



# Drinking Water Audit Report

<b>County:</b>	Donegal	<b>Date of Audit:</b>	21 <sup>st</sup> September 2016
<b>Plant(s) visited:</b>	Milford Water Treatment Plant	<b>Date of issue of Audit Report:</b>	14 <sup>th</sup> October 2016
		<b>File Reference:</b>	DW2016/162
		<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>• <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> </ul>		

## MAIN FINDINGS

- i. **The Milford water supply is to have its distribution networks upgraded by March 2017 to enable its supply to be fully extended to the Rathmullan PWS area.**
- ii. **Low levels of free residual chlorine are evident in some parts of the distribution network and funding to replace cast iron mains is required in order to ensure at least 0.1mg/l free chlorine is present in the distribution network.**
- iii. **Water quality analysis (e.g. microbiological sampling) is not carried out to demonstrate if predetermined water quality criteria are met before the filters are brought back into service as per the EPA's Water Treatment Manual on Filtration.**

## 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 Milford PWS abstracts water from Lough Columbkil to produce on average 2,045m<sup>3</sup>/day of treated water to a population of 3,570. Treatment consists of slow sand filtration followed by disinfection and fluoridation.

The opening meeting commenced at 9:30 am at Milford 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:

Martin Temple, Operations and Maintenance; Yvonne McMonagle, Compliance.

Donegal County Council: Fitz Howard, Senior Executive Engineer; Liam McBride, Water Works Inspector; Martin McAteer, A/ Water Works Inspector; James McHugh, Technician; Hugh Kerr, Chief Technician, Patrick Gallagher, Laboratory

Representing the Environmental Protection Agency:

Derval Devaney, 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.*

<p><b>1.</b></p>	<p><b>Source Protection</b></p> <ul style="list-style-type: none"> <li>a. The Lough Columbkil source was visited during the audit and was described as a stable water quality source with low intensity agriculture in the catchment. The average flow from Lough Columbkil to the plant is 85 m<sup>3</sup>/hr but at times of high demand can reach 120 m<sup>3</sup>/hr.</li> <li>b. The caretaker carries out a weekly inspection of the intake area and logs his findings in the daily log book.</li> <li>c. pH and TOC is monitored in the raw water source at the same frequency as the compliance sampling programme. The pH usually is around 7.3 and TOC usually around 4 mg/l. There is an online turbidity monitor on the raw water (which averages at 0.5-0.6 NTU) which read 0.44 NTU on the day of the audit. There is a raw water turbidity high alarm which is set to activate once turbidity reaches 1 NTU.</li> <li>d. In 2000 the intake pipeline was extended 150 m into the lake with an up-stand of 1m - 2 m for mid-water intake to avoid contamination (e.g. from algal blooms) of the intake water.</li> <li>e. There is a 2 mm stainless steel screen on the intake pipe which is cleaned every 6 months.</li> <li>f. There is a raw water inlet chamber of approximately 10 m<sup>3</sup> capacity at the plant which can be by-passed if it requires maintenance. A ball valve controls its water level.</li> <li>g. The <i>Cryptosporidium</i> Risk Score for this supply on EDEN is 72 (moderate risk).</li> </ul>
<p><b>2.</b></p>	<p><b>Filtration</b></p> <ul style="list-style-type: none"> <li>a. There are 6 slow sand filters (SSF) at the plant; 3 new (labelled 1-3) installed in 2010 and 3 older cells (labelled 4 – 6). The sand media was topped up with new sand during 2015 to 1m and the average sand depth of each cell is currently 800 mm with filtration rates of 0.15 m<sup>3</sup>/m<sup>2</sup>/hr.</li> <li>b. The filters are skimmed approximately every 5-6 weeks and skimming is determined by the head loss by visually inspecting the water level in the outlet chamber of each cell. There is also a flow meter in the intake to each cell.</li> <li>c. Once skimming or top-up with fresh sand is complete and the turbidity meter shows a return to normal operating conditions, the filter is brought back into service. At present microbiological samples are not taken to demonstrate that maturation of the “schmutzdecke” has taken place before the filter is brought back into service. Such monitoring is required to demonstrate that the filters have ripened prior to being brought back into service, in accordance with the EPA’s <i>Water Treatment Manual: Filtration</i>.</li> <li>d. The caretaker maintains a record of SSF inspections which includes depth of sand and depth each time the SSF is skimmed or topped up.</li> <li>e. There are turbidity meters on each filter. Information on EDEN for this supply states that there are no turbidity monitors after each filter. On the day of the audit F1- F3 read 0.06 NTU; F4 0.07 NTU; F5, 0.08 NTU and F6 0.05 NTU. The filter turbidity monitors are all set to alarm at 0.5 NTU. The combined final water turbidity meter read 0.06 NTU on the day of the audit and alarms at 0.2 NTU.</li> </ul>
<p><b>3.</b></p>	<p><b>Disinfection</b></p> <ul style="list-style-type: none"> <li>a. An on-site electrolytic chlorination (OSEC) system is used onsite to assist in producing 0.6 % sodium hypochlorite solution. Approximately 648 litres of 0.6 % chloros is used at the plant per day. As the OSEC unit is undersized for the plant, 2 drums of 10% sodium hypochlorite (50 L) are added to the OSEC generated disinfection solution per week to achieve 0.6 % sodium hypochlorite strength.</li> <li>b. Water from all 6 SSF cells enters a clear water sump and is pumped to 2 reservoirs (each having 1000m<sup>3</sup> capacity) on-site.</li> <li>c. The chlorine injection point is in the mains post the clear water pump en route to the reservoirs. The chlorine dose is approximately 1.89 mg/l to meet a target free chlorine</li> </ul>

