



Drinking Water Audit Report

County:	Laois	Date of Audit:	23 July 2019
Plant(s) visited:	Abbeyleix 1 Water Treatment Plant	Date of issue of Audit Report:	01 August 2019
		File Reference:	DW2013/13
		Auditors:	Derval Devaney Daryl Gunning
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended.</i> • <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> • The recommendations specified in the <i>EPA Drinking Water Report.</i> • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in the previous EPA audit report issued 27th March 2013. 		

MAIN FINDINGS

- i. **Abbeyleix 1 Public Water Supply is supplied by two spring sources and its only treatment process; disinfection by chlorination, does not provide a barrier to *Cryptosporidium* entering the water supply. For this reason, the EPA has added Abbeyleix 1 PWS to its Remedial Action List.**
- ii. **Many source protection measures recommended to be put in place during the previous EPA audit in March 2013 were not actioned and complete.**
- iii. **The treated water chlorine sampling point was not located at an appropriate point where adequate disinfection can be verified.**

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 to assess the performance of Irish Water in providing clean and wholesome drinking water.

Abbeyleix 1 PWS serves 1,000 m³ of water per day to a population of approximately 1,836 people in the northern portion of Abbeyleix town. Abbeyleix 1 PWS comprises of two spring source waters; ‘Aughfeerish Spring’ and ‘Maxwell Spring / Ballyglisheen Well’. Treatment at the plant consists of disinfection using liquid sodium hypochlorite. Treated water is delivered to a reservoir which has 36 hours storage.

The opening meeting commenced at 2.30 pm at the Abbeyleix 1 WTP. 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 Daryl Gunning 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.

Representing Irish Water:

Andrew Boylan, Compliance Specialist
 Aodhnait Ní Chathasaigh, Compliance Analyst
 John Gavin, SLA Lead
 Malcolm Doak, Company Hydrogeologist

Representing Laois County Council:

Desmond Byrne, Water Quality
 Tom O'Carroll, Senior Executive Engineer
 Francis Hegarty, Caretaker
 Larry Gittens, Supervisor
 Conor Ryle, Engineer

Representing WS Atkins Ireland Limited:

Bruno Teillard, Hydrogeologist

Representing the Environmental Protection Agency:

Derval Devaney, Inspector
 Daryl Gunning, Inspector

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.

