

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 | Glashaboy |
| Organisation | Irish Water |
| Scheme Code | 0500PUB3303 |
| County | Cork |
| Site Visit Reference No. | SV23045 |

| Report Detail | |
|--------------------|--------------|
| Issue Date | 21/12/2021 |
| Prepared By | Criona Doyle |

| Site Visit Detail | | | |
|----------------------------|--|------------------|-------|
| Date Of Inspection | 03/12/2021 | Announced | Yes |
| Time In | 10:00 | Time Out | 11:55 |
| EPA Inspector(s) | Criona Doyle | | |
| Additional Visitors | | | |
| Company Personnel | Irish Water: Pat Britton, Phil Elvins, Tommy Roche. Cork County Council (acting under service level agreement to Irish Water): Eimer O'Riordan, Mark O'Leary and Padraig Griffin. | | |

> Summary of Key Findings

(1) Improvements to the coagulation and filtration stages have been undertaken since the previous audit on 23/03/2019. Improvements to the coagulation stage include the installation of a static mixer, automatic coagulant dosing via a streaming current monitor and the addition of a coagulant aid (polyelectrolyte). Improvements to the filtration stage include resanding of the filters and increasing the height of the free board.

(2) A number of the previous audit recommendations have not been completed but works are underway to address these as part of the further upgrade works planned with a RAL completion date of 30/06/2024. A contractor has been appointed and detailed design is underway.

(3) Sludge is being discharged from the Glashaboy water treatment plant (WTP) to the river. Irish Water should review the current methods of handling and disposal of water treatment sludge to ensure that the practice is not in contravention of the Waste Management Act 1996-2011. The discharge of water treatment sludge to the receiving water, where practiced, should cease immediately.

(4) The plant was performing satisfactorily on the day of the audit as demonstrated by the low filtered water turbidity levels and stable residual chlorine levels.

> Introduction

The Glashaboy public water supply (PWS) serves a population of 24,602 and produces 17,397m³/d of treated water (EDEN figures). Raw water is abstracted from the Glashaboy River. Treatment includes coagulation, flocculation, clarification, filtration, disinfection, fluoridation and final pH correction. The site is manned 24 hours a day 365 days a year.

The audit was undertaken to assess the operation and management of the water treatment plant and to assess progress with the recommendations from the previous audit undertaken by the Environmental Protection Agency (EPA) on 25/03/2019. The Glashaboy PWS has been on the EPA Remedial Action List (RAL) since 30/04/2020 under the category EPA Audit Observation – Treatment and Management Issues.

> Supply Zones Areas Inspected

The audit consisted of an on-site inspection of the Glashaboy WTP on 03/12/2021. The treatment processes were inspected.



1. Coagulation Clarification Flocculation (CFC) Stage

| | Answer |
|---|--------|
| 1.1 Is the CFC process optimised to respond to changes in raw water quality? | No |
| Comment | |
| <p>Dosing is flow proportional and automatic coagulant dosing is controlled by the streaming current monitor which has been in operation since May 2021. Jar testing is undertaken 4 times a day for validation purposes. The aluminium sulphate dose rate on the day of the audit was 36 to 37 mg/l. pH adjustment with soda ash has not been required since 2019 as the pH has remained above 6 pH units. A new polyelectrolyte dosing unit has been installed to provide coagulant aid since the last audit and dosing is flow proportional and dosed via a spreader bar.</p> <p>Duty and standby coagulant dosing pumps are installed for dosing of the coagulant (8% aluminium sulphate). While the CFC process is optimised to respond to changes in raw water quality the following issues were observed: (i) the current set up requires manual switchover of the pumps if the duty pump breaks down and (ii) on the day of the audit the standby pump was not working.</p> <p>A new duty and standby pump have been procured and are expected to be installed by the end of 2021. Cork County Council stated there will be automatic switchover between the new duty and standby pumps. An alarm is triggered in the event the alum dose low level setpoint of 10 l/hr is breached. This alarm triggers automatic plant shutdown after a 10 minute delay period.</p> | |

