

Cardiff Council

Roath Park Dam

Scour Valve Management Plan – annual maintenance & intrusive works

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1. Introduction

Roath Lake is classified as a Category A large raised reservoir under the Reservoirs Act (1975) and is owned & operated by Cardiff Council. There is the requirement for it to have operational draw-down facilities in the case of an emergency and to allow management of the lake water level.

This document details the management of the reservoir scour valve for both the annual operation for maintenance and a one-time operation for intrusive investigations planned for 2024.

2. Reservoir Details

2.1 Reservoir Location

Roath Park Lake is situated in the suburbs of Cardiff approximately 5km north of Cardiff City Centre, at the following address:

Roath Park Lake Reservoir
Roath Park
Lake Road West
Cardiff
CF23 5PH

The National Grid Reference for the reservoir is ST 185 793.

2.2 Access Routes

2.2.1 Access to the reservoir site

Access into the grounds of Roath Park can be made from the following entrances:

- The east side of the reservoir can be accessed from gates on Lake Road East at National Grid References ST 186 793.
- The west side of the reservoir site can be accessed from the gates on Lake Road West at National Grid References ST 184 793.
- The upstream sides of the reservoir are open with good access available the east and west banks from Lake Road East & Lake Road West.

2.2.2 Access onto the embankment crest

Access onto the eastern and western ends of the embankment can be made directly from the two gates detailed above on Lake Road East and Lake Road West.

2.3 Reservoir Owner & Undertaker

The reservoir Owner & Undertaker is:

Cardiff Council
Queen Alexandra House
Cargo Road
Cardiff
CF10 4LY

Contact: Mr Adam Beach
Office: 02920 684000; Mobile: 07976 011850
Email: A.Beach@cardiff.gov.uk

2.4 Reservoir Supervising Engineer

The reservoir Supervising Engineer is:

Nathan Walding

Stillwater Associates Limited
Chapter House
33 London Road
Reigate
Surrey
RH2 9HZ

Office: 01737 768237
Mobile: 07807 217862
Email: nathan.walding@stillwater-associates.co.uk

Alternative Supervising Engineer contact:

Mr David Littlemore

Stillwater Associates Limited
Office: 01737 768237
Home: 01737 270301
Mobile: 07740 432292
Email: david.littlemore@stillwater-associates.co.uk

2.5 Reservoir Use

Amenity and recreation.

2.6 Reservoir Type

Earth fill embankment.

3. Reservoir Scour Valve

The dam running along the south side of the lake comprises of an earth fill embankment. The valve is within a chamber located towards the western end of the dam, adjacent to the existing spillway. Access to the chamber is via a cover within the pedestrian area of the embankment.

Chamber location grid reference: ST 18502 79281.

The scour valve controls flow in pipework which extends into the reservoir. Downstream of the valve, pipework discharges into a tunnel which runs through the downstream shoulder of the embankment and flows into the Roath Brook. The scour pipes and valve are ~610mm in diameter. The valve arrangement is the only means of emptying the reservoir (all other outflows from the reservoir go over the spillway).

4. Operation for Annual Maintenance

4.1 Timing of operation

The scour valve will typically be operated once a year in order to partially drawdown the top water level of the lake to allow maintenance of the lake shoreline by Cardiff Council.

It is anticipated that in order to draw the lake level down by approximately 1m, the scour valve will be open for ~33 hours, with valve 50% open. This assumes normal low inflows, as the drawdown won't be undertaken during a flood event when higher inflows would be entering the lake. The maximum discharge rate has been calculated as $\sim 1.1 \text{ m}^3/\text{s}$.

The maintenance of the shoreline will include the removal of debris and plants and could take up to 1 week depending on the extent of debris found. The lake level of 1m below top water level will be maintained by operation of the scour valve in order to ensure operative safety during the maintenance works.

4.2 Procedure

1. Advise NRW at least 48 hours in advance, using the following e-mail address:
reservoirs@cyfoethnaturiolcymru.gov.uk
2. Responsible Person to approve and monitor valve operation.
3. Fence off the access to the valve chamber cover to prevent public and non-authorised access. Open the chamber cover to allow view of the valves. Do not enter the chamber, as it is considered a confined space.
4. Competent person to fully open and close the scour valve using a 'T key' from the crest of the dam through a stopcock cover. The valve opens clockwise with approximately 20 turns to reach 50% open. Close the valve once the required water level is reached. It is anticipated that the valve will take approximately 10 minutes to open and 10 minutes to close.
5. Maintain the required lake level through operation and regular adjustment of the valve, to ensure any lake inflow is passed forward to the downstream watercourse.
6. Record valve operation on the site Prescribed Form of Record.

5. One-time Operation for Intrusive Investigations

5.1 Timing of operation

The scour valve will be operated once in order to partially drawdown the top water level of the lake to allow intrusive investigations to be undertaken within the spillway by Cardiff Council's contractors. This work is required to inform the design for a replacement spillway.

It is anticipated that in order to draw the lake level down by up to 1m, the scour valve will be open for ~33 hours, with the valve 50% open. This assumes normal low inflows, as the drawdown won't be undertaken during a flood event when higher inflows would be entering the lake. The maximum discharge rate has been calculated as $\sim 1.1 \text{ m}^3/\text{s}$.

The intrusive investigation will include coring of the spillway stonework and could take up to 3 weeks to complete. The lake level of up to 1m below top water level will be maintained by operation of the scour valve in order to ensure operative safety during the investigation works.

