



# Drinking Water Audit Report

<b>County:</b>	Limerick	<b>Date of Audit:</b>	18/10/2018
<b>Plant(s) visited:</b>	Rathkeale Public Water Supply (1900PUB1046)	<b>Date of issue of Audit Report:</b>	05/11/2018
		<b>File Reference:</b>	DW2018/173
		<b>Auditors:</b>	Cliona Ní Eidhin
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014) as amended.</i></li> <li>• <i>The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i></li> <li>• The recommendations specified in the <i>EPA Drinking Water Report.</i></li> <li>• EPA Drinking Water Advice Notes No.s 1 to 15.</li> <li>• The recommendations in any previous audit reports.</li> </ul>		

## MAIN FINDINGS

- i. In response to the recent elevated turbidity incident and associated ‘Do not drink’ notice placed on the Rathkeale supply, Irish Water was found to have removed the source with elevated turbidity from production and drilled, tested and commissioned an alternative borehole source to restore a quality water supply to consumers.
- ii. An online turbidity monitor is in place but the Rathkeale supply should be prioritised under Irish Water’s Disinfection Programme for Co. Limerick for the installation of automatic shutdown based on turbidity when the permanent production borehole is commissioned.
- iii. The installation of a warning level turbidity alarm below 1 NTU and the enacting of a procedure for responding to any alarms raised are of critical importance until automatic shutdown is installed and should be completed as a matter of urgency.

## 1. INTRODUCTION

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 in response to the notification by Irish Water dated 05/10/2018 of the failure to meet the Turbidity parametric value (as specified in Table C of Part 1 of the Schedule of the Regulations) in the Rathkeale PWS and of the imposition on the same date of a ‘do not drink’ notice on the entire supply. The notice was lifted on the 18/10/2018 following the completion of this audit.

The Rathkeale Public Water Supply is served by two drinking water treatment plants located at Clouncagh and Kilcolman, Co. Limerick. Both plants supply water to the same reservoir almost five kilometres south of Rathkeale town for distribution to a population of 2,921. The Clouncagh treatment plant has UV disinfection and chlorination in place with an alarmed turbidity monitor linked to SCADA and was not visited as part of this audit. The audit focussed on the Kilcolman portion of the

supply which had been the subject of high turbidity in early October 2018, resulting in the imposition of a 'do not drink' notice on the entire supply. Prior to the high turbidity event, the Kilcolman treatment plant had been sourcing raw water from two groundwater sources, Keating's well and Kilcolman spring. Since the high turbidity event, Kilcolman spring has been removed from use and an alternative borehole to an artesian source commissioned. The Kilcolman treatment plant produces approximately 84 m<sup>3</sup>/hour. Treatment comprises chlorine dosing only.

The opening meeting commenced at 14:15 at the Kilcolman Drinking Water Treatment Plant. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audits observations and recommendations are listed in Section 2 and 4 of this report. Photographs taken by Cliona Ní Eidhin during the audit are attached to this report and are referred to in the text where relevant.

The following were in attendance during the audit.

<p><b>Representing Irish Water:</b>  Deirdre O'Loughlin – Drinking Water Compliance Specialist  Ian O'Mahony – Operations Lead</p> <p><b>Representing Limerick County Council</b>  Sinéad Kennedy – A/Senior Executive Engineer  Aiden Nicoll – Caretaker  Peter McEvoy – Assistant Scientist  Claire Linehan – Executive Scientist</p> <p><b>Representing the Health Service Executive</b>  Andrew Curtin - Principal Environmental Health Officer</p> <p><b>Representing the Environmental Protection Agency:</b>  Cliona Ní Eidhin – Inspector</p>
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## 2. AUDIT OBSERVATIONS

