

# 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>	Fedamore PWS
<b>Organisation</b>	Irish Water
<b>Scheme Code</b>	1900PUB1048
<b>County</b>	Limerick
<b>Site Visit Reference No.</b>	SV20851

Report Detail	
<b>Issue Date</b>	04/10/2021
<b>Prepared By</b>	Orla Harrington

Site Visit Detail			
<b>Date Of Inspection</b>	07/09/2021	<b>Announced</b>	Yes
<b>Time In</b>	11:00	<b>Time Out</b>	12:50
<b>EPA Inspector(s)</b>	Orla Harrington		
<b>Additional Visitors</b>			
<b>Company Personnel</b>	Irish Water: Tommy Roche and Paul O'Leary Limerick City and County Council: Diarmuid O'Dea		

## > Summary of Key Findings

1. The audit found that Irish Water have complied with the Regulation 9(2) Direction issued by the EPA on 12/10/2020. The Direction required Irish Water to install and commission a new borehole source at Fedamore Public Water Supply (PWS) by 30/06/2021. The new borehole was commissioned on 14/12/2020 and constructed in accordance with the requirements of the EPA Drinking Water Advice Note 14: Borehole Construction and Wellhead Protection.
2. In response to an elevated turbidity incident, the Fedamore PWS has been on a Boil Water Notice (BWN) since 02/12/2019. The scope of works identified by Irish Water to address the BWN status was the construction of a new borehole which is now installed and commissioned. However, Irish Water have not completed a programme of verification monitoring to demonstrate that the actions undertaken have been adequate to address the turbidity issues. Irish Water have advised that this verification data will be provided to the EPA in Q4 2021.
3. The supply was placed on the EPA's Remedial Action List in Quarter 1 2020 under the categories 'Poor turbidity removal' and 'EPA audit observations - Treatment and Management issues'. Irish Water advised that further work is needed to address an audit recommendation requiring Irish Water to provide a permanent solution for disposal of backwash water and 'run to waste' water from the site. This work is not on track to meet the RAL completion date of Q3 2021. Irish Water and Limerick City and County Council should progress this work without any further delay.

## > Introduction

The Fedamore Public Water Supply serves a population of 507 producing 172 m<sup>3</sup>/day (EDEN). The supply is served by a new borehole located within the treatment plant site. Treatment at the plant consists of cartridge filtration, followed by UV primary disinfection and chlorination with sodium hypochlorite providing secondary disinfection. Treated water is then pumped to a reservoir located approximately 480m south of the plant. The plant operates 24 hours/day.

The supply is currently on a BWN imposed on 2/12/2019 as adequate disinfection could not be guaranteed due to elevated turbidity. The supply was placed on the EPA's Remedial Action List in Quarter 1 2020 under the categories 'Poor turbidity removal' and 'EPA audit observations - Treatment and Management issues'. The audit was carried out to assess compliance with the Regulation 9(2) Direction issued by the EPA requiring Irish Water to install and commission a new borehole source at Fedamore PWS by 30/06/2021.

Irish Water was found on the day of the audit to have capped and sealed the old borehole source and to have installed and commissioned an alternative new borehole source to meet the needs of the supply. The new borehole was commissioned on 14/12/2020.

## > Supply Zones Areas Inspected

The audit consisted of an inspection of both the new and old borehole's and a review of the treatment plant processes. The site was previously audited on 02/12/2019.