	<p>residual of 0.2 mg/l. There is a static mixer in the mains to assist in adequate dispersion. There is a duty and standby chlorine pump with automatic switchover.</p> <p>d. There is a CL17 chlorine analyser at the inlet to the reservoirs and at its outlet. The inlet was reading 1.29 mg/l free chlorine and the outlet 0.32 mg/l free chlorine on the day of the audit. The inlet chlorine monitor alarms at 0.9mg/l and the outlet at 0.22 mg/l. There is a cascade system in place to alert the relevant persons of an alarm and the plant shuts down if the inlet alarm is triggered. This alarm system affords the caretaker time to investigate the situation while there is one day's storage of treated water in the on-site reservoirs.</p> <p>e. The caretaker takes free chlorine residual samples at the plant and compares the readings to the chlorine analysers and logs readings in the daily log book. The amount of salt used for the OSEC system is also recorded.</p> <p>f. There is a secondary chlorination point on the mains distribution pipe post the on-site reservoirs using 10% sodium hypochlorite provided in drums at the location. This location was visited during the audit. The chlorine is flow proportionally dosed at approximately 1.14 mg/l to meet a target chlorine residual of 1.1 mg/l. There is a chlorine monitor at this location and is set to alarm at 0.9 mg/l. The chlorine monitor read 1.02 mg/l on the day of the audit.</p> <p>g. The caretaker records free chlorine residuals in the network on a weekly basis. There are areas in the network prone to low chlorine residual levels e.g. Glenvar (which has a low water demand and cast iron mains) and St Marians, Milford town (has cast iron mains). Irish Water stated that an Assets Needs Brief was submitted to Irish Water's Asset Strategy Team for funding to replace the cast iron mains however these works are not included under any current programme.</p>
<p><b>4.</b></p>	<p><b>Treated Water Storage and Distribution Network</b></p> <p>a. Treated water once dosed with chlorine is fluoridated and flows into Reservoir 1 and on to Reservoir 2. These reservoirs are modern, roofed, its vents are protected with mesh and inspection chambers are easily accessed. Both reservoirs were cleaned in September 2016. There are valves in place to enable one or both reservoirs to be bypassed for maintenance or to allow water to flow to Reservoir No 2 first prior to entering Reservoir 1. There is a low water level alarm on both reservoirs set at 2m.</p> <p>b. There are 5 reservoirs in the network, all are roofed.</p>
<p><b>5.</b></p>	<p><b>Monitoring and Sampling Programme for treated water</b></p> <p>a. There are 10 checks and 2 audit samples planned for 2016. The results taken to date for 2016 were reviewed and were compliant with the Drinking Water Regulations, 2014.</p> <p>b. In an audit compliance sample taken on 04/07/16 at the Public Services Centre TOC was 2.41 mg/l and THMs 96 µg/l (close to the THMs parameter value of 100 µg/l).</p> <p>c. There is a <i>Cryptosporidium</i> sampling rig at the secondary chlorination point. Monitoring is carried out annually. A <i>Crypto.</i> sample taken on the 30/03/16 at the headworks was negative for the parasite. There was an additional sample taken at a domestic tap in the network during 2016 at the HSE's request to investigate a <i>Cryptosporidiosis</i> case and this result was also clear.</p>
<p><b>6.</b></p>	<p><b>Management and Control</b></p> <p>a. The fluoridation system is sampled and inspected by the HSE once per month. The weighing scale on the day tank has been out of calibration since 2015.</p> <p>b. This water supply is to have its distribution networks upgraded under Irish Water's Advanced Works under Minor Programmes. This work will enable the Milford supply to be fully extended to the area currently served by the Rathmullan Water Treatment Plant and the Churchill Group Water Scheme. Irish Water stated that the date for completion of the works is 6 months from the 15<sup>th</sup> of September 2016. The Milford supply already provides 50% of Rathmullan's PWS (which is on the RAL for THMs) and the extension will enable Milford WTP to provide an additional 1,750 m<sup>3</sup> / day of treated water to Rathmullan and enable the Rathmullan WTP to be decommissioned.</p> <p>c. The Milford PWS produces on average 2,045m<sup>3</sup>/day of treated water to a population of 3,57; the information for this supply on EDEN states the supply produces 1,331 m<sup>3</sup>/day of treated water to a population of 3,204.</p>

