The history of the Ketley canal

1788 - 1818 (to 1850s?)

how and why it was built where it is, and why it closed.

Its influence on the district

some of this material is guesswork, because no exact information or records are available.
mistakes are possible.

Local knowledge and researched feedback that might
improve on this presentation would be appreciated

Norman Pagett

Why here?

By the late 1700s, the Napoleonic wars had quadrupled the demand for iron.

The ironworking industry of East Shropshire was predicated on there being abundant quantities of coal, iron ore, water and usable clays in close proximity to one another.

* Coal (coke) provided the heat to smelt the iron
* Bricks were used to build the furnaces
* Falling water drove the necessary air blast

Ketley/Oakengates was a highly localised area for that, at very shallow depths

The River Severn provided the means to export manufactured goods to markets all over the world.

The Ketley canal was the first of the canal network that Reynolds constructed, so in many respects it became the prototype

Planning

It is important to see the local canal system planned as an integral whole, with the 1788 Ketley canal as the protoype.

When that was seen to work, a few improvements were made, in particular steam power was added to the haulage system on subsequent inclines and lock designs were altered.

By 1793 the Hay inclined plane completed the network, allowing access to the Severn

The Ketley foundry needed a lot of coal and ironstone.

shallow seams of it were under the Cockshutt and at corresponding levels under Ketley Bank on the opposite side of Oakengates valley

But the Cockshutt seams were about 80 ft higher than the Ketley foundry.

A means had to be found to transfer this ironstone and coal safely and economically downhill for 1.5 miles to the Ketley foundry

Photographs taken from same place

The Cockshutt coal seams are now hidden behind the mosaic wall on Queensway

Function

Iron ore and coal couldn’t be carried by horse and cart in the quantities needed to satisfy demand.

Canals were the obvious solution, one horse can pull 50 times as much on water as it can on wheels.

Canal systems must have constant water availability and be able to change water levels.

The established way of doing this was by using locks, but locks need a constant inflow of water. The Ketley canal was a closed system with no water inflow other than mine drainage.

With a water supply problem, Reynolds introduced a new way of changing levels: the Inclined Plane. This provided the necessary fall of 73ft.
Without it, the Ketley canal would not have been a practical proposition.

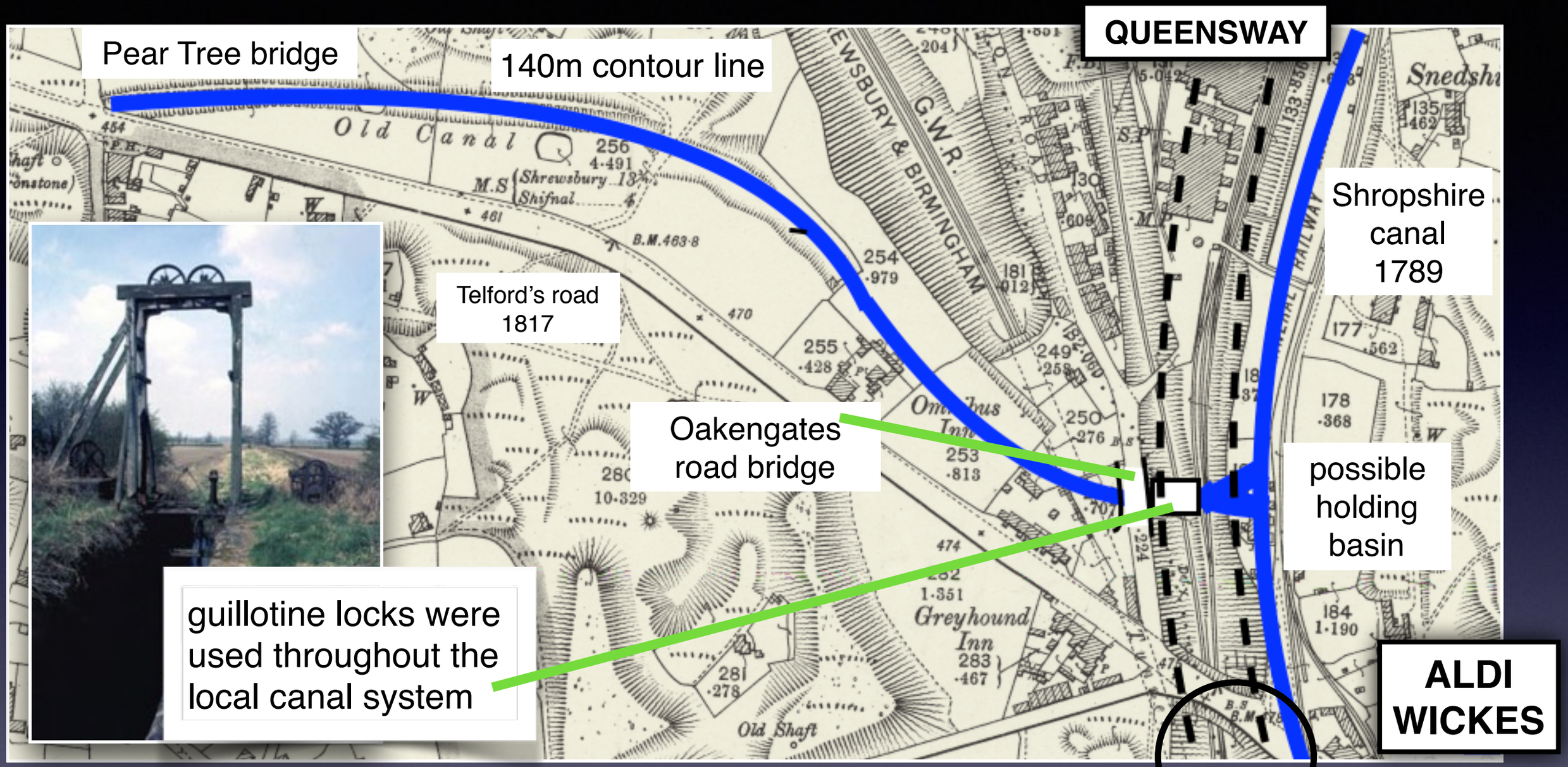
Land Contours

the Ketley canal was aligned closely to the 140m contour line, (ie above sea level) which explains the curving route followed by the canal to reach the top of the inclined plane.

long smooth curves also helped when boat trains were being hauled. Where acute bends were unavoidable, the canal was widened to allow easy boat movements, with iron slide rails as guides.

