

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	Lough Mask RWSS
Organisation	Irish Water
Scheme Code	2200PUB1032
County	Mayo
Site Visit Reference No.	SV22871

Report Detail	
Issue Date	01/11/2021
Prepared By	Ruth Barrington

Site Visit Detail			
Date Of Inspection	08/10/2021	Announced	Yes
Time In	09:30	Time Out	12:50
EPA Inspector(s)	Ruth Barrington		
Additional Visitors			
Company Personnel	Irish Water: Thomas Gibbons, Eoin Hughes Mayo County Council (acting under Service Level Agreement to Irish Water): Mark O'Donnell, Conor O'Toole, Ann Brown, Brian Conmy		

> Summary of Key Findings

1. The audit found that the Tourmakeady Water Treatment Plant was well operated with alarms and inhibits in place to manage treated water quality. Older infrastructure on site (clarifiers and rapid gravity filters) requires investment and upgrading, and Irish Water have programmes in place to address these points.
2. The clarifiers were observed to be in poor condition with algal growth and broken lamella plates. Contractors were on-site on the day of the audit, to start the upgrade of the clarification processes at Tourmakeady Water Treatment Plant with tank improvements and the installation of tube settlers to improve clarifier performance and increase capacity.
3. Incident response for the Lough Mask Regional Water Supply was outlined during the audit. Irish Water should provide further improvements on what is generally good practice at the site, to include a fully documented and site specific procedure for incident and emergency response, and to document how alarms are received, cascaded, acknowledged and closed out.
4. At the time of the audit, there was no plant inhibit/ shutdown to protect the regulatory turbidity limit of 1 NTU on final treated water. Irish Water should ensure that this is put in place.

> Introduction

The Lough Mask Regional Water Supply serves a population of approximately 42,000 people with water treated at the Tourmakeady Water Treatment Plant (WTP). It is one of the largest 25 drinking water supplies in Ireland and this audit was undertaken as part of the EPA's assessment of these large supplies.

Raw water for the supply is abstracted from Lough Mask. Treatment processes at Tourmakeady WTP include coagulation, flocculation and clarification (CFC), filtration in rapid gravity filters, fluoridation and disinfection using sodium hypochlorite. Due to the requirement for zero treatment plant discharge to Lough Mask, washwater supernatant and picket fence thickener supernatant are recirculated to the head of the works, where they comprise approximately 3% of flow presented to the treatment processes.

> Supply Zones Areas Inspected

The audit included a site inspection of treatment plant infrastructure, processes and controls as well as an assessment of process trends and incident response measures. The raw water abstraction, off site reservoirs and distribution network did not fall within the scope of the audit.



1. Coagulation Clarification Flocculation (CFC) Stage

	Answer
1.1 Are the CFC processes appropriately controlled?	No
Comment	
<p>1. At the time of the audit, contractors were setting up on-site at Tourmakeady WTP to undertake an upgrade of the CFC infrastructure, which will address the observations below within Quarter 4 2021.</p> <p>2. The static mixer on the line post coagulant dosing is limited based on flow. Mayo County Council recognise this and plan to replace it as part of the CFC upgrade.</p> <p>3. The polyelectrolyte is dosed at the flocculation tank weir. This weir is relatively high and may contribute to floc breaking up prior to the clarification stage. The weir height will be reduced within the CFC upgrade.</p> <p>4. The clarifier tanks were observed to have a build up of algal growth and many of the lamella plates were broken. These issues will be addressed within the CFC upgrade which will provide safe access for operators to carry out tank cleaning more thoroughly, and the replacement of the old lamella plates with tube settlers which will increase treatment capacity.</p> <p>5. The clarifier channels were differently sized between clarifiers 1 and 2 and clarifier 3. This will be reviewed during the CFC upgrade to optimise clarifier outflows.</p> <p>6. Despite the observation No. 3 above in relation to the high weir level at the flocculation tank, the clarification stage was observed to be operating well at the time of the audit with no rising floc or pin floc carryover into the clarifier channels.</p>	



