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 (Old WTP)
Organisation	Irish Water
Scheme Code	0300PUB1022
County	Clare
Site Visit Reference No.	SV22359

Report Detail

Issue Date	02/06/2021
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	05/05/2021	**Announced**	Yes
Time In	14:00	**Time Out**	16:15
EPA Inspector(s) **Additional Visitors**	Orla Harrington Regina Campbell		
Company Personnel	Irish Water: Duane O'Brien*, Tommy Roche**, Kian Guihen*. Clare County Council: Tony McNamara**, Derek Troy**, Noreen Shannon**, Maeve Lait*, Fergal Cleary***, Micheal Murray***. * attended pre-site meeting 04/05/2021 ** attended pre-site meeting 04/05/2021 and site visit 05/05/2021 *** attended site visit 05/05/2021		

Summary of Key Findings

1. The West Clare Regional Water Supply (RWS) Old Water Treatment Plant (old WTP) 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. Irish Water advised that the old WTP is earmarked for decommissioning and the supply will then be served by West Clare RWS (new WTP) once the remedial action list (RAL) works are complete.
2. On the day of the audit, water treatment plant sludge was observed discharging into the receiving water; Annageeragh River from the sludge holding tank at the old WTP. A lack of alarms or appropriate operational controls resulted in Clare County Council Operational staff not being alerted to this discharge.
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.
4. Based on the audit findings, the EPA is considering adding West Clare RWS (old WTP) to the Remedial Action List.

Introduction

Irish Water have advised that the West Clare RWS (old WTP) is to be decommissioned and connected to the West Clare RWS (new WTP) when it is fully upgraded. The latest submission from Irish Water provides a completion date of June 2022 for these works to be complete.

According to the EDEN portal, the West Clare RWS (old WTP) serves 3,874 people and produces 2,893 m3/day. The plant currently produces 200m3/hr and is operating within its design capacity. The West Clare RWS (old WTP) was commissioned in the 1960's and according to Clare County Council there have been very little changes made to infrastructure at the plant since then.

Raw water is abstracted from Doolough Lake. Treatment at the plant consists of pH correction using sodium carbonate, coagulation with ferric sulphate & polyelectrolyte, clarification, further pH correction with lime, rapid gravity sand filtration, disinfection using sodium hypochlorite and fluoridation. There are no sludge treatment facilities onsite. The sludge bleeds from the clarifiers to two holding tanks for settlement before being tankered off to West Clare RWS (new WTP) on a weekly basis for treatment and disposal. At the time of the audit, this practice had ceased until further notice, due to the sludge incident at West Clare RWS (new WTP) and sludge was being transported to Bunlickey water treatment plant as an alternative option.

Supply Zones Areas Inspected

All areas of the treatment process at the water treatment plant were inspected during the audit and the abstraction point, including management of sludge generated on-site.

The audit comprised of a video conference meeting with all relevant parties on 04/05/2021 followed by a site visit with essential audit participants on 05/05/2021.

1. Coagulation Clarification Flocculation (CFC) Stage

		Answer
1.1	Are the CFC processes appropriately controlled?	No

Comment

The pH of the raw water is generally between 6 and 6.3. Sodium Carbonate (soda ash) is added at a concentration of approximately 80 litres/hr, in advance of the mixing tank to achieve a target pH of approximately 7, for optimum coagulation. There is then a 15 second delay before a 13% ferric sulphate (coagulant) dose of 16 litres/hr is added. Clare County Council stated that the pH drops to approximately 3.9 once the coagulant is added. All chemical dosing is manually adjusted based on visual inspections and monthly jar tests are also carried out. There is a further 2.5 minute delay before water enters the clarifiers. The polyelectrolyte dose point is located at the top of the mixing tank, just prior to entry into the clarifiers.

There are three hopper bottomed clarifier tanks at the plant with a total volume of 850m3. All tanks have compressed sludge bleeds set on an adjustable timed sequence, currently open 2 minutes and closed 8 minutes. Settled water is monitored daily for colour and pH.

There are coagulant duty/standby pumps but no automatic switchover or shutdown of the supply in the event of a failure of the duty pump.

		Answer
1.2	Were the CFC tanks, channels and weirs observed to be clean, level and well maintained during the audit?	No

Comment

The clarifiers showed significant corrosion on the base of the decanting channels and broken channels were also observed.

2. Filtration

		Answer
2.1	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 three rapid gravity sand filters. There are turbidity monitors on the individual filters and on the combined filtered water. There are no alarms and automatic shutdowns on the turbidity monitors on each filter or on the combined filtered water. The turbidity monitors are not linked to SCADA which prevents remote access to the system and trend analysis of turbidity readings. The location of the turbidity monitors prevented safe access and there was a difficulty in reading the results due to a lack of accessibility.

The media used in all filters is silica sand with a depth of 800mm, underlain with 300mm gravel aggregate.

Two out of the three filters are backwashed every day. This is done manually and not triggered by turbidity. The duration of the backwash can be manually adjusted and generally takes between 10 and 15 minutes. After backwash the filters are returned to service as there is no slow start or run to waste. The backwash water is collected in a 85m3 washwater tank. According to Clare County Council there is limited capacity in this tank for settlement prior to discharge to the receiving water.

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. Sampling was undertaken of the final water on 25/02/2021 for Giardia and *Cryptosporidium* and provided in support of the audit. Results were clear.

