# 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

| | |
|---|---|
| **Name of Installation** | Edenderry PWS |
| **Organisation** | Irish Water |
| **Scheme Code** | 2500PUB1008 |
| **County** | Offaly |
| **Site Visit Reference No.** | SV22565 |

## Report Detail

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| **Issue Date** | 05/08/2021 |
| **Prepared By** | Daryl Gunning |

## Site Visit Detail

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|---|---|---|---|
| **Date Of Inspection** | 02/07/2021 | **Announced** | Yes |
| **Time In** | 10:00 | **Time Out** | 10:45 |
| **EPA Inspector(s)**<br><br>**Additional Visitors** | Daryl Gunning | | |
| **Company Personnel** | Irish Water: Dara Chadwick; Ivan Corcoran*; Michael McArdle<br><br>Offaly CoCo: Joe Coleman*; Dermot Killeen; Gerry McGarrigle<br><br>Coffey Group (contractor): Gary Gilliland; Mahsa Foolad<br><br>*Attended pre-site visit meeting (01/07/21) only. All other personnel attended both pre-site meeting and site visit (02/07/21) | | |

## Summary of Key Findings

1. The disinfection upgrades at the Blundellwood WTP were fully commissioned by 27.11.20. However, due to a lack of power supply capacity, the ultraviolet (UV) disinfection system is not currently in operation. The plant is currently operating with chlorination as the primary disinfection until the ESB connection for the new UV system is completed. Irish Water made the EPA aware of this issue, prior to this audit, through a compliance plan that was opened for the Edenderry public water supply (PWS) in relation to inadequate chlorine contact time.

2. All other disinfection upgrades have been fully commissioned and are in operation at the WTP.

3. Irish Water's chlorine contact time calculations show that a chlorine residual concentration of 0.5 mg/l in the final water leaving the Blundellwood water treatment plant (WTP) is required to ensure adequate disinfection in the distribution network. However, the low (0.3 mg/l) and low-low (0.2 mg/l) chlorine alarms currently in place at the WTP are not currently aligned with this requirement and will not sufficiently alert the plant operators to a disinfection incident. Irish Water should ensure that the minimum free chlorine concentration after the established contact time validation point is 0.5 mg/l, with low chlorine alarm set-points in place, while Blundellwood WTP is operating with chlorination as the primary disinfection system.

## Introduction

The Edenderry PWS produces approximately 2113 m3/day of water serving a population of 7,626. Raw water is abstracted from the Kishawanny and Edenderry boreholes.

This audit is a targeted audit specifically assessing the disinfection systems that have been subjected to Irish Water's Disinfection Programme and reported to the EPA as having been fully commissioned.

Disinfection upgrades at the Blundellwood WTP consist of: an upgraded chlorination system, a new UV system (awaiting ESB connection), a new borehole control system, and upgraded telemetry system (Note: primary disinfection is currently chlorination until the ESB connection for the new UV system is completed).

## Supply Zones Areas Inspected

This audit assessed the disinfection system at the Blundellwood WTP.

## 1. Disinfection

| | | Answer |
|---|---|---|
| 1.1 | Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible? | Yes |

**Comment**

All chlorine and UV monitors are within their calibration date.

| | | Answer |
|---|---|---|
| 1.2 | Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place? | Yes |

**Comment**

Monitors and alarms for the disinfection system operate via dial out and are responded to with a cascade system (there are four Offaly County Council staff on the cascade system). Note: UV monitors and alarms have been fully commissioned, however, the UV system is not yet in operation at the WTP.

| | | Answer |
|---|---|---|
| 1.3 | Is there a procedure in place for caretakers and contractors to check and sign-off that all alarms have been correctly re-set on completion of any maintainence work? | No |

**Comment**

Irish Water stated that once the formal handover of the disinfection upgrades to Offaly County Council has been completed (see section 3.4), documented alarm response, alarm check, and sign-off procedures will be made available on site.

| | | Answer |
|---|---|---|
| 1.4 | Is the UV system suitably validated? | Yes |

**Comment**

1. A "VISADES T2500-300" UV disinfection system was installed and commissioned at the WTP by 27.11.20, via the use of an electricity generator.
2. The UV system is validated to an international validation standard by the Austrian Association for Gas and Oil (OVGW certification). A copy of the validation certificate was provided at the audit.
3. Automatic switch-over of duty and standby UV units will occur every 12 hours.
4. The UV system is alarmed for UV dose as follows: (i) low: 44 mJ/cm3 and (ii) low low: 40 mJ/cm3 and for UVT as follows: (i) low: 80% and (ii) low low: 75%. The UVI alarm (low and low low) is calculated by the intelligent UV ballast system. There is a three minute time delay before the alarms are activated. A cascade system is in place to alert staff in the event of an alarm being triggered. A plant shutdown will occur in the case of a low-low alarm being triggered.
5. Automatic switchover will also occur in the case of UV unit failure. An alert will also be sent out via the cascade system. If both UV units fail, the plant will enter into shutdown mode. An alert will also be sent out via the cascade system.
6. The warm-up time of the UV units is <5 minutes. No water will pass through the UV units during this warm-up period.

