



Drinking Water Audit Report

County:	Laois	Date of Audit:	23 rd June 2016
Plant(s) visited:	Fermoyle water treatment plant. Durrow No. 2 PWS (1600PUB1103) and Ballinakill No. 2 PWS (1600PUB1101)	Date of issue of Audit Report:	1 st July 2016
		File Reference:	DW2016/109
		Auditors:	Aoife Loughnane Pauline Gillard
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • The <i>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. 		

MAIN FINDINGS

- The nitrate concentration trend in raw water abstracted at the Fermoyle borehole increased significantly in Q1 2016 resulting in exceedances of the 50 mg/l parametric value in treated water and the issuing of a Drinking Water Restriction Notice for infants under 6 months of age in the Ballinakill 2 PWS and Durrow 2 PWS on 17th June 2016.
- Landspredding within the zone of contribution is suspected to have contributed to the elevated nitrate levels in the groundwater arriving at the borehole. Greater source protection measures are required and Irish Water and Laois County Council need to take action to minimise the risk of contamination of the drinking water source.
- Irish Water has installed additional nitrate removal treatment capacity at Fermoyle water treatment plant, and is investigating a permanent solution of installing a new borehole in the deeper sand and gravel aquifer.
- The Drinking Water Restriction Notice for infants remains in place until Irish Water can demonstrate to the satisfaction of the EPA and the HSE that the remedial actions have been effective in restoring the public water supplies to compliance with the nitrate parametric value.

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* 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 of the failure to meet the nitrate parametric value and the issuing of a Drinking Water Restriction Notice for infants under 6 months of age in the Ballinakill 2 PWS and Durrow 2 PWS on 17th June 2016.

The Fermoyle borehole is the raw water source for Durrow No. 2 and Ballinakill No. 2 public water supplies. There are two boreholes (A & B) at Fermoyle however only borehole A has been in operation since May 2014. Fermoyle water treatment plant provides nitrate removal and disinfection by chlorination before the water enters into the distribution network. The plant currently produces 18

m³/hr and has the pumping capacity to increase 25 m³/hr. The population served by the Fermoyale source is 1,144; comprising 744 on the Durrow No. 2 supply and 400 on the Ballinakill No. 2 supply.

The opening meeting commenced at 10.30 am at Fermoyale 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. Photographs taken by Aoife Loughnane during the audit are attached to this report and are referred to in the text where relevant.

The audits observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water:

Aoife Lambe, Drinking Water Compliance Analyst, Irish Water

John Gavin, SLA Lead, Operations & Maintenance, Irish Water

Michael O’Hora, Senior Engineer, Laois County Council

Stan Cullen, Acting Senior Executive Engineer, Laois County Council

Larry Gittens, Supervisor, Laois County Council

David Phelan, Caretaker, Laois County Council

Representing the EPA:

Aoife Loughnane, Inspector

Pauline Gillard, 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>Exceedances of the Parametric Values</p> <ol style="list-style-type: none"> Irish Water notified the EPA of an exceedance of the 50 mg/l nitrate parametric value in the treated water at Fermoyale WTP on 18th April 2016. Follow up investigative sampling has recorded further nitrate exceedances as follows: <ul style="list-style-type: none"> 11th May 2016: 130 mg/l in raw water, 54 mg/l in treated water at plant, 53 mg/l in the network; 17th May 2016: 146 mg/l in raw water, 59 mg/l in treated water at plant, 59 mg/l, 53 mg/l, 61 mg/l, 53 mg/l and 63 mg/l in network; 26th May 2016: 52 mg/l in network; 1st June 2016: 143 mg/l in raw water, 61 mg/l, 53 mg/l and 52 mg/l in network; 9th June 2016: 70 mg/l and 72 mg/l in network. 15th June 2016: 111 mg/l in raw water, no exceedances in treated water. Following the advice of the HSE on 17th June 2016, Irish Water issued a Drinking Water Restriction Notice for infants under 6 months of age in the Ballinakill 2 PWS and Durrow 2 PWS due to nitrates exeedances.
2.	<p>Source Protection</p> <ol style="list-style-type: none"> The Fermoyale boreholes were installed in the 1980s. No borehole logs are available. The boreholes are not capped (see photos 1 & 2) but both chambers are covered and locked. According to the EPA Groundwater Monitoring Programme Site Information Report (August 2011), both boreholes are 26.7 m deep and are situated in Dinantian Lower Impure Limestones. The aquifer is a regionally important karstified bedrock dominated by diffuse flow (Rkd). The zone of contribution (ZOC) delineated for this raw water source is 0.64 km² located mainly to the south of the boreholes. Groundwater vulnerability within the ZOC ranges from high to extreme.

