

# 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	
<b>Name of Installation</b>	Mountain Stage PWS 062A
<b>Organisation</b>	Irish Water
<b>Scheme Code</b>	1300PUB1119
<b>County</b>	Kerry
<b>Site Visit Reference No.</b>	SV22572

Report Detail	
<b>Issue Date</b>	04/08/2021
<b>Prepared By</b>	Regina Campbell

Site Visit Detail			
<b>Date Of Inspection</b>	15/07/2021	<b>Announced</b>	Yes
<b>Time In</b>	11:00	<b>Time Out</b>	13:30
<b>EPA Inspector(s)</b>	Regina Campbell		
<b>Additional Visitors</b>			
<b>Company Personnel</b>	Irish Water: Deirdre O'Loughlin, Kerry County Council: Eamon Lawlor, Seamus O' Mahony Veolia: Tim O'Brien, Vincent Bertault, Catherine Furey		

## > Summary of Key Findings

1. The newly constructed water treatment plants at the lake and borehole sites for the Mountain Stage Public Water Supply (PWS) provide an adequate barrier to *Cryptosporidium* based on the verification data submitted and the observations made during the audit. The supply was removed from the RAL category 'Inadequate Treatment for *Cryptosporidium*' in the Quarter 2 2021 Remedial Action List (RAL) published on 30/07/21.
2. The lake water treatment plant (main source) is currently powered by a generator until such time as it is connected to a permanent electricity supply. Irish Water and Kerry County Council were unable to confirm when the permanent electricity supply would be put in place. This remains a vulnerability at the lake plant and raises a concern over the security of the supply. For this reason the supply remains on the RAL under the Category EPA Audit and Observations - Treatment and Management Issues.
3. The plants are currently being operated under a DBO (design build operate) contract until 8th March 2022 at which stage they will be handed over to Irish Water and Kerry County Council. It is very important that there is full training on all aspects of the operation and maintenance of the water treatment plants before handover is completed by the contractor to the operators of the water treatment plants.

## > Introduction

The Mountain Stage Public Water Supply (PWS) has a primary raw water source, Coomaglaslaw Lake and a supplementary source, Droum borehole, which is used at times of greater demand. The sources are located approximately 5km apart and a separate treatment plant is in place at both locations. The supply serves a population of 840 and produces 780 m<sup>3</sup>/day. The lake source produces up to 35 m<sup>3</sup>/hr whilst the borehole provides 5 m<sup>3</sup>/hr. Both water treatment plants are currently being operated by Veolia until March 2022 under a DBO (design build operate) contract at which point they will be handed over to Irish Water and Kerry County Council.

The Mountain Stage PWS has been on the EPA's Remedial Action List (RAL) since 2008 due to the absence of a treatment barrier to prevent *Cryptosporidium* from entering the supply. The purpose of the audit was to assess the treatment upgrade works and process controls that have been implemented under the RAL improvement programme and to verify if the Mountain Stage PWS can be removed from the RAL.

The main treatment processes in place at each site are as follows:

### Lake plant

- Coagulation dosing facilities (not currently required due to high quality of the lake water); 3 no. pressure filters; duty/standby UV units; chlorination systems; final pH correction systems (not required at present); washwater and sludge treatment facilities.

The lake plant is currently being operated by a generator. Irish Water and Kerry County Council are waiting for connection to the permanent electricity supply which has been delayed due to access issues. There was no timeframe available for the connection at the audit.

### Borehole plant

- coagulation dosing systems; 2 no. pressure filters; duty UV unit; chlorination systems; final pH correction systems (not required at present); washwater and sludge treatment facilities.

## > Supply Zones Areas Inspected

The audit consisted of a site visit to the lake and borehole water treatment plants. All aspects of the treatment processes were inspected.



