Drinking Water Audit Report

County:	Tipperary	**Date of Audit:**	10/05/19
Plant(s) visited:	Dualla Water Supply (Scheme Code 2900PUB0009)	**Date of issue of Audit Report:**	23/05/19
		File Reference:	DW2019/73
		Auditors:	Criona Doyle
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014) as amended*. • *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)* • The recommendations specified in the EPA *Drinking Water Report*. • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **A Do not Drink Notice was placed on the Dualla Public Water Supply (PWS) on the 03/04/19. This was caused by the failure of the level sensor in the contact tank at the site which resulted in the continued pumping of the borehole and elevated levels of turbidity in the water supply. Irish Water have replaced the level sensor.**

ii. **The problem of regular spurious alarms from the turbidity monitor contributed to the delay in the identification of the turbidity issue at the site. The turbidity monitor was replaced on the 03/05/19. The current turbidity alarm is set at 1 NTU and this level does not provide enough warning to prevent water above 1 NTU entering the network. Irish Water should undertake a review of the current turbidity alarm settings and time delays to ensure appropriate alarm levels and documented response procedures are in place.**

iii. **The current wellhead completion on the supply borehole results in the supply being at risk of surface water contamination in the event of flooding or spillages at the site. Irish Water should undertake improvement works to provide additional wellhead protection as per the requirements of EPA Advice Note 14: Borehole Construction and Wellhead Protection and investigate the feasibility of grouting the annulus.**

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 following the notification of the exceedance of the turbidity parametric value (01/04/19) and the issuing of a Do Not Drink Notice on the Dualla Public Water Supply, Co. Tipperary (PWS) on the 03/04/19. The Notice was lifted on the 11/04/19.

The average daily volume of water provided is of the order of 279 m^3/d serving a population of 551. The supply serves the area surrounding the village of Dualla. Groundwater is abstracted from a borehole located on the treatment plant site. Treatment at the plant consists of disinfection by chlorination.

The opening meeting commenced at 10:00am at the Dualla 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 audit observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water:

Patrick Duggan, Compliance Specialist, Irish Water.

Representing Tipperary County Council:

Flan Real, Assistant Scientist, Tipperary County Council.

Joe Burke, Executive Engineer, Tipperary County Council.

Anthony Phelan, Operations and Maintenance, Tipperary County Council.

Representing the Environmental Protection Agency:

Criona Doyle, 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.	**Level Sensor Failure – Investigations and Actions** a. On Tuesday the 02/04/19 Irish Water notified the EPA of an exceedance of the turbidity parametric value (7.6 NTU sampled 01/04/19) and informed the EPA that the water supply in Dualla, Co. Tipperary had been switched off since Monday 01/04/19 due to the elevated turbidity. b. The failure of the level sensor in the contact tanks over the weekend of Saturday 30/03/19 and Sunday 31/03/19 resulted in the continuous pumping of water from the borehole through the treatment plant and into the 2 no. adjacent storage tanks. The tanks overflowed and flooded the site. The continuous pumping of the borehole may have increased the turbidity in the groundwater and /or ponded water may have gained access to the borehole via the poorly sealed wellhead. c. A build-up of deposits on the probe, due to the hard water, is likely to have caused the failure of the level sensor. A photograph was presented at the audit confirming the extent of the build-up. d. The site is not normally visited on a Saturday or Sunday. e. A review of the alarm log from the PMAC system indicates there were 3 no. turbidity alarm events logged on Saturday 30/03/19 for the Dualla PWS. The PMAC system does not have the facility to include a cascade alert system but each generated alarm is copied to the caretaker, relief caretaker and 2 no. supervisors for information. f. At the audit Tipperary County Council outlined that air bubbles cause a false turbidity reading of > 1 NTU and generate spurious alarms. This is possibly linked to the switching on of the pump. A debubbler was installed previously but did not rectify the issue. There have also been issues with intermittent clay / silt resulting in elevated turbidity on occasion. g. The caretaker arrived on site on Monday morning 01/04/19 to find the WTP site flooded and shut down the water supply. h. On Monday morning 01/04/19 during a routine review of the PMAC SCADA alarm log the turbidity alarms were also noted by senior staff in Tipperary County Council. i. Tipperary County Council notified Irish Water of the issue with the elevated turbidity on Monday 01/04/19 and consulted with the HSE to obtain health advice. j. A water tanker was set up in the village at Dualla Church on Monday 01/04/19 to provide an

