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	Tuam RWSS
Organisation	Irish Water
Scheme Code	1200PUB1047
County	Galway
Site Visit Reference No.	SV18354

Report Detail

Issue Date	07/10/2019
Prepared By	Derval Devaney

Site Visit Detail

Date Of Inspection	18/09/2019	**Announced**	Yes
Time In	11:00	**Time Out**	14:30
EPA Inspector(s) **Additional Visitors**	Derval Devaney		
Company Personnel	Irish Water: Thomas Gibbons – Drinking Water Compliance Specialist Sandra Keane-Joyce – Asset Operations Engineer Galway County Council: Fergal O'Sullivan, Senior Executive Engineer Michael Divilly – Plant Manager		

Summary of Key Findings

1. Adjustments were made to the sludge treatment facilities at Luimnagh Water Treatment Plant allowing for four days extra storage and settlement capacity prior to supernatant discharge to Lough Corrib. However, an assessment of the discharge of supernatant to Lough Corrib is required to ensure it is not having a negative impact on the receiving waters.

2. Optimum pH for coagulation is not being met, floc carry-over was evident in the clarified water and six alum day tanks at the plant are not bunded. There are four caustic soda tanks for final water pH adjustment which are also unbunded, however these tanks are not in use. Irish Water's Process Operations Team is addressing these issues as part of the current upgrade works in addition to the enhancement of plant alarms and inhibits which will be linked to SCADA.

3. Six out of the seven recommendations from the EPA's audit of 2009 were addressed. Floc carry-over from the clarification process to the filters is still an issue at the plant.

Introduction

Luimnagh water treatment plant supplies Tuam Regional Water Supply serving 40,632 people. The plant currently produces 26 – 30,000 m3/day and has a design capacity of 48, 000 m3/day. There are 26 public group water schemes served by the supply and an additional five group water schemes have been taken in charge by Irish Water and one is currently in progress. Treatment consists of pH correction, coagulation with 8% liquid alum & poly, clarification, rapid gravity filtration, disinfection using UV and sodium hypochlorite and fluoridation.

Supply Zones Areas Inspected

In August and September 2019 the EPA received complaints alleging the discharge from the water treatment process (waste water from the filter back wash process and supernatant from the clarification process) was having a negative impact on the receiving water; Lough Corrib. While the audit inspected the abstraction point from Lough Corrib and the plant's treatment processes, the main focus was on the treatment and management of sludge generated on-site and the supernatant discharging to Lough Corrib.

1. Coagulation Clarification Flocculation (CFC) Stage

		Answer
1.1	Is the pH within a suitable range for the coagulant used?	No

Comment

The pH of the raw water is generally 7.8. It was stated that the optimum pH for coagulation is 6.2 or 6.3 and Irish Water is carrying out jar tests currently to confirm this. There is the facility to pH correct the raw water with sulphuric acid to reduce the pH for optimum coagulation, but this facility is not currently in use. This is because the facility to re-correct the pH of the final water upwards is not being used as the caustic soda tanks are unbunded.

Currently the raw water is dosed with aluminium sulphate which reduces the pH to 6.58 - 6.8 and poly is then dosed into two contact tanks. Irish Water plans to change to Chemifloc 101 (which contains ferric in addition to alum) during the proposed upgrade works, as jar tests show better water quality results using this chemical.

		Answer
1.2	Were the CFC processes visually observed to be operating appropriately during the audit?	No

Comment

There are eight clarification tanks at the plant which have lamella plates. Rising floc which was identified as an issue in the EPA's previous 2009 audit report and remains an issue and was observed on this audit (see Photo 1).

Irish Water is currently assessing process operations at the plant to identify plant efficiencies and treatment optimisation. Processes being reviewed or implemented include pH correction, further jar testing, trialling the installation of tube settlers in the clarifiers to increase the capacity for treatment and/or installation of carbon treatment to improve sludge blanket generation and floc settlement and bunding capacity on-site.

2. Filtration

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

Comment

There are 10 rapid gravity filters at the plant and all have turbidity monitors. Backwash of the filters is triggered by head loss of 2 m or a 48 hour run time. There is no run to waste facility on the filters, however the filters rest for 15 minutes post a backwash.

The high-level filter turbidity alarm on each filter is currently set at > 0.2 NTU. The caretakers are alerted of these alarms and there is a cascade system in place to ensure plant alarms are responded to. Filter No 1 was not in use during the audit as its sand media was being replaced and pipework repaired. All filters are serviced at least every 10 years, and all will have been inspected, repaired and their sand media replaced between 2016 and the end of 2019.Turbidity of the final water on the day of the audit was 0.21 NTU.

3. Disinfection

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

Comment

Filtered water is disinfected with a duty and standby UV unit and with sodium hypochlorite to allow for a residual disinfectant to be present in the distribution network. The low chlorine alarm is set at 0.8 mg/l and the high alarm at 1.1 mg/l. A final water chlorine plant inhibit is to be included as part of the upgrade works. The final water chlorine monitor read 0.9 mg/l on the day of the audit. Disinfection treatment was not inspected during the audit.

There is the facility to pH correct the final water using caustic soda, but these tanks are not in use as they are not bunded. Therefore, there is a reliance on the chlorine dose to enable an increase in the pH of the final water to ensure it meets the > 6.5 pH parametric value. Irish Water stated that final water pH correction will be investigated as part of the upgrade works. The final water pH meter read 6.77 on the day of the audit.

There are six reservoirs on the network and those that have chlorine booster stations also have online chlorine monitors at the inlet and outlet of the reservoirs which are alarmed.

4. Treatment Process Chemicals

		Answer
4.1	Are treatment process chemicals appropriately managed and stored?	No

Comment

The six aluminium day tanks in use are not bunded (see Photo 2). There is the facility to pH correct the final water using caustic soda, but these tanks are not in use as they too are not bunded (see Photo 3).

