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	Carrigmore PWS
Organisation	Irish Water
Scheme Code	1900PUB1052
County	Limerick
Site Visit Reference No.	SV22324

Report Detail

Issue Date	20/05/2021
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	21/04/2021	**Announced**	Yes
Time In	14:15	**Time Out**	15:45
EPA Inspector(s) **Additional Visitors**	Orla Harrington Regina Campbell		
Company Personnel	Irish Water: Deirdre O'Loughlin, Tommy Roche and Oliver Harney. Limerick City and County Council: Diarmuid O'Dea, Claire Linehan and Neal Boyle.		

Summary of Key Findings

1. The Carrigmore public water supply (PWS) has been offline since 25th May 2020 due to intermittent nitrate exceedances of the 50mg/l nitrate parametric value in the treated water. Irish Water advised that the plant went back into production on 21st April 2021.
2. The EPA issued a Regulation 9(2) Direction to Irish Water on 18th May 2020 requiring installation of a continuous online nitrate monitor and alarm on the final water and to comply with the nitrates parametric value of 50mg/l for the Carrigmore PWS by 30th June 2020.
3. At the time of the audit, Irish Water had completed the upgrade works necessary to comply with the Direction after the Direction deadline of 30th June 2020 at Carrigmore water treatment plant (WTP). The upgrade works included the installation of an additional backup ion exchange unit to improve nitrate removal treatment capacity at the WTP and a continuous nitrate monitor and alarm on the final water.
4. Irish Water has completed a programme of verification monitoring to demonstrate that the actions undertaken have resulted in compliance with the nitrate parametric value. However verification monitoring has shown an increase in chloride levels in the final water after passing through the ion exchange unit. Irish Water need to undertake an investigation into the elevated chloride levels in the treated water and submit actions to be taken to ensure that the chloride parametric value is not exceeded.

Introduction

The Carrigmore public water supply serves a population of 370 people producing an approximate volume of 71 m3/day of treated water. The supply is served by a borehole (17.7m deep) located within the treatment plant site. Treatment consists of ion exchange (for removal of nitrates), ultra violet primary disinfection and chlorination with sodium hypochlorite providing secondary disinfection. Treated water is pumped to a reservoir located approximately 400m up-gradient from the treatment plant from where it serves the network by gravity. The WTP operates 24 hours/day.

The nitrate concentration in raw water abstracted at the Carrigmore WTP borehole began to increase in August 2019 resulting in intermittent exceedances of the 50mg/l nitrate parametric value in treated water. On these occasions Irish Water switched off the Carrigmore PWS and supplied the Carrigmore network with water from Doon Cooga PWS. Following three exceedances of the nitrate parametric value during May 2020, the Carrigmore PWS was switched off on 25th May 2020. The supply was brought back into production on 21st April 2021.

Upgrade works have been completed at the WTP which ensures the compliance with the nitrate parametric value. A nitrate monitor and alarm has been installed and commissioned. A new back up ion exchange unit has also been installed.

Supply Zones Areas Inspected

The purpose of the audit was to examine progress with the Regulation 9(2) Direction issued by the EPA on 18th May 2020 which required the installation and commissioning of a continuous nitrate monitor and compliance with the nitrate parametric value of 50mg/l in the final water by 30th June 2020.

The audit comprised of a video conference meeting. A site visit was not undertaken due to Covid-19 risk. The site was previously audited on 6th November 2019.

1. Source Protection

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

Comment

The supply is served by a borehole (17.7m deep) located within the treatment plant site.

Landspreading is suspected to have contributed to the elevated nitrate levels in the groundwater. Limerick City and County Council (LCCC) identified five different landowners located within the zone of contribution (ZOC).

Information on prior investigations and outreach carried out by LCCC was provided, including engaging with farmers to explain the impacts of their operations on groundwater quality and the drinking water supply. However, in response to the recommendation from the previous audit (dated 6th November 2019) it is unclear whether all five farmers within the ZOC have been issued with letters 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*. A landowner informed LCCC that a reseeding programme was carried out and slurry applied to lands south of the well in March and April 2020.

Irish Water have completed land drainage works around the well head to prevent ingress of surface water to the well chamber.

Raw water nitrate monitoring on 31/03/21, 6/4/21, 12/04/21, 13/4/21 and 14/4/21 indicates that nitrate continues to be elevated above the Drinking Water standard of 50mg/l with results between 61.2 mg/l ad 65.5 mg/l.