	<ul style="list-style-type: none"> c. Land use within the ZOC is high intensity agriculture and Laois County Council (LCC) has identified 5 different landowners. There is a piggery located 500m south of the boreholes which is within the ZOC. LCC met with the operator of the piggery on 23rd May 2016 and confirmed to the EPA that the details of the dates, volumes and destination of slurry exported from the facility appear to support the view that landspreading within the ZOC contributed to elevated nitrate levels in groundwater arriving at the borehole. d. The requirements of Article 17 of the <i>European Union (Good Agricultural Practice for Protection of Waters) Regulations 2014</i> were discussed during the audit, including prior investigations by the local authority to specify an alternative landspreading set-back distance or exclusion area to protect the drinking water source. LCC has not carried out a prior investigation, but is instead engaging with farmers to explain the impacts of their operations on groundwater quality and the drinking water supply, and to identify opportunities to improve nutrient management for their own benefit and to protect the drinking water source. e. LCC has identified and inspected 6 septic tanks in the ZOC; 3 failed the inspection and required follow up remedial actions. LCC is due to follow up on one repeat inspection (the septic tank located closest to the boreholes) in the coming weeks. f. LCC carried out farm inspections in the ZOC in 2012, and plans to do another round of inspections within the next 4 to 6 weeks. g. The Fermoy source is included in Irish Water's Raw Water Monitoring Programme to determine the appropriate level of treatment to ensure the safety and security of the water supply. A UVT monitor and <i>Cryptosporidium</i> sampler has been installed at the plant and sampling commenced in Q1 2016. There has been no detection of <i>Cryptosporidium</i> oocysts to date.
3.	<p>Nitrate Removal</p> <ul style="list-style-type: none"> a. LCC confirmed there is a history of elevated nitrate levels in the groundwater at Fermoy, generally in the region of 37 mg/l. b. Nitrate exceedances in the drinking water supply first occurred in April 2014, when 51 mg/l and 55 mg/l was measured in the network. This coincided with an increased raw water abstraction rate (increased aquifer drawdown) in order to supply Abbeylax PWS, with a view to decommissioning the Abbeylax No. 2 (5 wells) supply. c. As a remedial action, Irish Water reduced the abstraction rate (by re-commencing the Abbeylax No. 2 supply) and installed a temporary nitrate removal plant (ion exchange units) at Fermoy in July 2014. The nitrate removal units had the capacity to treat 25 m³/hr at a maximum raw water concentration of 67 mg/l nitrate. These actions returned the nitrate levels to < 50 mg/l in the treated water and restored compliance with the Drinking Water Regulations. d. A further nitrate exceedance was notified to the EPA on 18th April 2016 when 63 mg/l was measured in the treated water at the plant. The drinking water supply has remained non-compliant for nitrates since that time due to significantly elevated nitrate levels in the raw water. e. On 16th June 2016, Irish Water installed an additional ion exchange unit at the plant to increase the nitrate treatment capacity (see photo 3). On the day of the audit, the online treated water nitrate monitor was reading 33.83 mg/l. f. Irish Water has identified a permanent solution to install a new deeper (70 – 100m) production well in a compound located immediately north of the current boreholes. It is believed there is a bedrock fault in this area and a consultant hydrogeologist has been engaged to investigate the productivity of a new borehole in the sand and gravel aquifer at that location. Irish Water and LCC confirmed that the exploratory drilling works are due to commence within the next 2 weeks (there had been procurement delays) and that the exploratory well could be brought into operation as a production well to replace the existing boreholes, depending on satisfactory yield and water quality. A timeframe for completion of this work could not be confirmed during the audit, but was estimated to be in the region of 6 to 9 months.

