



Drinking Water Audit Report

County:	Mayo	Date of Audit:	2 September 2015
Plant(s) visited:	Lisglennon Water Treatment Plant	Date of issue of Audit Report:	30 September 2015
		File Reference:	DW201/93
		Auditors:	Ms Derval Devaney
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • <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> • The recommendations specified in the <i>EPA Drinking Water Report</i>. • The recommendations in any previous audit reports. 		

MAIN FINDINGS

- i. The chlorine residuals in parts of the network of this supply were inadequate and there was no plan in place to resolve the matter.
- ii. Water treatment equipment was in need of maintenance (e.g. final water turbidity monitor was malfunctioning, the filters and clarifiers needed cleaning and sand filter media was not replaced in almost 30 years).
- iii. Correspondence is outstanding on the open THMs and Pesticides files and a complaint remains open with a response outstanding since 2013.
- iv. The Lisglennon and Wherrow Water Treatment Plants are incorrectly categorised under the one water supply zone with the one scheme code being used for both water supplies. These should be separated into two water supply zones and separate monitoring programmes should be developed for each supply zone.

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. be

It became apparent during this audit (at the Lisglennon water treatment plant) that both the Lisglennon water treatment plant (WTP) and the Wherrow WTP (both abstracting water from Lough Conn and having separate treatment facilities) fall under the one scheme code (2200PUB1033), named the Ballina Regional Water Supply Scheme. The Wherrow WTP was not inspected as part of this audit. The Lisglennon WTP was constructed in the mid-1980's to provide water to Killala and its regional areas in addition to Ballina town. The plant's capacity is 9,100m³/day and currently provides 8,000m³/day to a population of 15,000. The plant runs 23 hours/day. Treatment consists of coagulation, clarification, rapid gravity filtration, chlorination and fluoridation. 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 12.20 pm at the Lisglennon 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: (*Present at closing meeting only, ** Not present at closing meeting)

Mayo Co. Co. (MCC): PJ Brogan, Senior Caretaker, Kevin Maheady, General Operator, Eddie Munnelly, Senior Executive Engineer, Iarla Moran, Acting Senior Engineer**, Gerry Shally, Electrician*.

Irish Water (IW): Sean Higgins and Anne Bonner, Water Compliance Liaison Specialist.

Representing the Environmental Protection Agency (EPA):

Derval Devaney – Inspector

2. AUDIT OBSERVATION

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>Source Protection</p> <ul style="list-style-type: none"> a. The Lisglennon PWS is sourced from Lough Conn and is pumped by night 11km to a 16,000 m³ raw water tank (uncovered) at Lisglennon. The Wherrow Water Treatment Plant, located at the source lake, was built in the 1970's to supply the Asahi Chemical Plant in Kilalla (which closed in the late 1990's) and Ballina town. The Wherrow PWS serves a population of 2,000. The caretaker advises staff at the Wherrow Plant each evening of the water levels in the raw water reservoir at Lisglennon and the volume of water needed to be pumped from source overnight. As there is no automatic shutoff once the desired level in the reservoir is met, water has at times overflowed from the reservoir at Lisglennon. b. There is an online turbidity monitor on the raw water. It was reading 0.4 NTU on the day of the audit. The Caretaker stated that it is usually between 1 and 4 NTU. Colour and pH is monitored at the outlet from the reservoir on a daily basis by staff. c. The water quality colour varies from 30-180 Hazen. pH does not vary much (7.6 to 7.9). The caretaker stated that flooding, heavy rainfall and wind direction can impact colour at source. The River Deel enters the lake near the abstraction point which can also affect water quality as it flows through agricultural land. The caretaker at the Wherrow WTP notifies the Lisglennon caretaker if it observes deterioration in the source water quality. It was stated that MCC have fenced off the area surrounding the abstraction point.
2.	<p>Coagulation, Flocculation and Clarification</p> <ul style="list-style-type: none"> a. There is a static mixer (with baffles in the pipeline) in the incoming raw water line from the water tank to the plant where aluminium sulphate is injected on a flow proportional basis. b. It was stated that jar tests are not carried out regularly and a change in dose is initiated with raw water colour changes. c. The polyacrylamide, Golkem A225 10% solution is dosed 10 minutes later into three separate tanks. d. There are 3 clarifiers which had lamellae plates upgraded 3 years ago and are cleaned once/year. The clarifiers required cleaning and pin-floc was observed in the water entering the channels (see photo 1). e. The upflow is 3.3m/hr and there is a 90 second sludge bleed every 30 minutes.
3.	<p>Filtration</p>