Telford had to follow much the same contour when building the Holyhead road through upper Ketley/Oakengates. (1817-on). At that time the canal was fully functional so Telford would have had to bridge it.

Start



The original (1788) Ketley canal started close to where Wickes store is now.
It was 16ft wide and 4ft 6in. deep
When the main Shropshire canal was built (1789) a lock was needed to connect them because there was a 1 foot difference in levels.
It would be a fair assumption that this lock would be big enough to take several boats at a time.

Bridges

Construction of the canal required a series of bridges allowing the canal to pass under existing roads.

There are no photographic records of bridges on the Ketley canal, but parts of the Shropshire canal, built a few years later would have used the same bridge formers. Photographs are from that canal.

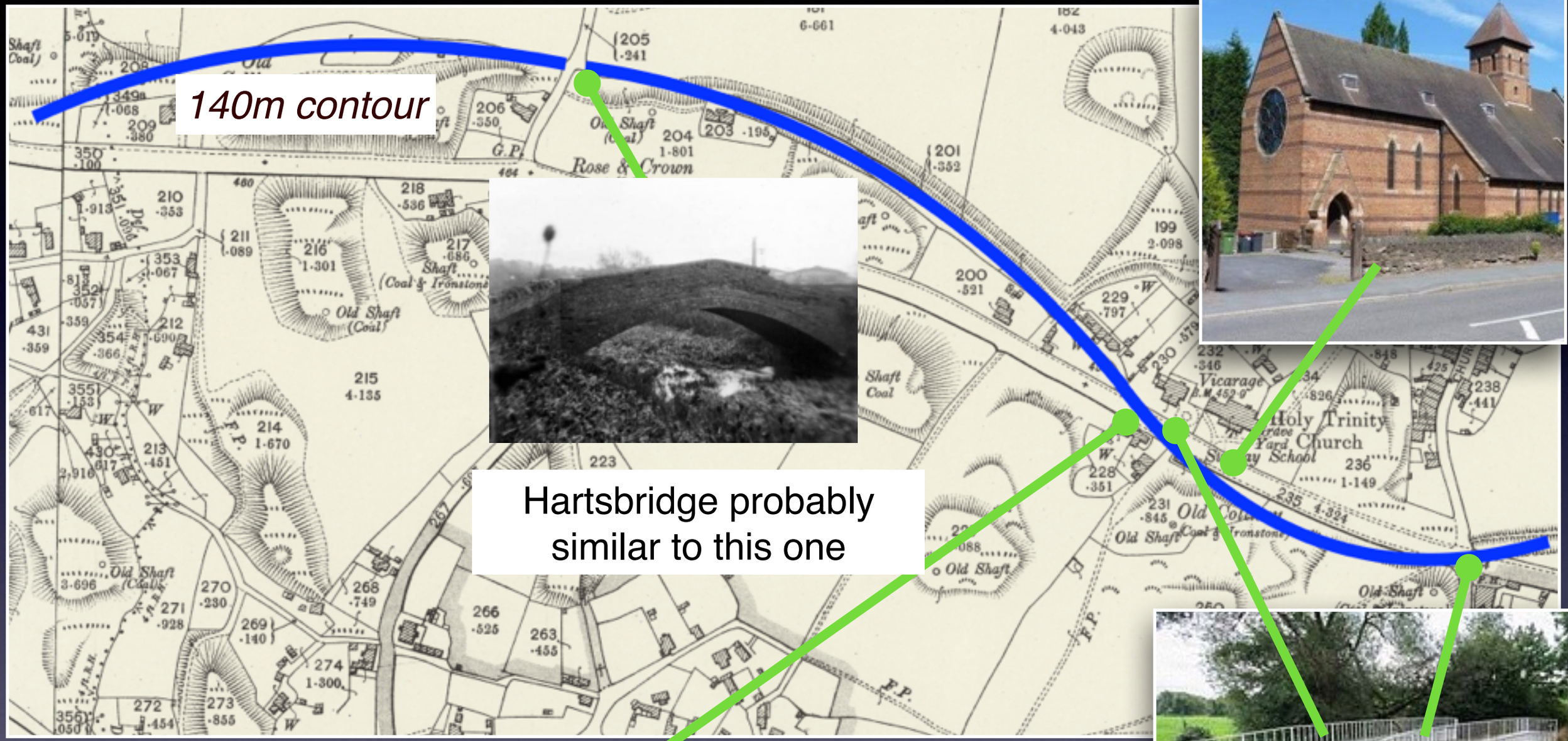
In 1817, Thomas Telford built the Ketley section of the Holyhead road, (Shepherd's lane to Snedshill) which appears to have required three new bridges over the canal.

It would be a fair assumption that these would also have been to the standard pattern that Telford was already using.

Telford’s road and the canal

Cound brook is a similar width to the Ketley canal, Telford’s 3 canal bridges (erected 1817) would almost certainly have been the same design as this one.

