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	West Clare RWS (New WTP)
Organisation	Irish Water
Scheme Code	0300PUB1066
County	Clare
Site Visit Reference No.	SV22353

Report Detail

Issue Date	31/05/2021
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	05/05/2021	**Announced**	Yes
Time In	10:20	**Time Out**	13:30
EPA Inspector(s) **Additional Visitors**	Orla Harrington Regina Campbell		
Company Personnel	Irish Water: Duane O'Brien**, Tommy Roche** and Kian Guihen* Clare County Council: Tony McNamara**, Derek Troy**, Noreen Shannon** and Maeve Lait* * attended pre-site meeting 04/05/21 ** attended pre-site meeting 04/05/21 and site visit 05/04/21.		

Summary of Key Findings

1. An incident occurred on 13/04/2021 at the West Clare Regional Water Supply (RWS) New Water Treatment Plant (new WTP), when elevated sludge levels in the Picket Fence Thickener (PFT) resulted in an uncontrolled discharge of sludge into the Annageeragh River. A lack of alarms or appropriate operational controls resulted in Clare County Council not being alerted to the incident at the time of the discharge. On 15/04/2021 Clare County Council were made aware of the incident following a complaint from a member of the public. Significant operational difficulties in March and April 2021 relating to sludge management at the West Clare RWS (new WTP) were not communicated promptly by plant operators to supervisors in Clare County Council and Irish Water, therefore no corrective action or alternative treatment decisions were made in response to an increase in sludge at the plant.
2. The West Clare RWS (new WTP) was added to the EPA's remedial action list (RAL) on 27/10/2017 under the heading 'elevated levels of THM's above the Drinking Water Regulations'. The EPA issued a Regulation 16(1) Direction to Irish Water on 28/11/2019 requiring compliance with the Trihalomethane (THM) parametric value of 100 ug/l by 31/12/2021. At the time of the audit, Irish Water and Clare County Council said that the scope of works to comply with the Direction was close to being finalised. There are ongoing persistent breaches of the THM parametric value in this supply (twenty notifications in 2020 and four to date in 2021). The West Clare RWS (new WTP) continues to breach the limits in the Drinking Water Regulations 2014, as amended and it is expected to be the case until the plant upgrades are complete. The latest submission from Irish Water provides a completion date of June 2022, which goes beyond the Direction compliance date of 31/12/2021.
3. The rapid gravity sand filters are not currently being operated in accordance with the log credit approach as set out in the EPA's Water Treatment Manual: Filtration, therefore the performance of the plant's *Cryptosporidium* barrier cannot be verified. Irish Water should consult with the HSE and inform them that they are unable to verify the *Cryptosporidium* barrier until the RAL plant upgrades are complete.
4. The plant has serious deficiencies regarding management and control. These include a lack of; turbidity alarms and shutdowns, automated dosing and switchover, adequate storage and settlement capacity for sludge treatment. The EPA are considering adding West Clare RWS (new WTP) to the RAL under an additional category of 'EPA audit observation, treatment and management issues'.

Introduction

According to the EDEN portal, the West Clare RWS (new WTP) serves 11,236 people and produces 11,017 m3/day. The plant currently produces approximately 500m3/hr and is operating within its design capacity. The West Clare RWS (new WTP) was commissioned in 1984 and according to Irish Water there has been little changes made to operations at the plant since then, with the exception of a disinfection upgrade carried out in 2019.

Raw water is abstracted from Doolough lake. The abstraction is via a manmade impounding structure which has elevated the natural lake level. Raw water flows through a coarse 50mm screen. It then travels through a finer screen, which includes an automatic washing and debris collection system before being conveyed to the WTP via a trunk main. Treatment at the plant consists of pH correction using sodium carbonate, coagulation with ferric sulphate & poly, clarification, further pH correction with lime, rapid gravity sand filtration, disinfection using 14% sodium hypochlorite and fluoridation. There is sludge treatment on-site, consisting of a picket fence thickener and dewatering units. The plant also accepted a weekly transfer of sludge for treatment from the West Clare RWS (old WTP). This practice had ceased at the time of the audit until further notice due to the sludge incident.

The West Clare RWS (new WTP) is on the RAL since 27/10/2017 due to 'elevated levels of THM's above the Drinking Water Regulations'. The projected date for completion of RAL upgrade works is June 2022, beyond the Regulation 16(1) Direction compliance date of 31st December 2021.