| | Answer |
|--|--------|
| 1.2 Are the CFC processes appropriately controlled? | No |
| Comment | |
| <p>Improvements to the coagulation process have been implemented since the last audit in 2019. However, further works remain to be carried out. A new flow meter chamber has been installed and the dosing points have been moved to this location to increase the time for the coagulation process. A static mixer has also been installed to improve the coagulation process. The daily aluminium test results for the month of October were provided prior to the audit and indicated satisfactory results.</p> <p>On the day of the audit pin floc was visible quite high in the clarifiers but no floc was observed to be carrying over into the decanting channels. Further improvement works are planned as part of the RAL upgrades works including the installation of a new flocculation tank which should address this issue. A contractor has been appointed and the detailed design is underway however planning will be required before this work can proceed.</p> | |

| | Answer |
|--|--------|
| 1.3 Were the CFC tanks, channels and weirs observed to be clean, level and well maintained during the audit? | Yes |
| Comment | |
| <p>The decanting channels and weirs were observed to be clean, level and well maintained. Cork County Council confirmed that a deep clean of the tanks is undertaken every 2 months which includes cleaning of the tank walls, channels and weirs.</p> | |

> 2. Filtration

| | | Answer |
|--|---|--------|
| 2.1 | Are the filters designed and managed in accordance with EPA guidance? | No |
| Comment | | |
| <p>There are 6 no. rapid gravity filters at the WTP. Since the previous audit all of the filters have been resanded (works completed on 11/11/21), the height of the freeboard increased and media depth marker posts have been installed. The filter media is composed of 700mm silica sand, 150mm gravel layer (3mm to 6mm), 100mm gravel layer (6mm to 12mm), 150mm gravel layer (12 – 25mm). The 700mm depth of filter media is less than the 1m minimum recommended in the EPA Water Treatment Manual: Filtration.</p> <p>Filter backwashing is undertaken on a timed basis and each filter is washed every 48 hours. There is no automatic backwashing based on turbidity or headloss. There is no run to waste following backwashing. The installation of a run to waste following backwashing is progressing as part of the RAL upgrade works. There is a 45 to 50 minute delayed start after backwashing.</p> <p>There is a turbidity alarm set point at 0.25 NTU on each of the individual filter turbidity monitors. The alarm generates a text alert to the plant mobile. The plant is manned 24 hours a day and in the event of a triggering of the turbidity alarm setpoint site staff respond to the alarm and investigate. There is no automatic shutdown of individual filters linked to the turbidity alarm. There is no turbidity monitor for combined filters 1 to 6 which is a requirement to achieve the log credit and to verify the continued operation of the Cryptosporidium barrier. Cork County Council undertake monthly monitoring of Cryptosporidium and Giardia. The new combined filtered water turbidity monitor has been purchased and will be installed by the end of 2021. It was outlined by Irish Water that this new monitor will be alarmed at 0.25 NTU but there may not be a plant shutdown linked to this alarm.</p> | | |

| | | Answer |
|--|--|--------|
| 2.2 | Does monitoring indicate that the filters are operating effectively? | Yes |
| Comment | | |
| <p>On the day of the audit the following individual filter turbidities were observed: Filter 1 0.027 NTU, Filter 2 0.170 NTU (commencing backwashing), Filter 3 0.052 NTU, Filter 4 0.040 NTU, Filter 5 0.025 NTU and Filter 6 0.023 NTU. Turbidity trends for the month of October for individual filters 1 to 6 were provided in advance of the audit. The trends indicated satisfactory turbidity < 0.3 NTU. Spikes on the trends related to backwashing of the filters and the resanding works which were taking place on Filter no. 3.</p> | | |