Telford’s road and the canal

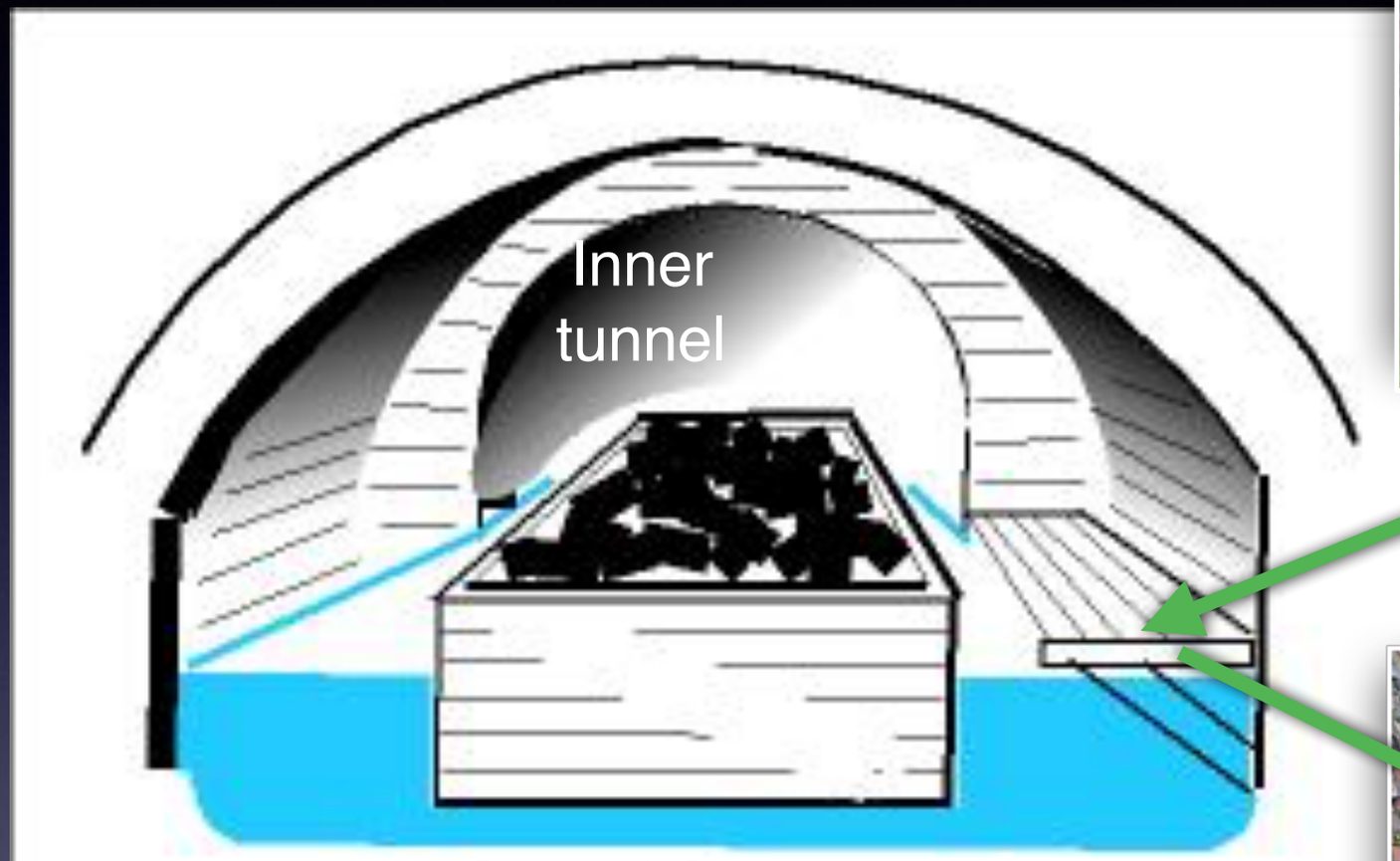


Hartsbridge probably similar to this one

It is likely that Telford’s road alongside the canal where Holy Trinity church (b.1855) is now, will have had bridge deviations removed by later road re-alignments.

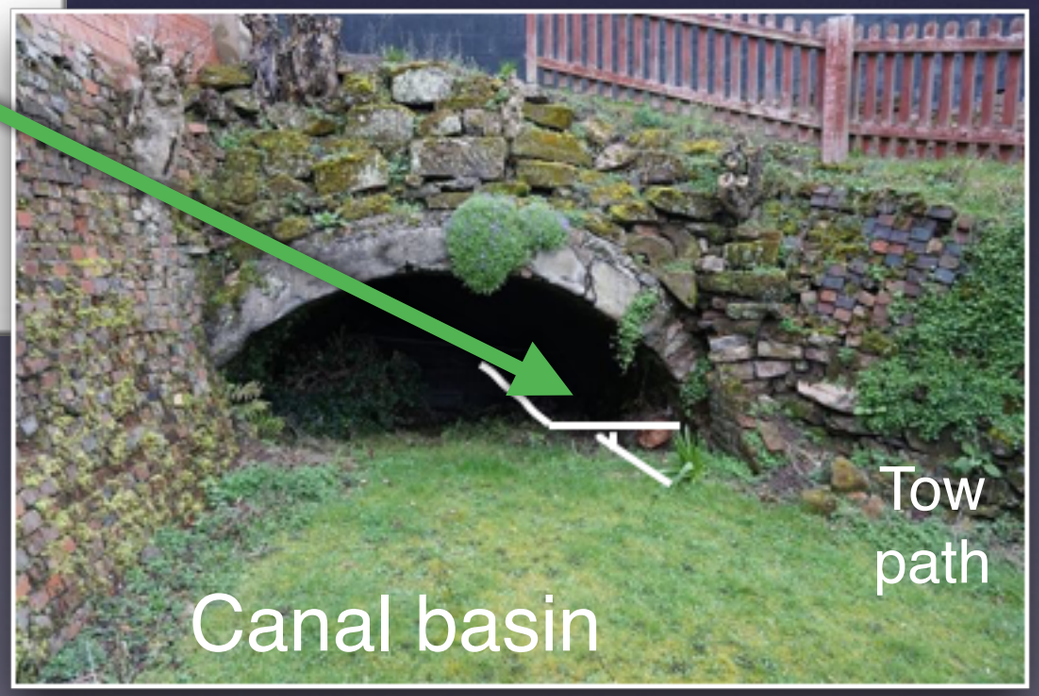
Tunnels

The tunnels have a wide entrance, leading to a narrower inner tunnel



Tunnel profile

Wooden walkway allows boats to be positioned to run through inner tunnel



We must assume that the tunnel at Waterloo Road was the same design as this one.

