



# Drinking Water Audit Report

<b>County:</b>	Mayo	<b>Date of Audit:</b>	13 June 2016
<b>Plant(s) visited:</b>	Kilkelly Drinking Water Treatment Plant (2200PUB1015)	<b>Date of issue of Audit Report:</b>	30 June 2016
		<b>File Reference:</b>	DW2010/126
		<b>Auditors:</b>	Ms. Derval Devaney
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>.</li> <li>• 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></li> <li>• The recommendations specified in the EPA Report on <i>The Provision and Quality of Drinking Water in Ireland</i>.</li> <li>• The Recommendations specified in the previous Audit report of 8<sup>th</sup> October 2010</li> </ul>		

## MAIN FINDINGS

- i. Many of the recommendations of the EPA’s last audit in 2010 were addressed, such as disinfection upgrade, raw water monitoring and measures to protect the spring source including notifying farmers in the catchment of set-back distances for landspreading.
- ii. Irish Water is to carry out further improvements at the plant this year under it’s Disinfection Programme.
- iii. The Zone of Contribution needs to be validated to ensure the spring’s catchment is verified and appropriately protected.

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

The Kilkelly PWS is located opposite the church in the village of Kilkelly and currently provides an average of 670 m<sup>3</sup>/day of treated water to a population of approximately 1208 persons. Water is sourced from a spring situated next to the treatment plant and is treated by means of ultraviolet (UV) and chlorination disinfection. In late 2010 the PWS was amalgamated with some Group Water Schemes (GWS), namely the Kilkelly, Woodfield/Ballure, Shammer and Cullemore GWS, which were also sourcing their water from this spring source. The Midfield Private GWS (2200PRI2150) is sourced from this spring also but has its own treatment facility which serves 1000 persons.

The spring source originates from an esker comprised of well-drained gravels. This esker overlies a locally important aquifer of Dinantian Mixed Sandstones, Shales and Limestones. The GSI vulnerability maps show a mostly high to low vulnerability, which means > 3 m of subsoil, but in effect this area has not been mapped to verify this depth of soil cover. The EPA monitor the raw water source

quarterly, as the Kilkelly PWS is on the EPA's National Groundwater Monitoring Programme. A review of the EPA's monitoring results from 1995 – 2015 shows an increase in the concentration of faecal coliform present in the source since 2011 (for e.g. > 2419.6 No./100 ml on 03/04/13) and therefore shows contamination of the source water and a potential link with a surface water source(s).

Photographs taken by Ms. Derval Devaney during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 12:10 pm at the Kilkelly 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. The following were in attendance during the audit.

Representing Irish Water:

Mayo County Council: Mr Iarla Moran, Senior Engineer; Mr Gerard Shally, Electrician; Mr Michael Flatly, Waterworks Caretaker.

Irish Water: Mr Patrick O'Sullivan, Compliance Analyst; Mr Sean Higgins, Operations & Maintenance Engineer.

Representing the Environmental Protection Agency:

Ms Derval Devaney, Inspector

## 2. AUDIT OBSERVATIONS

In view of the observations noted during the audit and listed below, Irish Water is recommended to carry out the following recommendations;