3. Disinfection

| | | Answer |
|---|--|--------|
| 3.1 | Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place? | Yes |
| Comment | | |
| <p>On the day of the audit the low level chlorine alarm setpoint was 0.6 mg/l and the high level alarm setpoint was 2.50 mg/l at the reservoir outlet (time delay 5 minutes). Both these alarms result in the generation of a text alert to the curator via the plant mobile (24 hour on site cover) followed by a cascade to the 2 no. engineers. Automatic plant shutdown occurs at 0.50mg/l (time delay 15 minutes). There was also a low low alarm level of 0.2mg/l on the alarm system which would not be triggered as it was below the automatic plant shutdown level of 0.5 mg/l.</p> <p>The target residual chlorine level on the reservoir outlet is 0.90 mg/l to 1.0 mg/l on the day of the audit the level at the outlet from the reservoir was 0.95 mg/l.</p> | | |

| | | Answer |
|---|--------------------------------------|--------|
| 3.2 | Is the chlorine dosed appropriately? | Yes |
| Comment | | |
| <p>Primary disinfection is via chlorination using 14-15% sodium hypochlorite. Dosing is flow proportional with a residual trim. There are duty, standby and trim dosing pumps with automatic switchover between duty and standby pumps.</p> | | |

| | | Answer |
|---|---|--------|
| 3.3 | Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection? | Yes |
| Comment | | |
| <p>The residual chlorine trend for the reservoir outlet for the previous week (26/11/21 to 02/12/21) was reviewed on site and confirmed stable levels at approximately 1.0mg/l.</p> | | |

| | | Answer |
|----------------|---|--------|
| 3.4 | Is the residual chlorine monitored at a suitable sample location after contact time has been completed? | No |
| Comment | | |

The contact time calculations provided indicated an effective contact time of 106.40mg.min/l for the new reservoir and 49.26mg.min/l for the old reservoir both of which meet the required site specific target level of 31.20mg.min/l. The residual chlorine level is monitored on both the inlet and outlet on the combined flow to and from the reservoirs (old reservoir & new reservoir).

The low level chlorine alarm was set at 0.6mg/l on the day of the audit and low low chlorine alarm at 0.2 mg/l with automatic plant shutdown at 0.5 mg/l. While the monitors are installed at a suitable location the alarm set points do not align with the information provided in the contact time calculation.

The contact time calculation, submitted with the pre audit information, indicated a minimum free chlorine concentration of 0.75mg/l is required at the contact time validation point. This does not correlate with the current low level chlorine alarm set points. Cork County Council indicated that they would review the contact time calculation and low level chlorine alarm set points following the audit to ensure they are set at appropriate levels.

| | | Answer |
|--|---|---------------|
| 3.5 | Is there a suitable monitoring frequency for residual chlorine in the network with records available? | No |
| Comment | | |
| Monitoring of residual chlorine levels at the extremities of the network is being undertaken once per week at multiple locations. The records for the month of October were reviewed and confirmed that the residual chlorine levels were > 0.1 mg/l throughout the network, however monitoring should be undertaken several times per week. | | |



4. Treatment Process Chemicals

| | | Answer |
|---|---|--------|
| 4.1 | Are treatment process chemicals appropriately managed and stored? | No |
| Comment | | |
| <p>Standard operating procedures for chemical delivery were displayed adjacent to the chemical storage areas. All chemical deliveries are supervised by Cork County Council staff. In response to the previous audit the gas oil storage tank has been replaced with a new bunded tank.</p> <p>A drip tray was present at the fill point for the sodium hypochlorite bulk storage but the fill point is located outside of the bunded area. The fill point for the delivery of aluminium sulphate in the bulk storage area is not located within a bunded area.</p> | | |



5. Management and Control

| | | Answer |
|--|---|--------|
| 5.1 | Has the protozoal compliance log treatment requirement been identified for the water treatment plant? | Yes |
| Comment | | |
| Irish Water confirmed the protozoal log treatment requirement for the Glashaboy PWS as 3 log. There is no deficit as the treatment in place at the Glashaboy WTP provides Log 3 removal if operated in accordance with the EPA Water Treatment Manual: Filtration. | | |