3. Disinfection

		Answer
3.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	No

Comment

The disinfection system at West Clare RWS (old WTP) has not been upgraded by Irish Water. Chlorine dosing (14% sodium hypochlorite) is flow proportional and the residual chlorine target leaving the plant is 1.7mg/l. The dosing rates are manually set and can be adjusted in the event the chlorine levels in the final water drops. There are duty/standby chlorine pumps with automatic switchover in the event of a failure of the duty pump.

Daily monitoring during April 2021 of residual chlorine in the final water was submitted in advance of the audit. Monitoring results ranged between 1.29mg/l and 1.71mg/l.

There was no high chlorine alarm level set at the WTP. The low chlorine alarm is set at 0.5mg/l but there is no shutdown of the supply.

There was no contact time calculation submitted in support of the audit for West Clare RWS (old WTP).

4. Management and Control

		Answer
4.1	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	No
	Comment	
	There is no alarm response cascade system in place at the plant. Only the caretaker on duty gets an alarm.	

5. Sludge Management

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

Comment

Settled sludge is drawn off each clarifier on an adjustable timed sequence, currently open 2 minutes and closed 8 minutes. Four tanker loads of 20m3 settled sludge is transported to the West Clare RWS (new WTP) for treatment on a weekly basis. At the time of the audit, the transportation of this sludge had been suspended due to a sludge incident at West Clare RWS (new WTP) and was instead being sent off site to Bunlicky waste water treatment plant, Co. Limerick for treatment and disposal until further notice.

The supernatant from the sludge holding tank and the backwash water combine before discharge to the receiving water; Annageeragh River. According to Clare County Council, there is limited capacity at the plant for settlement. Monitoring of this discharge takes place 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 1100ug/l for iron, 6.51 pH, 3.02mg/l total organic carbon (TOC) and 4mg/l suspended solids (SS). Further monitoring results taken on 22/10/2020 included 91,300ug/l iron, 4.18 pH, 16.57mg/l TOC and 288mg/l SS. On occasion, the discharge can have an extremely high iron content, acidic and have high SS.

On the day of the audit, the auditors observed the discharge of sludge (rather than supernatant) from the sludge holding tank into the receiving water. There is no continuous online monitor on the discharge and no alarm if the discharge to the Annageeragh River is of unsatisfactory quality or if there is elevated sludge in the holding tank.

6. Fluoridation

		Answer
6.1	Are fluoride dosage calculations and monitoring records satisfactory?	No

Comment

Fluoridation is carried out after chlorination at the plant. Dosing is flow proportional using 0.99 litres/hr hydrofluorosilicic acid to achieve a target reading of between 0.6 mg/l and 0.8mg/l. There are duty/standby pumps with manual intervention in the event of a failure.

There is daily manual monitoring of fluoride carried out using the Colorimetric and Weight methods. Daily monitoring results were provided for April 2021 in support of the audit. The colorimetric results were recorded and five exceedances of the fluoride parametric limit were noted (>0.8 mg/l). Fluoride results for the same period using the Weight method were also provided and no exceedances were noted. The daily colorimetric results do not correspond with the weight calculations.

Clare County Council stated that the HSE carry out monthly sampling at the plant and all results are compliant to date.

Recommendations

Subject	West Clare RWS (old WTP) [05/05/2021]	Due Date	02/07/2021

Action Text

Recommendations:

1. Irish Water should submit an action programme and timeframe for the decommissioning of the West Clare RWS (old WTP).
2. Irish Water should carry out the following works to ensure the protection of the Annageeragh River until the West Clare RWS (old WTP) is decommissioned:
    i. submit a sludge management plan for the West Clare RWS (old WTP). The discharge of water treatment sludge to receiving water, where practiced, should cease immediately;
    ii. assess the impact of the discharge from West Clare RWS (old WTP) on the Annageeragh River, and implement mitigation measures as necessary to ensure the discharge is not having an adverse effect on the receiving water quality;
    iii. 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 holding tanks and when to escalate issues to Clare County Council senior management and to Irish Water.
    iv. ensure that alarms are in place and operating effectively, in order to alert plant operators to any malfunction or discharge of sludge from the sludge holding tank at West Clare RWS (old WTP).
3. Irish Water should submit the chlorine contact time calculation to verify that the water supply is adequately disinfected before it reaches the consumer.
4. Irish Water should install a high chlorine alarm or automatic shutdown of the plant, if the final water reaches a critically high chlorine setpoint.
5. Irish Water should ensure that the clarifier channels are examined and any broke channels replaced as part of routine site maintenance.
6. Irish Water should put in place a cascade system to escalate and notify incidents at the plant.
7. Irish Water should ensure the following works are done to demonstrate an effective *Cryptosporidium* barrier at the West Clare RWS (old WTP):
    i. consult with the HSE in relation to the plants inability to verify the *Cryptosporidium* barrier at the plant;
    ii. examine and implement alternative options to the addition of lime pre-filtration, to ensure the filters meets the EPA turbidity performance criteria for filtered water of <0.3 NTU (using the log credit approach);
    iii. implement turbidity alarms and shutdowns on each filter and in the final water;
    iv. continue to monitor the supply in accordance with the IW Rationale for Monitoring *Cryptosporidium* in Public Water Supplies.
8. Irish Water should investigate the cause of the discrepancy between the fluoride results obtained by colorimetric testing and weight calculations, and carry out appropriate corrective action.

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 **2nd July 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 **DW20210048** in any future correspondence in relation to this Report.