	<ul style="list-style-type: none"> a. The 3 rapid gravity cross flow filters had their walls washed 2 months ago and this is carried out a few times per year. However algae growth was observed on the walls of the filters. The sand media has not been replaced since its installation in the late 1980's. b. Water is gravity fed to each filter and a level sensor on each filter ensures a pre-determined water level is maintained above the filter media. The filtration rate is 5.5 to 6 m/hr. c. The Backwash sequence includes 7 minutes of air scour, 9 minutes of water scour at a backwash rate of 15m³/m²/hr. d. Backwash is based on time on a daily basis. e. Filter No. 1 was backwashed on the morning of the audit. During the 45 minute backwash cycle, the filter in operation takes the additional loading of the plant, however it was stated that the filters have the capacity to do this and turbidity has not been noted to increase during this period on post filtration. A backwash of Filter no. 2 was requested and observed and air scour was even. However a full backwash was not observed as the inlet to the plant was shut-off accidentally preventing sufficient water flow to the filter to complete the full backwashing cycle. f. There is no run to waste facility or low start built into the filters. g. There is a turbidity monitor on each filter and the results from the filters on the date of the audit were 0.06 NTU for Filter No. 1, 0.064 NTU for Filter 2 and 0.06 NTU for Filter 3. Filter No 2 was backwashed at 1pm. h. The final water monitor was reading 0.14 NTU for the entire audit. It was discovered that the turbidity monitor was malfunctioning, with online final water turbidity monitor was reading 0.14 NTU for a week (since 26th August 2015). It was only during the process of the audit that personnel became aware of the monitor's malfunction. i. The caretaker is alerted by text to a turbidity reading when it exceeds 0.5 NTU on the filters and in the final water. j. The filtered water flows by gravity to a final water sump and then to the on-site 4,500 m³ reservoir where the contact time is achieved. There a level sensor and flow meter on the reservoir.
<p>4.</p>	<p>Chlorination and Disinfection</p> <ul style="list-style-type: none"> a. Chlorine gas is used on-site for disinfection. Plans are in place to substitute chlorine gas with another chlorination chemical within the next 12 months. There are 4 gas cylinders in the chlorine room (duty and standby x 2). Automatic changeover of chlorine is in place when there is a drop in pressure. b. The chlorine dose is fixed and not flow proportional however it was stated that the flow to the plant is static. The dose is not linked to the chlorine residual reading on the continuous final water chlorine monitor. Therefore the dose requires manual adjustment to match the chlorine demand (e.g. when the raw colour changes). c. A CL17 chlorine online monitor on the outlet of the final water sump acts as an initial check for chlorine and is alarmed at 0.5 mg/l and 2 mg/l. There is a monitor on the outlet of the on-site reservoir (0.5 days storage) which has the same alarm set points. In both cases, alarms are sent to SCADA and a history of alarms is recorded on-site. The caretakers also receive notification of an alarm by text. d. The chlorine residual at the outlet of the reservoir was 1.59 mg/l on the day of the audit.
<p>5.</p>	<p>Treated Water Storage and Distribution Network</p> <ul style="list-style-type: none"> a. There are 3 treated water reservoirs associated with this supply (a) the on-site 4,500m³ reservoir at Lisglennon, (b) the 5,000m³ reservoir in Ballina serving the town and (c) the 730 m³ reservoir at Kilala. All reservoirs and the raw water tank were cleaned out 3 years ago.
<p>6.</p>	<p>Monitoring and Sampling Programme for treated water</p> <ul style="list-style-type: none"> a. Chlorine residual readings are taken daily in the network and post the Ballina reservoir by the caretakers. The Ballina reservoir ranged from 0.65 to 0.8 mg/l. Chlorine residuals were inadequate during May and June 2015 at Graffy (0.01 mg/l) Kilgarvon (rectified by air value) and Cloonslawn (0.05 mg/l). There is no chlorine booster in the southern distribution area of the network where the residuals are low. b. Compliance monitoring for 2015 in the network was reviewed during the audit and found satisfactory with the exception that on 22/06/15 monitoring at the Ballina Health Centre had inadequate chlorine residual (0.07 mg/l).

	<ul style="list-style-type: none"> c. TOC monitoring was not carried out on the raw and final water to assess the capability of the plant in removing THMs precursors. d. Aluminium in the final water is monitored daily at the plant and was 17 ug/l on the day of the audit. From review of the daily log book aluminium was generally within the range of 23 to 45 ug/l.
7.	<p>Exceedances of the Parametric Values</p> <ul style="list-style-type: none"> a. There is a THMs file open for this supply (File No. DW2013/93) as a result of a THMs failure in 2013 and 2014. Information is outstanding on this file as requested by email on 22/07/15. b. The THMs failure for 2014 (03/06/14) notified to the EPA via ODWNS on 17/06/14 was not included in the Drinking Water Monitoring Returns for 2014. c. There is a pesticide (MCPA) file open for this supply (File No. DW2012/81) and a response to the email sent 14/07/15 is outstanding (MCPA monitoring results for Ballina PWS and how IW/MCC is to engage with stakeholders to promote responsible use of pesticide).
8.	<p>Chemical storage and bunds</p> <ul style="list-style-type: none"> a. The concrete bund of the fluorosilicic acid tank was not adequately lined with protective material.
9.	<p>Sludge Management</p> <ul style="list-style-type: none"> a. Sludge generated on-site is passed through a picket fence thickener and plate press prior to being diverted to Rathoreen Landfill for use as a daily cover for waste. b. A complaint was received on 21/06/13 concerning the impact that a discharge from the WTP occurring about 10-12 times/year is having on the stream. A response to the EPA's letter dated 24/07/13 regarding this matter remains outstanding since 31/10/13. It was stated during the audit that backwash times were staggered to avoid overflow from the wash water sump and clarifiers are drawn down gradually to limit overflow to the scour drain however it was stated that the size of the picket fence thickener and waste water sump was limited and this needed to be optimised to deal with waste water and sludges generated on-site and the amount and quality of wash water discharging from the scour drain to stream.

