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	Louisburgh PWS
Organisation	Irish Water
Scheme Code	2200PUB1020
County	Mayo
Site Visit Reference No.	SV22633

Report Detail

Issue Date	25/08/2021
Prepared By	Ruth Barrington

Site Visit Detail

Date Of Inspection	27/07/2021	**Announced**	Yes
Time In	09:30	**Time Out**	13:00
EPA Inspector(s) **Additional Visitors**	Ruth Barrington		
Company Personnel	Irish Water: Thomas Gibbons, Ger Greally Mayo County Council: Ronan McDonnell, Colette Scahill, William McDonnell		

Summary of Key Findings

1. Louisburgh water treatment plant operates over its design capacity during the summer and when the holiday homes in the area are in increased use. This poses a significant risk to the quality of treated water and to the maintenance of a supply to the area. Irish Water should address these risks by progressing the plans for the replacement of the supply by connection to Westport Public Water Supply.

2. The management of sludge from the treatment processes at Louisburgh Water Treatment Plant is unsatisfactory. Irish Water should put in place measures to eliminate sludge discharge to Bunowen River.

3. The EPA is considering placing the Louisburgh public water supply on the Remedial Action List, due to the operation of the treatment plant over its design capacity, the log deficit on treatment, inadequate sludge management, and the lack of space at the existing water treatment plant to address these issues. Irish Water's own plan for dealing with the treatment deficiencies is the interconnection of the supply to Westport public water supply.

Introduction

Louisburgh public water supply supplies treated drinking water with the source abstraction being the Bunowen River. Irish Water's monitoring programme for the supply is based on a census population of 793, but this population is seasonally variable due to the high number of holiday homes in the area. Treatment at the water treatment plant includes coagulation processes, Dissolved Air Flotation and Filtration (DAFF) and disinfection using sodium hypochlorite.

This audit was carried out as part of the EPA investigation into a report from the Local Authority Waters Programme (LAWPRO) of suspected alum sludge from the water treatment plant visible in the main channel of the Bunowen River downstream of the weir at Louisburgh. The audit also follows up on Irish Water's plans to replace the treatment plant with a connection to the Westport public water supply. This would involve construction of a pipeline connection over 10 km from Westport, also taking in Murrisk Group Water Scheme along the way, and has been in the planning stage for many years.

Supply Zones Areas Inspected

The abstraction source above the weir, the treatment processes at the water treatment plant, and the area surrounding the sludge and backwash water discharge point were inspected as part of the audit.

1. Coagulation Clarification Flocculation (CFC) Stage

		Answer
1.1	Is the CFC process optimised to respond to changes in raw water quality?	Yes

Comment

1. The CFC processes at Louisburgh WTP are carried out within the Dissolved Air Flotation and Filtration (DAFF) unit. The coagulant and pH/ alkalinity control dosage is manually controlled on the basis of a range of set points corresponding to UVT changes in raw water, established through operator's experience and informed by occasional jar tests. The dose pumps are flow proportional.

2. The requirement for manual changes to dose rates means that operators must be vigilant and respond quickly to what can be rapidly changing source water quality in the Bunowen River. The lack of water treatment plant automation to assist operators with these responsibilities is further referred to in Sections 2 and 4 of this report.

2. Filtration

		Answer
2.1	Are the filters designed and managed in accordance with EPA guidance?	Yes

Comment

1. The filtration aspect of the Dissolved Air Flotation and Filtration (DAFF) system has recently been enhanced with replacement sand media installed in mid July 2021. The depth of sand was also increased from 800 mm to 900 mm at this time.

2. Under design conditions, two backwashes per day would be required in the operator's experience. However due to the water treatment plant being operated over capacity, the filter now requires backwashing three times per day based on rising headloss. This further affects capacity as each backwash and return to service takes 45 minutes during which time the plant is not producing water as there is only one filter.

3. The filters are alarmed on a filtered water turbidity of 0.3 NTU triggering a run to waste. The operator must then attend site to supervise the backwash, which in practice is triggered more often on the basis of headloss before the turbidity alarm level is reached. After backwashing there is a semi-automated run to waste, and this together with the manually set duration of the air scour phase of the backwash, results in the need for an operator to be present during backwash.

4. Aluminium residuals are monitored daily on site using manual tests. Results for June and July 2021 were assessed during the audit and were compliant.

5. The treatment steps of CFC and filtration were observed to be achieving a good level of UVT improvement through the process, from 18.35% UVT in the raw water to 94.13% UVT in filtered water being achieved during the audit. The raw water turbidity was 8.5 NTU which was brought down to 0.028 NTU in the filtered water on the day of the audit.