*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> <ol style="list-style-type: none"> <li>a. The spring source flows directly into a holding tank where it is fed by gravity to a raw water sump (see Photo 1). There is a level sensor on the raw water sump which cuts the pump off at 3.25 meters and re-starts at 3 meters. There are 2 abstraction pumps, one duty and one stand-by which alternate. Water is abstracted at the same pumping rate - 31.5 m<sup>3</sup>/hr was displaying on the SCADA screen on the day of the audit. The caretaker stated that the pumps operate 20 to 21 hours per day.</li> <li>b. The two concrete covered intake areas which tapped into the spring source on-site are no longer in use. Piping the spring source directly to the treatment plant was a recommendation of the previous audit report.</li> <li>c. The entire spring intake area is fenced off and therefore protected from animal grazing/access.</li> <li>d. Raw water data is being monitored to assess its quality and trends to ensure adequate treatment is being provided and to ensure source protection measures are adequate. Irish Water stated that a pH, turbidity and UVT monitor is to be installed on the raw water source as part of the Disinfection Programme which is being rolled out in Co Mayo this year to determine if treatment is adequate and if additional controls are necessary.</li> <li>e. The Kilkelly spring source is part of the EPA's National Groundwater Monitoring Programme and while a Zone of Contribution (ZOC) was delineated in 2011, additional measures (e.g. stream flow measurements as suggested in that report) are required to verify this mainly desk-based ZOC delineation.</li> <li>f. This spring is on the EPA's Groundwater Monitoring Programme and quarterly results show faecal coliforms are persistently present in this source. This would indicate the spring has a potential link with a surface water source(s).</li> <li>g. Article 17 of the GAP Regulations (S.I. 610 of 2010) <i>inter alia</i> regulates the</li> </ol>
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	<p>landspreading of organic fertilisers in the vicinity of drinking water abstraction points. Sub-article 6 enables a local authority, following 'prior investigations' and consultation with the Agency, to specify greater distances to that specified in sub-articles (2) or (3) based on water quality evidence and trends. Irish Water should be mindful of this legislative requirement and the EPA's Advice Note No. 11: "Technical Assessments and Prior Investigations" if the ZOC changes and there is a need to further protect the source water.</p> <p>h. There is a disused quarry approximately 500 m NW of the site.</p>
<p><b>2.</b></p>	<p><b>Disinfection</b></p> <p>a. UV treatment and sodium hypochlorite are used as disinfectants.</p> <p>b. The Trojan UV Swift S.C. B08 UV Unit was validated and the validation sticker was present on the unit as shown in Photo 2. There is a flow meter (31.5 m<sup>3</sup>/hr), UVI monitor (60 W/m<sup>2</sup>), UVT monitor (85%) and a pressure gauge (10 bar) present at the plant to control and assess the operation of the UV treatment system. The readings in brackets are the SCADA/monitor readings on the day of the audit which show the system to be operating within its validated range.</p> <p>c. There is no standby UV unit but the pumps cease to operate when the UVI is &lt; 30 W/m<sup>2</sup> (the Low-Low alarm set point). The High-High alarm is set at 90 W/m<sup>2</sup>; High at 80 W/m<sup>2</sup> and Low at 38 W/m<sup>2</sup>. The caretaker is alerted to an alarm via a text message on his phone and there is a procedure in place to respond.</p> <p>d. There are 8 UV lamps and the UV unit displays the hours to the next service (128 hours was displaying on the unit). The pumps shut down when this falls below 30 hours and the caretaker receives a text alert when 35-38 hours are reached. There are spare quartz sleeves on-site and the lamps are automatically wiped every 48 hours.</p> <p>e. When plant shuts down (e.g. when levels in the reservoir are sufficient) there is a 40 second delay when the plant re-starts to afford time for the UV lamps to warm up.</p> <p>f. The UV unit is serviced yearly with its last service on 10<sup>th</sup> May 2016.</p> <p>g. The water is chlorinated post UV disinfection. Adjustments were made to the chlorine pumps since the 2010 audit to ensure they are operating efficiently (e.g. air blockages were a frequent problem on the chlorine dosing lines at the plant). New chlorine pumps were installed as part of the upgrade to the plant in late 2010. Chlorine is dosed flow proportionally and the pumps changeover automatically every 3 hours.</p> <p>h. There is a standby and duty pump which pumps water to a reservoir 2.4 km away. The SCADA readings for water level in the reservoir are sent back to the treatment plant's control room and when the reservoir reaches a pre-defined low water level flow, chlorination and UV treatment is triggered to commence.</p> <p>i. It is estimated that a 2 hours contact time is achieved in the 200 mm rising main before it enters the reservoir. There are chlorine monitors, sampling from the inlet and outlet to the reservoir. Chlorine residual readings displayed on the SCADA were 0.77 mg/l at the inlet to the reservoir and 0.57 mg/l on the reservoir outlet on the day of the audit. The low level alarm is set at 0.6 mg/l and high is set at 1.3 mg/l post the reservoir.</p> <p>j. All customers are served by the supply post the reservoir which has a day's storage capacity.</p> <p>k. The caretaker takes daily or a minimum of 3 times per week manual chlorine residual tests on the network. On the day of the audit the daily log book had chlorine residual entries of 0.41 mg/l taken on Shammer Road and 0.67 mg/l at the Bridge in Kilkelly.</p> <p>l. The SCADA system installed in 2010 at the plant displays and records readings but it is not possible to view the trends remotely. Irish Water stated that such facility will be included in the upgrade at the plant as part of the Disinfection Programme due to be completed this year.</p>
<p><b>3.</b></p>	<p><b>Treated Water Storage</b></p> <p>a. The 700 m<sup>3</sup> reservoir (see Photo 3) 2.4 km from the plant was visited.</p> <p>b. Pumping to the reservoir ceases once a pre-determined reservoir level is reached and pumping re-commences once another pre-determined level is met. There is an overflow pipe on the reservoir.</p> <p>c. There SCADA system at the plant displays chlorine readings at the reservoir, water levels, pressure, pumping rates, etc.</p>