Boats would have been positioned in the outer tunnel then ‘legged’ through the inner tunnel

Then and now

Shepherd's Lane tunnel

Line of canal 1788

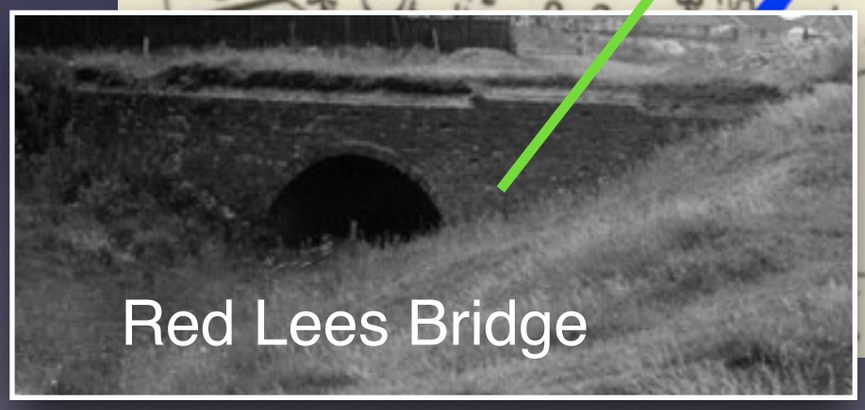
Telford's bridge here 1817

Red Lees

coal wharf

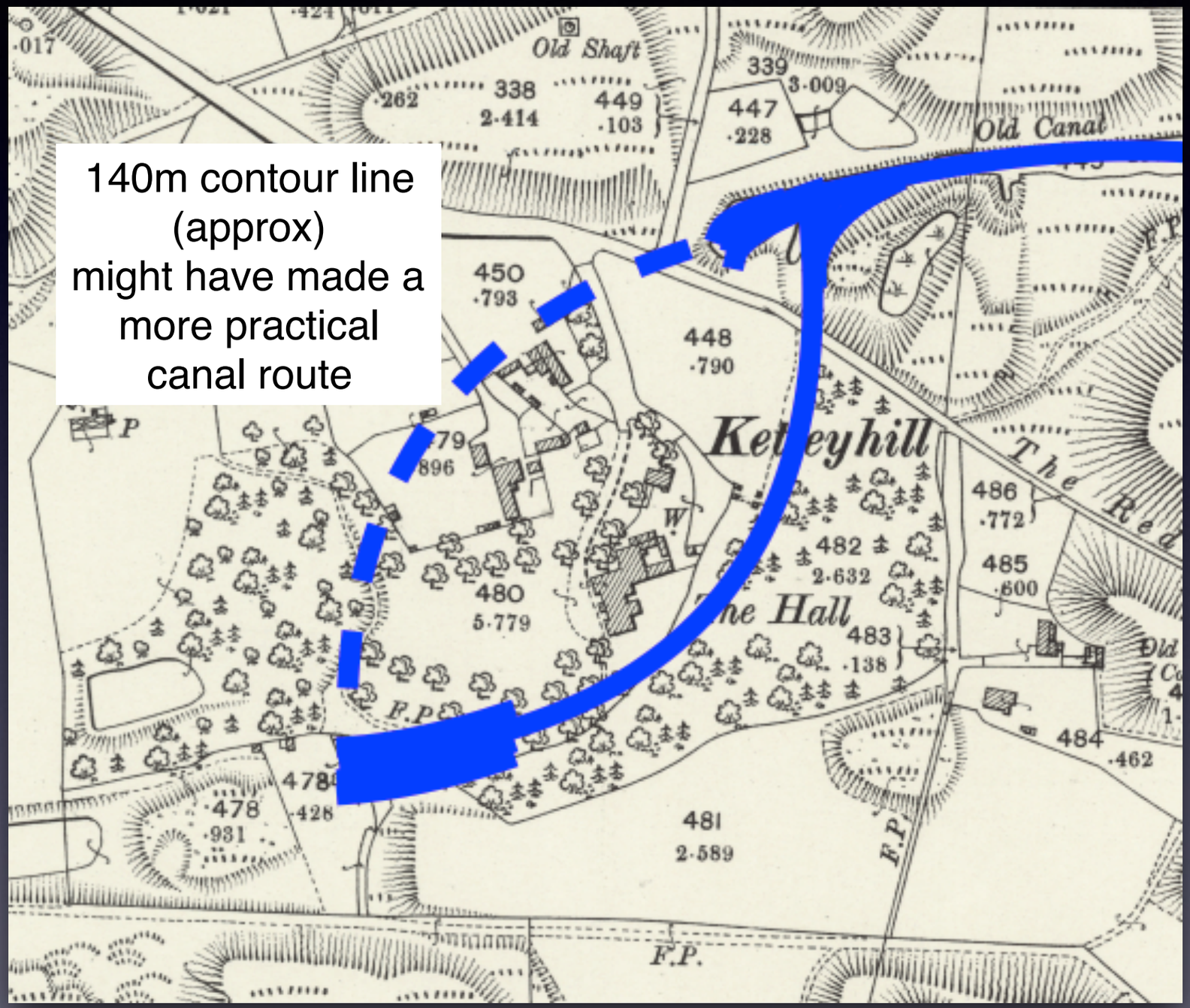
Canal widens to allow tub boat trains to swing round the bends

FARMFOODS



The canal continues to follow the 140m contour and is on that line through the Shepherd's lane tunnel. The canal then swings round under Red Lees bridge. (picture is of 1790s bridge on the canal at Wrockwardine Wood).

Alternative route?



the canal could have stayed on the 140m contour round to the point of the Incline, and possibly have started the incline at a different place.

