

# Drinking Water Audit Report

<b>County:</b>	Donegal	<b>Date of Audit:</b>	20 August 2014
<b>Plant(s) visited:</b>	Killybegs Water Treatment Plant	<b>Date of issue of Audit Report:</b>	19 September 2014
		<b>File Reference:</b>	DW2014/305
		<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 in any previous audit reports.</li> </ul>		

## MAIN FINDINGS

- i. **Sludge and washwater waste produced from the water treatment process is discharged to the nearby stream. Irish Water is requested to cease this practice and submit a timeframe for cessation of the discharge.**

## 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. Where the text refers to the Water Service Authority this refers to Irish Water in accordance with Section 7 of the Water Services (No. 2) Act 2013.

The Killybegs Public Water Supply was commissioned in 1994 and provides treatment to a population of 5,000 in the form of clarification, filtration and chlorination. There is no fluoridation treatment on this supply. Elevated levels of manganese occurred in the source (Lough Adeery) in 2013 and 2014 which prompted the Water Supplier to provide additional treatment via chlorine oxidation post filtration to ensure compliance with the water quality standard for this parameter. The plant has a capacity to treat 4,500 m<sup>3</sup>/d of water and during 2013 the average water production was 3,124 m<sup>3</sup>/d. There is a large demand for water during the fish processing season, which runs from mid-September to mid-February, and during the summer season due to tourism. This is a very rural supply with ~200km of distribution mains serving its domestic customers in addition to the commercial fish-related industries surrounding Killybegs Harbour.

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

The opening meeting commenced at 2pm at the Killybegs 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:

Paul McCloskey, Assistant Senior Supervisor; Patrick Doherty, Waterworks Inspector; Hugh Kerr, Senior Technician; Eddie McGrane, Supervisor; Martin Temple, Irish Water; Paul Lyons, Engineer; Eamonn Kelly, Electrical 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.*

1.	<p><b>Source Protection</b></p> <ul style="list-style-type: none"> <li>a. Two impoundment dams were constructed to store water in the Lough Adeery source (see Photo 1) and a stream to the north of the lake was diverted to flow into the lake (see Photo 2). The lake's surface area is approx.7 hectares.</li> <li>b. There are 2 abstraction points in the lake – one at 2m high water level and one at 4m low water level. It is the upper level that is used by the Water Supplier.</li> <li>c. Currently 150 m<sup>3</sup>/hr is abstracted from Lough Adeery (a set abstraction rate that is controlled at the inlet) and there is capacity to abstract to 450 m<sup>3</sup>/hr. There is also the capacity to deliver 450 m<sup>3</sup>/hr to the distribution network however currently the plant can only treat a maximum of 225 m<sup>3</sup>/hr.</li> <li>d. Land use in the catchment of about 800 hectares comprises of low intensity agriculture (mainly sheep grazing). There are 4 houses on the catchment.</li> <li>e. MCPA was an issue in this catchment in the past and recently (2013 and 2014) elevated levels of manganese are evident (400 ug/l<sup>+</sup>) in the source water.</li> <li>f. There is a Johnston Screen of 6mm at the inlet point which is manually cleaned via air purging.</li> <li>g. Raw water colour varies seasonally ranging from 40-170 Hazen. The raw water turbidity monitor was reading 0.5 NTU on the day of the audit.</li> </ul>
2.	<p><b>Coagulation, Flocculation and Clarification</b></p> <ul style="list-style-type: none"> <li>a. Upon entering the plant water is dosed with soda ash (~ 35 mg/L) and polyaluminium chloride (at 150 mg/l) prior to entry into the contact tank.</li> <li>b. The top and bottom wall of the contact tank act as baffles due to the low flow (there are no flash mixers). Poly Magnafloc LT25 is dosed at 0.15 mg/l prior to entry into the clarifiers.</li> <li>c. The Poly and PAC pumps are manually controlled and are to be automated.</li> <li>d. There are 2 no. flat bottomed upflow clarifiers (see Photo 3) which have an upward flow rate of 2 m/ hr. There is space for two additional clarifiers on-site if additional capacity is required in future.</li> <li>e. Post clarification the pH is adjusted with soda ash to achieve a target pH of 7.3.</li> <li>f. Due to the presence of manganese in the raw water, chlorination (1.9 mg/l chlorine dose) also occurs post clarification to oxidise the manganese ion to an insoluble form for removal by filtration.</li> </ul>
3.	<p><b>Filtration</b></p> <ul style="list-style-type: none"> <li>a. There are 3 no. rapid gravity filters with a filtration rate of 5.5 m<sup>3</sup>/m<sup>2</sup>/hr.</li> <li>b. A backwash was observed in Filter No. 2. Air is discharged first for 5 minutes and water for 10 minutes. The process is automated. Headloss is monitored but the backwash is triggered by time (every 24 hours). The backwash water rate is 16.9 m<sup>3</sup>/m<sup>2</sup>/hr and air 22.59</li> </ul>