*The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.*

<p><b>1.</b></p>	<p><b>Source Protection</b></p> <p><u>General</u></p> <p>a. The zone of contribution (ZOC) has been delineated for this supply. The groundwater vulnerability map was examined during the audit and areas of extreme vulnerability on high ground to the south of the sources were highlighted. The importance of vigilance in these areas in terms of activities potentially impacting on the aquifer was emphasised by the auditor.</p> <p>b. Landuse within the mapped ZOC includes improved pasture and rough grazing and is used for cattle. Limerick County Council advised that landowners within the zone of contribution were last written to in relation to their obligations under the Good Agricultural Practice Regulations in 2008. It was not known whether septic tank inspections had been undertaken within the ZOC.</p> <p>c. Irish Water advised that the Cryptosporidium risk score for the supply was 115 indicative</p>
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	<p>of high risk. A revised assessment will be completed for the supply once the permanent replacement borehole has been commissioned.</p> <p>d. Inspection hatches to the raw water sump at Kilcolman were observed to not have a rubber seal in place.</p> <p>At the time of the audit, the supply was being fed by two sources; Keating’s Well and a new 6” trial borehole. Observations are as follows:</p> <p><u>Keating’s well (borehole)</u></p> <p>e. Keating’s well is a 20-30 year old borehole located within a securely fenced off compound surrounded by agricultural pasture. Irish Water advised that the decommissioning of this borehole is envisaged in the long term.</p> <p>f. The wellhead was inspected as part of the audit. The wellhead is housed within a block built chamber with a removable inspection hatch. Borehole logs were not available but the borehole is known by Limerick County Council to be 40m in depth. The borehole appeared to have only a single steel casing and had a removable stainless steel cap which did not adequately seal the wellhead. The auditor recorded the wellhead and borehole casing as needing significant upgrading (see Photograph No. 1).</p> <p><u>New 6” Trial Borehole</u></p> <p>g. Irish Water informed the auditor that the new trial borehole had been drilled on the site of the Kilcolman treatment plant to investigate the viability of this alternative to Kilcolman spring. This borehole reached water, underlying an impermeable layer in the overburden, which is artesian in nature. This trial borehole source was subjected to sampling and was subsequently commissioned to serve the supply (see Photograph No. 2a).</p> <p>h. Irish Water advised that the trial borehole is an interim solution and that the permanent production well would be bored in the weeks following the audit some 15m from the trial bore (see Photograph No. 2b). Once commissioned, the fate of the trial borehole will be determined by Irish Water.</p> <p><u>Kilcolman Spring</u></p> <p>Kilcolman spring is no longer in use but was viewed and discussed as part of the audit.</p> <p>i. The open spring (see Photograph No. 3) is located within the Kilcolman treatment plant site. Irish Water told the auditor that the spring had been used intermittently during the week commencing October 1st but that it had been taken out of commission as a source for this supply on Friday October 5th with the occurrence of sustained high turbidity.</p> <p>j. Irish Water advised that it is not envisaged to use the Kilcolman spring in the future as a source for this supply adding that it may be in-filled to decommission it, pending hydrogeological advice.</p>
<p><b>2.</b></p>	<p><b>Monitoring and Sampling Programme for raw water</b></p> <p>a. Raw water results for the new trial borehole were reviewed during the audit and no results of concern were noted for any parameter. Irish Water reported that results had been stable across sampling to-date.</p>
<p><b>3.</b></p>	<p><b>Disinfection</b></p> <p>Treatment at the Kilcolman drinking water treatment plant provides disinfection with sodium hypochlorite. The disinfection system was inspected against the disinfection criteria set out in EPA Advice Note No. 3.</p> <p>a. Duty and standby dosing pumps are in place but there is no routine scheduled switching over to maintain the pumps’ prime.</p> <p>b. A chlorine monitor is in place but it monitors chlorine residual prior to the achievement of the required disinfection contact time. There is no further chlorine monitor in place after the reservoir.</p> <p>c. Chlorine residuals are checked at seven locations in the network by the Caretaker and</p>