1.	<p>Source Protection and Raw Water Monitoring</p> <ul style="list-style-type: none"> a. Abbeyleix 1 PWS is supplied by two source waters that are blended and treated. The sources are estimated to be 50 years old and there are no records of their design or construction. b. The Maxwell spring source (also known as Ballyglisheen source) is located in a below-ground concrete chamber approximately 1 m in diameter and 1.8 m deep. A lockable inspection hatch was installed at the Maxwell source however, when opened, rust was evident around the base of the hatch opening and there was a slug and snail on the internal wall of the chamber (see photos 1 & 2). The inspection hatch was not sealed to prevent water or animal ingress. This was raised in the previous EPA audit on 27th March 2013. c. There was an old water pump exiting the source chamber which was not made secure to prevent ingress of contamination or animals into the supply (see Photo 3). This was raised during the previous EPA audit in 2013. d. The Maxwell spring is on a site which has two additional sources that serves two private water supplies; Ballyglisheen Group Water Scheme and Ballypickas Group Water Scheme. e. The Aughfeerish Spring source emerges from the ground over a large surface area that is housed within a metal shed. A handrail and lighting were installed since the EPA audit in 2013. The overflow pipe did not contain a mesh to prevent vermin and other animals entering the source (see Photo 4). This was raised in a previous EPA audit. f. Water from Maxwell Spring (350 m³/d) is gravity fed by pipe to the Aughfeerish Water Treatment Plant where it is blended with the Aughfeerish Spring source. There are duty and standby pumps operating approximately 16 hours / day abstracting 1,000 m³/d of the blended sources for treatment. g. Both Aughfeerish Spring and Maxwell Spring are located within the 'Abbeyleix Gravels Group' gravel aquifer (gravels derived from limestone), with a reported high vulnerability rating. h. The land use surrounding both sources is predominately agriculture (beef and dairy) and it was confirmed that farmers in the vicinity of the sources were written to in 2014 in relation to the requirements of the <i>European Union (Good Agricultural Practice for the Protection of Waters)</i>
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	<p><i>Regulations 2014 (SI No.31 of 2014).</i></p> <ul style="list-style-type: none"> i. Each source is monitored annually for ammonium, colour, conductivity, <i>E. coli</i>, hardness, iron, manganese, nitrate, pH, total coliforms and turbidity. Results from each source from 2014 – 2018, presented during the audit, illustrate both raw water sources have elevated concentrations of nitrate ranging from 18.2 mg/l to 29 mg/l. j. <i>Cryptosporidium</i> and UVT was monitored in the raw water monthly during 2014 but this data was not available during the audit. Laois County Council confirmed however that all results were clear of the parasite. The <i>Crypto. rig</i> and UVT monitor at the plant were recently serviced and Irish Water has consulted with the HSE and agreed to re-commence monthly <i>Crypto.</i> monitoring within the next week. The UVT raw water monitor was in operation during the audit however as the plant was not in production during the time the monitor was being inspected it was not possible to record the UVT reading. k. Irish Water proposes to commence raw water continuous monitoring for pH, conductivity, turbidity and UVT as part of Irish Water’s advanced investigation works. l. There is a sand and gravel quarry to the north-west of Aughfeerish water treatment plant. Atkins Hydrogeological Report (Version 3), completed on behalf of Irish Water and submitted to the EPA on 19th December 2018, stated that the quarry ceased operation in 2010 as it was interfering with water levels within the zone of contribution. It was confirmed during the audit that the quarry is back in operation. Laois County Council stated that it was liaising with the quarry company to ensure its activities did not affect water quantity or quality being supplied to Abbeyleix and its environs. m. There is a flow monitor on the blended raw water source which is connected to SCADA.
<p>2.</p>	<p>Disinfection</p> <ul style="list-style-type: none"> a. Sodium Hypochlorite 10 / 12 % Low Bromate and Calgon solution is used to disinfect the water at the Aughfeerish WTP. b. There are duty and standby pumps that automatically alternate every 24 hours. The chlorine is dosed in proportion to flow into the rising main prior to the storage reservoir. There is a flow meter on the distribution pipe from the WTP to the reservoir which is linked to SCADA. c. Contact time (Ct) calculations were provided during the audit. A minimum free chlorine of 0.3 mg/l is required and provides a total effective Ct of 45.28 mg.min/l. The pipe leading to the reservoir and the reservoir itself are needed to ensure adequate Ct. d. The online chlorine monitor was last calibrated on 28th February 2019 and the next calibration is due on 28th February 2020. The chlorine monitor takes a final water sample from the rising main at the WTP prior to the achievement of Ct. This matter was raised in the EPA’s previous audit in 2013. There is no chlorine monitor on the outlet of the reservoir. e. During the audit the chlorine monitor read 0.54 mg/l. The target chlorine residual leaving the plant is 0.6 mg/l – 0.7 mg/l. f. There are low and high-level chlorine alarms, but the alarm settings were not available during the audit. Alarm settings provided after the audit include a high-high chlorine alarm at 1 mg/l and high alarm at 0.9 mg/l and a low-low alarm set at 0.2 mg/l and a low alarm at 0.3 mg/l. The low-low alarm is below the 0.3 mg/l chlorine residual requirement post contact time for adequate disinfection to be achieved. g. The caretaker takes daily chlorine residual readings of the final water leaving the WTP with a handheld monitor, but these are not being recorded in his diary. h. Turbidity, chlorine and flow alarms are automatically sent by text to the caretaker. There is a cascade system in place whereby additional people are alerted if the alarm is not responded to.
<p>3.</p>	<p>Treated Water Storage and Distribution Network</p> <ul style="list-style-type: none"> a. Treated water is pumped 2.4 km from the treatment plant to a covered and vented storage reservoir (approximately 15 years old). The reservoir has new lockable inspection hatches which were opened for inspection during the audit. The reservoir was cleaned in 2018. The reservoir has capacity to store 1800 m³ of water giving 36 hours storage. b. The reservoir vents were not fully protected against the ingress of animals (see Photo 5). This was raised in the EPA’s previous audit in 2013.
<p>4.</p>	<p>Monitoring and Sampling Programme for treated water</p> <ul style="list-style-type: none"> a. The online turbidity monitor on the final water read 0.03 NTU on the day of the audit and it is linked to SCADA. Its high alarm is set at 0.9 NTU and alarms and shuts down the plant at a high-high alarm setting of 1 NTU. The caretaker records readings daily from the turbidity monitor into his diary. A review of the daily readings showed low turbidity was characteristic of the final water

