

Mill of Benholm, Kincardineshire, Aberdeenshire



Gazetteer: Part 4: Water Mill Infrastructure

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Introduction

This Gazetteer forms part of a series for the assets at the Mill of Benholm including:

Part 1: Mill Buildings

Part 2: Meal Mill Lower Floor

Part 3: Meal Mill Upper Floor & External Items

Part 4: Water Mill Infrastructure

The Gazetteer should also be read in conjunction with the Mill of Benholm Conservation Plan.

The gazetteer lists items of interest recorded during site visits in May to September 2023. The items are listed with a short description and images. Comments on their authenticity, significance and other observations are made. Terminology for mill infrastructure and parts of the milling operations has been taken from *The Mill of Benholm, The Story of a Scottish Meal Mill*, by Lesley Miller, published by Kincardine & Deeside District Council in 1996 when the mill was reopened as a visitor centre; additional information presumed from the same source is available on interpretation panels on site. Information recorded in the Scottish Industrial Archaeology Survey in 1983 (Canmore, MS/500/35/83) has been included where relevant as a comparison to the current position.

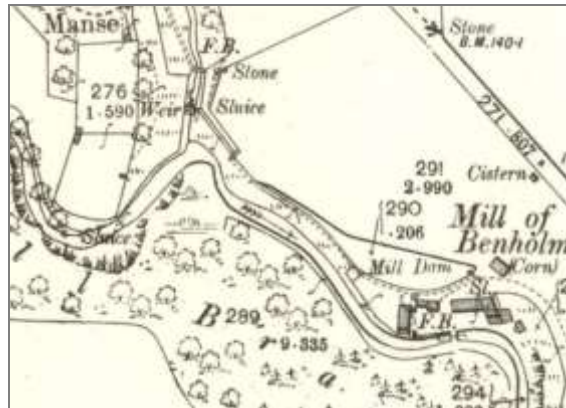
The items have been set out in sequence starting from the water sources, following through to the waterwheel.

Historic development in cartographic evidence



1864: 1st ed. OS records a dam at the convergence of the burns, as well as the mill pond.

© NLS [View map: Ordnance Survey, Kincardineshire XXV.9 \(Benholm\) - Ordnance Survey 25 inch 1st edition, Scotland, 1855-1882 \(nls.uk\)](#)



1901: 2nd ed. OS shows the dam is no longer in place, either adapted by the miller or perhaps as a result of changes to the water courses or embankments. The dam has been replaced by a weir.

© NLS [View map: Ordnance Survey, Kincardineshire XXVIII.6 \(Benholm; Bervie\) - Ordnance Survey 25 inch 2nd and later editions, Scotland, 1892-1949 \(nls.uk\)](#)



1923: this later OS shows little change from the 1901 arrangement although the lade appears more structured.

© NLS [View map: Ordnance Survey, Kincardineshire XXVIII.6 \(Benholm; Bervie\) - Ordnance Survey 25 inch 2nd and later editions, Scotland, 1892-1949 \(nls.uk\)](#)

There has been effectively no change to the water infrastructure excepting that the aqueduct (underground pipe) from the upper weir to the Castleburn is not functioning and was not restored during the 1990s work.

Water Mill Infrastructure

The infrastructure which brings water power to the milling machinery was designed using the following components: the water sources (Castle Burn and Burn of Benholm), the upper and lower weirs, mill lade (7) and sluice gates, the mill pond (5), sluice and culvert to bring water to the overshot waterwheel via the trowse.






Mill of Benholm site drawing from Miller (1996) indicating the main buildings and features © Aberdeenshire Council.

Mill buildings include the meal mill (1), former miller's house (2), former byre (3) and former grain store (4).

Mill water infrastructure including mill pond (5; also referred to as the mill dam in other resources), weirs, lade (7), sluices, and waterwheel.

Open space and woodlands both on the mill lands and former croft (8) and the neighbouring Mill Brae Wood, now commonly referred to as the Mill Brae 'woods' (6).