## 1. Source Protection

	Answer
1.1	Is the abstraction source(s) adequately protected against contamination?
	Yes
<b>Comment</b>	
<u>Lake source</u>	
<p>The primary source is Coomaglaslaw lake which provides 35 m<sup>3</sup>/hr. The lake is located in a mountainous area with some sheep grazing in the vicinity. On the day of the audit the raw water turbidity was 0.183 NTU and the pH was 6.17. Generally the quality of the lake water is very stable and is not generally influenced by weather events. There is a high turbidity alarm on the raw lake water of 0.4 NTU with shutdown at 0.5 NTU.</p>	
<u>Borehole source</u>	
<p>Droum borehole is a supplementary source providing 5m<sup>3</sup>/hr and is used to maintain head in the reservoir. The capping and pumping arrangements of the existing borehole have been upgraded. The housing of the borehole headworks has yet to be completed. The raw groundwater pre treatment has a typically low pH of 5.8 to 6 and is naturally high in manganese (approximately 200 ug/l).</p>	



## 2. Coagulation Clarification Flocculation (CFC) Stage

2.1

Are the CFC processes appropriately controlled?

Answer

Yes

### Comment

#### Lake plant

Duty and standby dosing pumps for PACL and polymer have been installed and commissioned at the lake plant. However the high quality of the raw water has not necessitated the use of coagulation prior to the filters. Should the raw water UVT drop below 80% or when the raw water turbidity exceeds 0.5NTU, the plant operator will be required to organise jar testing in order to confirm the coagulant dose needed.

#### Borehole source

Caustic soda is dosed followed by PACL and polymer (0.2%) on the raw groundwater. Duty and standby pumps are in place. The target pH is 7.1-7.2 and flocculation is aided by a static mixer prior to the filters. Flocculation is needed to aid manganese removal in the filters.

		Answer
3.1	Are the filters designed and managed in accordance with EPA guidance?	Yes
<b>Comment</b>		
<p><u>Lake plant</u></p> <p>3 no. pressure filters have been installed each with a design capacity of 54 m<sup>3</sup>/hr. The media comprises of 0.6m anthracite and 0.6m sand. The filters operate on a duty/duty/duty basis with the flow split evenly between the 3 filters.</p> <p>Backwashing is on a timed basis every 48 hours and can also be operated based on turbidity or loss of head. Backwashing is followed by run to waste.</p> <p><u>Borehole plant</u></p> <p>Duty and standby pressure filters have been installed. Media comprises of 0.6m sand, 0.5m MnO<sub>2</sub> (to aid manganese removal) and 0.6m anthracite. The filters are backwashed every 48 hours and backwash can also be triggered based on loss of head or turbidity. Backwash is followed by run to waste which can last for up to an hour.</p>		

		Answer
3.2	Does monitoring indicate that the filters are operating effectively?	Yes
<b>Comment</b>		
<p>There are turbidity monitors after each pressure filter and on the combined filtrate at the lake and borehole plants.</p> <p>The turbidity alarms are set at 0.18 NTU with shutdown at 0.2 NTU.</p> <p>On the day of the audit, the turbidities after Filter 1, 2 and 3 at the lake plant were 0.121 NTU, 0.102 NTU and 0.107 NTU respectively with the combined filtered turbidity reading 0.109 NTU.</p> <p>The borehole plant was not operating at the time of the audit. Two months trend data submitted prior to the audit showed final water turbidity to be 0.07 NTU on average.</p>		



## 4. Disinfection

		Answer
4.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	Yes
<b>Comment</b>		
<p>Disinfection systems have been upgraded at both the lake and mountain plants. Primary disinfection is provided by chlorination with UV treatment installed on both plants to provide a <i>Cryptosporidium</i> barrier. UV and chlorination treatment systems are verified with monitors with suitable alarms and shutdowns in place.</p> <p>Chlorine alarms and shutdowns at the lake plant are as follows: Hi 1.9 mg/l; Hi Hi 2 mg/l; Lo 1.1 mg/l; Lo Lo 1.0 mg/l.</p> <p>Chlorine alarms &amp; shutdowns at the borehole plant as as follows: Hi 1.7 mg/l; Hi Hi 2 mg/l; Lo 0.6 mg/l; Lo Lo 0.5 mg/l.</p>		

		Answer
4.2	Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place?	Yes
<b>Comment</b>		
<p>The plants are currently operated by Veolia under a DBO (Design Build Operate) contract until March 2022. Alarms in relation to the plant are sent to two members of staff.</p>		