3. AUDITORS COMMENTS

The auditor became aware during the audit that there were two treatment plants operating under the Ballina Regional Water Supply Scheme – Lislennon WTP and Wherrow WTP - under the one scheme code 2200PUB1033. The auditor explained that each treatment plant should have its own supply zone and public water supply scheme code as there are discrete areas supplied by each treatment works and as such there could be significant differences in treated water quality supplied by each supply due to the difference in treatment and control in place at each plant (e.g. a raw water balance tank exists at Lislennon WTP). See Section 4, paragraph 3.4 of the EPA's Handbook for Public Water Supplies for more information on the delineation of water supply zones <http://www.epa.ie/pubs/advice/drinkingwater/publicwatersupplieshandbook/Section%204.pdf>

The audit highlighted that there are areas of the network which have inadequate chlorine residual and it appears that management was not aware that this was an issue for this supply. The need for maintenance of key equipment was also highlighted as a priority during the audit, such as the final water turbidity monitor and the filters and clarifiers.

Irish Water is requested to communicate with the EPA on the outstanding information that remains for the open files that relate to the Lislennon WTP.

4. RECOMMENDATIONS

1. Irish Water should prevent the loss of raw water from the onsite raw water tank at Lislennon WTP by automating the pumping regime and linking it to water level sensors in the tank to eliminate overflow.
2. Irish Water should undertake a review of the coagulation process at the water treatment works to investigate cause of pin floc formation and ensure there is adequate control of this treatment stage. Jar

testing, use of dosage charts or tables should be in place to determine the correct amount of chemicals to use in the process when raw water quality changes. Irish Water should take account of the recently published EPA Advice Note 15: Optimisation of Chemical Coagulation Dosing at Water Treatment Works available online at <http://www.epa.ie/pubs/advice/drinkingwater/dwadvicenote15.html>.

3. (a) Irish Water should repair the final water turbidity monitor and calibrate it to ensure it is working optimally. Measures should be put in place to ensure a similar incident does not occur (e.g. carry out a manual spot check of turbidity in the final water and cross reference with the online monitor).

(b) Irish Water should ensure that readings from the turbidity monitors post filtration and in the final water are used to determine if there are any spikes in turbidity above the normal operating range post backwash which will determine the appropriate length of time before water is put back into service.
4. Irish Water should carry out cleaning and any necessary maintenance on the clarifiers and filters including: (a) replace filter media, (b) review filter backwash process to ensure backwashing / air scouring systems and underdrains are operating optimally, (c) put in place the facility to ensure filters are run to waste for an appropriate period of time or that there is a delayed or slow start when the filter is brought back into use and (d) ensure there is a programme in place for maintenance and cleaning work to be carried out as required on both the filters and clarifiers.
5. Irish Water should investigate the efficiency of the WTP in removing THM precursors. Investigations should be conducted as per Figure 3.1 and Appendix 2, EPA Drinking Water Guidance on Disinfection By-Products Advice Note No. 4. Version 2 available online at http://www.epa.ie/pubs/advice/drinkingwater/DrinkingWaterGuide4_v8.pdf.
6. Irish Water should review the chlorination system to ensure a fail-safe response is built into the disinfection of the supply so that, in the event of an increase in chlorine demand as a result of raw water deterioration or network demand, there is adequate chlorine dose at the plant to satisfy the contact time and at least 0.1 mg/l in the network at all times. It is recommended that the chlorine dose is flow-proportional and linked to the chlorine monitor reading post contact time.
7. (a) Irish Water should submit the outstanding information on the open files for this supply; THMs File No. DW2013/93 and Pesticide File No. DW2012/81. In addition provide a reason as to why the THMs failure for 2014 (03/06/14) notified to the EPA via ODWNS on 17/06/14 was not included in the Drinking Water Monitoring Returns for 2014.

(b) Irish Water should respond to the EPA's letter dated 24/07/13 regarding the complaint concerning the impact from Lisglennon WTP discharges to water. Irish Water should take measures to ensure the wastewater and sludge management facilities onsite (size of the picket fence thickener and waste water sump) are fit for purpose and there is no impact on the nearby stream.
8. Irish Water should ensure the bund of fluorosilicic acid tank is adequately lined with protective material.
9. Irish Water should create and submit via EDEN a new scheme code for the Wherrow Water Treatment Plant and supply. Irish Water should ensure that compliance sampling (check and audit monitoring) carried out each year are separate for the Lisglennon and Wherrow WTP and are based on the volume of water distributed or produced each day within the individual supply zones serving Lisglisnon WTP and Wherrow WTP. Such monitoring should be reported to the EPA in under the individual scheme codes for these supplies.

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, 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:

Derval Devaney

Date:

30/09/2015

Derval Devaney

Inspector



Photo 1 Pin floc and sludge build up on clarifier