	recorded in the plant diary. Most of the sampling points are not consumer taps.
<b>4.</b>	<p><b>Monitoring and Sampling Programme for treated water</b></p> <p>a. A continuous turbidity monitor is in place on the combined water from both sources and has been relaying to SCADA since 2016. Spot turbidity readings are routinely taken and recorded by the caretaker in the plant diary.</p> <p>b. Irish Water confirmed that an alarm based on turbidity has been configured since the recent high turbidity event. Prior to this no alarm was in place. Irish Water advised that the new alarm set point is 1 NTU which, the auditor noted, does not allow for a response to prevent water above 1 NTU entering the network. A lower warning level is required.</p> <p>c. Irish Water confirmed that there is currently no shut-down facility based on turbidity but that this can be installed as part of the imminent (in approximately four weeks) Disinfection Programme upgrades. Irish Water confirmed that Rathkeale would be prioritised within this county-wide programme of work.</p> <p>d. Three months of graphed turbidity results from the SCADA were reviewed during the audit. It was observed by the auditor that occasional turbidity spikes in excess of 1 NTU were detected from September 23<sup>rd</sup> onwards and that water with sporadic elevated turbidity would have entered the supply from that date without triggering a response procedure.</p>
<b>5.</b>	<p><b>Treated Water Storage and Distribution Network</b></p> <p>a. The reservoir to which treated water is pumped from the Kilcolman drinking water treatment plant was not accessible for inspection on the day of the audit.</p>
<b>6.</b>	<p><b>Fluoridation</b></p> <p>a. Fluoridation plant is in place at the Kilcolman treatment plant but was not in use on the day of the audit. The chemical storage and dosing equipment were not inspected during the audit.</p>
<b>7.</b>	<p><b>Exceedances of the Parametric Values</b></p> <p>a. Elevated turbidity was first noted by the Caretaker on Monday 01/10/2018. In subsequent days, levels of 3.05 NTU, 1.38 NTU were recorded. On Friday 05/10/2018 levels of 4.19 NTU were recorded in Rathkeale and of 12.2 NTU at Kilcolman East were recorded and, following the advice of the HSE, a 'Do not drink' notice imposed on 05/10/18.</p>
<b>8.</b>	<p><b>Chemical storage and bunds</b></p> <p>a. The sodium hypochlorite day tank was not adequately banded.</p>
<b>9.</b>	<p><b>Management and Control</b></p> <p>a. Irish Water advised the auditor calibration and maintenance is initiated and undertaken by an external contractor and that this arrangement may change in the future.</p> <p>b. The auditor recorded that the portable HACH chlorimeter was overdue calibration.</p> <p>c. Good record keeping in the treatment plant diary of key operational metrics was noted by the auditor.</p>

### 3. AUDITORS COMMENTS

While work is ongoing to put in place a permanent production borehole at the Kilcolman drinking water treatment plant, a great deal of work has been completed by Irish Water, Limerick County Council and their contractors since the detection of high turbidity in the open spring source in early October 2018. The new trial borehole is sourcing water of apparent high quality. The drilling of the final production borehole in accordance with EPA Advice Note No. 14 Borehole Construction and Wellhead Protection and to Irish Water's G1 classification specifications to abstract from the artesian source will provide a more secure source than the former open spring source and should be expedited as quickly as possible. Oversight and management of critical control parameters in the intervening period is critical. Until automatic shutdown based on turbidity is put in place under Irish Water's disinfection programme for Co. Limerick, the establishment of an appropriate lower warning level turbidity alarm and enactment of an associated response procedure is of critical importance to protect consumers from any water with high turbidity entering the supply.

### 4. RECOMMENDATIONS

#### Source Protection

1. Irish Water should liaise with Limerick City and County Council requesting that landowners are written to in relation to the requirements of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014)*.
2. Irish Water should ensure that the *Cryptosporidium* risk assessment for the Rathkeale supply is revised and inputted on the EPA's EDEN portal once the current works at the Kilcolman Drinking Water Treatment Plant have been completed.
3. Irish Water should complete an upgrade of Keating's Well borehole in accordance with EPA Advice Note No. 14: Borehole Construction and Wellhead Protection in so far as is technically feasible.
4. Irish Water should undertake any decommissioning of Kilcolman spring in accordance with the advice of a hydrogeologist and ensure that materials used during any backfilling to achieve decommissioning do not compromise the integrity of the aquifer. If the new 6" trial borehole is to be decommissioned, this should be undertaken in accordance with guidance such as SEPA's Good Practice for Decommissioning redundant Boreholes and Wells. (available at <https://www.sepa.org.uk/media/34618/decommissioning-redundant-boreholes-and-wells.pdf>)