5. Management and Control

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

Comment

Currently there are no plant inhibits in place at the Luimnagh Water Treatment Plant. The upgrade works at the plant include the installation of plant inhibits once the turbidity and residual chlorine goes above a pre-defined level.

6. Sludge Management

		Answer
6.1	Is sludge arising from the treatment processes adequately managed?	Yes

Comment

Sludge treatment is managed on-site by Ormond Organics who have subcontracted the works to Enva.

Settled sludge is drawn off each clarifier tank at regular intervals by an automated sludge bleed regime into a sludge bleed holding tank. Irish Water is currently assessing sludge draw frequencies to determine if draw-off can vary to optimise sludge collection. The sludge is then directed to two sludge balancing tanks before entering a thickening tank. Polyelectrolyte is dosed to assist flocculation in the thickening tank which also includes a rotating picket fence. The supernatant from the thickening tank flows over a weir wall into two sludge lagoons (see Photos 4 & 5). Sludge generated from the picket fence thickener is sent to a sludge press and dosed with polyelectrolyte en-route. The press filtrate is diverted back to the wastewater pumping chamber for recycling through the sludge treatment process.

Filter wash water is directed to balancing tanks on site and the supernatant from this stream is also sent to the two lagoons on-site. The dry solids content of the sludge typically constitutes 0.03% for filter backwash and 1-2% for clarifier bleeds. Clarifier bleeds and filter wash water volumes generated typically represent 5% of the plant throughput.

The two lagoons both measure 30 m x 10 m and act as a settling stage for the thicker supernatant. After about 48 hours of settlement in the lagoons the supernatant flows to a lagoon sump. Prior to 2019, the supernatant in the lagoon sump was pumped to the final effluent chamber and discharged to Lough Corrib. A visual inspection of the receiving water drain during the audit showed remnants of sludge build-up from this discharge (see Photo 6). Since Q1 2019, supernatant from the lagoons is pumped to unused raw water balance tanks (see Photos 7 & 8). These tanks provide an additional four days storage capacity and additional settlement of the supernatant prior to water being gravity fed to the final water effluent chamber and discharged to Lough Corrib.

The water discharging to receiving water during the audit was found to be clear during the audit (see Photo 9). Monitoring of the discharge takes place approx. four times/week for pH, conductivity, TDS, turbidity, colour, UVT, UVA, aluminium and more recently includes nitrate, nitrite and ammonium. The addition of extra settlement facilities has brought about, on average, a reduction in turbidity, colour and aluminium concentrations in the supernatant discharging to Lough Corrib. The most recent discharge sample taken on 23/08/19 from the final effluent chamber was presented during the audit. Seventeen parameters were analysed in the supernatant discharge including aluminium which was 451 ug/l, turbidity 4.4 NTU, colour 2 mg/l, nitrate <2.0 mg/l, nitrite 0.04 mg/l and ammonium 0.3 mg/l.

There is no continuous online monitor on the discharge and no alarm if the discharge to Lough Corrib is of unsatisfactory quality. The discharge is not licenced by Galway Co. Co. A risk assessment of the discharge to receiving waters was carried out by Galway Co. Co. in 2009 however this report has been archived and therefore was not available for review during the audit.

At the end of the sludge treatment processes, the sludge output is approximately 18 - 20 % dry solids which is sent off-site for disposal to Corranure Landfill, Co. Cavan. The average monthly sludge volume sent off-site for disposal is approximately 90 tonnes per month (i.e. 6 - 8 loads per month).

Recommendations

Subject	Tuam RWSS Recommendations	Due Date	07/11/2019
Action Text	**Recommendation(s)** 1. Irish Water should: 1. remove any sludge that is present in the discharge drain to the Lough Corrib; 2. submit the risk assessment carried out in 2009 by Galway Co. Co. on the supernatant; 3. assess the impact of the discharge of supernatant on the water quality of Lough Corrib to ensure it is not having a negative impact on the receiving environment. Take into account in your assessment compliance with the *European Union Environmental Objective (Surface Waters) (Amendment) Regulations 2019 (S.I No. 77 of 2019);* 4. liaise with Galway Co. Co. environment and planning section to determine if a discharge license is required for the supernatant discharge to receiving waters from the Luimnagh water treatment plant, 5. based on the outcome of (3) and (4) determine what online monitors, alarms and inhibits are required to ensure the discharge from the water treatment plant does not have a negative impact on the receiving environment of Lough Corrib; 6. investigate the feasibility of upgrading the sludge management process on-site to ensure it does not have a negative impact on receiving water and that sludge volumes generated on-site for landfill disposal are minimised. For example, technologies such as gravity thickening, dewatering, sludge drying can be used to minimise sludge end volume, improve stability and handle-ability. 2. Irish Water should ensure the upgrade works include the following: 1. Jar tests to determine optimum pH for coagulation; 2. Automated pH correction to ensure optimum coagulation pH is met; 3. Optimisation of the coagulation process to address floc carryover from the clarifiers; 4. Re-instatement of final water pH adjustment as required; 5. Alum day tanks and caustic soda tanks are bunded when in use. These tanks must be capable of containing at least 110% of the chemicals stored therein. 3. Irish Water should ensure that appropriate alarms and plant inhibits are in place, operating effectively, and linked to the main plant SCADA system, in order to alert plant operators to any malfunction of the water and sludge treatment processes. **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 Michelle Minihan, Drinking Water Senior Inspector. Irish Water should submit a report to the Agency on or before 7th November 2019 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. Please quote the Action Reference Number "(DW2019/166) Tuam RWSS - Audit" in any future correspondence in relation to this Report.		