



# Drinking Water Audit Report

<b>County:</b>	Mayo	<b>Date of Audit:</b>	13 June 2017
<b>Plant(s) visited:</b>	Knock Airport PWS (2200PUB1036)	<b>Date of issue of Audit Report:</b>	30 June 2016
		<b>File Reference:</b>	DW2010/145
		<b>Auditors:</b>	Ms. Derval Devaney
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>.</li> <li>• <i>The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i></li> <li>• The recommendations specified in the EPA Report on <i>The Provision and Quality of Drinking Water in Ireland</i>.</li> <li>• The Recommendations specified in the previous EPA Audit report of 8<sup>th</sup> October 2010.</li> </ul>		

## MAIN FINDINGS

- i. The recommendations listed in the EPA’s Audit Report on Knock Airport PWS in 2010 have been addressed, including enhanced raw water monitoring, disinfection improvements and the implementation of documented procedures and record keeping.
- ii. The management and control of the chlorination process at the plant has been improved since the EPA’s previous audit and Irish Water is committed to carrying out further upgrade works under its Disinfection Programme by October 2016.
- iii. It appears that no audit compliance sampling was carried out on this supply for 2015.

## 1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* 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 drinking water.

Knock Airport PWS is sourced from a groundwater seep into an excavated pit, which is located in disused (since 1984) glaciofluvial sand and gravel quarry. The aquifer beneath is a karstified regionally important aquifer (Rkc) of Dinantian Pure Bedded Limestones. The Groundwater vulnerability map for this area shows high to low vulnerability (but the Geological Survey of Ireland (GSI) maps state only an interim study took place and the vulnerability is unmapped). The Groundwater Monitoring Programme Site Information Report for the supply, carried out in 2011 in conjunction with the EPA, Mayo Co. Co. and the Western River Basis District, confirm the vulnerability is unmapped. The PWS supplies Knock West Airport with 50 m<sup>3</sup> of treated water per day. Chlorination is the only form of treatment at this plant. A small quantity of water is also sourced from the pit to serve a few nearby houses by gravity and also Cloonlyon Group Water Scheme which supplies approx. 20 domestic users and a national school.

Photographs taken by Derval Devaney during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 9.30 am at Knock Airport PWS. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audits observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water: (\* indicates that the person was not present for the closing meeting)

Mayo County Council: Mr Eddie Munnelly, Senior Executive Engineer; Ms Eileen Kavanagh\*, Executive Scientist; Mr Gerard Shally, Electrician; Mr Iarla Moran, Senior Engineer; Mr John Burke, Waterworks Caretaker.

Irish Water: Mr Patrick O’Sullivan, Compliance Analyst; Mr Sean Higgins, Operations & Maintenance Engineer.

Representing the Environmental Protection Agency:

Ms Derval Devaney, Inspector.

## 2. AUDIT OBSERVATIONS

In view of the observations noted during the audit and listed below, Mayo County Council is recommended to carry out the following recommendations;