## 1. Source Protection

1.1

	Answer
Is the abstraction source(s) adequately protected against contamination?	Yes
<b>Comment</b>	
<p>There are two boreholes (old and new) at Fedamore water treatment plant (WTP) and both were inspected on the day of the audit.</p> <p>The old borehole was drilled in the 1960's and is no longer in use. It has been capped and sealed, however Irish Water advised that full decommissioning is not envisaged at the moment.</p> <p>The raw water for the supply is now obtained from the new borehole (PW02) which was commissioned on 14/12/2020. This borehole is located in a secure kiosk bolted onto a concrete slab. The well head was inspected and the production borehole is well protected in accordance with EPA guidance. The borehole log was available for inspection and indicates that the groundwater is abstracted from the section between 30m and 48m below ground level, with an abstraction rate of approximately 7.5m<sup>3</sup>/hr. Limerick City and County Council stated that this abstraction rate is adequate to supply the treatment plant. Flow rates and water levels are recorded and linked to SCADA. Irish Water advised that the source water is subject to variation in levels of turbidity during high rain events. However there is no turbidity monitor on the borehole source, which would alert the plant operators to these changes in raw water conditions.</p> <p>The aquifer map in the report entitled '<i>Fedamore WTP Borehole Drilling (dated 7th July 2021)</i>' provided by Irish Water in support of the audit, shows that the plant is on a Regionally important Aquifer - Karstified and the area is classed as having a high vulnerability. The Zone of Contribution (ZOC) was delineated for this supply in the past when the old borehole was the supply source and it was confirmed in the previous audit report (dated 13/12/2019) that the landowner in the ZOC had been written to at the end of October 2019 in relation to his obligations under the Good Agricultural Practice for Protection of Waters Regulations. The ZOC should be delineated for the new groundwater source using all the site specific information e.g. abstraction rate, recharge rates, groundwater flow direction gathered in the drilling, testing and commissioning of PW02 at the plant, in order to identify the hazards and assessment of risks to be focused on the catchment of the supply.</p> <p>Raw water monitoring results for PW02 were reviewed in advance of the audit. It was noted that initial water quality samples collected in December 2020 show total coliforms (maximum 8.5 MPN/100ml) were detected in the borehole on all four sampling occasions. The borehole has UV primary disinfection prior to entering the supply. A further single raw water sample was taken on 15/03/2021. There was no microbial contamination evident in that sample. Irish Water advised that while the borehole was constructed in accordance with EPA Advice Note 14, the borehole intercepted deep karst caverns which have the potential to be prone to microbial contamination. Limerick City and County Council confirmed that the raw water at Fedamore will be sampled annually, typically in spring.</p>	

## > 2. Filtration

	Answer	
2.1	Are the filters designed and managed in accordance with EPA guidance?	Yes
<b>Comment</b>		
<p>There are multiple cartridge filters in series installed, each with a different pore size. This allows the coarser pore size to remove large particles in advance of the next stage with a smaller pore size and prevents the raw water from rapidly clogging the finer pores. Raw water is treated in four cartridge filters operating in series of 150um size firstly, followed by 100um, 50um and 50um, with all four in operation at the same time with a maximum filtration capacity of 15 m3/hr. Irish Water advised on the day of the audit that the pore size of the first three filters was to be reduced on 13/09/2021 to 50um, 20um and 10um. This reduction was on foot of elevated turbidity in the source linked to heavy rainfall between 21/08/2021 and 23/08/2021. Subsequent to the audit, Irish Water advised that the filters were replaced on the 13/09/2021 and that turbidity data will be reviewed for the next 2 months to confirm if the filters in place are sufficient.</p> <p>The cartridges are housed in kiosks close to the borehole. The control criteria on the filters is differential pressure, with plant shut-down at 8 bar pressure (it typically operates at 2 -3 bar) due to inadequate flow through the filters. This requires the cartridges to be replaced and this can occur weekly, depending on the raw water quality. There is capacity for 3 filters to handle the full flow while the fourth filter is undergoing a backwash.</p>		

	Answer	
2.2	Does monitoring indicate that the filters are operating effectively?	Yes
<b>Comment</b>		
<p>There is a turbidity monitor on the final cartridge filter. This monitor is not alarmed and on the day of the audit the turbidity read 0.433 NTU. There is a turbidity monitor on the final water which according to documentation received from Irish Water is alarmed as follows: (i) High: 0.8 NTU and (ii) Shutdown: 1 NTU. Limerick City and County Council confirmed on the day of the audit that there is a shut down facility based on a final water turbidity reading of 1 NTU, with a text alert being sent to the caretaker in the event of an alarm. However, it was noted on SCADA that the high high turbidity alarm was set at 1.6 NTU (TU001). Final water turbidity reading on the day of the audit was 0.394 NTU.</p>		



### 3. Disinfection

3.1

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

**Answer**

Yes

**Comment**

Primary disinfection is provided by UV treatment. Duty and standby UV units are in place with automatic switchover. The units are alarmed at 89% (low) and 85% (low low) UVT. Secondary disinfection is provided by dosing of sodium hypochlorite. There are duty and standby chlorine dosing pumps in place with automatic switchover. Dosing is flow proportional, a chlorine monitor is in place and a residual of 0.5mg/l is aimed for in water leaving the plant.

