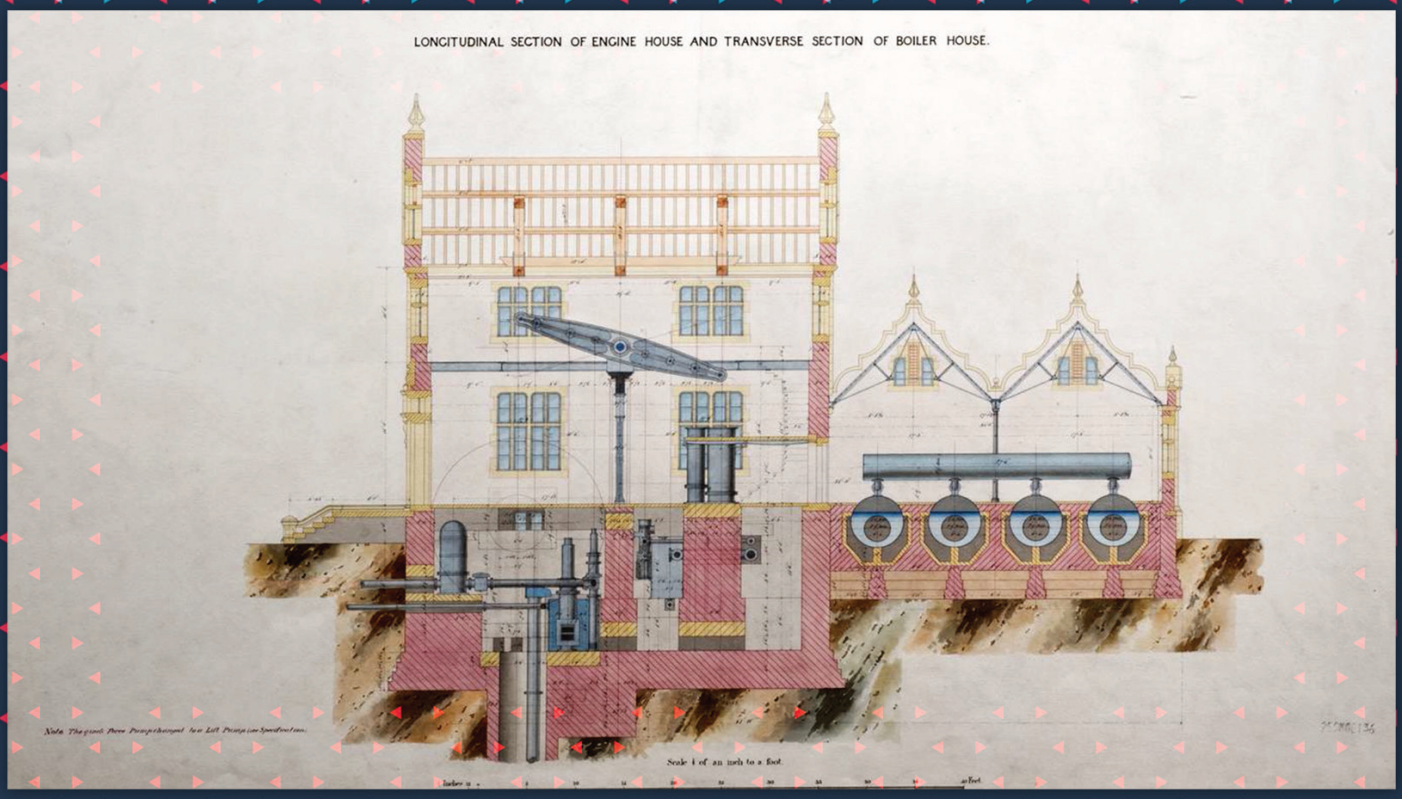

Industrialization and Clean Water

You might take it for granted today, but clean water was a fantasy for most people during the Industrial Revolution. Everything from sewage to dead bodies polluted Britain's water. In this short video, Peter Griffin explains how steam engines helped filter foreign bodies from our drinking water.

00:01

Nick Dennis stands with Peter Griffin at the Nottingham Industrial Museum

NICK: I'm here with Peter Griffin to talk about the problem with water during the Industrial Revolution. So Peter, what was the issue with water?

00:35

Video footage of large water pumps and steam filling the room

Cess pit: *an underground pit for the disposal of sewage*

PETER: Basically, as the population grew and became more densely compact, the sewage was contaminating the drinking water, and obviously was a major health issue. Some people had cess pits in their cellars, and this could lead, obviously, to production of Methane gas in the cellar, which could then explode or asphyxiate people. Most of the public wells were in churchyards, very contaminated by rotting bodies, and the water supply, it was absolutely terrible.

01:07

Portrait of Thomas Hawksley

So, Thomas Hawksley pioneered the use of a system. The first one he built was at Trentbridge in Nottingham, and it's unique in that he kept the water pressure on 24/7, so you didn't get contaminated water going back into the main. He built it on the side of the river. He built brink line chambers with gravel in them to filter the river water. It then went through cast-iron pipes to a steam-powered pumping station. Pump the water through cast-iron pipes to a totally enclosed brick built reservoir. So there's no possibility of contamination, and the water then ran down by cast-iron pipes to the streets, and finally to lead pipes into people's houses or standpipes.

01:50

Video footage of the rotated beam engine

Very detailed drawing of Thomas Newcomen's steam engine

This is what's called a rotated beam engine, operating on the Cornish cycle. In 1712, Thomas Newcomen invented the first practical, usable steam engine. But it worked on the vacuum system, they put steam into the cylinder, followed by a jet of cold water, which condensed the steam, creating a vacuum, which sucked the piston down. It's deliberately designed so that the pumping end was heavier, and that would then pull the piston up, you then put more steam in, put a jet of water in, that condensed the steam, create a vacuum, pull the piston down. Steam piston went down, water piston came up top.

NICK: So what kind of machinery did this power?

02:35

Footage shows the rods that drive the underground pump

PETER: This powered water pumps. Over here you can see two rods, parallel rods. They drove a pump that was 110 feet underground, about 35 meters in metric—there's a well drill down into the bunter of sandstone which underlies Nottingham—so rainwater fell in the hills outside the town, filtered through the rock, and was clean, totally uncontaminated. This pump pulled the water up to the surface, and you can see the design of these rods—they're parallel.

Before his waterworks came into use, there was a major cholera outbreak, part of the globalization post the Napoleonic war, spread cholera and typhoid from all over Europe and North America. And the outbreak before Hawksley's clean water supply caused heavy casualties throughout Europe, particularly around the UK.

03:28

There was another outbreak after his water supply came into use, and the casualties in Nottingham then were notably less than in the first outbreak and less

than the rest of the country. So thousands of people at that time owed their lives to Hawksley producing clean drinking water, available 24/7, which is a world first.