The EPA first received a complaint on 16/04/2021 alleging the discharge from the WTP was having a negative impact on the receiving water; Annageeragh River. In total, the EPA received five complaints from three complainants.

Supply Zones Areas Inspected

While the audit inspected the plant's treatment processes and the abstraction point, the main focus was on the treatment and management of sludge generated on-site and the discharge to the Annageeragh River.

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?	No

Comment

On 16/04/2021 the EPA were first alerted to a complaint alleging discharges from the WTP were having a negative impact on the water quality of the Annageeragh River. In response to the EPA's request for further information on the alleged discharges, on 23/04/2021 Irish Water informed the EPA that the complaints were as a result of an incident that took place on 13/04/2021 at the plant and provided details into the investigation carried out.

From 13/03/201 until the 25/03/2021 one of the screw press dewatering units was out of operation due to repair works. Clare County Council stated that these works took longer than anticipated, resulting in less than normal processing of sludge at the WTP. During that time, the weekly sludge transfer, estimated to be 80m3, from West Clare RWS (old WTP) was ceased. Clare County Council operational staff at the WTP then made the decision to pump 50% of the sludge (approximately 100m3) that would have been processed in the dewatering units directly to the emergency lagoon, in order to manage the increase in sludge. During the audit, it was advised by Clare County Council that sludge in the lagoon will need to be excavated and the lagoon cleaned out. There is no discharge to receiving waters from this lagoon.

On 12/04/2021 Clare County Council said that operational staff at the plant noted elevated sludge in the picket fence thickener (PFT) but that there was no evidence of sludge overflow. The screw press dewatering units were operating satisfactorily and to full capacity at that time.

On 13/04/2021 between 9am and 12.30pm four 20m3 tanker loads of 1-2% dry solids content (DSC) sludge were transferred from West Clare RWS (old WTP) to West Clare RWS (new WTP) for treatment. Clare County Council stated that an overflow discharge from the elevated sludge rather than the decant water in the PFT occurred sometime after 8pm on 13/04/2021 resulting in an estimated sludge discharge of 80m3 into the Annageeragh River. There is no continuous online monitor on the discharge and no alarm if the discharge to the Annageeragh River is of unsatisfactory quality.

On the morning of the 14/04/2021, Clare County Council operational staff did not observe any elevated sludge at the PFT and were unaware of the incident until 15/04/2021 following a compliant to Clare County Council from a member of the public.

Separately on 30/04/2021, the EPA received correspondence from Clare County Council's Environment Section. It stated that following a reported pollution incident from a member of the public on 18/04/2021, Clare County Council Environment staff carried out an inspection of the Annageeragh River. A discharge was discovered from a pipe emanating from the West Clare RWS (new WTP). Samples were taken of the discharge and following analysis it was determined by Clare County Council Environment staff that this discharge is having a negative impact on the Annageeragh River. This correspondence also stated that Irish Water had been notified of this incident.

Significant operational difficulties in March and April 2021 relating to sludge management at the West Clare RWS (new WTP) were not communicated promptly by plant operators to supervisors in Clare County Council and Irish Water, therefore no corrective action or alternative treatment decisions were made in response to an increase in sludge at the plant. During the audit, Clare County Council provided details of the mitigation measures that have been taken to prevent a reoccurrence of this incident. These measures include; the suspension of weekly sludge transfer from West Clare RWS (old WTP), additional operator training to deal with high sludge loading and daily visual inspections of the sludge level in the PFT.

2. Source Protection

		Answer
2.1	Is the abstraction source(s) adequately protected against contamination?	Yes

Comment

The lake source is located about 1km from the plant and was inspected as part of this audit. It is predominately Coillte forestry and agriculture in the catchment. At the audit, it could not be confirmed when landowners within the zone of contribution were written to, to inform them of their obligations under the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 S.I. No. 31 of 2014.*

The raw water intake at the lake is fitted with coarse and fine screens. A tear was noted on the fine screen on the day of the audit. Clare County Council (CCC) stated that the screen would be replaced as part of the RAL upgrade works.

The raw water quality is generally consistent entering the plant. Irish Water confirmed that the protozoal compliance requirements for this source is a log credit of 3. There is monthly monitoring for *Cryptosporidium* carried out on the final water at the WTP and results were provided for a sample taken on 25/02/2021 which was clear.

There is daily monitoring of the raw water for colour, turbidity, pH and temperature. There is no alarm or shutdown based on turbidity. The online monitor had a pH of 5.80 and turbidity of 2.71 NTU on the day of the audit.