	<p>quality.</p> <p>b. The calibration sticker on the turbidity meter stated it was calibrated on 28th February 2019 and the next service is due on 28th February 2020. However, the calibration certificate provided during the audit had conflicting dates of calibration (i.e. date of calibration was 6th April 2019 but signed off on 6th April 2018).</p>
5.	<p>Exceedances of the Parametric Values</p> <p>a. Results of compliance monitoring taken in the water supply’s network from 4th February 2008 – 11th December 2018 were provided during the audit. Elevated colony count @22° above the usual 0 cfu / 100ml result was evident in some samples (e.g. 127 cfu / 100ml on 14/12/10 and 900 cfu / 100ml on 07/03/11) and a clostridium perfringens failure was evident on one occasion (1 no./100mls on 07/03/11). Nitrates, while below the parametric limit of 50 mg/l, were continually elevated with the maximum concentration of 43 mg/l obtained on 29/07/09. On the occasions that Total Phosphorus (as P) was monitored it was elevated (concentrations ranged from 41 ug/l on 02/02/09 to 45.81 ug/l on 08/05/13 to 69 ug/l on 29/07/09). These results would indicate that the spring sources’ water quality is vulnerable and can be negatively influenced by activities such as agricultural land-use (over fertilisation of grassland, storage of manure heaps, unlined slurry storage facilities, etc.) and waste water / septic tank discharges in the catchment.</p>
6.	<p>Chemical storage and bunds</p> <p>a. Deliveries of disinfectant are by way of drums which upon inspection did not have an expiry date or PCS number (See Photo 6). The Local Authority stated that this was previously raised with the manufacturer, Brenntag, who advised it was not possible to place an expiry date on the product.</p>
7.	<p>Management and Control</p> <p>a. WS Atkins Ireland Limited were commissioned by Irish Water during 2018 to provide a hydrogeological assessment and technical advice in relation to the source waters of the Abbeyleix 1 PWS. The objective of the project was to improve the resilience of Abbeyleix 1 PWS as it was listed as a priority supply on Irish Water’s Emergency Drought Works Hydrogeological Programme.</p> <p>b. Irish Water requested that Atkins apply the methodology outlined in their document entitled “Water Supply Borehole Classification G1 – G5”, dated 20th December 2017, prepared by David Ball (Hydrogeologist) to the Abbeyleix sources in order to define a ‘G’ rating for each source. Atkins draft report classifies the springs as G5 boreholes as they are “<i>effectively a ‘hole-in-the-ground’, analogous to the springs.</i>” The draft report states, “<i>whilst the sand and gravel through which the groundwater flows clearly provides protection and acts as a slow sand filtration system in removing microbial contamination, the sources are still vulnerable to activities within their catchments.</i>” The auditors found evidence of such vulnerability within the spring’s zone of contribution from the raw and final water monitoring data that was provided during the audit .</p> <p>c. Irish Water stated that the G5 rating was intended only to support its drought works, where the chief output was to record findings following the Hydrogeological Audit conducted on 19th October 2018. Irish Water stated that a categorisation for spring sources has not yet been devised and this action will fall under the DWSP programme where a pilot will commence late 2019.</p> <p>d. Irish Water confirmed during the audit that the S2 classification, which was applied back in 2015 when all springs were assigned a surface water categorisation score, still applies to Abbeyleix 1 PWS. This classification requires 4-log credits to be in place to ensure sufficient protozoal treatment and compliance. Currently there is a 4-log deficit at the WTP.</p>

3. AUDITORS COMMENTS

The audit found that improvements have been made to the management and control of the Abbeyleix 1 water treatment plant since the EPA’s previous audit in 2013, such as the installation of online monitors, alarms and SCADA system. However, other important recommendations relating to the safety and security of the water supply remain outstanding, despite the EPA being told these recommendations were complete, e.g. securing of vents and overflow pipe to prevent potential contamination.

