

# 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>	Central Regional-Lough Guitane (H) 400F
<b>Organisation</b>	Irish Water
<b>Scheme Code</b>	1300PUB1016
<b>County</b>	Kerry
<b>Site Visit Reference No.</b>	SV22849

Report Detail	
<b>Issue Date</b>	27/10/2021
<b>Prepared By</b>	Regina Campbell

Site Visit Detail			
<b>Date Of Inspection</b>	08/10/2021	<b>Announced</b>	Yes
<b>Time In</b>	10:30	<b>Time Out</b>	13:45
<b>EPA Inspector(s)</b>	Regina Campbell		
<b>Additional Visitors</b>			
<b>Company Personnel</b>	Irish Water: Deirdre O' Loughlin, Michael Byrne, Glan Agua (operating under DBO contract to Irish Water): Ross O' Sullivan, Conor Callaghy		

## > Summary of Key Findings

1. The audit found that the Central Regional Lough Guitane Water Treatment Plant is a modern and very well operated and managed plant.
2. There are a number of recommendations in the audit report that when progressed will help to address some network issues related to high iron and lead.

## > Introduction

The Central Regional Lough Guitane Public Water Supply (PWS) serves a population of 65,648 including Killarney, Tralee, Castleisland, small villages and rural hinterland. The supply volume is 34,411 m<sup>3</sup>/day.

The sources of the supply are Lough Guitane (70%) and Owgariff River (30%).

The raw water is treated at the plant as follows: raw water pH adjustment, chemical coagulation and flocculation, dissolved air flotation (DAF) clarification, rapid gravity sand filtration, UV disinfection, chlorination, final water pH correction and fluoridation. Irish Water said that there are proposals to adjust final water pH correction at the plant and to commence orthophosphate dosing in the network.

The plant construction and commissioning was completed in 2018. The plant is currently managed by Glan Agua under the operational phase of the Design Build Operate (DBO) contract (7 years in duration). The plant is manned 24 hours a day and 7 days a week.

The audit was undertaken to assess the general operation and management of the plant.

## > Supply Zones Areas Inspected

All the main water treatment plant areas were inspected.



## 1. Source Protection

	Answer
1.1	Is the abstraction source(s) adequately protected against contamination?
	Yes
<b>Comment</b>	
<p>The sources of the supply are Lough Guitane (70%) and Owgariff River (30%). Occasionally the proportion supplied by the river may decrease if river levels are very low. Catchment uses include low intensity agriculture and rural housing.</p> <p>Alarms and shutdowns are in place on a wide range of raw water parameters including ammonia, pH, dissolved oxygen, turbidity, conductivity, colour and UVT. Raw water alarms are rarely triggered with the raw water balancing tank (5,000 m<sup>3</sup> volume) key to ensuring stable raw water.</p>	



## 2. Coagulation Clarification Flocculation (CFC) Stage

2.1

	Answer
Are the CFC processes appropriately controlled?	Yes
<b>Comment</b>	
<p>Lime is added to the raw water to adjust pH directly upstream of the raw water tank. After the raw water tank, raw water passes through a Flash Mixing stage. Polyaluminum chloride (PAC) is mixed with the raw water in a flash mix chamber with injection via a static mixer. No coagulant aid is used in the process.</p> <p>Coagulant dosing is adjusted in response to UVT.</p> <p>There is a floc pH probe with alarm in each of the flocculation tanks.</p> <p>Water then passes through to a series of 6 no. DAF clarification units. There is a settled water turbidity monitor after the DAF clarification units with an alarm of 0.7 NTU and a shutdown setpoint of 1 NTU. On the day of the audit the monitor was reading 0.427 NTU.</p> <p>No issues of concern were noted in relation to the CFC processes at the audit.</p>	



### 3. Filtration

	Answer
3.1 Are the filters designed and managed in accordance with EPA guidance?	Yes
<b>Comment</b>	
<p>There are 8 no. rapid gravity filters at the plant with 6 no. filters in operation at any one time. On the day of the audit filters 2 and 7 were offline. The filters comprise of dual media (450mm anthracite and 550mm sand). Media depth is regularly measured and Glan Agua do in house operational checks on the condition of the filters (including media coring) twice per year.</p> <p>Glan Agua said that backwash of each filter takes place every 35 hours. Backwashing can also be triggered by headloss or turbidity &gt; 0.2 NTU. There is a run to waste facility after backwashing and the filter does not go back into production until turbidity is &lt; 0.2 NTU.</p>	

