Drinking Water Audit Report

County:	Co. Meath	**Date of Audit:**	02/03/2017
Plant(s) visited:	Liscarton Water Treatment Plant Navan Mid-Meath PWS (Scheme Code 2300PUB1016)	**Date of issue of Audit Report:**	14/03/2017
		File Reference:	DW2008/363
		Auditors:	Ms Ruth Barrington Ms Pauline Gillard
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).* • *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*.		

MAIN FINDINGS

i. **Navan Mid-Meath Public Water Supply (PWS) will remain on the EPA's Remedial Action List due to under capacity at the Liscarton plant until the construction and verification of a proposed new treatment plant at Dowdstown (completion date estimated as 2021). Irish Water must ensure that the scope and details of the planned interim upgrade to Liscarton Water Treatment Plant is sufficient to ensure that water quality is maintained in the interim.**
ii. **The filter media should be replaced and the operation of the filters reviewed.**
iii. **Irish Water should implement a cascade system for response to critical plant alarms.**

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 and to assess the Remedial Action List programme for the supply.

The Navan - Mid Meath PWS is supplied by two water treatment plants (WTP), Liscarton and Kilcarn, whose sources are the Kells Blackwater and Boyne rivers respectively. The scope of this audit covered the Liscarton WTP only. The Navan Mid Meath PWS serves a population of approximately 35,536 and provides 12,233 m^3/day of treated water into supply. The Liscarton WTP produces approximately 10,000 m^3/day which is in excess of the design capacity of 8,000 m^3/day. Treatment at the Liscarton plant consists of coagulation with aluminium sulphate, flocculation and clarification, rapid gravity filtration, disinfection using chlorine gas, and fluoridation.

Future plans for Navan – Mid Meath PWS include upgrading the Liscarton WTP, building a new plant at Dowdstown to address the capacity issues for which the supply is on the RAL, while Kilcarn will be decommissioned.

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

The opening meeting commenced at 10.30 am at Liscarton WTP. 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:

Mr Andrew Boylan, Drinking Water Specialist
Mr Fran Glancy, Drinking Water Analyst

Representing Meath Co Council

Mr Martin Mc Govern, Technician
Ms Helen Mc Donnell, Executive Technican
Mr David Rogan, Caretaker
Mr Aidan Young, Caretaker
Mr Shane Durcan, Caretaker
Mr John Gilsenan, Engineer

Representing the Environmental Protection Agency:

Ms Ruth Barrington, Inspector
Ms Pauline Gillard, 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.	**Coagulation, Flocculation and Clarification** a. The coagulation phase uses aluminium sulphate (alum) as a coagulant. Polyelectrolyte (poly) is used as a coagulant aid. b. There are duty and standby pumps for the alum, both of which pump from the duty tank. The caretaker manually changes between the tanks used. 30 tonnes of aluminium sulphate is delivered approximately every two weeks (weather dependant). c. There is no mixing at present after the alum is dosed, but this will be addressed as part of the upgrade. d. There is no pH correction in the plant, leading to potential over use of alum to adjust the pH. The provision of pH correction will be addressed as part of the upgrade. e. The contact time for alum and polyelectrolyte prior to clarification was unknown during the audit. f. A poly dose of 0.12 mg/l is applied at the flocculation tank. g. Four clarifiers with lamella plates are in place. The sludge blanket bleeds are automatically set, every 6 minutes the clarifier bleeds for 1 minute.