4.	<p><b>Monitoring and Sampling Programme for treated water</b></p> <p>a. The HSE monitor this PWS and compliance data results from 2012 to date were reviewed during the audit and deemed to be compliant with the <i>European Union (Drinking Water) Regulations 2014</i>.</p> <p>b. On the day of the audit the chlorine residual taken in the network were 0.41 mg/l on Shammer Road and 0.67 mg/l at the Bridge in Kilkelly.</p>
5.	<p><b>Management and Control</b></p> <p>a. There is a cast iron distribution main in parts of the network which is prone to bursts, particularly during the cold winter months. It was stated during the audit that leakage rates could be reduced further (down to 50 -60 m<sup>3</sup>/day) by replacing this with plastic pipework. There was no indication or timeframe provided during the audit for completion of this work.</p> <p>b. The 2015 Drinking Water Returns reported to the EPA incorrectly stated this supply served a population of 157 with 460 m<sup>3</sup>/day, and failed to identify that there is UV disinfection in addition to chlorination and that a chlorine alarm was in place.</p>

### 3. AUDITORS COMMENTS

Most of the recommendations of the previous EPA audit report for the Kilkelly PWS have been addressed such completion of the upgrade to the disinfection system, increased control of the supply (e.g. SCADA system installed, procedure to respond to alarms in place), reducing the risk of surface water contamination via piping the source directly to the sump, etc. Further improvements to the supply via the disinfection programme, which is proposed to be complete this year, are welcomed by the EPA and will bring about greater control in ensuring a safe and secure water supply.

Irish Water should verify the extent of the zone of contribution for the spring source, and liaise with Mayo County Council in order to prioritise source protection measures. This and ensuring the Drinking Water Returns are up-to-date were recommendations of the last EPA audit report and should be addressed by Irish Water as outlined in the recommendations below.

### 4. RECOMMENDATIONS

#### Source Protection

- a) Irish Water should examine the EPA's Water Framework Directive Groundwater Monitoring Programme Site Information report for the Kilkelly PWS with a view to further determining and validating the Zone of Contribution (ZOC).

Irish Water may also need to consider the amendment of the buffer zone in the catchment of the source under Article 17 of the GAP Regulations (S.I. 610 of 2010) for the landreading of organic fertiliser or soiled water (by way of formal agreement with the EPA as per the EPA's Advice Note No. 11: "Technical Assessments and Prior Investigations") once this ZOC is verified if there is a need to further protect the source from contamination.

#### Management and Control

- b) Irish Water should ensure the works proposed under the Disinfection Programme (e.g. installation of raw water monitors and remote access to data) are completed this year as planned.
- c) Irish Water should take action to address high leakage areas in the distribution network and replace pipework that is prone to bursts.
- d) Irish Water should ensure that the annual Drinking Water Returns data is up-to-date and

reflects any increase in volume supplied, population served and treatment provided for the Kilkelly PWS. This recommendation was also listed in the EPA's previous audit report conducted in 2010.

### **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 Ms Aoife Loughnane, Drinking Water Team Leader.

Irish Water is recommended to put such measures in place as are necessary to implement the recommendations listed in this report. The actions by Irish Water to address the recommendations taken will be verified by the Agency during any future audits.

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:**



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Derval Devaney

Inspector

**Date:**

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30/06/16



Photo 1: Spring source intake sump

Sensor: Supplier: <b>Trojan Technologies Inc</b> Typ: 794528 Quantity: 1		
DVGW-Registration No. DW-9181BO0017		
DVGW File Reference No.: 01-0290-WNE		
UV-Transmission SSK-254 m-1	Max flow rate m <sup>3</sup> /h	Minimum UV-Intensity W/m <sup>2</sup>
9.2	40	24
4.4	70	34
2.2	100	44
0.9	130	50

Photo 2 – UV validation sticker



Photo 3: New reservoir 2.4 km from treatment plant.