	alternative water supply. k. On Tuesday 02/04/19 the supply remained switched off and the borehole was flushed and run to waste for a number of hours until the turbidity reduced to normal levels. l. On Wednesday 03/04/19, in consultation with the HSE, a precautionary Do Not Drink notice was put in place due to the potential risk of contaminated water being present in the network. A copy of the Do Not Drink Notice was delivered to households prior to water being put back into the network for sanitary purposes. The supply remained switched off until the notices had been delivered. m. Over the following days the following remedial measures were undertaken (i) the borehole was super chlorinated; (ii) all storage tanks (2 no. storage tanks at the WTP site and booster tank on network) and the Garranmore reservoir were cleaned out; (iii) the network was flushed; (iv) samples were taken at various locations in the network to monitor turbidity, total and residual chlorine levels and microbiological parameters (04/04/19 & 10/04/19). n. Following the completion of the remedial works and the receipt of satisfactory monitoring results in the network consultation took place with the HSE and the Do Not Drink Notice was lifted on Thursday 11/04/19.
2.	**Source Protection** a. The supply borehole was drilled in 2009. A copy of the borehole log was available at the audit. The log indicates the borehole is not completed in accordance with EPA Drinking Water Advice Note 14: Borehole Construction and Wellhead Protection. b. An above ground prefabricated kiosk is present over the borehole which provides some protection of the borehole but the wellhead at the top of the borehole is not fully sealed. This results in the supply being at risk of surface water ingress in the event of the site flooding as was the case in the recent level sensor failure and elevated turbidity incident. c. The site is adjacent to the R691 road and surrounded by agricultural land used for pasture. d. The Zone of Contribution for the supply has been delineated and a copy of the Source Protection Map was available at the audit. e. Adjacent landowners have not been informed of their obligations under the GAP regulations [European Union (Good Agricultural Practice for the Protection of Waters) Regulation 2014 (S.I. No. 31 of 2014)]. It was outlined at the audit that Tipperary County Council intend to send out letters this month to inform landowners of their obligations. f. No raw water monitoring programme is in place and monitoring of raw water has not taken place since 2015. g. A hydrogeological assessment of the source including a camera survey of the borehole has been completed following the recent incident and Irish Water are awaiting the final report. It was reported that the *Cryptosporidium* Risk Screening Score indicates moderate risk. h. The borehole is currently classed as a G3 borehole. i. The high-level turbidity alarm on the raw water is currently set at 1.03 NTU (1.00 NTU not permitted by the system). The PMAC system generates a text alert. There is no automatic plant shutdown on high turbidity. There have been issues at the site with frequent spurious turbidity alarms which are thought to be related to pump start up. A new turbidity monitor was installed on Friday 03/05/19 to address this issue. On the day of the audit the turbidity was 0.585 NTU. j. It is not possible to review the turbidity trends on site. The caretaker can text the PMAC monitoring system to get a turbidity reading at any time. k. The site is well fenced and secure.
3.	**Disinfection** a. The site has been assessed under the County Tipperary Disinfection Programme. The site has been assessed as having a log credit requirement of 3 under the Irish Water Log credit requirements for protozoal compliance. Irish Water outlined that disinfection upgrades are currently being examined following from the site assessment to determine if the supply will be retained and upgraded or rationalised. The outcome of the value engineering report is likely to be available next month. b. On the day of the audit the residual chlorine level was 0.98 mg/l and the pH was 6.89 pH units. The target chlorine dose is 0.9 to 1.0mg/l to achieve a chlorine residual of 0.1mg/l at

	the end of the network. c. Sodium hypochlorite (10-12%) is used for chlorination. The labels on the sodium hypochlorite drums indicated a "use by" date of 29/06/19. d. The chlorine dosing is flow proportional. Duty and assist chlorine dosing pumps are installed on site. There is no automatic switch over between the duty and assist pump in the event of malfunction of the duty pump. Manual changeover of the pumps between duty and assist is undertaken on a weekly frequency. The assist pump can provide 100% of the required dose. e. All pumps and monitoring equipment were within service dates (completed 31/08/18 and next due 31/08/19). f. The plant log book indicates the caretaker undertakes daily monitoring of the residual chlorine levels on the distribution line at the Church yard. This monitoring location is not located at the end of the network. g. The low-level chlorine alarm is set at 0.70 mg/l and high-level alarm at 1.2 mg/l. There is no automatic shutdown of the supply in response to chlorine alarms. h. A text alert is sent to duty and standby caretakers and 2 no. supervisors in response to chlorine alarms. i. A contact time of 24 mg.min/l is provided. j. It was outlined at the audit that there have been no recent chlorine alarms. The county wide alarm logs are reviewed by Tipperary County Council on a daily basis.
4.	**Treated Water Storage and Distribution Network** a. There are 2 no. above ground precast storage tanks present adjacent to the borehole (storage volume 32m^3 each). A crack was visible on outer wall of Tank No. 1. The tanks were drained down and cleaned following the recent turbidity exceedance / incident. On the day of the audit it was not possible to inspect the vents and inspection points on the top of the tanks. b. There is a reservoir located at Garranmore (storage volume 120m^3) located 1.5 miles from the site which was not visited as part of the audit. The reservoir was cleaned following the recent incident. c. There are some pressure issues in the network which result in delays in water pressure returning to normal for some consumers in the event the water level in the reservoir drops.
5.	**Chemical Storage and Bunds** a. A locked bunded chemical store is provided for the storage of the 25 litre sodium hypochlorite containers. A stock of two to three weeks sodium hypochlorite is stored on site
6.	**Hygiene and Housekeeping** a. The site was clean and tidy.
7.	**Management and Control** a. The plant manual contained the response procedures for dealing with chlorine alarm and turbidity alarm. The turbidity procedure has been updated in light of the recent exceedance.

