# Site Visit Report

Under the European Union (Drinking Water) Regulations 2014 as amended, 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 water to the visited public supply.

The audit process is a sample on a given date of the facility's operation. Where a finding against a particular issue has been reported this should not be construed to mean that this issue is fully addressed.

## Water Supply Zone

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| **Name of Installation** | Dundrum Regional |
| **Organisation** | Irish Water |
| **Scheme Code** | 2900PUB0113 |
| **County** | Tipperary |
| **Site Visit Reference No.** | SV20708 |

## Report Detail

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| **Issue Date** | 27/11/2020 |
| **Prepared By** | Criona Doyle |

## Site Visit Detail

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| **Date Of Inspection** | 12/11/2020 | **Announced** | Yes |
| **Time In** | 11:00 | **Time Out** | 12:30 |
| **EPA Inspector(s)**<br><br>**Additional Visitors** | Criona Doyle<br>Regina Campbell | | |
| **Company Personnel** | Irish Water: Pat Duggan; Colin Cunningham; Duane O’Brien; Catherine Rice.<br><br>Tipperary County Council: Flan Real; Sharon O’Dwyer, Josie Lyons; Joe Burke | | |

## Summary of Key Findings

(1) The audit confirmed that the incidents on 13/07/20 (turbidity); 24/08/20 (turbidity & aluminium) and 01/10/20 (*Cryptosporidium & Giardia)* which lead to exceedances of the parametric values had been promptly escalated and investigated by Tipperary County Council and Irish Water in accordance with procedures at the water treatment plant. Two of the incidents (24/08/20 & 01/10/20) were linked to the power failures and further investigation is required to ensure remedial measures are implemented to prevent a reoccurrence.

(2) There is no automatic shutdown of the water treatment plant (WTP) linked to the filtered water turbidity alarm setpoints and there are no alarm setpoints on the individual filters. As a result treated water with elevated turbidity can be discharged to the network and the performance of the plants protozoal barrier cannot be verified. Irish Water should review and implement turbidity alarms and shutdowns at the Dundrum WTP using the log credit or turbidity approach. Irish Water also need to identify how the protozoal log deficit at the Dundrum WTP will be addressed.

(3) Remedial works are required on the rapid gravity filters at the Dundrum WTP to ensure an adequate depth of filter media is provided. Irish Water should ensure this work takes place without delay as the minimum recommended depth of filter media, as per EPA guidance, is not currently being achieved.

## Introduction

The Dundrum Public Water Supply (PWS) serves a population of 5,028 and produces 3,627m3/d (EDEN figures) of treated water. Raw water is abstracted from the Multeen river and treated at the Dundrum Water Treatment Plant. Treatment includes coagulation, flocculation, clarification, rapid gravity filtration, chlorination, fluoridation and final pH correction. Upgrade works are being undertaken on the disinfection system under the Irish Water Disinfection Programme.

The purpose of the audit was to review the operation of the Dundrum WTP following the notification of exceedances of the turbidity (13/07/20 & 25/08/20) and aluminium (26/08/20) parametric values and the detection of *Cryptosporidium* (02/10/20) and *Giardia* (02/10/20) following incidents at the Dundrum Water Treatment Plant on the 13/07/20; 24/08/20 and 01/10/20.

## Supply Zones Areas Inspected

In response to COVID-19 social distancing requirements the audit compromised of a video conference meeting with all relevant parties on 12/11/20.

A review was undertaken of the sequence of events surrounding the incidents at the WTP on 13/07/20; 24/08/20 and 01/10/10 that resulted in exceedances of the aluminium and turbidity parametric values and the detection of *Cryptosporidium* and *Giardia*.

A review of the SCADA trend data for turbidity and residual chlorine levels in the final water from the water treatment plant was undertaken for October 2020 to assess the recent operation of the site.

## 1. Incident Management

| | | Answer |
|---|---|---|
| 1.1 | Was the incident suitably alerted to the plant operators, escalated and managed in order to maintain water quality and protect public health? | Yes |
| | **Comment** | |

**Incident No. 1:** The EPA was notified on 14/07/20 of a turbidity exceedance (1.18 NTU) as a result of high raw water colour. Coagulant dosing is automatically controlled with dose rates developed for different raw water colour bands. A blockage occurred in the sample line of the raw water colour monitor which affected the coagulation process and the final filtered water turbidity increased above 0.3 NTU for a 12 hour period. The filters were not operating effectively as a protozoal barrier during this time. The 1 NTU parametric value was exceeded for a duration of 2.2 hours.