	<p>m<sup>3</sup>/m<sup>2</sup>/hr. The water is run to waste for 10 minutes after backwashing prior to being put back into service. The process is set-up whereby water cannot go back into service after a backwash unless the turbidity is &lt; 0.5 NTU.</p> <ul style="list-style-type: none"> <li>c. Backwash water is discharged to a stream which flows to the estuary.</li> <li>d. The filter media was replaced in 2008 and is 1 m in total depth. The depth is checked bi-annually.</li> <li>e. Turbidity meters are in place post each filter with Filter 1 reading 0.04 NTU, Filter 2 0.1 NTU (just after backwash) and Filter 3 0.05 NTU. All turbidity monitors were calibrated in August 2014 and are calibrated bi-annually.</li> <li>f. There is a turbidity monitor on the final water which was 0.09 NTU on the day of the audit.</li> <li>g. The turbidity monitors are alarmed (with a text-out cascade facility). The low alarm is set at 1 NTU and the high alarm at 2 NTU.</li> <li>h. There is space for an additional 2 filters to be installed on-site if the capacity is needed.</li> </ul>
<b>4.</b>	<p><b>Chlorination and Disinfection</b></p> <ul style="list-style-type: none"> <li>a. Late 2013 chlorine gas was replaced by sodium hypochlorite 10%.</li> <li>b. There are three chlorine dose pumps, one for the manganese oxidation and the other two for disinfection post filtration (duty &amp; standby).</li> <li>c. The duty and standby chlorine pumps automatically switchover every 24 hours and dose is 60% based on flow and 40% based on the chlorine residual read-out from the chlorine monitor.</li> <li>d. The filtered water flows into a cleanwater tank on-site where chlorination occurs with a dose of 1.0 mg/l. The free chlorine residual target post the clear water tank is 1.8 mg/l. An alarm signals on the clear water tank if the chlorine residual falls below 0.8 mg/l. The monitor was reading 2.05 mg/l during the audit. The contact time in the clearwater tank is 3.7 mg.min/l.</li> </ul>
<b>5.</b>	<p><b>Treated Water Storage</b></p> <ul style="list-style-type: none"> <li>a. After the Clearwater tank, the water enters the on-site 6,400 m<sup>3</sup> reservoir which is divided into two cells. These cells can be isolated to enable inspection and cleaning. The reservoir was cleaned during 2014. There is capacity on-site and foundations laid for an additional reservoir. The contact time in the reservoir is 293 mg.min/l.</li> <li>b. There is an alarmed monitor post the reservoir also. The target chlorine residual is 1 mg/l. The chlorine residual on the day of the audit was 0.83 mg/l post the reservoir.</li> <li>c. There is a cascade system in place whereby staff are contacted by phone when chlorine residual and water level alarms associated with the reservoir are activated. There is a similar cascade in place for alarms associated with turbidity in the final water and chlorine residual in the clearwater tank whereby staff are alerted by text. Alarms also show on the SCADA screen.</li> </ul>
<b>6.</b>	<p><b>Monitoring and Sampling Programme for treated water</b></p> <ul style="list-style-type: none"> <li>a. TOC was found to be close to 2 mg/l post filtration. There is not a THMs issue on the supply in terms of meeting the 100 ug/l parametric value but the Water Services Authority stated that it can be elevated at times.</li> <li>b. This supply had historic aluminium failures in the past and this was the main reason for putting in place the run to waste facility. Since January 2012 to date there have been no issues with aluminium compliance.</li> <li>c. An MCPA failure was also found on this supply on 31/07/12 (network) &amp; 08/08/12 (final water) however follow-up monitoring was complaint (18 further sampling taken in raw and treated water in 2012). As a result the use of PAC for treatment of MCPA was suspended and the file (DW2012/118 – MCPA) was closed on 28/01/13. Analysis for pesticides was carried out 6 times since, upon advice from the HSE, and all results were compliant.</li> <li>d. Manganese is being monitored in the network and two samples failed the 50 ug/l parametric value (52 ug/l and 73 ug/l) on 13/08/14. The Water Services Authority is continuing to specifically treat the water via oxidation while high levels of manganese is present in the raw water.</li> </ul>
<b>7.</b>	<p><b>Chemical storage and bunds</b></p> <ul style="list-style-type: none"> <li>a. PAC is stored in a bulk tank outdoors which is bunded and tops up the day tank indoors.</li> </ul>