But Ketley Hall had been built 20 years earlier, perhaps the canal cutting went round the back of the house to keep it out of sight.

That required a deep cutting to maintain the level to the top of the incline and to create the holding basin.

Red Lees Open Water

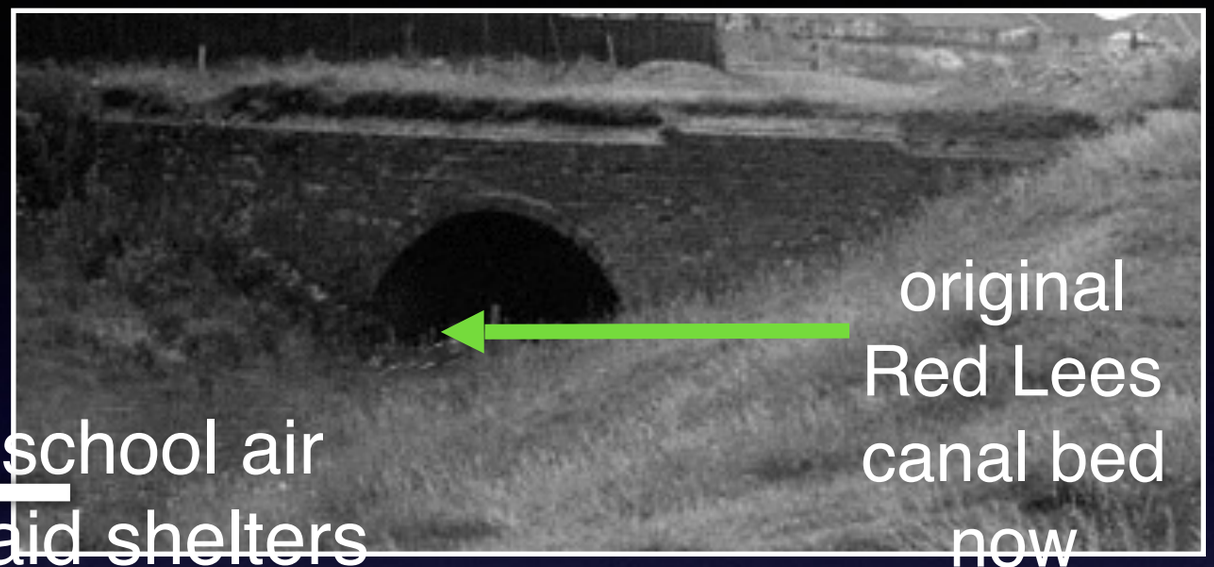
It can be difficult to visualise that the level of water still existing on the open stretch at Red Lees is at the same level as it was at the start point below Wickes at Snedshill, and through to the head of the Incline

Red Lees Bridges

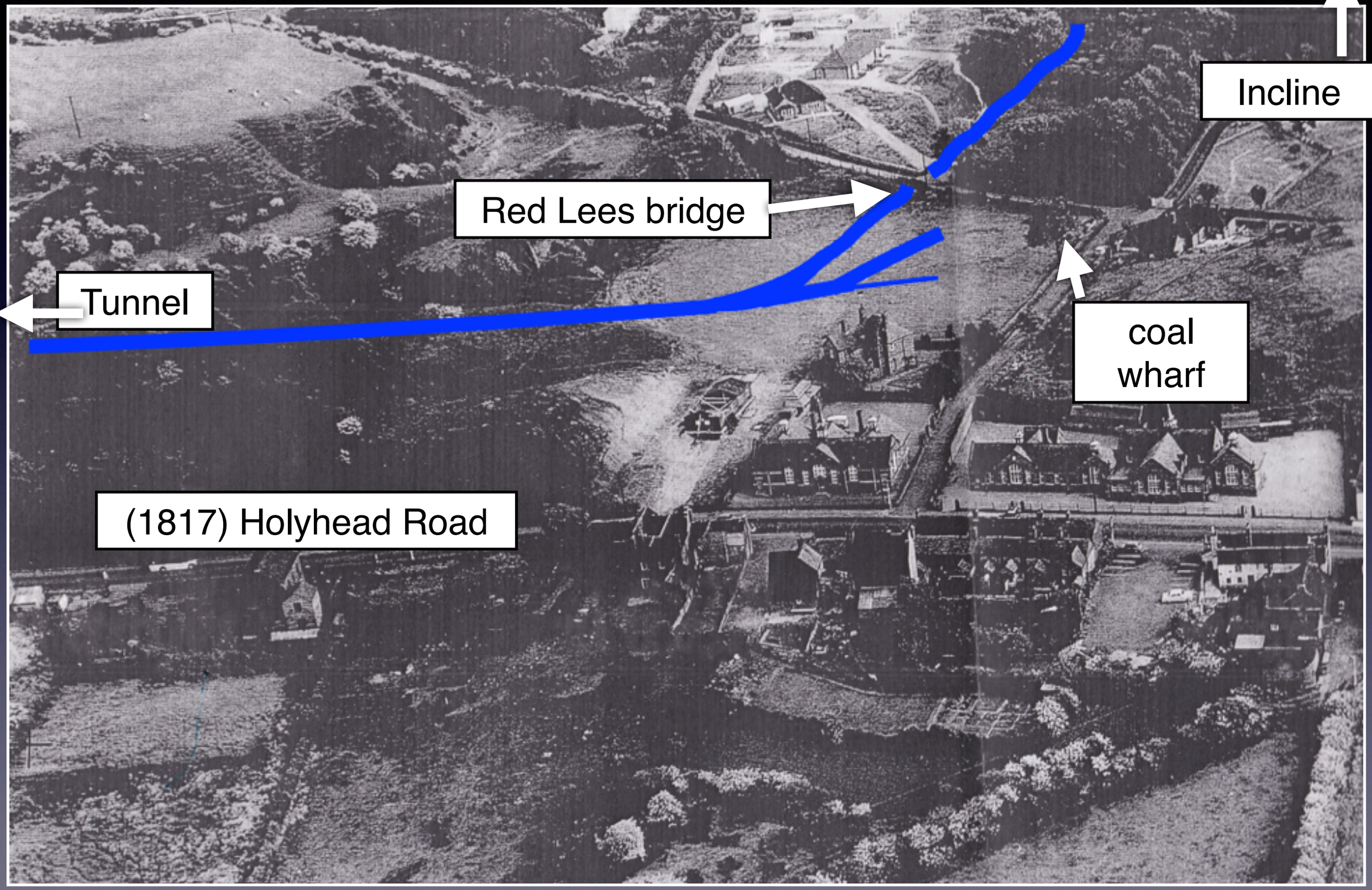
This canal was the prototype for the rest of the system. (1790s-on)