2.	**Filtration** a. Filtration is comprised of three rapid gravity filters. Backwashing is initiated twice a week and all three filters are backwashed on the same day. The caretaker waits 13 minutes after the backwash before returning the filter to service. There is no run to waste facility at the plant. b. A backwash of all the filters was manually triggered during the audit. At filter No. 3, the inspectors observed the air scour at different strengths on each side of filter. The side nearest the weir had much more disturbance/boiling. The air bubbles continued in filter No. 3 even after the air/water scour was complete. Filter Nos.1 and 2 had bubbles closer to the edges of the weir after the air/water scour in the filter. This is shown in Photograph Ref. 1. c. The bubbling observed on each filter suggests that there is a risk of filter breakthrough which may pose a *Cryptosporidium* risk. d. The weir height has been increased since the previous EPA audit to prevent carry-over of the sand media and appears to be working well. e. New air blowers were also provided since the previous audit. f. The sand media was last changed in 2005. A recent filter assessment, not examined during the audit, was said by staff to indicate a need for media replacement.
3.	**Disinfection** a. Disinfection is achieved using chlorine gas. There are 2 large chlorine gas cylinders in a secure, marked and ventilated room. b. The target pH of final water prior to chlorination is pH 6.8. c. Chlorine dosing is flow proportionate and there are duty and standby chlorinators in place. d. There is a chlorine monitor and alarm at the plant which monitors chlorine residuals. There is a low level alarm system with a low level alarm at 0.9 mg/l and a plant shut off at 0.7mg/l. The high alarm is set at 1.7 mg/l and plant shut off alarm is set at 1.8mg/l. There are written procedures in place for both high and low alarms activations. e. A chlorine residual of 0.6 mg/l leaving the plant is aimed for, with a free chlorine residual of 0.1mg/l at the end of the network. f. The chlorine contact time was unknown during the audit. g. Daily samples are taken at kiosks along the network by the caretaker. h. Data from online monitors is logged and can be accessed at the plant.
4.	**Monitoring and Sampling Programme for treated water** a. Daily monitoring is carried out on the final treated water for aluminium, turbidity, pH and fluoride. The results are recorded. b. There are programmed plant shut offs controlled by online monitoring as follows: for turbidity 0.5 NTU, pH 9, aluminium 200 mg/l. c. There are records on site of the network flushing and chlorine residual monitor. The chlorine monitors are calibrated as necessary by the caretaker.
5.	**Management and Control** a. Irish Water indicated that upgrade works to this plant would be completed by Q4 2018. b. Turbidity monitor No. 3 had an out of date calibration sticker (Photograph Ref. No. 2). c. Low chlorine alarms text out to two contact persons, the engineer and caretaker. There is no cascade system in place to react to the alarms but negotiations are in place for setting this up. d. An incident where a low chlorine alarm was triggered on 13th January 2017 was discussed during the audit. One of the factors identified as contributing to increased chlorine demand at the Proudstown Reservoir is a stuck valve at the reservoir, which is thought by staff to lead to a zone of low mixing in the reservoir.

	e. There are individual turbidity monitors on the filters but only one was operational at the time of the audit. Two new monitors had been fitted prior to the audit but were not working and had to be returned to the supplier. The one monitor that was in service was out of calibration. There also is a final water turbidity monitor. The reading at the time of the audit on the treated water turbidity monitor was 0.17 NTU.

3. AUDITORS' COMMENTS

The plant was found to be well run and process documentation and record keeping was up to date and of a good standard. However, it must be noted that the plant is operated over its design capacity due to pressure on the supply, and for this reason the supply is on the RAL until this matter is addressed.

An interim upgrade of the Liscarton WTP is planned by Irish Water and recommendations for inclusions in the scope of this upgrade include pH adjustment, enhanced control over coagulant dose and mixing, and enhanced control over filter operation and backwashing.

Irish Water should replace the media in the filters and review their operation to address the air bubbling on each filter. A cascade system for response to critical plant alarms should be implemented.

4. RECOMMENDATIONS

Coagulation, Flocculation and Clarification

1. Irish Water should ensure that there is adequate mixing and contact time of the coagulant/coagulant aids prior to entry into the clarifier, with consideration given to the provision and location of static mixing as part of the upgrade.