2. Filtration

		Answer
2.1	Does monitoring indicate that the filters are operating effectively?	No

Comment

Irish Water completed a programme of verification monitoring between 1st March 2021 and 14th April 2021 to demonstrate that actions undertaken at the plant have been adequate to ensure compliance with the nitrate parametric value of 50mg/l. Eighteen compliant samples for nitrate have been provided. However while the supply was offline, verification monitoring of the nitrate removal unit recorded exceedances of the 250mg/l chloride parametric value in the treated water on 10th March 2021 (301mg/l) and 10th February 2021 (254 mg/l). The level of chloride in the raw water on those dates was 214mg/l and 231mg/l respectively. Irish Water did not notify the EPA of these exceedances as the Carrigmore PWS was offline during this time.

However, since the supply was brought back into production on the 21st April 2021 there have been two exceedances of the chloride parametric value notified to the EPA, on 6th May 2021 (448mg/l) and 11th May 2021 (265mg/l).

Following an investigation by Irish Water, it is believed that the elevated chloride was due to run to waste and backwash water re-entering the ground water supply. In response, Irish Water then extended this discharge route from 15m to 350m down-gradient of the borehole. There has been no monitoring of this discharge or assessment of its impact on the receiving environment. During the audit, it was also noted that nitrate is being replaced with chloride during the process of ion exchange and this could also be contributing to the elevated chloride in the final water. The root cause of the elevated chloride will need to be confirmed and the treatment optimised to ensure that the chloride parametric value is not exceeded.

The Irish Water Carrigmore Direction report (dated 9th April 2021) states that Irish Water are to continue monitoring for chloride three times a week for the next six weeks and on a weekly basis for the remainder of the year.

3. Site Specific Issues

		Answer
3.1	Do the upgrade works meet the requirements of the Direction?	Yes

Comment

The EPA issued a Direction on 18th May 2020 under Regulation 9(2) of the *European Union (Drinking Water) Regulations 2014, as amended,* which required the installation and commissioning of a continuous nitrate monitor and alarm on the final water and compliance with the nitrate parametric value of 50mg/l in the final water by 30th June 2020. At the time of the audit, the Carrigmore PWS was still offline but subsequent to the audit, Irish Water advised that it went back into supply on 21st April 2021.

Irish Water submitted a Direction Report to the EPA on 9th April 2021, which listed upgrade works and operational controls implemented at the WTP to ensure compliance with the EPA Direction, after the Direction deadline of 30th June 2020. The audit confirmed that the following works have been completed:

- installation of a continuous nitrate monitor and alarm in June 2020;
- installation of an additional backup ion exchange unit in July 2020;
- backwash of the ion exchange unit is triggered based on a nitrate level of 45mg/l and a volume of 40m3;
- an automatic shutdown has been installed, based on an alarm of 49mg/l nitrate being reached;
- nitrate alarms are sent to three people; the area supervisor, plant caretaker and area engineer;
- procedures have been updated and implemented to ensure the correct operation of the ion exchange units;
- training of staff in maintenance of ion exchange units is complete;
- the supply will continue to be sampled three times a week for a further six week period and then monitored once per week for the remainder of 2021

Irish Water undertook a programme of verification monitoring and between the 1st March 2021 and 14th April 2021 there was eighteen rounds of compliant nitrate results from the final water at the WTP. However, monitoring has shown an increasing trend in chloride levels in the treated water and Irish Water need to investigate this.

The audit confirmed the treatment infrastructure has been commissioned and operational. Irish Water confirmed that the Carrigmore WTP will continue to be operated by the contractor (Campion's) for a further two years.

Recommendations

Subject	Carrigmore Audit Recommendations [21/04/2021]	Due Date	21/05/2021
Action Text	**Recommendations:** 1. Irish Water should investigate and confirm the root cause of the high chloride in the final water and optimise the treatment process to ensure that the chloride in the final water complies with the 250mg/l parametric value. 2. Irish Water should continue the investigative sampling programme to monitor chloride in the Carrigmore public water supply until the root cause is identified and a solution is put in place. 3. Irish Water should confirm the discharge route for the wastewater and carry out an assessment of its impact on the environment. 4. Irish Water should submit photographs and a brief description of the land drainage works carried out around the well chamber, including works to ensure that the housing around the well head is sealed. 5. Irish Water should liaise with Limerick City and County Council to ensure that all five landowners within the delineated zone of contribution are 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 **21/06/2021** 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 **DW20190185** in any future correspondence in relation to this Report.		