The issue occurred during the night of 13/10/20 to 14/10/20. The final water turbidity alarm (2 systems HMI and PMAC 0.3 / 0.25 NTU) on the outlet of the reservoir was triggered and a text alarm generated. There is no automatic shut down of the WTP linked to the turbidity alarm. In line with the alarm response procedure the Caretaker responded to the out of hours alarm the following morning. A programme of investigative monitoring took place at the WTP and in the network in response to the incident including monitoring for aluminium, free and total chlorine, *Cryptosporidium*, *Giardia* and microbiological parameters (Coliforms & *E. Coli*). All of the investigative monitoring results were compliant.

In response to the incident the remedial works included the replacement of the sample tube with a wider diameter bore tubing to avoid blockage and the setting up of a more detailed cleaning rota for the raw water colour monitor.

**Incident No. 2:** The EPA was notified on 25/08/20 of an exceedance of the turbidity parametric value in the final water (5.4 NTU). The incident was as a result of a high raw water colour and an electrical outage which occurred between 3am and 5am on 25/08/20.

The settled water turbidity alarm (1.5 NTU) was generated at 03:45 hours. The final water turbidity alarm (0.25 NTU on PMAC system) on outlet from reservoir was generated at 05:30 hours. In accordance with the alarm response procedure the caretaker responded to the out of hours alarm the following morning at 08:00 hours. The caretaker investigated the issue and identified that the aluminium sulphate dosing pump had tripped out. There is no automatic switch over between duty and standby alum dosing pumps. The plant was run to waste and a manual backwash was instigated. The residual aluminium level in the final water was checked on site (35 ug/l on 25/08/20 and 70 ug/l on 26/08/20) and was satisfactory. A programme of investigative monitoring was undertaken at the WTP and in the network including monitoring for aluminium, free and total chlorine, *Cryptosporidium*, *Giardia* and microbiological parameters (Coliforms & *E. Coli*).

The EPA were subsequently notified on 02/09/20 of aluminium exceedances, 745 ug/l in network at Clonoulty village and 631 ug/l in Carhue reservoir (26/08/20), following the receipt of the sampling results from the laboratory on 01/09/20.

The investigation into the incident identified the cause as an electrical issue linked to the failure of a relay. The aluminium sulphate dosing pump failure did not show up as a trip on the HMI. The pumps were inspected and returned to operation on the evening of 25/08/20. The investigations into the issue with the power supply at the WTP were ongoing on the day of the audit.

**Incident No. 3:** The EPA received a phone call on 02/10/20 to notify of a turbidity issue at the WTP where the turbidity > 0.5 NTU for a 2 hour period. A power failure resulted in monitoring instruments tripping out and the failure of the alum dosing pump. An electrical contractor was called to site and all instruments were reset. Investigative monitoring was undertaken in response to the incident at the WTP and in the network and included chlorine residual, microbiological parameters (*E. Coli* and Coliforms), aluminium, *Cryptosporidium* and *Giardia*. *Cryptosporidium* and *Giardia* were detected in the final treated water sample taken at Dundrum WTP on 03/10/20 in response to the incident. Sampling for *Cryptosporidium* and *Giardia* on 09/10/20 and 14/10/20 was clear.

The investigations into the power supply issue are ongoing at the plant. The power logger is to be reviewed and investigated by an electrical contractor.

All 3 no. incidents were suitably alerted to the plant operators, escalated and managed in accordance with the WTP procedures. The absence of automatic shutdown of the WTP linked to the turbidity alarm resulted in the discharge of treated water with elevated turbidity to the network and the compromising of the protozoal barrier.

## 2. Coagulation Clarification Flocculation (CFC) Stage

| | | Answer |
|---|---|---|
| 2.1 | Is the CFC process optimised to respond to changes in raw water quality? | Yes |

**Comment**

Aluminium sulphate is used as the coagulant at the WTP. There are duty and standby alum dosing pumps. There is no automatic switchover between duty and standby dosing pumps. Coagulant dosing is automatically controlled with dose bands developed based on colour. Poly is used as the coagulant aid with duty and standby dosing pumps provided.