2.1

	Answer
Are the filters designed and managed in accordance with EPA guidance?	Yes
Comment	
<p>1. There are eight rapid gravity filters on-site. Following the clarifiers, water is split into two streams, one directed to Filters 1-4 and the other directed to Filters 5-8. These streams remain separate until after the treated water reservoirs, where they are re-combined to enter the mains.</p> <p>2. Filter outlet turbidities on the day of the audit were satisfactory, ranging from 0.052 NTU to 0.071 NTU. The combined final treated water, comprising both treated water streams with a sample point after the treated water reservoirs, had a satisfactory turbidity of 0.089 NTU.</p> <p>3. Filter backwash is governed by turbidity controls, where a reading of 0.18 NTU for 10 minutes will queue a filter to backwash at the next available opportunity, and a reading of 0.3 NTU for 10 minutes will remove the filter from service until it is backwashed. Return to service after backwash is similarly controlled by turbidity. Filter backwash is also programmed on a time basis. These controls are in accordance with the EPA <i>Water Treatment Manual: Filtration</i>.</p> <p>4. Irish Water stated that once the clarifier upgrades are complete, a further upgrade programme at the Tourmakeady water treatment plant will be carried out on the rapid gravity filters including filter media replacement.</p>	



3. Disinfection

3.1

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

Answer

Yes

Comment

1. The chlorine disinfection system at Tourmakeady WTP has been upgraded under Irish Water's National Disinfection Programme. This has provided enhanced controls, alarms and inhibits to verify the disinfection process as well as the introduction of a carrier water system to assist the maintenance of flow of the 10-12% sodium hypochlorite.

2. Sodium hypochlorite is dosed on a flow proportional basis with duty and standby dose pumps with automatic switchover. The controls operate on both flow via the dosing pumps and on chlorine residual. Failure of dosing, or a drop in residual for two minutes will lead first to switchover to the standby dose pump, and then to plant shutdown if the dose or residual do not respond within 10 minutes. Alarms are in place to dial out to operators of these events.

3. In the operators' experience interruptions to the chlorine dose pumps at Tourmakeady WTP can be caused by power supply fluctuation. There is an inlet valve plant inhibit set to shutdown the plant in the event of power failure.



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?	Yes
Comment		
<p>1. The current and planned water treatment plant upgrades will enhance the clarification and filtration treatment processes already present at Tourmakeady WTP and mitigate against potential issues caused by ageing infrastructure.</p> <p>2. A Drinking Water Safety Plan (DWSP) has been prepared for the Lough Mask Regional Water Supply. Irish Water outlined that an Asset Management Improvement Plan to provide a framework for risk mitigation would be started during October 2021. The number of high and very high risks identified in the DWSP was provided to the EPA prior to the audit, but Irish Water had not provided details of individual risks.</p>		

		Answer
4.2	Is the plant suitably managed and controlled to maintain the designed log credit on each treatment stage?	Yes
Comment		
<p>1. The washwater supernatant and picket fence thickener supernatant recirculation at Tourmakeady Water Treatment Plant is in place due to a requirement for no process discharge to Lough Mask. These recirculated streams are managed through splitting the flow between the raw water balance tanks and by turbidity controls on raw water and recirculated streams. Irish Water stated that the additional <i>Cryptosporidium</i> risk posed by recirculated water has been factored into the overall treatment log credit and thus to the DWSP.</p> <p>2. Monthly <i>Cryptosporidium</i> sampling is carried out at Tourmakeady WTP and Mayo County Council indicated that results have been clear.</p>		

		Answer
4.3	Is there a documented alarm response procedure?	No
Comment		
<p>1. Alarm response process flows and contact lists have been developed and training on recognising and responding to incidents was provided on 28/09/2021 to plant operators and network caretakers. The Mayo County Council and Irish Water staff present during the audit were aware of roles and escalation requirements during an incident, but there is no formally documented and site specific procedure for incident response.</p> <p>2. Alarms are dialled out to a limited cascade system of two personnel from Mayo County Council and there is also a system of plant inhibits which will shut down the plant based on specific critical alarm set points. The number of personnel on the cascade system should be reviewed by Irish Water and Mayo County Council during the development of the formal incident response procedure to determine whether this is sufficient to respond to emergencies including when staff annual leave/ illness etc. occurs.</p>		