3. Disinfection

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

Comment

1. The Louisburgh water treatment plant has been upgraded under Irish Water's National Disinfection Programme including the provision of new controls and alarms. Duty and standby chlorine dosing pumps with automatic switchover respond to the chlorine residual, and if the chlorine residual drops or if a pump fails, the system can maintain disinfection.

4. Management and Control

		Answer
4.1	Is the water treatment plant resilient enough to cope with significant variations in raw water quality or demand?	No

Comment

1. Irish Water and Mayo County Council described the Louisburgh water treatment plant as in operation over its design capacity much of the time, at up to 32 m3/hour versus design capacity of 23 m3/hour. The plant is in operation 24 hours per day, seven days per week to meet the demand placed on it. Mayo County Council staff stated that much of the seasonal demand is from high occupancy of holiday homes in the area and that two new large schools will be opening shortly also fed from the supply.

2. Mayo County Council staff outlined that the on-site reservoir can provide for less than one day's demand. Thus any plant outage will quickly result in supply being lost and homes and businesses being without water.

3. At the time of the audit, the indicators of water treatment plant efficiency such as turbidity, UVT and residual aluminium showed that the plant was operating well. However, to maintain it at this status requires significant effort. Under design conditions, the backwashing of the DAF filter should be required twice per day, but due to the volumes being treated, a third backwash in every 24 hours is necessary. Changes in the quality of the water abstracted from the river must be responded to manually by changes to the coagulant and pH adjustment dose rates so vigilance and prompt intervention by the operator is required. The raw water UVT can change rapidly following rainfall with between 15% to 50% UVT considered the usual range by the operators.

4. Irish Water has described Louisburgh water treatment plant as having a log score requirement of 4, using the objective *Cryptosporidium* source risk assessment methodology, with the existing CFC and filtration processes providing a 3-log barrier. The deficit is addressed by a monthly *Cryptosporidium* monitoring programme. Results of the monitoring, reviewed as part of the audit, found no *Cryptosporidium* present in the samples.

5. The connection of Louisburgh public water supply to Westport public water supply will address the sludge management, design capacity and log deficit issues raised in this audit report. The plan has been delayed over many years and involves the construction of a pipeline over 10 km from Westport, firstly to connect with and replace Murrisk-Lecanvey Group Water Scheme, and then on to Louisburgh. Irish Water stated during the audit that the National Water Resources Plan includes the amalgamation of the three supplies Westport, Murrisk and Louisburgh as a Regional Supply. The contract for the first stage of this work is now anticipated by Irish Water to be issued in May 2022, with the completion of both phases projected to take 2 years.

6. The EPA is considering placing the Louisburgh public water supply on the Remedial Action List to prioritise the need for action on the basis of design capacity, resilience of treatment, *Cryptosporidium* log deficit and inadequate sludge management. This decision will be made at the next quarterly review of the Remedial Action List in October 2021 and will take into account Irish Water's response to this audit report.

7. The Drinking Water Safety Plan (DWSP) for Louisburgh public water supply is in the early stages of development. The hazards identified at the time of the audit corresponded broadly with the findings of this audit report, with those relating to treatment plant capacity and sludge management scored at the top of the "High Risk" category in the absence of mitigation measures. The DWSP will be developed further during 2021.

		Answer
4.2	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	Yes

Comment

1. Alarm dial outs to the operators for turbidity and for chlorine residuals do not match those included on the new HMI unit provided under the Irish Water National Disinfection Programme. In the case of turbidity, the dial out to the operator provides more protection to water quality than the setting displayed on the HMI. The alarm settings should be reviewed across all systems at the water treatment plant to ensure that they are consistently providing the maximum levels of protection to the treatment processes and to treated water quality.

2. Trends in continuous monitoring data were accessible, but difficult to view on-site being accessible through the HMI screen. Downloads of the data were requested but technical issues meant they were not downloaded prior to the audit. Access by operators to easily viewed trend data is considered important, to enable the identification of changing water quality before alarms are triggered.

5. Sludge Management

		Answer
5.1	Is sludge arising from the treatment processes adequately managed?	No

Comment

1. The Louisburgh water treatment plant has inadequate sludge management and containment facilities within the water treatment plant site. The sludge generated by on-site treatment processes within the Dissolved Air Flotation system, and the washwater from backwashes of the filters, is directed via a pipeline to a small stream flowing to the Bunowen River downstream of the abstraction point.

2. EPA biologists reported a build up of sludge in the Bunowen River downstream of the discharge in May 2020. In response to this, Irish Water and Mayo County Council constructed a straw bale structure covered and supported by sandbags in the stream to retain the sludge and enable it to be removed for disposal. However this structure was planned to be used only in low river flow or drought conditions.