The following chlorine dosing alarms are set at the plant: (i) low: 0.3mg/l; (ii) low low: 0.2mg/l; (iii) high: 1.3mg/l; and (iv) high high: 1.5mg/l. The low and low low chlorine alarm setpoints are below the target of 0.5mg/l chlorine residual concentration in the final water. Therefore, they may not be set at an appropriate level to ensure treated water at the extremities of the distribution network contains at least 0.1mg/l to ensure adequate disinfection.

A cascade system is in place to alert staff in the event of an alarm being triggered. A plant shutdown will occur in the event of a low low or high high alarm being triggered.



## 4. Supply on the Remedial Action List

	Answer
4.1 Is further information needed to assess completion of the Remedial Action List upgrade?	Yes
<b>Comment</b>	
<p>Irish Water should provide RAL removal verification data to demonstrate actions undertaken have been adequate. This data includes 2 months of compliant daily turbidity monitoring at the plant and at least 3 consecutive compliant turbidity samples from the distribution network taken at different dates.</p> <p>When a backwash commences, the wash water is run to waste for an average of 1 - 2 hours and discharged to adjacent lands, before the filter is slowly returned to service. Irish Water advised that further work is required to address a previous audit recommendation requiring Irish Water to find a permanent solution for disposal of backwash water and run to waste from the site. Irish Water stated that they are investigating the feasibility of discharging this water to a nearby watercourse, approximately 250m away from the plant. Irish Water were advised that this work needs to be progressed without delay.</p> <p>These actions must be undertaken in order to complete RAL actions and facilitate RAL removal.</p>	



## 5. Site Specific Issues

	Answer
5.1 Do the works meet the requirements of the Direction?	Yes
<b>Comment</b>	
<p>The EPA issued a Direction on 12/10/20 under Regulation 9(2) of the <i>European Union (Drinking Water) Regulations 2014, as amended</i>, which required the installation and commissioning of a new borehole source in accordance with EPA Drinking Water Advice Note 14: Borehole Construction and Wellhead Protection at Fedamore PWS by 30/06/2021. The audit confirmed that the Direction requirements had been met and the new borehole was commissioned on 14/12/2020 in accordance with the EPA Drinking Water Advice Note 14: Borehole Construction and Wellhead Protection.</p>	

	Answer
5.2 Has the protozoal log treatment requirement been identified for the water treatment plant?	No
<b>Comment</b>	
<p>Irish Water stated that the Fedamore water supply source most likely has a 2 log protozoal treatment requirement. However the calculated log removal requirement has been conservatively rated at 3 log rounded up from 1.62 log as the sanitary survey has not yet been completed. The plant has UV primary disinfection and provides 3 log credits if operated in accordance with EPA guidance.</p>	

## Recommendations

Subject	Fedamore Audit Recommendations [07/09/21]	Due Date	22/10/2021
Action Text	<p><b>Recommendation(s)</b></p> <ol style="list-style-type: none"> <li>1. Irish Water should install a continuous turbidity monitor, along with alarms and shutdown setpoints, on the borehole source to alert plant operators of any changes to raw water quality.</li> <li>2. Irish Water should provide RAL removal verification data consisting of two months of daily turbidity monitoring of the final water and three consecutive compliant turbidity samples from the distribution network on different dates.</li> <li>3. Irish Water should provide a permanent solution for the disposal of backwash water and run to waste water from the plant, along with timeframe for completion.</li> <li>4. Irish Water should ensure that the old borehole will not act as a potential pathway for contamination.</li> <li>5. Irish Water should delineate the zone of contribution for the new borehole source and establish links with the Environment Section of Limerick City and County Council to ensure both parties are aware of the issues potentially impacting on the raw water abstraction point with the borehole zone of contribution. Irish Water should ensure all potentially polluting discharges into the catchment of the water source are identified and implement mitigation measures, where appropriate, to reduce potential impact of these discharges.</li> <li>6. Irish Water should review the turbidity shutdown setting on the final water to ensure that water is adequately disinfected at all time.</li> <li>7. Irish Water should ensure that the low and low low chlorine alarm set points are set at an appropriate level to ensure that the target residual chlorine concentration in the final water leaving the plant is met.</li> <li>8. Irish Water should confirm the protozoal treatment requirement for the source following completion of the sanitary survey.</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 Regina Campbell, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency on or before 01/11/21 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 DW20190208 in any future correspondence in relation to this Report.</p>		