| | | Answer |
|---|---|---|
| 1.5 | Are UV lamps replaced at a suitable frequency? | Yes |

**Comment**

UV lamps are replaced every 9000 hours by fully trained contractors.

| | | Answer |
|---|---|---|
| 1.6 | Is the chlorine dosed appropriately? | Yes |

**Comment**

1. Raw water from the Kishawanny and Edenderry Boreholes is disinfected with 10-11% sodium hypochlorite. Chlorination is currently the primary disinfection at the WTP.
2. Dosing is flow proportional. There is a duty and standby dosing pump, which is automatically switched over every 3 hours. The chlorine dose is automatically adjusted based on the residual chlorine monitor.
3. Automatic switchover also occurs in the case of pump failure. An alert will also be sent out via the cascade system. If both pumps fail, the plant will enter into shutdown mode. An alert will also be sent out via the cascade system.
4. A chlorine residual of 0.5 mg/l is aimed for leaving the WTP. The chlorine residual monitor (CL002) was reading 0.54 mg/l on the day of the audit.

| | | Answer |
|---|---|---|
| 1.7 | Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection? | No |

**Comment**

Irish Water's chlorine contact time calculations show that the minimum free chlorine concentration required after the established contact time validation point is 0.5 mg/l to ensure adequate disinfection of the final water leaving the Blundellwood WTP. The chlorine monitoring data submitted by Irish Water showed that on a number of occasions (25.05.21 - 25.06.21), the chlorine residual reading from the CL002 monitor was <0.5 mg/l.

| | | Answer |
|---|---|---|
| 1.8 | Is the residual chlorine monitored at a suitable sample location after contact time has been completed? | Yes |

**Comment**

There are two chlorine monitors at the WTP. CL001 is located at the disinfection kiosk prior to the reservoir. CL002 is located between the reservoir and water tower, after contact time has been achieved.

| | | Answer |
|---|---|---|
| 1.9 | Are manual chlorine tests carried out and recorded on final treated water to compare with the continuous monitor results? | Yes |

**Comment**

The caretaker takes a daily sample on a handheld chlorine monitor to check the accuracy of the continuous monitors.

| | | Answer |
|---|---|---|
| 1.10 | Is there adequate chlorine contact time before the first connection? | Yes |

**Comment**

Irish Water's chlorine contact time calculations show that the chlorine contact time before the first connection is 28.80 mg.min/l, which is sufficient to ensure an adequately disinfected water supply before it reaches the first consumers. Contact time is achieved via the on-site reservoir (12m x 12m x 2.6m).

| | | Answer |
|---|---|---|
| 1.11 | Is there a chlorine residual ≥0.1 mg/l throughout the network? | Yes |

**Comment**

Chlorine residual levels are measured in the network daily. A chlorine residual of >0.1 mg/l is consistently achieved throughout the Edenderry PWS network, which demonstrates the water in the distribution network is adequately disinfected.

## 2. Treatment Process Chemicals

| | | Answer |
|---|---|---|
| 2.1 | Are treatment process chemicals appropriately managed and stored? | Yes |

**Comment**

1. The sodium hypochlorite dosing tank is stored in an appropriately bunded area. There was no evidence of standing water around the dosing points.
2. No sodium hypochlorite drums are stored on site. The empty drums are appropriately packaged and removed from site by a contractor as soon as the sodium hypochlorite dosing tank is filled.
3. One empty drum was kept on-site and was examined at the audit. It had all the appropriate labels attached (pesticide control service number, expiry date, and manufacture date).

## 3. Management and Control

| | | Answer |
|---|---|---|
| 3.1 | Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network? | No |

**Comment**

1. The following chlorine alarms are set at the WTP: (i) low: 0.3 mg/l; (ii) low low: 0.2 mg/l; (iii) high: 1.5 mg/l; and (iv) high high: 2 mg/l. There is a 15 minute time delay before the alarms are activated. These low chlorine alarm set-points are not satisfactory because chlorination is currently the primary disinfection system at Blundellwood WTP, and Irish Water's chlorine contact time calculations show that 0.5 mg/l chlorine residual is required in the final water. Therefore it is crucial that the low chlorine alarms are set at a minimum of 0.5 mg/l to ensure the final water leaving the plant is adequately disinfected.
2. A cascade system is in place to alert staff in the event of an alarm being triggered. A plant shutdown will occur in the case of a low-low or high-high alarm being triggered.