The same bridge formers would have been used elsewhere

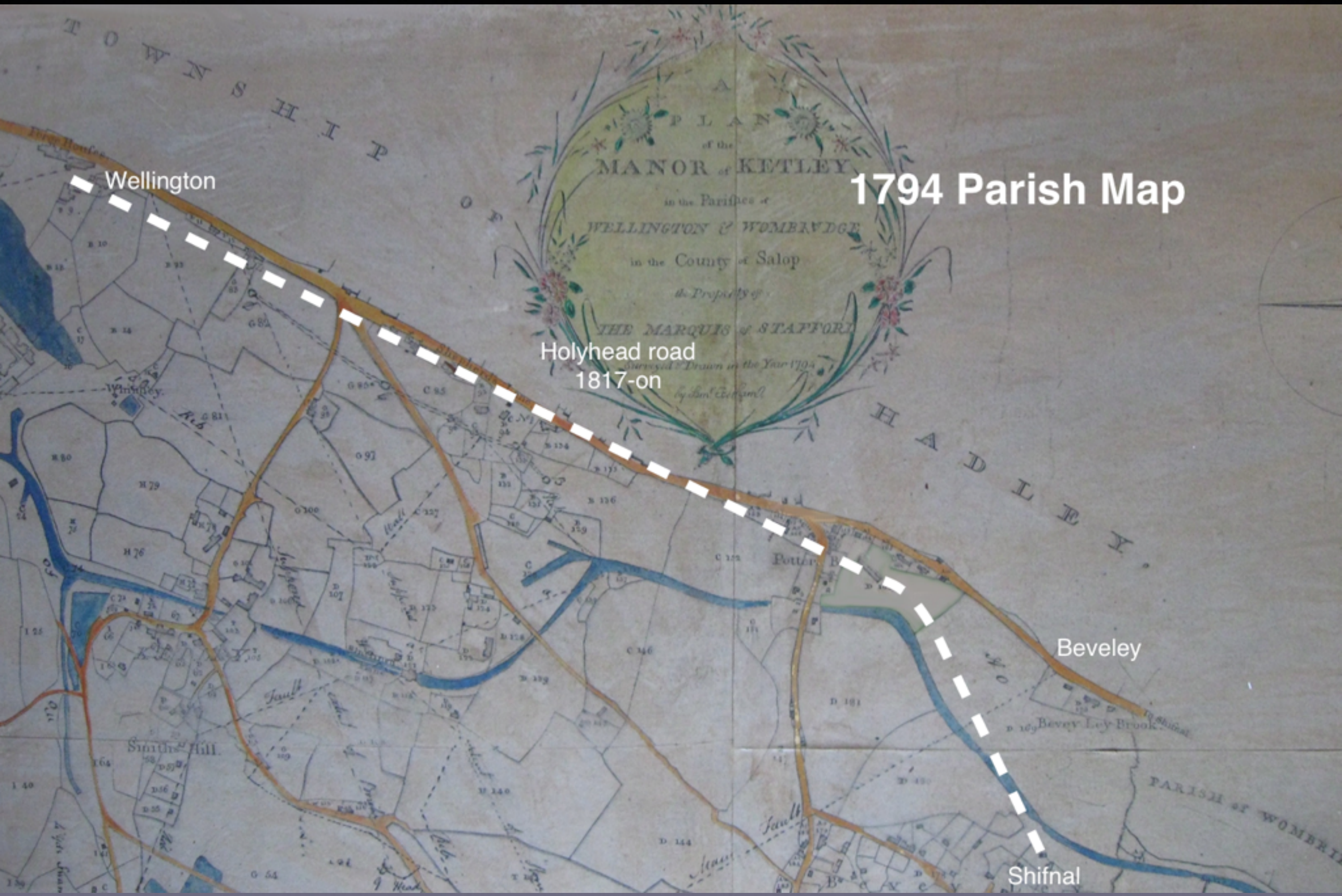
Water level was the same as the open water stretch, hence deep cutting