		Answer
4.3	Are duty and standby chlorine pumps/ UV units in operation?	Yes
<b>Comment</b>		
<p>Duty and standby chlorine pumps and UV units are operational at Commonage.</p> <p>Duty and standby chlorine pumps and a duty UV unit are operational at the Droum plant. The Droum borehole acts as a supplementary source and its function is to maintain the head in the reservoir during times of demand. In the event that the duty UV unit fails the Droum plant will shutdown. There is approximately 24 hours treated water storage in the supply at current demand levels.</p>		

		Answer
4.4	Is the UV system suitably validated?	Yes
<b>Comment</b>		

Lake plant

Duty and standby Amaline 100 UV units are validated in accordance with USEPA validation protocols. The UV unit provides a minimum 3 log credit for protozoal removal when dose is >27 mJ/cm<sup>2</sup> and when the unit operates at flow <60m<sup>3</sup>/hr and UVT >70%.

Borehole plant

The duty Best BLE2.250 UV unit provides 3 log credits for protozoal removal and is validated against the Austrian ONORM standard. It delivers a fixed dose of 40 mJ/m<sup>2</sup> when operating within its validation envelope (> 74.1% UVT, UVI > 94.9 W/m<sup>2</sup> and flow < 11.9m<sup>3</sup>/hr).

Validation certificates for the UV units at both plants were submitted in advance of the audit. However the complete certification reports were not available at the plants on the day of the audit. The contractor said it had requested the reports from the suppliers of the UV units and that the full reports would be maintained at the plants.

4.5

Is the UV disinfection system operating within its validated range?

**Answer**

Yes

**Comment**

Lake plant

Monitors at the audit showed that the duty UV unit was operating within its validated range (UVT 95.9%, flow 34.66 m<sup>3</sup>/hr,) and delivering a dose of 113.9 mJ/cm<sup>2</sup>. Two months satisfactory trend data to show that the UV units were operating within their validated range was provided prior to the audit. Satisfactory alarms and shutdowns were enabled at the plant.

Borehole plant

The borehole plant was not in operation during the audit. Two months satisfactory trend data to show that the plant was operating within its validated range was provided prior to the audit. Satisfactory alarms and shutdowns were enabled at the plant.

4.6

Is the chlorine dosed appropriately?

**Answer**

Yes

**Comment**

Lake plant

10% sodium hypochlorite is dosed flow proportionally with duty and standby pumps with automatic changeover in place.

Borehole plant

10% sodium hypochlorite is dosed flow proportionally. There are duty and standby chlorine dosing pumps with automatic changeover.

4.7

Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?

**Answer**

Yes

**Comment**

Trends submitted in advance of the audit showed adequate and stable levels of disinfection at both the lake and borehole plants.

**Answer**

4.8 Are manual chlorine tests carried out and recorded on final treated water to compare with the continuous monitor results?

No

**Comment**

The caretaker said that manual chlorine tests are carried out daily but that he does not record the results.

**Answer**

4.9 Is there a suitable monitoring frequency for residual chlorine in the network with records available?

No

**Comment**

Records submitted for May and June show that there are gaps of up to 6 and 7 days between residual chlorine monitoring in the network. All results showed that a chlorine residual of  $\geq 0.1$  mg/l is maintained in the network.

**Answer**

4.10 Is there adequate chlorine contact time before the first connection?

Yes

**Comment**

Information submitted showed that the chlorine contact time achieved at the lake plant is 22.94 mg.min/l with a minimum free chlorine concentration of 0.9 mg/l required at the validation point. The chlorine contact time achieved at the borehole plant is 134.63 mg.min/l with a minimum free chlorine concentration of 0.5mg/ required at the validation point.

Residual chlorine monitoring takes place after contact time has been achieved at both plants.