Item	Description & Images	Authenticity, Significance and Observations
<p>Burn of Benholm</p>	 <p>Looking SW from the Lower Weir at the head of the lade to the Burn of Benholm. The Upper Weir is in the distance.</p>	<p>Miller (1996) notes that the efficient operation of the water source (i.e. Castle Burn) also relies on the Aqueduct. However both Whittaker Engineering Ltd. and Pete Babs have confirmed that the aqueduct was not functioning and was not restored as part of the repair works. There appears to have been some dispute at that time as to the ownership of the ground to the west of the burns, said to belong to the manse and access to clear the original underground pipework or to lay over ground pipe was prohibited.</p>
<p>Castle Burn</p>	  <p>The primary water source for the mill is the Castle Burn seen here looking north from the Lower Weir at the head of the lade.</p>	

<p>Pool on Burn of Benholm, Upper Weir, Aqueduct</p>			<p>Several trenches were dug along the pipe route to determine the status of the underground pipes as there was no water flow through the pipes from the Burn of Benholm (WE Ltd files).</p>
	<p>The Upper Weir on the Burn of Benholm creates a pool which fed an underground pipe, the Aqueduct, from the pool to the Castle Burn. (WE Ltd image c.1991)</p>	<p>The Aqueduct outlet entered the Castle Burn above the Lower Weir close to the Burn Sluice (outlet not found in 2023). (WE Ltd image, c.1991)</p>	
<p>Burn sluice</p>			<p>Miller (1996, 8) describes a “dual sluice system” which diverts water into the lade. This implies that this sluice was part of the water infrastructure design.</p> <p>Pete Babs confirmed that it was possible to board a second sluice in flood although this had not been used.</p>

<p>Lower weir</p>			<p>The weir would disperse water flow when the lade sluice was shut. The lade sluice would be kept closed most of winter as mill not operating. lade section from river to sluice would easily infill with silt in storms.</p>
<p>Sluice at head of lade</p>			<p>“The original sluice opening was only 9” wide which was totally inadequate given the small head of water available from the burn dam” (WE Ltd files).</p>




Rounded stones laid to a fall to create the **Lower Weir**.

Cast iron sluice gate with manual wheeled screw operation (2023).

Image of existing sluice after it was fitted by Whittaker Engineering Ltd. c. 1992 replacing the earlier one. (WE Ltd image)

<p>Lade</p>	 <p>Lade is constructed using both timber and stone walling. Condition varies with large sections blocked with vegetation growth.</p>		<p>Former custodian miller Pete Babs has said that the lade was lined in puddle clay.</p> <p>Lade section from river to sluice would easily infill with silt in storms. Currently this section of lade from the Castle Burn to the lade sluice cannot be determined as it appears damaged / infilled with debris from the river. It may have been deliberately infilled by Aberdeenshire Council.</p>
<p>Paths to lade</p>	 <p>Paths run along the lade both for operation of the sluice gate and visitor routes around the grounds.</p>	 <p>Footbridge at the mill pond / lade intersection with stone steps towards the croft area.</p>	

<p>Mill pond</p>	 <p>Miller (1996) describes the mill pond as the power source of the mill. A full dam was sufficient to power the mill for a day's work. Mill pond is retained by a concrete dam (refer Canmore, 1983, MS/500/35/83).</p>	 <p>The dam is also an important part of the biodiversity of the site and a scenic viewpoint.</p>	<p>Former custodian miller Pete Babs has said that as a visitor centre, the mill stones could be driven for 4-5 hours with a full pond. He would open the sluice wheel at the pond 2 to 2.5 turns to get a slow water flow.</p> <p>There is an overflow for the pond (not seen) said to be close to the west end / bridge on the river side.</p> <p>The pond was generally clear of vegetation when the mill was in use as a visitor centre, other than bull rushes. Waterlilies were trialled but failed.</p>
	 <p>A view of the mill pond in 1983 shortly after its closure as a commercial mill. Note the water appears vegetation free. © Mills Archive Trust: Jim Woodward-Nutt collection, image 10742: https://catalogue.millsarchive.org/benholm</p>	 <p>A view of the pond on March 2019, just before maintenance would cease due to Covid-19 restrictions. © Mills Archive Trust: image FISH-01-003: https://catalogue.millsarchive.org/mill-pond-mill-of-benholm-benholm</p>	