#### Disinfection

5. Irish Water should install a continuous chlorine residual monitor on the final water after achievement of the required disinfection contact time, in accordance with EPA Advice Note No. 3: E.coli in Drinking Water. The monitor should be alarmed with a dial out to ensure that an immediate response can be made in the event of inadequate levels of chlorine in the final water.
6. Irish Water should install automatic changeover of chlorine dosing pumps.
7. Irish Water should ensure that consumer taps are included in the routine network-based checks on chlorine residuals.
8. Irish Water should ensure that the chlorine monitor and/or handheld chlorine analyser is regularly maintained and calibrated in accordance with the manufacturer's instructions.

### Raw and Treated Water Storage

9. Irish Water should ensure that the inspection hatches accessing the raw water mixing sump at Kilcolman are fully sealed when shut.
10. Irish Water should submit photographs of the service reservoir, including the inspection hatches (open) and the underside of vents. It should be ensured by Irish Water that the reservoir is secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism. If work is required to ensure this, a timeframe for completion should be provided.

### Chemical Storage and Bunds

11. Irish Water should ensure that the sodium hypochlorite day tank is stored within a bund capable of containing at least 110% of its volume.

### Management and Control

12. Irish Water should ensure that, in addition to the existing 1 NTU turbidity alarm, a lower warning level turbidity alarm is set up as a matter of urgency along with a procedure for responding to any alarms raised.
13. Irish Water should install an automatic shutdown facility on the Rathkeale Public Water supply based on turbidity when the permanent production borehole is commissioned.
14. Irish Water should collate and retain all drilling and borehole logs following commissioning of the final production borehole at Kilcolman (and of the 6" trial borehole, should this be retained).
15. Irish Water should ensure that a procedure is developed for the routine checking by the Caretaker of calibration requirements of all monitors and dosing equipment, and for initiating calibration before it is overdue.

### FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

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 within one month of the date of this audit report 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 timeframe 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 the File Reference **DW2018/173** in any future correspondence in relation to this Report.

**Report prepared by:**

*CNE*

**Date:** 05/11/2018

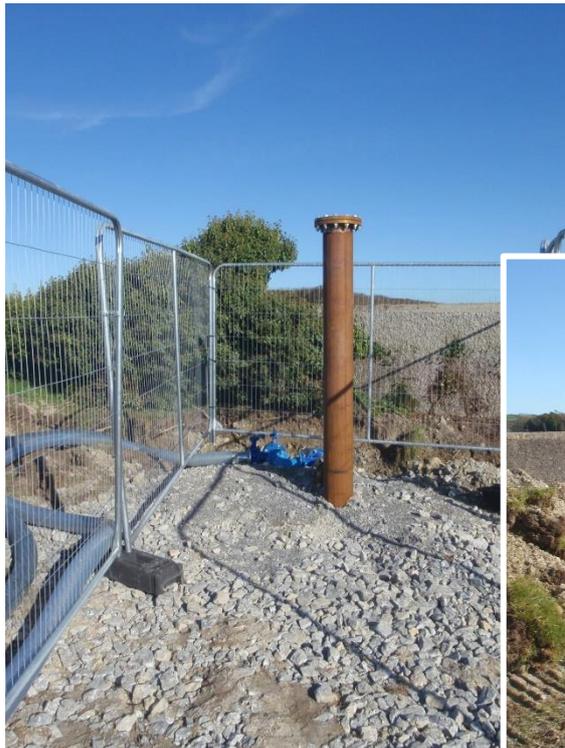
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Inspector

**Photograph No. 1:** Keating's Well (with cap removed for inspection). Inadequately sealed well head and apparent insufficient casing of the borehole shaft.



**Photograph No. 2a:** New trial borehole. To be decommissioned when final production borehole is drilled.



**Photograph No. 2b:** Proposed location of the final production borehole at Kilcolman.



**Photograph No. 3:** Kilcolman Spring (not in use and to be decommissioned).