	Answer
3.2 Does monitoring indicate that the filters are operating effectively?	Yes
<b>Comment</b>	
<p>There is a turbidity monitor on each filter and all monitors were displaying &lt; 0.1 NTU at the audit. There is shutdown on each filter if turbidity &gt; 0.2 NTU (5 mins time delay).</p> <p>There is also an online turbidity monitor on the final water with alarm of 0.12 NTU and shutdown of 0.2 NTU (on the day of the audit reading 0.11 NTU).</p> <p>Trends for filtered and final water turbidity for September 2021 were satisfactory.</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>Primary disinfection is achieved using chlorination with a <i>Cryptosporidium</i> barrier provided by UV.</p> <p><u>Chlorination</u></p> <p>0.7% sodium hypochlorite is manufactured on-site by electrolysis. Duty/standby/assist chlorine pumps are in operation which automatically switchover every 12 hours. Dosing is flow proportional with residual trim. The target residual chlorine dose is 1.22 mg/l which is monitored by monitor CL001 in the mixing chamber of the clear water tank.</p> <p>Chlorine contact time is achieved in the clear water tank with monitors CL002 and CL003 providing dual validation after contact time has been achieved.</p> <p>There are alarms and shutdowns on each of the 3 no. chlorine monitors. The low chlorine alarm and shutdown at monitors CL0002 and CL003 are 0.7 mg/l and 0.5 mg/l respectively. The high chlorine alarm and shutdown at the same monitoring points are 1 mg/l and 1.3 mg/l.</p> <p><u>UV</u></p> <p>Water passes through UV prior to chlorination. There are 3 no. Wedeco Spektron 2000e units which operate on a duty/standby/assist basis with the units alternating every 24 hours. The target dose is 15.72 mJ/cm<sup>2</sup> which delivers 3 log reduction of protozoa. The unit shutdowns if the dose falls below 13.10 mJ/cm<sup>2</sup>. The validated operating range is: at UVT min 70% 314m<sup>3</sup>/hr; at UVT min 85% 1.596 m<sup>3</sup>/hr; at UVT min 98% 3,202 m<sup>3</sup>/hr. During the audit. the monitors on UV1 were reading 98% UVT, 440 m<sup>3</sup>/hr and UV dose of 90 mJ/cm<sup>2</sup> and on UV2 were reading 470 m<sup>3</sup>/hr and UV dose of 105 mJ/cm<sup>2</sup> which shows that they were operating within validated range.</p>		

		Answer
4.2	Is the UV system suitably validated?	Yes
<b>Comment</b>		
<p>The UV units are validated in accordance with the USEPA validation protocol.</p>		

		Answer
4.3	Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes
<b>Comment</b>		
<p>Chlorine and UV trends submitted for September 2021 showed stable and adequate levels of disinfection.</p>		

	<b>Answer</b>
4.4 Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	Yes
<b>Comment</b>	
<p>Residual chlorine is monitored after the clear water tank (twin celled, 5000m<sup>3</sup>) which is where contact time is achieved. The chlorine contact time calculation sheet for the plant gives a target CT of 24 mg.min/l with a total effective time of 34 mg.min/l when there is a minimum of 0.4 mg/l residual chlorine after contact time.</p> <p>At the audit, the chlorine concentration post contact time was 0.9 mg/l which demonstrates the target contact time was being achieved.</p>	

	<b>Answer</b>
4.5 Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
<b>Comment</b>	
<p>Records submitted for the month of September 2021 showed that residual chlorine monitoring at extremities of the network is not being undertaken several times a week.</p> <p>Subsequent to the audit, Irish Water confirmed that there are 11 no. chlorine booster stations and 11 no. online chlorine monitors on the network. Irish Water confirmed that there are chlorine alarms on 8 no. of the booster stations and that an updated risk assessment of all chlorine alarms is being undertaken.</p>	