The spring sources that supply the Abbeyleix 1 PWS are treated via chlorination only. As chlorination does not provide an adequate form of treatment or barrier to the parasite *Cryptosporidium*, this supply has been placed on the EPA’s Remedial Action List. Irish Water needs to provide an action programme and timeframe for the installation of appropriate treatment or remove the risk of *Cryptosporidium* entering the supply entirely.

4. RECOMMENDATIONS

Management and Control

1. Irish Water should undertake *Cryptosporidium* monitoring of Abbeyleix 1 Public Water Supply in accordance with its “*Rationale for Determining the Frequency of Cryptosporidium Monitoring in Public Water Supplies*”. If any oocysts are detected, Irish Water should consult with the HSE immediately regarding potential risk to public health and notify the EPA.
2. Irish Water should provide, no later than 30th September 2019, an action programme and timeframe for the installation of appropriate treatment or remove the risk of *Cryptosporidium* entering Abbeyleix 1 Public Water Supply.
3. Irish Water should clarify the calibration date for the turbidity monitor and ensure that calibration records and labels on equipment are accurate and up-to-date.

Source Protection

4. Irish Water should review the source protection and catchment risk within the zones of contribution for each spring source and implement appropriate measures to reduce the risk of contamination of the source waters.
5. Irish Water should take action to secure the abstraction areas around the spring sources to include:
 - a. the removal of the abandoned pump and fittings from the Maxwell spring source and sealing of all resultant openings against surface water ingress;
 - b. securing the housing around each source and its inspection chambers against the entry of animals and vermin;
 - c. regularly maintaining the source water’s inspection chambers and ensure they are free from rust;
 - d. investigation of the contamination risk the two casings located next to the Aughfeerish spring source may present to the source and the elimination of any risk posed.
6. Irish Water should provide a timeframe for the commencement of raw water continuous monitoring for pH, conductivity, turbidity, UVT.
7. Irish Water should submit details on how the protozoal compliance log deficit of 4 is to be addressed at Abbeyleix 1 water treatment plant.

Disinfection

8. Irish Water should ensure that:
 - a. the final water chlorine sampling point is located at an appropriate point where contact time has been achieved;
 - b. daily final water chlorine residual readings taken from the handheld automatic chlorine analyser are entered into a daily log book at the plant. Irish Water should investigate any discrepancy between readings on the chlorine monitor and the results of the manual residual chlorine test carried out daily at the plant;
 - c. alarm settings on the chlorine monitor are revised to ensure contact time for adequate disinfection is achieved at all times;
 - d. the label on each drum of chlorine disinfectant contains the date of authorisation, date of expiry and PCS number in accordance with Article 22 and 69 of the Biocidal Products Regulation (EU) No 528/2012.

Treated Water Storage

9. Irish Water should ensure that all reservoir vents are adequately secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

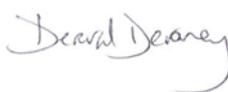
During the audit Irish Water representatives were advised of the audit findings and that action must be taken as a priority by Irish Water to address the issues raised. This report has been reviewed and approved by Aoife Loughnane, Drinking Water Team Leader.

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 Number in any future correspondence in relation to this Report.

Report prepared by:



Date:

Derval Devaney

Inspector

01 August 2019



Photo 1 A slug (circled in photo) was evident on the internal wall of the Maxwell spring source water's chamber and rust was evident on its inspection hatch



Photo 2 A snail and rust evident on the inspection hatch of the Maxwell spring source



Photo 3 Old water pump exiting the Maxwell source chamber which was not sealed to prevent ingress of contamination into the chamber



Photo 4 Overflow pipe exiting the Aughfeerish spring housing which is not secured to prevent vermin or animal entry



Photo 5 Inappropriate vent on treated water reservoir which does not prevent entry of small animals or vermin



Photo 6 Drum of disinfectant labelled inappropriately