	b. There are two chlorine bulk tanks – one was in use on the day of the audit and the other is stocked and brought into service when demand increases.
<b>8.</b>	<b>Management and Control</b> <p>a. Brenntag supply sodium hypochlorite drums to the plant for use as a disinfectant. The label of biocidal detergents is to contain all the relevant elements specified in Article 69 of the Biocidal Products Regulation (EU) No 528/2012 (e.g. the notification or approval number PCS 9xxxx or IE/BPA 7xxxx). The label did not appear to have such number displayed nor did it have an expiry date. Irish legislation requires that all biocides on the market in Ireland must as a first step be notified with DAFM. It is the responsibility of any company wishing to place a biocidal product on the market in Ireland to ensure that the product is notified in accordance with Statutory Instrument S.I. No. 625 of 2001. Further information can be found at <a href="http://www.pcs.agriculture.gov.ie/biocides.htm">http://www.pcs.agriculture.gov.ie/biocides.htm</a> and by contacting the Pesticide Registration and Control Division at <a href="mailto:biocides@agriculture.gov.ie">biocides@agriculture.gov.ie</a></p>
<b>9.</b>	<b>Sludge Management</b> <p>a. The sludge facility built on-site does not work and therefore the sludge bleeds from the clarifiers are discharged to the nearby stream ( see Photo 4) and onto the estuary. A number of options (e.g. pipe sludge to a WWTP facility, treat sludge on-site for which there is planning for) are to be assessed to arrive at the best solution for treatment and disposal of this waste.</p>

### 3. AUDITORS COMMENTS

Overall the plant is operating satisfactory with good control measures in place for the management and operation of the plant. The main concern at the plant is the disposal of sludge waste to receiving water, which should cease. As manganese is an indicator parameter under the Drinking Water Regulations 2014, any persistent failures or concentrations of manganese greatly above the parametric value of 50 ug/l in the final water should be notified to the EPA.

### 4. RECOMMENDATIONS

#### Disinfection

1. The Water Services Authority should ensure that the disinfectant product used for the treatment of this water supply is notified to the Pesticide Registration and Control Division of DAFM in accordance with Statutory Instrument S.I. No. 625 of 2001. The label of biocidal detergents is to contain all the relevant elements specified in Article 69 of the Biocidal Products Regulation (EU) No 528/2012 which is to include the expiry date

#### Sludge Management

2. The Water Services Authority should review current methods of handling and disposal of water treatment sludge to ensure that the practice is not in contravention of the *Waste Management Act, 1996-2003*. The discharge of water treatment sludge to receiving water, where practiced, should cease without delay. The Water Services Authority is requested to submit a timeframe for the cessation of the discharge of water treatment sludge to receiving waters and submit any Q-values / water quality of the stream to indicate if the discharge over time has had any negative impact on the receiving waters.



## **FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER**


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

The Water Services Authority 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.

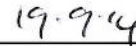
Please quote the File Reference Number in any future correspondence in relation to this Report.

**Report prepared by:**

  
Derval Devaney

Inspector

**Date:**



19/09/14



**Photo 1 Abstraction location in Lough Adeery**



**Photo 2 Stream diverted to feed Lough Adeery**





**Photo 3 Clarifiers (2 No.)**



**Photo 4 Stream receiving sludge and wash water wastes from plant**