## 3. Filtration

| | | Answer |
|---|---|---|
| 3.1 | Are the filters designed and managed in accordance with EPA guidance? | No |

**Comment**

There are 3 no. rapid gravity filters at the plant. There are no marker posts installed in the filters to assist with monitoring of the depth of filter media present. An assessment of the filter media was undertaken in May 2019. Irish Water and Tipperary County outlined that the filter media depth is approximately 700mm. This is less than the recommended minimum depth. Irish Water should ensure the filter media depth meets the EPA guidance.

The filter media was last changed in 2012 with media replacement scheduled to take place in 2022.

Automatic backwashing of the rapid gravity filters is instigated on a timed basis only with each filter being backwashed on a 24 hour frequency. There is no automatic backwashing of filters linked to monitoring of turbidity.

| | | Answer |
|---|---|---|
| 3.2 | Does monitoring indicate that the filters are operating effectively? | No |

**Comment**

Continuous monitoring of turbidity takes place on the final treated water on the outlet from the reservoir and the current turbidity alarm set points are linked to this monitoring location. There is no automatic shutdown of the supply linked to elevated turbidity.

Turbidity monitors are installed on each of the individual rapid gravity filters. There are no turbidity alarm set points in place on the individual filters.

The SCADA print out from the continuous turbidity monitor for Filter No. 2 indicated that the turbidity is generally close to 0.2 NTU which is consistently higher than the turbidity observed in Filter No. 1 or Filter No. 3. The accuracy of the turbidity monitor on Filter no. 2 should be assessed.

Irish Water confirmed the plant is operated under the log credit approach. The current alarm set points (0.25 NTU / 0.30 NTU) which are just on the final water do not meet the criteria to demonstrate an effective protozoal barrier is being maintained using the log credit approach as no alarm set points are in place on the individual filters.

## 4. Disinfection

| | | Answer |
|---|---|---|
| 4.1 | Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible? | Yes |

**Comment**

The residual chlorine trend and chlorine alarm setpoints on the outlet from the onsite reservoir were reviewed. The chlorine alarm setpoints on the HMI include a high chlorine alarm setpoint of 1.50mg/l and low level chlorine alarm set point 0.60mg/l which generate a text alert. There are also an additional set of alarm setpoints on the PMAC system which generate a text alert for a low chlorine at 0.81 mg/l and a high chlorine at 1.53 mg/l. Both the HMI and PMAC alarm systems send a text alert to the Process Technician and Plant Caretaker.

The continuous residual chlorine trend, measured at the outlet of the reservoir, for the month of October was reviewed. An explanation was provided for the dips in the residual chlorine level to 0 mg/l on the following dates: (i) 01/10/20 to 02/10/20 related to electrical panel issue; (ii) 13/10/20 cleaning of the residual chlorine monitor (iii) 20/10/20 shutdown during disinfection upgrade works at WTP.

The residual chlorine level between the 13/10/20 and 20/10/20 trended between 1.4 mg/l and 1.5 mg/l which is higher than the trend observed of 0.9mg/l and 1.2 mg/l which was observed for the rest of the month.

The chlorination disinfection system is in the process of being upgraded under the Irish Water Disinfection Programme. The works completed at the time of the audit include the installation of baffles in the clear water tank and new injection points.

| | | Answer |
|---|---|---|
| 4.2 | Is the residual chlorine monitored at a suitable sample location after contact time has been completed? | Yes |

**Comment**

Monitoring of the residual chlorine level takes place on the outlet from the reservoir. The contact time calculation was provided by Irish Water in advance of the audit. The total effective contact time of 39.11mg/l is higher than the target contact time of 37.44 mg/l confirming that adequate contact time is being achieved.

| | | Answer |
|---|---|---|
| 4.3 | Is there a suitable monitoring frequency for residual chlorine in the network with records available? | Yes |

**Comment**

Irish Water provided a copy of the monitoring records for residual chlorine in the network for the month of October 2020 which confirmed regular monitoring is taking place several times per week and the levels were > 0.1 mg/l on all sampling dates.

## 5. Management and Control

| | | Answer |
|---|---|---|
| 5.1 | Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process? | No |

**Comment**

There are continuous turbidity monitors on each rapid gravity filter but there are no turbidity alarms or shutdowns linked to the operation of the individual filters.