4.4

	Answer
Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No
Comment <p>1. In general the plant inhibits are set at suitable levels to prevent the entry of inadequately treated water into the network.</p> <p>2. The exception noted during the audit was that there was no plant shutdown on the basis of the regulatory turbidity limit of 1 NTU in combined treated water leaving Tourmakeady water treatment plant. Mayo County Council and Irish Water described that it is unlikely that this limit would be breached on the basis of other plant inhibits and operational actions for example on coagulant dose failure and individual filter turbidity. However, as the individual filter turbidity backwash triggers are set on the basis of a 10 minute time delay of the 0.3 NTU level, it is still regarded as necessary to implement a 1 NTU alarm and plant inhibit on the final treated water, activated on a 3 minute time delay, as described in the EPA <i>Water Treatment Manual: Filtration</i>. This is in addition to the existing non-critical alarm setting of 0.2 NTU for 3 minutes at this sample point.</p> <p>3. Operators have remote access to SCADA to assist in oversight of developing trends in raw water or treated water processes as well as for use at times of alarm response.</p> <p>4. The reservoir outlet turbidity trend in SCADA was difficult to interpret due to the scaling of the trend. This presents the data up to 100 NTU meaning that the graphical representation of the usual range of turbidity well within the 1 NTU required for treated water is much compressed. Irish Water should review the SCADA trend scaling to ensure that it is at a resolution which can be readily used for process management.</p> <p>5. Prior to the audit, the SCADA trend for final water turbidity was requested and was provided to the EPA. During this process Irish Water and Mayo County Council identified an issue with the SCADA trend showing negative turbidity readings from 12/09/2021 to 03/10/2021, while the turbidity meter itself was displaying the correct reading. An investigation by Irish Water and Mayo County Council determined that the SCADA was under-reading the value from the turbidity meter by 0.09 NTU. While the scaling of the trend may have contributed to a negative trend being overlooked, Irish Water should ensure that regular checks are in place to assess the quality of information displayed on SCADA so that accurate details are recorded for process management.</p>	

Recommendations

Subject	Lough Mask Audit recommendations	Due Date	01/12/2021
Action Text	<p>Recommendations</p> <p>Irish Water is responsible for ensuring a safe and secure supply of drinking water. To address these issues, Irish Water should implement the following recommendations without delay.</p> <ol style="list-style-type: none"> 1. Irish Water should ensure that a site specific incident response procedure is developed for Lough Mask Regional Water supply, setting out how alarms and incidents are received, escalated, cascaded, acknowledged and closed out, in order to maintain the safety and security of the supply. 2. Irish Water should ensure that a plant inhibit controlled by the regulatory 1 NTU turbidity on final treated water is provided at Tourmakeady Water Treatment Plant, as detailed in the EPA <i>Water Treatment Manual: Filtration</i>. 3. Irish Water should revise the scaling for the SCADA trend of reservoir outlet turbidity. The scaling used should reflect previous levels of turbidity experienced at this monitoring location. 4. Irish Water should progress the current clarifier upgrades and the planned filter upgrade, taking into account any relevant risks identified in the Drinking Water Safety Plan for the Lough Mask Regional Water Supply. 5. Irish Water should provide to the EPA the list of high and very high risks identified in the Drinking Water Safety Plan for Lough Mask Regional Water Supply, and the plans in place to address these risks. <p>Follow-Up Actions required by Irish Water</p> <p>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.</p> <p>This report has been reviewed and approved by Aoife Loughnane, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency within one month of the date of this audit report detailing how it has dealt with the issues of concern identified during the audit.</p> <p>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.</p> <p>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.</p>		