3. AUDITORS COMMENTS

The audit confirmed that the failure of a level sensor at the Dualla Water Treatment Plant resulted in the continued pumping of the borehole which resulted in elevated levels of turbidity in the water supply and the subsequent issuing of a Do not Drink Notice on the supply on the 03/04/19.

The problem of regular spurious alarms from the turbidity monitor contributed to the delay in the identification of the turbidity issue at the site. A new turbidity monitor was installed on 03/05/19 with the aim of addressing this issue. The current turbidity alarm level at the site does not provide enough warning to prevent water above 1 NTU entering the network. The installation of auto shut down of the supply linked to the turbidity alarms would provide additional security to the supply.

The current wellhead completion on the supply borehole results in the supply being at risk of surface water contamination in the event of flooding or spillages at the site. In the event that the current borehole is to be retained Irish Water should ensure that the wellhead is completed in accordance with EPA Advice Note No: 14: Borehole Construction and Wellhead Protection and investigate the feasibility of grouting the annulus to ensure the source is made secure.

At present there is no automatic switch over between the duty and assist pump in the event of the breakdown of the duty chlorine dosing pump. There is no automatic shut down of the supply linked to the high or low chlorine alarm. The site has been assessed under the County Tipperary Disinfection Programme and the proposed upgrade works identified under the disinfection programme are currently under review to determine if works will be undertaken or if the scheme will be rationalised. A report on the proposed upgrades together with the timeframe for completion should be provided to the EPA.

4. RECOMMENDATIONS

Management and Control

1. Irish Water should undertake a review of the current turbidity alarm settings and time delays to ensure appropriate alarm levels and response procedures are in place in the event that the raw water quality is compromised to ensure there is sufficient time to prevent water above 1 NTU entering the network.
2. Irish Water should examine the options for auto shut down of the supply (i) linked to high turbidity and (ii) chlorine alarms.

Disinfection

3. Irish Water should provide a report on the proposed upgrades arising from the assessment of the site under the County Tipperary Disinfection Programme together with timeframes for completion of the works. The report should include the proposals to address the log credit requirement for protozoal removal and / or inactivation following completion of the hydrogeologists report.
4. Irish Water should install a duty and standby chlorine dosing pump with automatic switch over in the event of the failure of one of the dosing pumps.
5. Irish Water should ensure that the residual chlorine level is monitored at the end of the network several times a week.

Source Protection

6. Irish Water should liaise with Tipperary County Council to ensure that all landowners are made aware of the set back distances as per the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No. 31 of 2014)* for the abstraction point. Irish Water should confirm to the Agency that the landowners have been written to.
7. Irish Water should undertake improvement works to provide additional wellhead protection as per the requirements of EPA Advice Note 14: Borehole Construction and Wellhead Protection and investigate the feasibility of grouting the annulus.
8. Irish Water should forward a copy of the *Cryptosporidium* Risk Assessment for the supply.

Treated Water Storage

9. Irish Water should confirm if the Garranmore Reservoir and 2 no. storage tanks are on the Irish Water Reservoir Cleaning Programme and ensure that the integrity of the storage tanks at the WTP is investigated in light of the crack visible on the outside of Tank No. 1. Irish Water is requested to submit photographic evidence that the vents are covered and inspection points are secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism.

Management and Control

10. Irish Water should ensure that all staff are familiar with the protocol for dealing with receipt of

turbidity alarms and that the documented procedures are being followed.

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 remaining recommendations 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: Fiona Doyle **Date:** 23/05/19

Inspector