*The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.*

1.	<p><b>Source Protection</b></p> <ul style="list-style-type: none"> <li>a. This supply is fed from a pool of groundwater and rainwater which collects naturally in a disused gravel pit (see Photo 1).</li> <li>b. A well was drilled near this source in 1982 but was found to be unproductive. This well was capped in accordance with the recommendations of the last EPA audit in 2010 to prevent contamination entering the groundwater source.</li> <li>c. Raw water monitoring was carried out since 2012 in accordance with the recommendations of the last EPA audit. This data (monitored 9 times from 2012-2014) was made available for review during the audit and results illustrated a good quality water source with low levels of turbidity, colour, conductivity, manganese, iron, nitrite and microbial contamination.</li> <li>d. The Zone of Contribution (ZOC) for this supply is set out in The Groundwater Monitoring Programme Site Information Report for the supply, carried out in 2011 in conjunction with the EPA, Mayo Co. Co. and the Western River Basis District. THE ZOC is located within a disused sand and quarry pit surrounded by agricultural land. A house, located across the road from the source, falls within this ZOC (see Photo 1).It was not clear if the septic tank associated with this house was inspected as part of the National Inspection Plan for Co. Mayo.</li> <li>e. Irish Water propose to carry out additional source protection works by creating drainage alongside the road which borders the pit to divert any runoff away from the source and also to re-profile the land to afford better protection to the source and to fence the overall area to add to its security by preventing unauthorised access or animal entry.</li> </ul>
2.	<p><b>Disinfection</b></p> <ul style="list-style-type: none"> <li>a. Water is pumped from the 2.8 m deep concrete caisson structure at source, in which the pump sits, to a 36 m<sup>3</sup> holding tank/sump approximately 1km from the source where it is chlorinated and then it pumped to a reservoir 2 km from Knock airport. The abstraction rate is dependent on the level of water in this holding tank.</li> <li>b. Sodium Hypochlorite 14 % is flow proportionally dosed into this holding tank to disinfect the water supply. There is an automatic switchover between the duty and standby chlorine pumps which was put in place since the last EPA audit.</li> <li>c. A chlorine monitor is located in the pumphouse recording chlorine on the rising main after it is dosed into the holding tank, however it is recognised that this reading is taken prior to contact time having elapsed. The reading on the day of the audit was 1.19 mg/l chlorine residual with the</li> </ul>

	<p>alarm setting of 1.9 mg/l high alarm and 0.4 mg/l low alarm.</p> <ul style="list-style-type: none"> <li>d. The chlorinated water is then pumped to a 45 m<sup>3</sup> reservoir situated within the boundary of Knock airport. Irish Water estimates that there is 7 day's storage in this reservoir. Irish Water has access to this reservoir and it was visited during the audit. Since the EPA's last audit a chlorine monitor was installed (in 2014) post the reservoir (and contact time) to determine the level of chlorine prior to entry to the distribution network (e.g. to the airport's canteen, bar, kitchens, aircraft, etc.). The CL17 monitor was reading 0.62 mg/l on the day of the audit and high level alarms are set at 1.5 mg/l and the low level alarm at 0.5 mg/l. The caretaker stated that the chlorine readings range from 0.6 – 0.8 mg/l exiting the reservoir.</li> <li>e. There is an alarm response procedure in place at the plant (this was put in place on the recommendation of the last EPA audit). The caretaker stated that he receives a text to this mobile phone when the chlorine alarm is activated and there is a cascade system in place which ensures the next available person responds to the alarm if he is not available.</li> <li>f. The chlorine monitor at the reservoir was calibrated on 16.02.16.</li> <li>g. A handheld CL17 analyser is used weekly to compare readings provided by the chlorine monitors and to take a chlorine residual reading on the Cloonlyon Group Water Scheme. All results are recorded in the daily log book stored at the pumphouse.</li> <li>h. Irish Water stated that all chlorine readings are being recorded remotely at the machinery yard in Castlebar Town Council.</li> <li>i. Irish Water stated that this supply is included in the Disinfection Programme with a timeframe of October 2016. This work includes the installation high lift pumps and a contact tank next to the source so disinfection can be carried out next to the area of raw water abstraction. A chlorine monitor will also be installed post contact time in addition to turbidity, pH and a UVT monitor at the raw water source to determine if current level of treatment is adequate. The upgrade also includes the installation of a Human Machine Interface (HMI) unit to enable the caretaker to carry out real time data acquisition and have access to trends and changes in water quality at the pumphouse. Irish Water also proposes to take over the Cloonlyon Group Water Scheme as part of this upgrade.</li> </ul>
<p><b>3.</b></p>	<p><b>Treated Water Storage</b></p> <ul style="list-style-type: none"> <li>a. Treated water is stored in a reservoir located on the Knock Airport site. The site is exposed and prone to elevated winds, as a result some of the roof's sheeting was compromised (see Photo 2).</li> </ul>
<p><b>4.</b></p>	<p><b>Monitoring and Sampling Programme for treated water</b></p> <ul style="list-style-type: none"> <li>a. The HSE carry out check compliance sampling of the treated water in the network (at the airport) and ELS carry out audit compliance sampling. The auditor reviewed the compliance (check and audit) monitoring results from 2012-2016 and were found to be satisfactory. The historic low chlorine residual levels in the airport (e.g. at the kitchen sink tap) evident from 2007, as discussed during the EPA's 2010 audit, have been addressed by Mayo County Council and the Airport Authority. Irish Water confirmed that there is now no discrepancy in chlorine residual results between the ground and top floor of the airport building and since 2012 all results are &gt; 0.1 mg/l residual chlorine.</li> <li>b. There was no audit sample from ELS in the file for 2015. Irish Water stated that there are usually 2 audit samples taken per year and would investigate whether the samples were taken.</li> <li>c. The turbidity meter on the source water was malfunctioning and not providing a reading even though this monitor was last calibrated within its annual timeframe on 18/12/15. Irish Water stated a call has been logged with CSL to service the instrument and as an interim measure the caretaker is taking manual daily turbidity readings since the monitor has malfunctioned. The turbidity was 0.24 NTU post the reservoir on the day of the audit (monitored by handheld meter).</li> <li>d. The pH was 7.24 on the online monitor post the reservoir on the day of the audit and the flow meter read 46 m<sup>3</sup>/d.</li> </ul>