The final water turbidity monitor is located on the outlet from the reservoir and does not provide an early warning of deteriorating water quality or the failure of a critical treatment process as an alarm will not be generated until the water has gone through the complete treatment process and is leaving the reservoir.

There is a high level turbidity alarm of 0.3 NTU for the final filtered water on the HMI system on site measured on the outlet from the reservoir. There is also a warning alarm level of 0.25 NTU on the PMAC system. Both alarms systems generate a text alert to the Process Technician and Plant Caretaker but there is no automatic plant shutdown in place. There is a procedure in place at the WTP on how to respond to alarms.

There is a settled water turbidity alarm set point at 1.5 NTU which generates a text alert. This alarm provides a warning of an issue after the coagulation stage and prior to the filtration stage. This alarm was instigated during the incident on 24/08/20 and alerted the Plant Caretaker of the issue at the WTP.

| | | Answer |
|---|---|---|
| 5.2 | Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network? | No |

**Comment**

There is currently no automatic shutdown of the water going into supply linked to elevated turbidity.

It was outlined at the audit that automatic plant shutdown linked to turbidity will be installed as part of the disinfection programme upgrades. A date for completion of the auto shutdown works could not be confirmed at the audit but quotes were being obtained for the works.

## 6. Site Specific Issues

| | | Answer |
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| 6.1 | Is there a log deficit under the protozoal log credit requirement ? | Yes |

**Comment**

Irish Water outlined that plant is being operated using the log credit approach. Irish Water advised at the audit that the Dundrum WTP had yet to be reviewed under the new *Irish Water Source Cryptosporidium Risk Assessment Methodology*. Under the current methodology the protozoal log credit requirement for the S2 source water is 4 log.

The current treatment at the plant provides 3 log credit if operated in accordance with the log credit performance approach. This indicates there is a 1 log deficit based on the current assessment.

Irish Water confirmed monitoring for *Cryptopsoridium* and *Giardia* is taking place 9 months per annum. *Cryptosporidium* and Giardia were detected in a treated water sample taken on 02/10/20 in response to the incident on 01/10/20. All other treated water samples for monitoring of *Cryptosporidium* and Giardia in 2020 were clear.

| | | Answer |
|---|---|---|
| 6.2 | Is the information reported by Irish Water on the EPA EDEN portal correct ? | No |

**Comment**

Tipperary County Council did not agree with the supply volume reported by Irish Water on the EPA EDEN portal and outlined that the volume figure needs to be updated as some of the supply is now being provided from Ironmills.

## Recommendations

| Subject | Dundrum - Audit 12 11 2020 | Due Date | 27/12/2020 |
|---|---|---|---|
| **Action Text** | **Recommendation(s)**<br><br>1. Irish Water should review and implement turbidity alarm setpoints and shutdowns on each individual filter and the final filtered water to ensure an effective protozoal barrier at the Dundrum water treatment plant using the log credit or turbidity approach.<br>2. Irish Water should ensure the rapid gravity filters meet EPA guidance in relation to (i) provision of marker posts (ii) age and condition of media (iii) media depth (iv) and backwashing of filters linked to turbidity.<br>3. Irish Water should confirm the completion date for the installation of the automatic plant shutdown linked to the turbidity alarm.<br>4. Irish Water should review the accuracy of the online monitor turbidity readings for Filter No. 2.<br>5. Irish Water should confirm the protozoal log treatment requirements for the plant and identify how the log deficit will be addressed.<br>6. Irish Water should install automatic switchover between the duty and standby coagulant dosing pumps.<br>7. Irish Water should provide an update on what remedial works are proposed to deal with power outages and provide an update on the findings of the investigations into the causes of the recent power outages.<br>8. Irish Water should confirm the population served by the supply and the volume being distributed on the EPA EDEN portal.<br>9. Irish Water should submit the results of daily aluminium monitoring at the Dundrum water treatment plant for the month of October 2020.<br><br>**Follow-Up Actions required by Irish Water**<br><br>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.<br><br>This report has been reviewed and approved by Regina Campbell, Drinking Water Team Leader.<br><br>Irish Water should submit a report to the Agency on or before 27/12/20 detailing how it has dealt with the issues of concern identified during this audit.<br><br>The report should include details on the action taken and planned to address the various recommendations, including time frame for commencement and completion of any planned work.<br><br>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.<br><br>Please quote the Action Reference Number Compliance Plan DW20200058 in any future correspondence in relation to this Report. | | |