5.2 Procedure

1. Advise NRW at least 48 hours in advance, using the following e-mail address: reservoirs@cyfoethnaturiolcymru.gov.uk
2. Responsible Person to approve and monitor valve operation.
3. Fence off the access to the valve chamber cover to prevent public and non-authorised access. Open the chamber cover to allow view of the valves. Do not enter the chamber, as it is considered a confined space.
4. Competent person to fully open the scour valve using a 'T key' from the crest of the dam through a stopcock cover. The valve opens clockwise with approximately 20 turns to reach 50% open. Close the valve once the required water level is reached. It is anticipated that the valve will take approximately 10 minutes to open and 10 minutes close.
5. Maintain the required lake level through operation and regular adjustment of the valve, to ensure any lake inflow is passed forward to the downstream watercourse.
6. Record valve operation on the site Prescribed Form of Record.

6. Environmental Impact and Mitigation Plan

The potential impact on the environment due to the annual or one-time operation of the valves is reviewed in Table 1.

Table 1: Environmental Impact Plan

Description of Risk or Hazard	Comment & Mitigation Measure(s)
Discharge of silt into downstream watercourse	<p>Due to the upfront silt management which was undertaken during the 2023 valve repair works to move the silt away from the tunnel entrance (see Appendix A for details), it is expected that any sediment transfer during the valve operations will be negligible quantity and temporary; therefore, no significant environmental impact is anticipated.</p> <p>However, a watch person will be located at the tunnel outlet during the valve operations and in the case of any significant silt discharge (observed through visual observation), the valve will be closed and silt curtain/hay dam will be installed within the tunnel outlet to capture any silt release.</p>
Release of stratified water into the downstream watercourse	<p>There is potential in deep lakes for water of poor water quality (i.e. water that that is excessively cold or depleted in dissolved oxygen) to be discharged into the downstream watercourse. Roath Park lake is ~4.5m at its deepest point and as such the risk of significant stratification causing a reduction in water quality in the Roath Brook is considered to be negligible.</p>
Release of fish into the downstream watercourse	<p>The lake is populated with carp, pike, roach and various other coarse fish (eDNA survey results that will provide a full species list are pending). Some coarse fish species from the lake are considered likely to be present downstream. There is a low risk of fish being released downstream, but given the temporary nature of the scour releases and the fact there is no change in the operational practice of the valves that has taken place since the dam was built, significant impacts to the Roath Brook are not anticipated.</p>
Release of invasive species into the downstream watercourse	<p>Although there may be invasive species are present in the lake (eDNA survey results are pending), there is no change in the operational practice of the valves that has taken place since the dam was built. The lake is known to support invasive elodea pond weed (suspected Nuttall's waterweed <i>Elodea nuttallii</i>). All species of elodea are non-native to the UK and listed on Schedule 9 of the Wildlife and Countryside Act. This species is considered likely to already be present downstream of the lake and risk of transfer during scour testing is considered low, given that this species is considered unlikely to grow at the depth of the scour valve inlet due to insufficient light levels.</p>
Flooding of the park downstream	<p>The maximum discharge of the scour valve is within the capacity of the downstream watercourse and so flooding is not anticipated due to the valve operation. Valve operation will only be undertaken when there's low flow in the downstream channel and not during storm events.</p>
Noise of the valve operation affecting surrounding environment	<p>The valve is located at the bottom of a chamber within the dam and the water will discharge from a tunnel into the downstream watercourse. Neither structure can be easily accessed by members of the public or wildlife, and so noise pollution will be low.</p>

Appendix A

Scour Valve Repair Works 2023

The valves were inoperable and works to repair them were undertaken in January & February 2023.

The methodology for this repair was undertaken in stages:

1. Preliminary works to allow access to the wet scour tunnel:
 - The end of the scour tunnel within the reservoir has a fence on it, which was removed to allow a diver to access the tunnel to isolate the valve. There was silt built-up in front of this fence, and so this silt was moved away.
 - Firstly, a silt management system was installed. A hydraulic pump, with diver's attachment, pumped the silt into a bunded area within the reservoir but away from the spillway. The bunded area consisted of a silt curtain, encompassed by a hay dam to contain all silt within the bund to act as a settling tank for the silt. All pump effluent was pumped into the bunded area and, on completion of the silt clearance works, was allowed to settle for a minimum of 24 hours prior to its removal.
 - In addition to the bunded area, a silt curtain/hay dam was established around the spillway weir. This was to prevent the siltation of the watercourse downstream, in the event the diver disturbs the silt to an extent that created a silt plume, which migrated to the spillway.
 - A watch person was available during the silt clearance works. This person monitored the siltation of the reservoir, to check if a silt plume appeared and migrated to the spillway. This didn't occur.
 - In addition to the siltation of the water, there was a direct danger to fish and eels in the vicinity of the hydraulic pump as they could have been drawn through the pump system. To mitigate against this, there was a 10mm mesh strainer on the diver's attachment. Prior to the commencement of pumping operations, the diver knocked two hollow steel tubes together for a duration of 30 seconds to scare away any fish and eels within the vicinity, prior to operating the pump.
 - Once the silt had been moved from the tunnel entrance, the divers removed the fence.
 - This methodology was discussed and agreed with NRW's Pollution Advisor, Martyn Davies, and Fisheries Officer, Rhys Davies-Herbert.
2. Isolation of the scour and bypass valves, by the installation of an inflatable bung within the upstream end of the scour pipe by divers.
3. Repair of the scour and bypass valves, from within the valve chamber.
4. Remote removal of the scour pipe isolation by the dive team.
5. Once the valves were confirmed to be operable, the fence over the end of the scour tunnel within the reservoir was replaced by divers, as this acts as a silt trap to limit silt discharge through the scour pipe during the valve operation.