Filtration

2. Irish Water should put in place a programme for the replacement of the filter media.

3. Irish Water should investigate the cause of the bubbling in areas of the filter media in each of the filters and should take appropriate action to optimise the operation of the filters, so that the air/water backwash is even across the filter and that the air line holes are fully functional and not blocked or damaged.

Disinfection

4. Irish Water should review the contact time for chlorine disinfection to ensure that the effective contact time achieved is 15mg.min/l and that the first connections are receiving appropriately disinfected drinking water. Irish Water should submit a calculation of the effective contact time to the Agency.

Management and Control

5. Irish Water should implement a cascade system for response to critical plant alarms.

6. Irish Water should ensure that the two additional filter outlet turbidity monitors (for Filter Nos. 2 and 3) are installed as a priority and procedures are in place to ensure equipment is calibrated.

7. Irish Water should consider the items discussed during the audit for inclusion in the scope of the interim upgrade. These included the following:

(i) Chemical storage and bunding.
(ii) Enhanced controls over filter backwash including automatic backwash, run to waste and the timing and duration of backwash.
(iii) Adjustment of pH and control of coagulant dosing, mixing and contact time.
(iv) Planned changes in the disinfection process (chlorine gas to liquid).

8. Irish Water should carry out works at the Proudstown reservoir to replace the stuck valve and ensure proper mixing throughout the reservoir.

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, Team Lead.

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.

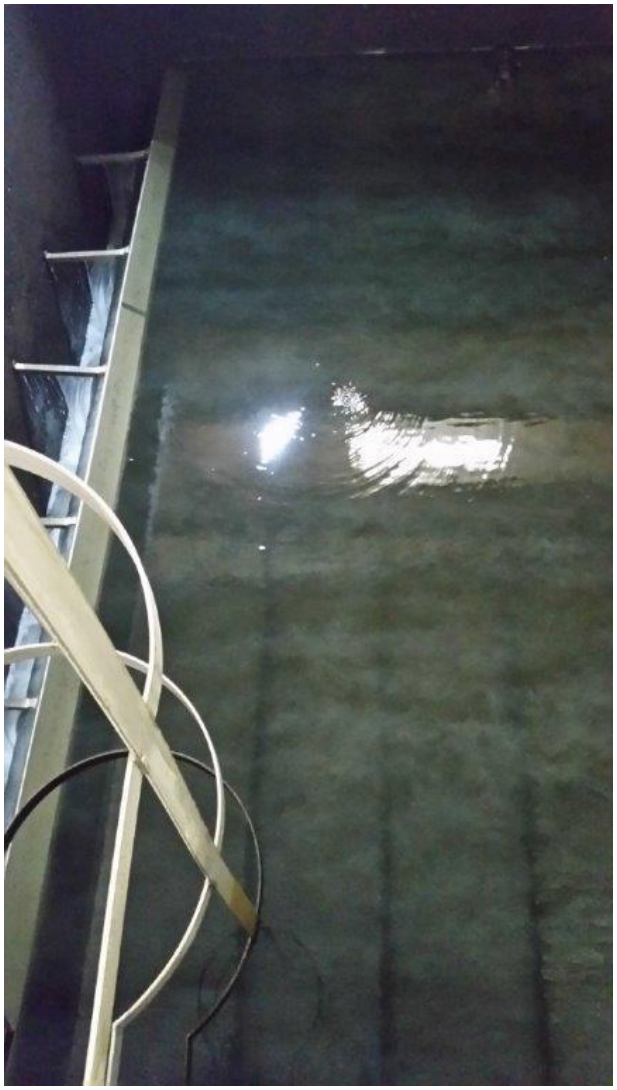
The EPA also advises that the findings and recommendations from this audit report should, where relevant, be addressed at all other treatment plants operated and managed by Irish Water.

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

Report prepared by: **Date:**

Pauline Gillard 14/03/2017

Inspector



Photograph No. 1: Bubbles in the filter (seen across each filter.)

Photograph No. 2: Turbidity monitor no. 3, out of date calibration sticker.