| | | Answer |
|---|---|--------|
| 5.2 | Is there a documented alarm response procedure? | Yes |
| Comment | | |
| <p>A copy of the Irish Water Incident Communication Guidance Response Form was on display in the operations room at the Glashaboy WTP. The chart outlines who is to be contacted in the event of an incident that is likely to have an effect on the quality or quantity of drinking water and provides contact details for the relevant personnel. Training has been provided in October 2021, on Practical Guidance on the Identification and Notification of Incidents, by Cork County Council to operational staff and roll out of this training is to be provided to the remaining staff on the list.</p> <p>Cork County Council also have an in house emergency response procedure and Cork County Council carried out an emergency simulation exercise at the WTP on 14/07/21.</p> | | |

| | | Answer |
|----------------|---|--------|
| 5.3 | Have the recommendations from the previous EPA audit been satisfactorily addressed? | No |
| Comment | | |

The following recommendations from the previous audit on 25/03/21 have not been fully completed to date. These being:

No. 1 Irish Water should progress the operational improvements to the coagulation process without delay to ensure an adequate barrier to Cryptosporidium is provided at all times. Irish Water should provide details on the outcome of the process optimisation investigations together with the details of the proposed improvement works and associated timeframes for completion. In carrying out this investigation Irish Water should have regard to the EPA Water Treatment Manual: Coagulation, Flocculation and Clarification and EPA Advice Note No. 15: Optimisation of Chemical Coagulant Dosing. Irish Water are progressing the operational improvement to the coagulation process. Works completed to date include the installation of a streaming current monitor to provide automatic coagulant dosing and relocation of the dosing points and installation of a static mixer to improve coagulation. Irish Water outlined at the audit that works are progressing for the installation of a flocculation tank with an estimated timeframe of June 2024 for completion of the RAL works.

No. 2 Irish Water should investigate the installation of automatic changeover of alum dosing pumps and investigate the feasibility of installing an alarm to warn of pump failure. The pumps have been purchased and are expected to be operational by end of 2021.

No. 4 Irish Water should install a continuous turbidity monitor on the final treated water (combined filters). This monitor should be linked to a recording device and generate an alarm in the event of deviation from the acceptable operating range of the filters. The monitor has been purchased and is expected to be operational by the end of 2021.

No. 6 Irish Water should undertake a review of the current procedure for bringing the filters back online following backwashing to ensure adequate controls are in place to prevent turbidity breakthrough. Irish Water intend to install a run to waste as part of the RAL works. This work is expected to be completed in advance of June 2024 as planning is not required to facilitate this work element.

No. 11 Irish Water should ensure that free residual chlorine levels at the end of the distribution network are monitored several times per week. The data provided prior to the audit indicated that monitoring is only being undertaken once per week.

No. 13 Irish Water should review the use of rodent bait. The use of rodenticides should be avoided unless absolutely necessary and where they are used, it should be for a limited duration until the problem is brought under adequate control. Irish Water should have regard to EPA Advice Note 13 – Pesticides in Drinking Water. Cork County Council outlined at the audit that an alternative to the use of rodent bait was being examined.

No. 14 Irish Water 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 – 2011. The discharge of water treatment sludge to receiving water, where practiced, should cease immediately. Leachate from stored drinking water sludge should not give rise to environmental pollution. Irish Water outlined that sludge management is to be addressed under the RAL works (completion date June 2024).

These outstanding recommendations have been included in this audit report.



6. Sludge Management

| | | Answer |
|---|--|--------|
| 6.1 | Is sludge arising from the treatment processes adequately managed? | No |
| Comment | | |
| <p>As outlined in the previous audit on 23/05/21 sludge is still being discharged from the Glashaboy WTP to the river. Irish Water indicated that the hydraulics are being investigated to determine if the sludge can be discharged to sewer for treatment at the Carrigrennan waste water treatment plant as part of the RAL upgrade works.</p> | | |



7. Fluoridation

| | Answer |
|---|--------|
| 7.1 Are the fluoride bulk tank and day tank arrangements appropriate? | No |
| Comment | |
| <p>Cork County Council outlined at the audit that there was a small leak in the fluoride day tank. The day tank is banded. Duty / standby fluoride dosing pumps are installed with automatic switchover on a routine basis every 4 hours or in the event of the breakdown of the duty pump.</p> <p>A new day tank and weighing scales have been purchased and were being stored in the fluoride dosing room. Cork County Council stated the installation of the new equipment is expected to be completed by the end of 2021.</p> | |



