

FACT SHEET WESTERN SPRINGS PUMPHOUSE AND BEAM ENGINE

The Problem of Water in Early Auckland

In the mid 1800's Auckland did not have a reliable supply of clean water. There was no major river for Auckland to draw water from, so water was collected from rainfall, local wells, springs or streams. However, the population of Auckland was growing quickly and the sewage and waste from homes and small businesses contaminated the few water supplies. As a result, water-borne diseases were common and epidemics occurred from time to time. Fires in homes and businesses were also a major concern, with no reliable water supply to help fight them.

In 1865 the first piped water supply started from the Domain Springs (where the Auckland Domain is now). However, by 1872 it was obvious that the Domain Springs could not produce enough water for Auckland's growing population and the Auckland City Council began to look elsewhere.

Auckland Waterworks and Pumping Station at Western Springs

Western Springs was chosen as the best source of water because it had large quantities of water coming from the springs and it was well removed from the populated areas of the city. The Auckland City Council created what we now know as Western Springs Lake by damming the springs. The lake was created to provide an impoundment pond, or reservoir, for the Waterworks to pump water from.

On 10th July 1877 the Auckland Waterworks and Pumping Station at Western Springs, with the magnificent beam engine, were officially opened. The Waterworks was designed by William Errington and the pumping engine and boilers were built by John Key & Sons of Kirkcaldy, Scotland. The day to day operation of the Waterworks was in the hands of an Engineer and a Fireman, who both lived on the site. The Engineer's cottage is still part of MOTAT and can be seen in the Victorian Village.

Though Aucklanders had to pay to connect to and receive the new water supply, it was extremely popular. From 1879 to 1889 the number of people connected increased from 877 to 6,248. In 1886, as water levels in Western Springs Lake started to drop, Edgecombe Creek (near the western end of the lake) was used to add another 200,000 gallons (900,000 litres) of water per day. Even so, the Waterworks could not keep up with the growing demand. In 1910 the first of five dams was built in the Waitakere Ranges to supply a greater volume of water to the growing city. By 1920 the Western Springs Waterworks was only used as a back up during the dryer summer months, and the final pumping occurred in the dry summer of 1926-1927. In 1937 the boilers were scrapped.



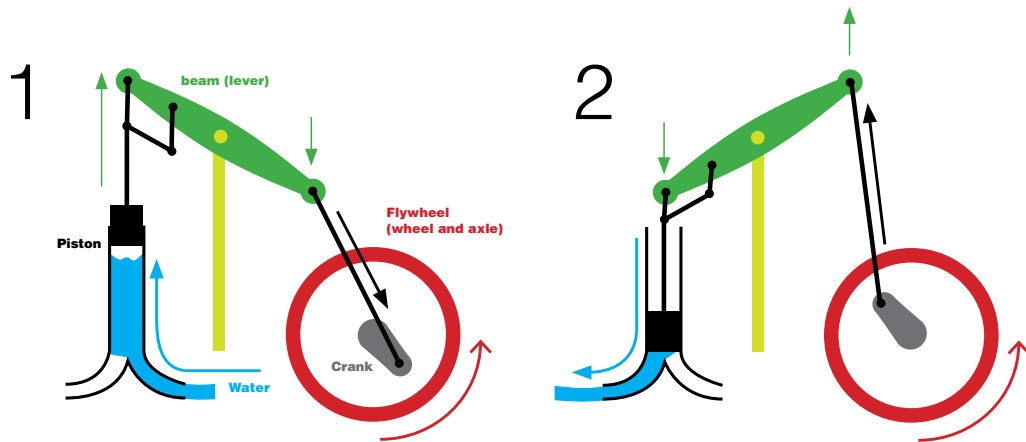
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The Beam Engine

The beam engine is a type of steam engine developed by English engineer Thomas Newcomen (1663-1729), which was used for pumping water from mines. Newcomen's engine had a large cylinder filled with steam at very low pressure which was condensed and caused a vacuum. This dragged the piston down with great force which moved the beam. When the vacuum was broken, the beam was weighted to rock back to its original position. Large wooden beams were attached to the piston at one end and to pumps below at the other end via long rods called pitmans. Flywheels, like the one on MOTAT's beam engine, did not appear until around 1780 and made the engines run more smoothly.



Other engineers improved on Newcomen's design including Richard Trevithick (1771-1833) who designed boilers from cast iron plates so they could produce high-pressure steam. Arthur Woolfe (1776-1837) invented "compounding." This used steam first in a high pressure cylinder then expanded its residual force in a larger low pressure cylinder working the same beam.

MOTAT's beam engine is a "double Woolf compound beam engine." It is the largest existing beam engine in the Southern Hemisphere and it is also the only one of its type in the world.

The Pumphouse Today

MOTAT was established in 1964 and took over the care of what we now call the Pumphouse. Restoration of the Pumphouse was completed in 2002 and restoration of the Beam Engine was completed in 2008. The beam engine is now powered once again by steam. It can be seen in operation every Thursday.



What Happened to the Chimney?

After World War II (1939-1945) there were size restrictions on new houses, due to a shortage of building materials. However there were fewer restrictions if second hand materials were used. In 1948 the bricks from the chimney were used to build a house in Massey Road, Mangere. Mr Beale, a returned serviceman, paid £50 to demolish the chimney by hand and remove the 32,000 bricks from the site. The house still stands today.

Beam Engine Statistics

Flywheel weight:	16 tons (16.25 tonnes)
Diameter:	20 ft 6 in (6.25 metres)
Circumference:	64 ft (19.5 metres)
Weight of rim:	11.5 tons (11.7 tonnes)
Rim speed:	920 ft per minute (280 metres per minute)
Output:	300 HP at 14.5 revs per minute (224 kW)

For more information about the Pumphouse take a look at these resources.

These are available from the MOTAT Library (09 815 5810, library@motat.org.nz)

Books

Green, Warren. (2007). *Notes on the restoration of the John Keys & Son beam engine at MOTAT*. Auckland: Warren Green.

Pointon, Ken (ed.). (2008). *The beam engine & Western Springs Pumping Station*. Auckland: Museum of Transport and Technology.

Wilson, Lorraine M. (1994). *An iron essay: a short history of the beam engine and Western Springs waterworks, Auckland*. Auckland: Museum of Transport and Technology..

Other Non-Book Material

Pumphouse Log books, 1884-1888 & 1894-1898.

Pumphouse sketches.

Beam Engine drawings.

Auckland City Council Waterworks by-laws, 1876.



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