<p>Pond sluice outlet with grille</p>	 <p>This sluice releases water from the mill pond via a stone lined culvert under the yard to the Trowse at the head of the Waterwheel.</p>	 <p>View of the pond sluice grille to prevent debris entering the waterwheel.</p>	
<p>Culvert</p>	 <p>The stone lined culvert was reconstructed by WE Ltd having partially collapsed. The full length of the culvert was exposed, the stone sides rebuilt with concrete base and rebuilt roof with both stone slabs and steel plates below the track. (WE Ltd image).</p>		

<p>Trowse and Trowse Sluice</p>	 <p>The metal trough carrying water to the top of the waterwheel is known as the Trowse.</p>	 <p>The Trowse Sluice is controlled by a lever in the upper floor of the meal mill to divert water from the Trowse into a bypass channel to adjust speed or stop the wheel.</p>	
<p>Trowse and Trowse Sluice</p>	 <p>The earlier waterwheel running in 1983 with wooden trowse. © Mills Archive Trust: Jim Woodward-Nutt collection, image 10749: https://catalogue.millsarchive.org/benholm-wh</p>	 <p>WE Ltd fabricated and installed the replacement metal trowse, complete with trap door diverter and stone guard in 1992. (WE Ltd image).</p>	<p>Douglas (Canmore, 1983, MS/500/35/83) describes the sluice operation prior to restoration: <i>“The 2cm dia. steel bar across the lade is attached to a wooden gate, this is the sluice which starts/stops water wheel. The bar goes through mill wall and can be operated from inside mill, by shelling stones”</i> Refer to Gazetteer Part 2 for images of the internal operation.</p>

<p>Waterwheel, bypass channel and tailrace</p>	 <p>The earlier waterwheel in 1983 © Mills Archive Trust: Jim Woodward-Nutt collection, image 10750: https://catalogue.millsarchive.org/benholm-wh2</p>	 <p>Detailed view c. 1991, note the earlier waterwheel has been removed. (WE Ltd image).</p>	<p>WE Ltd noted that the stone wall at side and base of waterwheel was cut back to provide sufficient clearance to allow spent water to escape freely into the tailrace. The tailrace was cleared of silt and stones before a concrete floor was formed and the internal walls were repointed the full length to the exit point on the burn by WE Ltd. The tailrace is believed to have subsequently required rebuilding more recently after damage/erosion.</p>
	 <p>New overshoot waterwheel designed and installed by Whittaker Engineering Ltd. of Stonehaven in April 1992. 366cm (12 foot) dia. and 102cm (3' 4") wide Steel axle with 8 wooden spokes and 32 wooden buckets; phosphor bronze axle bushes.</p>	 <p>View of the new waterwheel, tailrace, stone retaining wall and bypass channel shortly after repair and renewal. (HES file image c.1992).</p>	<p>In 1974, recorded as 6 spoke wheel 2'6" x 10' (76cm x 305cm; Hume, 1974); Douglas in 1983 has 364cm dia. x 106cm = 12' x 3' 6" with metal wheel axle 10cm dia. (Canmore, 1983, MS/500/35/83). It is not thought that the wheel was replaced over this period so this must an anomaly in the measurement technique.</p> <p><i>It was not possible to inspect the tailrace due to overgrown vegetation.</i></p>

**Waterwheel
bypass channel
and tailrace**



General view c. 1991, note the earlier waterwheel has been removed. (WE Ltd image).



General view shortly after repair and renewal of the waterwheel, with the new **Trowse** clearly visible above the **Waterwheel** and a new higher boundary wall next to the building. (HES file image c.1992).



View within the tailrace during the restoration works c. 1991. (WE Ltd image).



WE Ltd delivering the new waterwheel for installation in April 1992 (WE Ltd image).



The new waterwheel and trowse shortly after installation (WE Ltd image).