8. Site Specific Issues

| | | Answer |
|--|---|--------|
| 8.1 | Have the Drinking Water Safety Plan High Risks and Very High Risks been identified for the supply ? | Yes |
| Comment | | |
| <p>Irish Water outlined that the very high and high risks have been identified as part of the Drinking Water Safety Plan on 09 and 10/11/21. Irish Water outlined the risks have gone forward to the Asset Management Improvement Plan (AMIP) workshop to check the Early Contractor Involvement (ECI) scope of works with the output from this expected in January 2022. These risks were requested to be submitted as part of the information requested in advance of the audit but were not provided.</p> | | |

Recommendations

| Subject | Glashaboy Audit 03 12 2021 | Due Date | 21/01/2022 |
|--------------------|---|----------|------------|
| Action Text | <p>Recommendation(s)</p> <p>Irish Water is responsible for ensuring a safe and secure supply of drinking water. To address these issues, Irish Water should implement the following recommendations without delay.</p> <ol style="list-style-type: none"> 1. Irish Water should (i) ensure both the duty and standby aluminium sulphate dosing pumps are operational with automatic switchover and provide confirmation to the EPA when the upgrade works have been completed; (ii) continue to progress the operational improvements to the coagulation process being undertaken under the RAL works. 2. Irish Water should (i) install a continuous turbidity monitor with alarm on the combined filtered water and (ii) examine the feasibility of installing automatic plant shutdown linked to the final combined turbidity monitor, in accordance with the log turbidity performance criteria as set out in the <i>EPA Water Treatment Manual: Filtration</i>. 3. Irish Water should (i) assess the feasibility of increasing the sand depth in the filters to meet the recommended minimum 1m depth of sand; (ii) assess the feasibility of installing additional triggers for automatic backwashing based on turbidity and head loss and (iii) progress the installation of the run to waste facility after backwashing, as per the <i>EPA Water Treatment Manual: Filtration</i>. 4. Irish Water should complete the installation and commissioning of the new weighing scales and day tank for fluoride dosing. 5. Irish Water should ensure the fill points for the aluminium sulphate and sodium hypochlorite storage tanks are within the bunded area. Irish Water should refer to EPA guidance document – “<i>IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities</i>”. 6. Irish Water should install an appropriate alarm set point at the outlet from the reservoir to validate that chlorine contact time is being maintained at all times. The alarm level should reflect the minimum free chlorine concentration required at the contact time validation point as outlined in the site specific contact time calculation. 7. Irish Water should provide details of the Drinking Water Safety Plan (DWSP) very high and high risks identified for the Glashaboy PWS and the plans in place to address these. 8. Irish Water should ensure that free residual chlorine levels at the end of the distribution network are monitored several times per week. 9. Irish Water should review the use of rodent bait. The use of rodenticides should be avoided unless absolutely necessary and where they are used, it should be for a limited duration until the problem is brought under adequate control. Irish Water should have regard to EPA Advice Note 13 – Pesticides in Drinking Water. 10. Irish Water should (a) review current methods of handling and disposal of water treatment sludge to ensure that the practice is not in contravention of the <i>Waste Management Act, 1996 – 2011</i>. The discharge of water treatment sludge to receiving water, where practiced, should cease immediately. Leachate from stored drinking water sludge should not give rise to environmental pollution; (b) under take monitoring upstream and downstream of the discharge point to assess the impact of the discharge of sludge on the receiving water until the remedial works have been completed. <p>Follow-Up Actions required by Irish Water</p> <p>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 Regina Campbell, Drinking Water Team Leader. Irish Water should submit a report to the Agency on or before 21/01/22 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 time frame for commencement and completion of any planned work.</p> <p>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 Compliance Plan DW20190055 in any future correspondence in relation to this Report.</p> | | |

