

# Munnoch Reservoir

## Gate Valve Refurbishment



Two 24" gate valves, probably manufactured around 1902, have been removed from the line and placed in a nearby field alongside Munnoch Reservoir in Ayrshire. The valves were cleaned, disassembled, and all components were subjected to a detailed condition assessment.

Based on the recommendations of the condition assessment report, Scottish Water decided to refurbish the two valves such that they could be returned to service. The condition assessment and refurbishment works were undertaken by Glenfield Invicta's engineers at the company's engineering workshops in Kilmarnock.



The original gate valve

Benefits of valve refurbishment, when compared to new replacement valves, include considerable carbon emission savings, lower costs and faster turnaround. Returning a refurbished valve to its original location and function ensures the dynamics of the pipework/system configuration remain unchanged.



The original gate valve

### Introduction

Munnoch Reservoir is a small 25.8ha/63 acres service reservoir located 6km north of Ardrrossan, and around 50km to the southwest of Central Glasgow. The reservoir was decommissioned in 2008. In 2022, George Leslie (Scottish Water framework contractor) worked on the site to lower water levels and rewild the surrounding area. The reservoir now acts as a flood prevention measure.



The original gate valve

When the conservation works were being undertaken, two 24" gate valves were found hidden in dense undergrowth. Although nobody can say for sure, it is possible that the valves were removed when the reservoir was decommissioned in 2008. The original use of the valves is likely to have been scour protection or reservoir drawdown.



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## Dams & Reservoirs



The original gate valve



Valve during shot blasting



Valve during shot blasting

### Scope of works

Scottish Water contacted Glenfield Invicta and agreed a two-phase approach. Firstly, the valves were to be stripped down to their component parts and subjected to a detailed condition assessment, with Glenfield Invicta submitting a report to Scottish Water including recommendations on how best to proceed. If, upon analysing the report, refurbishment was the preferred course of action for Scottish Water, Glenfield Invicta was to refurbish the valves such that they could return to operational use.

George Leslie transported the valves to Glenfield Invicta's engineering workshop in Kilmarnock. Before assessment of the valves could begin, a significant amount of mud and soil was carefully removed.

Whilst the valves carried the Glenfield mark, there was no mark or date on the casting to identify when it had been manufactured. However, the flange configuration and the use of coach-type bolts indicated that the valves probably the originals installed when Munnoch Reservoir was built in 1902.

Once cleaned, the valves were disassembled into their component parts which, on visual inspection alone, appeared to be in good overall condition. A detailed condition assessment was then completed by Glenfield Invicta's engineers. Scottish Water decided to accept the condition assessment report's recommendation that the valves and their gearboxes were in a condition which meant refurbishment was a cost-effective option.

The refurbishment process took six weeks. Firstly, the valves' castings were shotblasted and spray coated with consecutive protective layers of paint that is used on our current valve range. At the same time, the seat rings were cleaned manually.

During reassembly, the original fasteners were replaced with new, as were the non-metallic seals and packing.

The valves' open top gearbox design was slightly unusual in that it had dual inputs. One shaft had a high ratio teeth setting, whereas the other had a low ratio. This meant the engineer opening or closing the valve could choose which input to use depending on the torque required.

Once the valves had been reassembled, they were hydrostatically tested to ensure the gate bedded correctly and there were no leaks.

'There are a number of benefits when refurbishing valves. The most obvious are the sustainability gains that can be achieved through refurbishment rather than procuring new replacement valves.

**For this particular project, the refurbishment of the two 24" metal seated gate valves will result in a saving of over 4.5 tonnes of CO2 emissions.**

Significant time and cost savings can be gained through refurbishment. A valve refurbishment project will usually take between four to six weeks (dependent on condition). As each new reservoir valve is bespoke to its intended application, lead times for new valves are typically around 24 weeks.

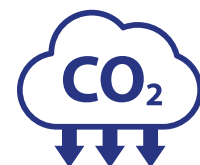
The cost of refurbishing a valve can be considerably lower than buying a new valve. Furthermore, if a refurbished valve is being returned to its original location and function, the installation is relatively straightforward. For example, there are no flange compatibility issues to resolve as could be the case if a new valve is being fitted into existing pipework. This can make the installation of a refurbished valve quicker and more economical than a new valve.

### The benefits of refurbishing legacy valves

Greg Morris was the Glenfield Invicta engineer leading the valve refurbishment project:

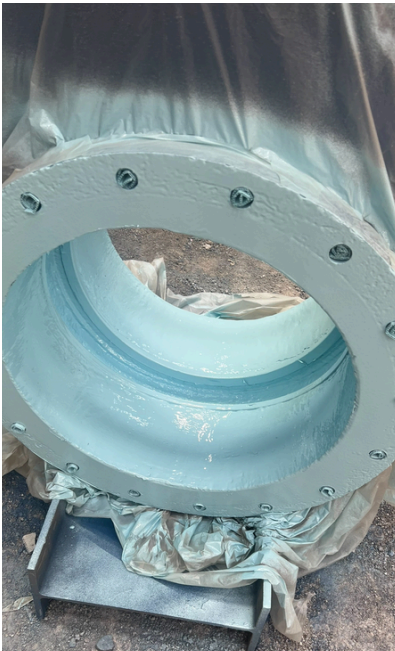


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# Case Study

## Dams & Reservoirs



Valve during shot blasting

In engineering terms, a refurbished valve ensures the dynamics of the original pipework configuration/system are not disturbed. It will continue to perform as it was originally designed to.

The Munnoch Reservoir valves refurbishment project clearly shows that even valves that may initially appear to be in a poor physical state are worthy of further investigation.'



Final refurbished valve



Final refurbished valve

### What next for the Munnoch Reservoir gate valves?

Given the new function of the Munnoch Reservoir as a flood prevention measure, it is unlikely that the refurbished valves will be used on the site.

There are numerous other reservoirs across the Scottish Power estate that date from the late 1800s and early 1900s. It is possible that the refurbished valves will be used as replacements, temporarily or permanently, for other gate valves.

Initially, one fully refurbished valve will be shown alongside the other valve that has not been refurbished and this will be displayed at the George Leslie Innovation & Sustainability Day in September 2024.



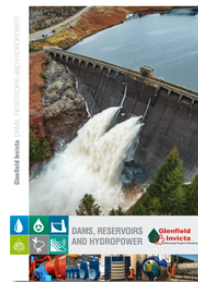
Final refurbished valve



Final refurbished valve

### Estimated carbon savings

For this project refurbishing the two 24" metal-seated gate valves will save more than 4.5 tonnes of CO2 emissions, when compared to producing two new valves



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