## 5. Reservoirs and Distribution Networks

		Answer
5.1	Is the distribution network adequately maintained to protect drinking water quality?	No
<b>Comment</b>		
<p>Parts of the network on the Central Regional Lough Guitane supply have issues with high iron in drinking water greater than the parametric value (200mg/l) due to old cast iron mains pipework. High iron levels have contributed to inadequate residual chlorine levels (&lt; 0.1 mg/l) in some areas of Tralee, Killarney and Castleisland. All incidences of high iron and inadequate residual chlorine are notified to the EPA and an assessment of risk to public health is undertaken by Irish Water and the HSE.</p> <p>At the time of the audit, there are Water Restrictions in place in Tralee (affecting a population of 16) due to high iron and low chlorine issues. Irish Water said that it is hoped that mains replacement works scheduled to be completed in October 2021 will address the areas with water restrictions. Irish Water also said that it is proposed to adjust final pH of the final water at the water treatment plant (by adding sodium bicarbonate to lime) to further address alkalinity issues in the final water.</p> <p>Irish Water also said that it proposes to commence orthophosphate dosing in the network to address lead issues in parts of the network.</p>		





## 6. Management and Control

		Answer
6.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	No
<b>Comment</b>		
The protozoal compliance log treatment requirement for the plant has been provisionally identified as 3 log but the sanitary survey has not been completed yet.		

		Answer
6.2	Is there a documented alarm response procedure?	Yes
<b>Comment</b>		
Glan Agua have compiled a set of Standard Operating Procedures for the plant which includes procedures for alarm responses. As part of the procedures all alarms are logged and all process changes and actions taken in response to alarms are logged.  Irish Water have also recently completed training on Incident Reporting Guidance with the plant operators		

		Answer
6.3	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	Yes
<b>Comment</b>		
There is extensive monitoring of all treatment processes at the plant with alarms and shutdowns at all key stages including on the final water.		

		Answer
6.4	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	Yes
<b>Comment</b>		
The plant is manned 24 hours a day and 7 days a week. Alarms are sent to the operator(s) on duty and off-site with the operator on duty responsible for responding to the alarm in the first instance.  Glan Agua said that records are maintained of all training provided and regular refresher training takes place.		



## 7. Sludge Management

		Answer
7.1	Is sludge arising from the treatment processes adequately managed?	Yes
<b>Comment</b>		
<p>Supernatant from settled sludge and from filter backwash water is treated by a dedicated UV unit prior to being recycled to the head of the works. There is no surface water discharge from the plant. The UV unit for the wastewater provides 2.5 log reduction for <i>Cryptosporidium</i> where UVT is &gt;60 % and 3 log reduction for <i>Cryptosporidium</i> where UVT is &gt; 68% at maximum flows of 270 m<sup>3</sup>/hr. Trends were submitted to show that satisfactory flows and UV dose were being maintained.</p> <p>Sludge is passed through a picket fence thickener and a dewatering press prior to disposal off-site.</p>		



## 8. Site Specific Issues

		Answer
8.1	Have the Drinking Water Safety Plan Very High and High risks been identified for the Public Water Supply?	No
<b>Comment</b>		
Irish Water said that it is in the process of completing a Drinking Water Safety Plan, following which the very high/high risks identified will be reviewed/assessed and will be submitted to the EPA once available.		

## Recommendations

<b>Subject</b>	Central Regional Lough Guitane Audit Recommendations	<b>Due Date</b>	27/11/2021
<b>Action Text</b>	<p><b>Recommendations</b></p> <p><b>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.</b></p> <ol style="list-style-type: none"> <li>1. Irish Water should confirm that the updated risk assessment of secondary chlorination stations and chlorine monitors and alarms in the network has been completed and that any risks identified have been addressed.</li> <li>2. Irish Water should ensure that monitoring of residual chlorine in the extremities of the network takes place several times a week.</li> <li>3. Irish Water should submit details of the project (including timeframe and location of dosing) to commence orthophosphate dosing in the supply.</li> <li>4. Irish Water should submit details of the project (including timeframe) to amend pH correction at the plant in order to address alkalinity issues in the final water.</li> <li>5. Irish Water should confirm the protozoal log treatment requirement for the source and confirm the log treatment provided by the plant.</li> <li>6. Irish Water should complete the Drinking Water Safety Plan for the supply and submit details of the very high and high risks identified.</li> </ol> <p><b>Follow-Up Actions required by Irish Water</b></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 Dr. Michelle Minihan, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency on or before 27/11/2021 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.</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> <p>Please quote the Compliance Plan Reference DW20190064 in any future correspondence in relation to this Report.</p>		