4.	<p>Disinfection</p> <ul style="list-style-type: none"> a. Disinfection of the water supply is achieved by dosing sodium hypochlorite, which was switched from chlorine gas in 2012. b. There is no automatic switchover between the duty and standby chlorine dosing pumps. c. A chlorine monitor and alarm is in place. The chlorine monitor was reading 0.57 mg/l during the audit. d. The chlorine monitoring location is on the rising main to Clonking reservoir. LCC identified a chlorine contact time of 132 mg.min/l for the Ballinakill No. 2 supply and 31 mg.min/l for the Durrow No. 2 supply which ensures the water supplied to the first consumers is adequately disinfected.
5.	<p>Treated Water Storage</p> <ul style="list-style-type: none"> a. The treated water quality was measured as 0.05 NTU, 33.83 mg/l nitrate and 0.57 mg/l chlorine at the time of the audit. b. Treated water is stored in a 15 m³ tanker at the plant before being pumped to Clonking reservoir which has a storage capacity of 374 m³. The reservoir was not visited on the day of the audit however it was confirmed that it is included in Irish Water's reservoir remediation programme due to leakage concerns.
6.	<p>Management and Control</p> <ul style="list-style-type: none"> a. The raw water online nitrate monitor is only capable of measuring up to 100 mg/l maximum, which is not a sufficient range for this source given that recent lab sample results have shown up to 146 mg/l nitrate in the raw water. b. It was not possible to review monitoring data trends at the plant during the audit due to a fault with the SCADA system. c. There was a discrepancy between the UVT readings on the UVT monitor (91.4%) and the HMI screen for the UVT sampling system (89.11%) during the audit. The UVT monitor was only recently installed in Q1 2016 and is within its calibration date. A possible explanation offered during the audit was that the UVT readings are taken at different times, however this does not satisfactorily explain the 2.29% difference and this issue needs further investigation.

3. AUDITORS COMMENTS

Given the significant increase in nitrate concentrations in the raw water abstracted at the Fermoy borehole in Q1 2016, Irish Water and Laois Council must take action to implement greater source protection measures to protect the drinking water source from contamination.

The auditors acknowledge the actions taken by Irish Water to install additional nitrate treatment capacity at the Fermoy plant, however the delivery of the permanent solution needs to be prioritised to ensure the safety and security of the water supply.

The Drinking Water Restriction Notice for infants remains in place until Irish Water can demonstrate to the satisfaction of the EPA and the HSE that the remedial actions have been effective in restoring the public water supplies to compliance with the nitrate parametric value.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should prioritise the delivery of the permanent solution to resolve the issue of elevated nitrate concentrations in the Fermoy drinking water source. Irish Water should identify a timeframe for bringing the proposed new production borehole into operation, and the decommissioning of the existing boreholes.

2. Irish Water should continue to liaise with Laois County Council in relation to the requirements of Part 3 (Nutrient Management) and Part 4 (Prevention of Water Pollution from Fertilisers and Certain Activities) of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SINo.31 of 2014)* to ensure appropriate nutrient management and set-back distances for the protection of the drinking water source. Irish Water and Laois County Council shall have regard to *EPA Drinking Water Advice Note No. 11: Technical Assessments and Prior Investigations*.
3. Irish Water, in liaison with Laois County Council, should identify all potentially polluting discharges into the catchment of the water source and implement mitigation measures, where appropriate, to reduce the potential impact of these discharges. Laois County Council should follow up on farm and septic tank inspections in the zone of contribution to the abstraction point and take enforcement action as necessary.
4. Irish Water should ensure that all boreholes are lined, sealed and capped in accordance with *EPA Advice Note No. 14: Borehole Construction and Wellhead Protection*.

Disinfection

5. Irish Water should ensure that there is automatic switch over between the duty and standby chlorine dosing pumps in the event of the failure of one of the pumps.

Treated Water Storage

6. Irish Water should ensure that Clonking reservoir is inspected and cleaned out on a regular basis and any maintenance and repairs completed as soon as possible after the need has been identified.

Management and Control

7. Irish Water should ensure the raw water nitrate monitor is capable of measuring the full range of nitrate concentrations in the abstracted water.
8. Irish Water should investigate and resolve the discrepancy between the UVT readings on the UVT monitor and the HMI screen.
9. Irish Water should ensure that the plant operator has access to raw and treated water monitoring data trends on the SCADA system at the plant.

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 Mr Darragh Page, Drinking Water Senior Inspector.

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:



Inspector

Date:

1st July 2016



Photo 1: Production Borehole A (Clonking) – not sealed or capped.



Photo 2: Redundant Borehole B (Durrow) – not sealed or capped.



Photo 3: Ion exchange units for nitrate removal at Fermoyle treatment plant.