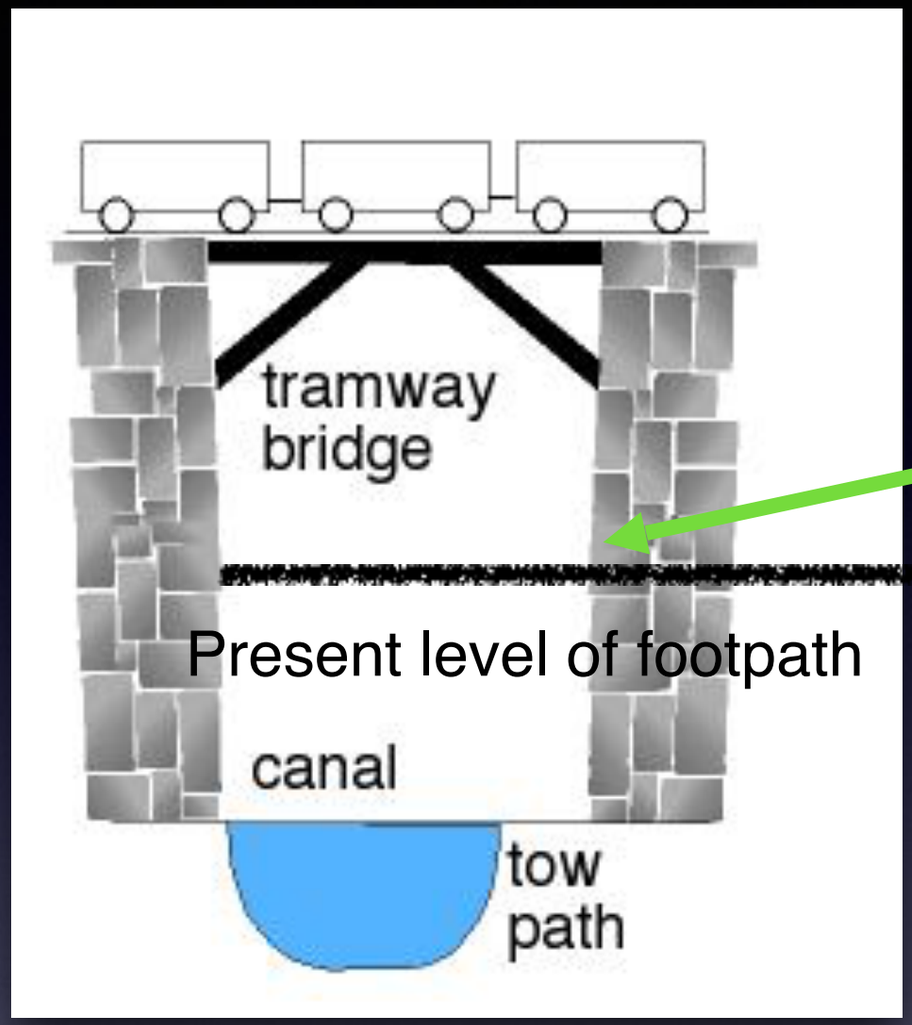
the canal in 1788



1794 Parish Map



Red Lees Tramway



The Red Lees canal section was also crossed by a high tramway bridge just before it reached the upper holding basin. (date unknown, 1820s?)

Some of the stone abutments and the tramway embankment can still be seen. Abutments for the same tramway system can also be seen on the Red Lees-Red Lake footpath

The floating conveyor belt

Logically as each train arrived at the incline top, there would be a train of empty boats waiting to be hauled back to the Cockshutt mines to be refilled.

Boat trains would also have to pass through the Cockshutt lock.

Picking up another train of full boats, they would then be taken back along the canal to the incline, arriving there as the last of the previous train went down.

In this way the supply line of materials into the foundry would be unbroken. 3 boat trains on the bottom canal, and 3 on the top at any one time, moving on the incline in sequence.

Effectively it was a floating conveyor belt.

Reynolds' comment about moving 40 boats in a day would almost certainly have been done in summer, not winter. Though it might have been possible to do it in the dark.

Severe winters in that period would also have affected canal traffic at times.

Boat trains

Stated tub boat capacities seem to vary between 5 and 8 tons and they were linked in trains. One horse could pull 12 boats loaded with coal, or up to 20 loaded with lighter materials.

Not sure how many boats in a train, but a 30 boat up/down (60 total) daily average suggests between 5 and 8.

This would have supplied the ironworks with about 250 tons of raw materials a day.

A banksman (using a long pole) was required with each train to ensure smooth running without impeding boats coming in the other direction, and to keep the boats clear of the canal sides.

Not sure if boats went in opposite directions at the same time on the Ketley canal

Some of the bends had iron sliderails to ease boat movement.

The Incline

Originally inclined planes were laid with “L” shaped plate rails, not modern rails as seen in the photograph. The tub boats and cradles were the same.

The waterline on the tub boat shows the loading level.
A steam powered pump emptied the locks at the top to allow boats to sink onto cradles.

At the bottom of the incline they were floated on or off the cradles

A descending full boat acted as a counterweight to haul up an empty boat, controlled by a brakeman at the top.

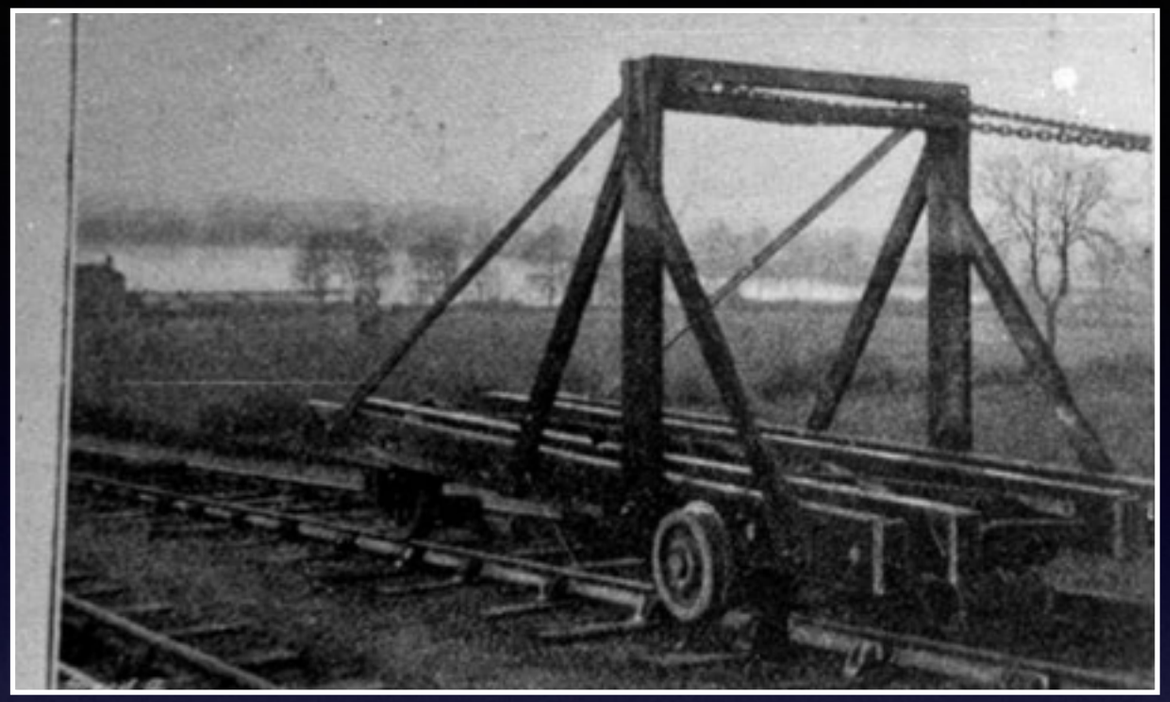
Reynolds wrote to James Watt in 1789 that:
“*Our Inclined Plane answers my most sanguine expectations …*
we have already let down more than forty boats per day each carrying 8 tons - in average about thirty boats daily and have not yet had an accident”.