3. Mayo County Council confirmed at the audit that in April 2021 the straw bales and sandbags were washed away by rising river levels and sludge again escaped into the main river channel. A Local Authority Waters Programme (LAWPRO) report, sent to both the EPA and Irish Water, of visible suspected sludge in the Bunowen River on 28/04/2021 corresponds with this incident. Straw bales and sandbags were reinstated in June 2021 accompanied by Mayo County Council liaising with Inland Fisheries Ireland on additional measures for the retention of sludge.

4. On the basis of the visual observations and of the impact on phytobenthos of the Bunowen River at the ecological monitoring point 90 m downstream of the discharge, the discharge has been assigned as a Third Cycle Water Framework Directive Pressure.

5. Based on the auditor's observations during the audit, the use of a straw bale and sandbag construction only during low flow or drought conditions would mean that there is no barrier to sludge entering the Bunowen River during other flow conditions. While the potential ecological impact of this discharge has not been fully assessed, it is unacceptable that this waste material is discharged to the river. The EPA has previously written to Irish Water on 19/05/2020 to advise that the sludge discharge at Louisburgh WTP be discontinued.

6. Mayo County Council staff outlined that the river levels can rise in a short period of time during a storm or heavy rainfall which can cause the straw bales and sandbags to be washed away. Mayo County Council has agreed a number of measures with Inland Fisheries Ireland to prevent the discharge of sludge. These are (i) inspecting the structure daily; (ii) cleaning the stream with vacuum tank every 4-6 weeks where the sludge enters; (iii) Placing a weir upstream of the discharge to prevent sludge backflowing and entering another adjacent small stream; (iv) increasing the height of the sandbags at the straw bales to stop sludge overtopping the structure; (v) placing an absorbent boom just below the discharge point to capture any floating scum on the surface.

7. At the time of the audit, the additional measures listed above as (i), (ii), (iii) and (iv) had been put in place. The absorbent boom had not yet been placed and some scum was visible in the area behind the straw bales. The daily visual checks of the area were not being recorded.

8. Irish Water has accepted that sludge from the DAFF process is a waste. If adequate sludge management facilities were available on site, the backwash and sludge supernatants could be discharged to the river with no additional requirements, but the restricted size of the Louisburgh water treatment plant site prohibits the installation of further infrastructure for this purpose.

9. The planned connection of Louisburgh public water supply to the Westport public water supply will enable the decommissioning of the Louisburgh water treatment plant and thus the elimination of the sludge discharge. However at present, Irish Water are effectively using the surface waters close to the water treatment plant as part of the sludge management process for the site and potentially causing additional pressure to the Bunowen River which in 2020 was categorised as having a Water Framework Directive status of "Moderate" at Louisburgh.

10. No ecological assessment of impact of sludge discharged to the small stream and to the Bunowen River has been carried out by Irish Water or Mayo County Council.

Recommendations

Subject	Louisburgh Audit Recommendations	Due Date	27/09/2021
Action Text	**Recommendation(s)** 1. Irish Water should put in place an Action Programme with timeframes for the replacement of the Louisburgh Water Treatment Plant with the connection to the Westport public water supply, to provide a secure drinking water supply by addressing the issues of treatment capacity, treatment log deficit, high levels of manual intervention required by operators and inadequate sludge management raised in this report in relation to the Louisburgh supply. 2. Irish Water should carry out a full ecological assessment of the impact of the discharge from the Louisburgh Water Treatment Plant on the Bunowen River, together with the completion of the items agreed with Inland Fisheries Ireland for the maintenance of the sludge retention structure. Records should be maintained on site of visual checks carried out at the discharge point. 3. Irish Water should continue the development of the Drinking Water Safety Plan and Asset Management Improvement Plan for Louisburgh Water Treatment Plant, to provide a framework for the management of the identified risks for the interim period before the supply is replaced. 4. Irish Water should ensure that sludge is not discharged to the main channel of the Bunowen River in any river flow conditions regardless of the outcome of the ecological assessment in Recommendation 2. 5. Irish Water should review the alarm settings at Louisburgh water treatment plant to ensure that both the existing system and the Disinfection Programme controls are consistently providing the highest level of protection to the treatment processes and to the treated water quality. 6. Irish Water should provide downloaded trended data for filtered water turbidity for July 2021 by way of a cross check on the HMI trends checked during the audit. **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 Aoife Loughnane, Drinking Water Team Leader. Irish Water should submit a report to the Agency on or before 27/09/2021, 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. 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.		