### 3. AUDITORS COMMENTS

The chlorination process for Knock Airport Supply has been adequately upgraded since the last EPA audit in 2010 and the low chlorine residuals continuously found at the airport's kitchen sink, which were a cause for concern at that time, were investigated by the Water Supplier and the problem rectified to ensure the drinking water provided is safe and secure.

A greater understanding of the source's raw water characteristics can be now determined from raw water monitoring that has been undertaken since the EPA's last audit in 2010. This information and the additional information to be collated under Irish Water's Disinfection Programme for this supply will inform Irish Water if current treatment is adequate and if there is a need to provide enhanced treatment at the site to ensure continued safety and security of the supply.

Documented procedures and record keeping has greatly improved at the plant since the EPA audited this supply in 2010 and the EPA welcomes further improvements to be undertaken by October 2016, as proposed by Irish Water under the Disinfection Programme.

## **4. RECOMMENDATIONS**

### **Source Protection**

1. Irish Water should ensure that the proposed source protection measures are carried out as outlined in Section 2 of this report and any septic tanks that are located within the Zone of Contribution are inspected with priority under the National Inspection Plan to ensure the raw water source is protected from contamination.

### **Disinfection**

2. Irish Water should complete the works proposed under the Disinfection Programme for this supply by October 2016 as outlined during the audit.

### **Distribution System**

3. Irish Water should ensure that the service reservoir is inspected on a regular basis and any maintenance and repairs required (e.g. to its roof structure) are completed as soon as possible after the need has been identified.

### **Management and Control**

4. Irish Water should ensure that monitors controlling the supply's treatment are regularly maintained and calibrated in accordance with the manufacturer's instructions and any malfunctions identified (e.g. the turbidity monitor malfunctioning on day of the audit) are rectified without delay to ensure adequate control of the treatment and water supply.
5. Irish Water should investigate the cause for lack of audit monitoring data for 2015 and report to the EPA if this sampling was undertaken. If so, provide the laboratory's certificate of analysis for the monitoring results, and if not, identify the reason for the lack of monitoring and the measures taken to ensure this does not re-occur.
6. Irish Water should ensure, once the Cloonlyon Group Water Scheme is taken in charge by Irish Water under the Disinfection Programme works proposed, that the EDEN system is updated to reflect these changes (e.g. volume and population updated for the Knock Airport PWS, and the Cloonlyon Scheme has an end date inserted to ensure this supply is inactive on EDEN).

## **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 Ms Aoife Loughnane, Drinking Water Team Leader.





**Photo 2 Reservoir roof (Reservoir within Airport Boundary)**