## 4. Disinfection Programme Audits

| | | Answer |
|---|---|---|
| 4.1 | Has the system been installed by the Contractor in accordance with the agreed scope of works for the site? | Yes |

**Comment**

Irish Water confirmed that all disinfection upgrades have been installed by the contractor in accordance with the agreed scope of works for the site. Disinfection upgrades at this WTP consisted of: an upgraded chlorination system, a new UV system (awaiting ESB connection), a new borehole control system, and upgraded telemetry system.

| | | Answer |
|---|---|---|
| 4.2 | Has the new/upgraded disinfection system been SAT tested, commissioned, available on Telemetry and available for operation? | Yes |

**Comment**

A copy of the System Acceptance (SAT) testing documentation was provided for inspection at the audit. Commissioning of the newly upgraded disinfection systems was completed on 27/11/20. Note: the newly installed UV system was fully commissioned via the use of an electricity generator. The UV system is not currently in operation at the WTP.

| | | Answer |
|---|---|---|
| 4.3 | Have all relevant staff received the appropriate training on the disinfection upgrades? | No |

**Comment**

Irish Water confirmed that all relevant staff are currently undergoing training on the disinfection upgrades. Once the UV system is fully operational at the WTP, staff training will be finalised.

| | | Answer |
|---|---|---|
| 4.4 | Have the disinfection upgrades formally been handed over to the LA? | No |

**Comment**

Irish Water confirmed that the formal handover of the disinfection upgrades to Offaly County Council will take place after the UV system is fully operational at the WTP. A Certificate of Completion will be issued once the following are achieved: i) the system has been installed by the contractor in accordance with the agreed scope of works for the site; (ii) the new/upgraded disinfection system has been SAT tested, commissioned, available on Telemetry and available for operation; (iii) appropriate training has been provided to operators; and (iv) the Operational Monitoring Period is complete (30 days of data monitoring of the live upgraded disinfection system followed by assessment and approval of the data).

| | | Answer |
|---|---|---|
| 4.5 | Are the disinfection upgrades currently in use at the WTP? | No |

**Comment**

All disinfection upgrades, except the UV system, are currently in use at the WTP. The current electricity capacity at the WTP is not powerful enough to run the UV system. Irish Water and Offaly County Council are engaging with the ESB on an ongoing basis to connect the WTP to the upgraded electricity supply.

| | | Answer |
|---|---|---|
| 4.6 | Is the Operational Monitoring Period complete?* | No |

**Comment**

Irish Water confirmed that the 30 day operational monitoring period (OMP) is complete for all aspects of the disinfection upgrades, except for the UV system. The OMP will be carried out separately for the UV system once it is fully operational at the WTP. Once complete, a copy of the Operation & Maintenance (O&M) manual will be made available at the WTP.

## Recommendations

| Subject | Edenderry disinfection audit recommendations | Due Date | 06/09/2021 |
|---|---|---|---|
| **Action Text** | **Recommendations**<br><br>1. Irish Water should ensure that the UV disinfection system is connected to the ESB electricity supply without delay.<br><br>2. Irish Water should provide the EPA with the 30 day Operational Monitoring Period data for the UV system, as soon as available.<br><br>3. Irish Water should provide confirmation to the EPA when the disinfection upgrades at the Blundellwood WTP have been formally handed over to Offaly County Council and confirm that a certification of completion has been issued. This should be completed without delay.<br><br>4. Irish Water should ensure that the minimum free chlorine concentration after the established contact time validation point is 0.5 mg/l while the Blundellwood WTP is operating with chlorination as the primary disinfection system.<br><br>5. Irish Water should ensure that the low and low-low chlorine alarm set points are set at an appropriate level to ensure that the target residual chlorine concentration in the final water leaving the WTP is met.<br><br>6. Irish Water should review the 15 minute time delay on the low chlorine plant shutdown alarm, in order to minimise the risk of inadequately disinfected water being supplied to consumers.<br><br>7. Irish Water should ensure that the following documentation is made available at the Blundellwood WTP: (i) alarm response, alarm check, and sign-off procedures; and (ii) Operation & Maintenance manual.<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 Aoife Loughnane, Drinking Water Team Leader.<br><br>Irish Water should submit a report to the Agency one month from the date of this audit report, 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 Compliance Plan Number DW20210088 in any future correspondence in relation to this Report. | | |