3. Coagulation Clarification Flocculation (CFC) Stage

		Answer
3.1	Are the CFC processes appropriately controlled?	No

Comment

The pH of the raw water is generally 6.2. There is the facility to pH correct at the plant. Sodium Carbonate (soda ash) is added at a concentration of 130 litres/hr to achieve a target pH of approximately 7, for optimum coagulation. There is then a 20 sec delay before a ferric sulphate (coagulant) dose of 24 litres/hr is added. Monthly jar tests are carried out at the plant to confirm correct dosing. Clare County Council stated that the optimum pH once coagulant is added is between 3.7 and 3.9. There is then a 3 minute delay prior to the addition of polyelectrolyte with a further 3 minute contact time before the water enters the clarifiers.

There are two flat bottomed clarifier tanks at the plant with a total volume of 1,450m3. Both tanks have compressed air sludge bleeds set on an adjustable timed sequence, currently open 3 minutes and closed for 20 minutes.

Settled water is monitored daily for colour, iron and pH and turbidity is continuously monitored.

Coagulant dosing is manually adjusted and this is to be included in the upgrade works. There are duty/standby dosing pumps but no automatic switchover in the event of failure of the duty pump. Irish Water is currently assessing process operations at the plant to finalise plans under the RAL upgrade. Processes being reviewed or implemented include automated chemical dosing systems, installation of tubes settlers or lamella plates to the clarifiers, upgrade of facilities for sludge treatment and a new SCADA system to provide remote access.

4. Filtration

		Answer
4.1	Are the filters designed and managed in accordance with EPA guidance?	No

Comment

There is lime dosing for pH correction in the channel between the clarifiers and the filters.

The combined water from the clarifiers then passes to six rapid gravity sand filters. There are turbidity monitors on the individual filters and on the combined filter. There are no alarms and automatic shutdowns on the turbidity monitors on each filter or on the final water. The *Cryptosporidium* barrier cannot be verified and the filters are not operating in accordance with the performance criteria of the EPA's Filtration Manual. There are no turbidity monitors linked to SCADA which prevents remote access to the system and trend analysis of turbidity readings. At the audit it was noted that the turbidity of the combined filter water was 0.041 NTU. Clare County Council also advised that there is occasional spiking of the turbidity reading at the outlet of the reservoir and it was unclear what is causing the spiking.

The media used on all filters is silica sand and this was last topped up in 2020. The filter media has a sand depth of 1m, underlain with a gravel underlayer. Irish Water advised during the audit that the filters would be assessed during the upgrade and upgraded if necessary.

There is no automatic backwashing of the filters linked to monitoring of turbidity and it requires manual intervention. Three out of the six filters are backwashed every second day. A backwash was observed during the audit. The media and distribution of air and water appeared to be even across the filter bed with no dead zones and the sequence in total takes approximately 15 minutes. The filters are then immediately returned to service without any run to waste or slow start. The backwash water is collected in a washwater tank prior to discharge to the river. There is limited settling capacity in the tank. Each filter backwash generates 50 - 60m3 of washwater.

Irish Water confirmed that a 3 log credit treatment is required to achieve protozoal compliance at the plant. The current treatment processes at the plant do not provide 3 log credits as the rapid gravity sand filters are not being operated in accordance with the log credit approach as per the EPA's Water Treatment Manual: Filtration and this means that the performance of the *Cryptosporidium* barrier cannot be verified.

5. Disinfection

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

Comment

Upgrade works to the disinfection system were completed on site in 2019 under the Irish Water Disinfection Programme.

		Answer
5.2	Is there a chlorine residual ≥0.1 mg/l throughout the network?	No

Comment

Monthly chlorine monitoring was submitted by Irish Water at sampling locations on the network. On the 29/3/2021 and 23/02/2021 there was free chlorine readings of 0.03mg/l and 0.05mg/l at Knockerra on the network.

6. Sludge Management

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

Comment

There are two clarifiers / settling tanks at the plant. Settled sludge is drawn off each tank on an adjustable timed sequence, currently open 3 minutes and closed 20 minutes. The sludge then flows by gravity to the sludge bleed sump pump and onto the centre of the Picket Fence Thickener (PFT). The PFT is 8m deep and enables the thickening and settlement of particles suspended in water into a sludge. The rotating mechanism of the PFT permits the movement of separated water to the surface which is displaced over the weir as supernatant. The dry solids content (DSC) in the PFT is ~ 2%.