### **3. AUDITORS COMMENTS**

The EPA welcomes the upgrade of the networks and the extension of the supply to the Rathmullan PWS area in order to remove the latter supply from the EPA's Remedial Action List (RAL). However increased THMs monitoring on the Milford networks is advised to ensure that there is not an issue with THMs on this supply given the level of TOC and THM found in the audit sample taken in the network in 2016.

The areas of the network subject to low chlorine residuals should be addressed to ensure adequate levels of chlorine are maintained at all times. In addition, Irish Water should set out water quality standards to determine when to bring the slow sand filters back into operation post sand top up or skimming as recommended below.

### **4. RECOMMENDATIONS**

#### **Slow Sand Filtration**

1. Irish Water should arrange to have water quality analysed (e.g. microbiological testing) post filtration following media replacement and skimming to determine if predetermined water quality criteria are met in order to ensure that a satisfactory quality outlet is being produced prior to bringing the filter back into service.

#### **Disinfection and Distribution System**

2. Irish Water should ensure that appropriate action is taken (e.g. frequent scouring, cast iron mains replacement, chlorine booster stations) to ensure free residual chlorine levels at the end of the distribution network are maintained at 0.1 mg/l.

#### **Management and Control**

3. Irish Water should take action to ensure the weighing scale on the fluoridation day tank is calibrated.
4. Irish Water should update EDEN to reflect the current status of the supply (e.g. population served, volume produced, and presence of turbidity monitors on each filter).

#### **Monitoring and Sampling Programmes for Treated Water**

5. Irish Water should liaise with the HSE to discuss the need for additional THMs monitoring in the network to determine if there is a presence of THMs in the supply which exceeds the parametric value of 100 µg/l.

### **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 Emer Cooney, 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:**



**Date:**

14<sup>th</sup> October 2016

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Derval Devaney

Inspector