## 5. Management and Control

		Answer
5.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	Yes
<b>Comment</b>		
<p>The protozoal compliance log treatment for the lake source is 1.55 which defaults to log 3, which incorporates a potential sanitary survey penalty of 1.</p> <p>The protozoal compliance log treatment for the borehole source is 1.6 which currently defaults to Log 3 in the absence of a sanitary survey.</p> <p>The UV treatment at both plants provides log 3 removal for Cryptosporidium when operated within validated range.</p>		

		Answer
5.2	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	Yes
<b>Comment</b>		
<p>Irish Water submitted a list of suitable alarms and shutdowns on the pressure filters, UV units and chlorination systems and these were confirmed to be enabled at the audit.</p>		

		Answer
5.3	Are instrument calibrations within date?	Yes
<b>Comment</b>		
<p>All calibration information viewed at the audit were within date.</p>		



## 6. Sludge Management

		Answer
6.1	Is sludge arising from the treatment processes adequately managed?	Yes
<b>Comment</b>		
Backwash water is dosed with polymer at both plants and then settles for 4 hours with sludge going to a sludge holding plant prior to tankering off-site and settled supernatant is discharged to a drain.		



## 7. Site Specific Issues

	Answer
7.1 Is there a permanent electricity supply at the water treatment plants?	No
<b>Comment</b>	
<p>The newly constructed water treatment plant at the lake site (main source of the supply) is currently powered by a generator since it went into production in March 2021. At the audit Irish Water or Kerry County Council could not confirm when the lake plant will be connected to a permanent electricity supply. Subsequent to the audit, Irish Water advised that the infrastructure was well advanced by the ESB with final connection to be completed in the coming months.</p> <p>There is no standby generator at the lake site and the EPA considers that the supply is not secure until a permanent electricity supply is in place.</p> <p>The borehole plant is on the mains electricity supply.</p>	

## Recommendations

Subject	Audit Recommendations Mountain Stage	Due Date	04/09/2021
Action Text	<p data-bbox="272 342 517 376"><b>Recommendations</b></p> <ol data-bbox="272 398 1428 1093" style="list-style-type: none"><li data-bbox="272 398 1428 488">1. Irish Water should secure connection to the permanent electricity supply for the lake plant. Any issues that may arise associated with the changeover from the generator to the new supply should be communicated to the EPA.</li><li data-bbox="272 510 1428 577">2. Irish Water should ensure that the UV units operate within their validated operating range at all times to ensure adequate disinfection of the Mountain Stage PWS.</li><li data-bbox="272 600 1428 667">3. Irish Water should ensure a copy of the validation certificates for the UV units are maintained at the plants.</li><li data-bbox="272 689 1428 779">4. Irish Water should ensure that the well-head arrangements at the Droum plant are suitably housed and protected in accordance with EPA Advice Note 14: Borehole Construction and Wellhead Protection.</li><li data-bbox="272 801 1428 947">5. Irish Water should ensure that:<ol data-bbox="304 857 1428 947" style="list-style-type: none"><li data-bbox="304 857 1428 891">a) monitoring of residual chlorine in the network takes place several times a week;</li><li data-bbox="304 913 1428 947">b) records of manual chlorine tests of the final water are maintained at each plant.</li></ol></li><li data-bbox="272 969 1428 1093">6. Irish Water should ensure that Operations and Maintenance Manuals are compiled and maintained on-site for the lake and borehole water treatment plants and that full training is provided to staff prior to handover by the contractor. The Manual should include jar testing and coagulation dosing procedures for the lake plant in the event that the need arises.</li></ol> <p data-bbox="272 1171 810 1205"><b>Follow-Up Actions required by Irish Water</b></p> <p data-bbox="272 1227 1428 1294">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 data-bbox="272 1317 1428 1373">This report has been reviewed and approved by Dr. Michelle Minihan, Senior Inspector, Drinking Water Team.</p> <p data-bbox="272 1395 1428 1462">Irish Water should submit a report to the Agency on or before 04/09/2021 detailing how it has dealt with the issues of concern identified during this audit.</p> <p data-bbox="272 1485 1428 1552">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 data-bbox="272 1574 1428 1641">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> <p data-bbox="272 1664 1428 1731">Please quote the Compliance Plan Reference DW20070539 in any future correspondence in relation to this Report.</p>		