Prior to the incident, four 20m3 tanker loads of sludge per week was also being accepted from the nearby West Clare RWS (old WTP). This importation of weekly sludge from West Clare RWS (old WTP) has been suspended and it is being transported to Bunlicky waste water treatment plant until further notice.

Polyelectrolyte and Chemifloc 101 (coagulant) are then dosed in the sludge stock chamber to further assist flocculation before the sludge is sent to the plate press and screw presses for further dewatering. These provide a final sludge of 20% and 14% DSC respectively.

Backwash water is collected in a separate tank prior to entering the combined discharge outfall.

There is limited capacity at the plant for settlement of the supernatant, filtrate from the dewatering units or filter backwash before discharge via one outfall to the Annageeragh River. Monitoring of the discharge takes place approximately once per month for iron, pH, total organic carbon (TOC) and suspended solids (SS). The most recent discharge sample result provided was taken on 12/03/2021, the four parameters analysed in the discharge included iron which was 8,570ug/l, pH 6.74, TOC 13.9mg/l and SS 24 mg/l. There is no continuous online monitor on the discharge and no alarm if the discharge to the Annageeragh River is of unsatisfactory quality. The discharge is not licensed by Clare County Council.

At the end of the sludge process, the sludge output is sent off-site for disposal at a rate of 2-3 skips per week to Bunlicky waste water treatment plant, Co. Limerick.

The water discharging to receiving water during the audit was found to be clear, however an orange rusty discolouration around the discharge point at the Annageeragh River was noted.

7. Site Specific Issues

		Answer
7.1	Is the information reported by Irish Water on the EPA EDEN portal correct?	No

Comment

Clare County Council did not agree with the supply volume and population served reported by Irish Water on the EPA EDEN portal and outlined that the volume and population figures need to be updated to reflect current data.

Recommendations

Subject	West Clare RWS (new WTP) [5/05/2021]	Due Date	28/06/2021

Action Text

Recommendations:

1. Irish Water should submit a sludge management plan for the West Clare RWS (new WTP) to ensure the protection of the Annageeragh River until the sludge infrastructure is upgraded and commissioned. The discharge of water treatment sludge to receiving water, where practiced, should cease immediately.
2. Irish Water should ensure that a standard operating procedure is in place, and that operators are appropriately trained, to deal with instances of high loading to the sludge treatment facilities and when to escalate issues to Clare County Council senior management and to Irish Water at West Clare RWS (new WTP).
3. Irish Water should ensure that alarms are in place and operating effectively, in order to alert plant operators to any malfunction of the sludge treatment processes at the West Clare RWS (new WTP).
4. Irish Water should assess the impact of the combined discharge of supernatant, dewatering filtrate and filter backwash on the water quality of the Annageeragh River. The assessment should include consultation with all relevant parties (IFI and NPWS).
5. Irish Water should undertake the following operational improvements at the West Clare RWS (new WTP): excavate and clean the emergency lagoon, daily visual inspections of the supernatant from the picket fence thickener, put in place a turbidity monitor and alarm on the combined discharge from the plant.
6. Irish Water should consult with the HSE in relation to the plants inability to verify the *Cryptosporidium* barrier until remedial action upgrades are complete.
7. Irish Water should ensure the following works are done to demonstrate an effective *Cryptosporidium* barrier at the West Clare RWS (new WTP): (a) examine and implement alternative options to the addition of lime pre-filtration, to ensure that the filters meet the EPA turbidity performance criteria for filtered water of <0.3 NTU (using the log credit approach); (b) implement turbidity alarms and shutdowns on each filter and in the final water; (c) continue to monitor the supply in accordance with the IW Rationale for Monitoring Cryptosporidium in Public Water Supplies.
8. Irish Water should provide a confirmed scope of remedial action list works to be completed. Such works should include the automation of chemical dosing at the plant, assessment of clarifiers and filters.
9. Irish Water should update information on this supply on EDEN to reflect current status (population served and volume of treated water it supplies).
10. Irish Water should link all monitoring data and alarms to the SCADA system.
11. Irish Water should ensure that residul chlorine is maintained at >0.1 mg/l in the network including extremities at all time.
12. Irish Water should liaise with Clare County Council to ensure that all landowners within the zone of contribution have been written to in relation to the requirements of the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No. 31 of 2014) to ensure appropriate nutrient management and set back distances for the protection of the drinking water source.

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 **Regina Campbell**, Drinking Water Team Leader.

Irish Water should submit a report to the Agency on or before **01/07/2021** 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.

Please quote the Action Reference Number in any future correspondence in relation to this Report.