The Incline

Two views of the same (Trench) incline shown to give an illustration of the incline layout.

the cradles are the same.

the tracks and wheels differ, but are essentially the same size



The boats appear to be about 5ft across, 18ft long and 3ft deep.

Each boat weighed 1.5 tons, so gave a fully loaded weight of about 8 tons.

The Ketley inclined plane was self-acting, with no steam powered winding system.
(as seen at the top of this incline)

Boat timetables

Reynolds' own records indicate that he kept at least 30 boats constantly on the move to feed the ironworks.

There is no way to establish UP/DOWN times precisely, but as each boat required the lock to be pumped out before it could be moved, a guess of about 10 minutes to empty the lock would seem reasonable.

Add to that maybe 10 minutes to run each boat down the incline. (It would have to be slow, because of manual braking, working the locks, then hitching/unhitching, boat movements and so on.)

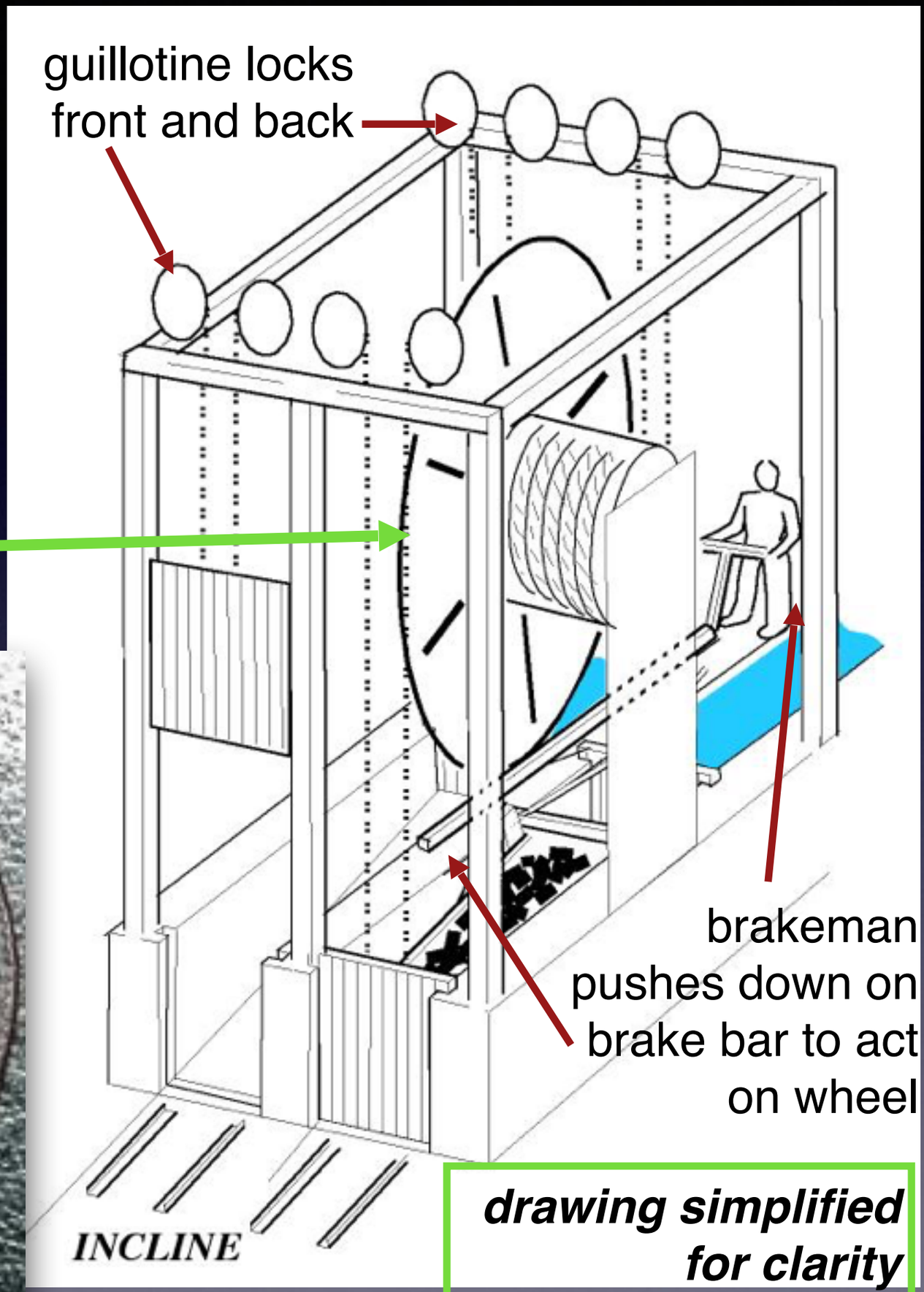
perhaps 20 minutes per boat

So Reynolds' record of 30 boats per day average, with say 5/6 boats in a train would suggest a down movement of 5 or 6 boats might take at least 2 hours.

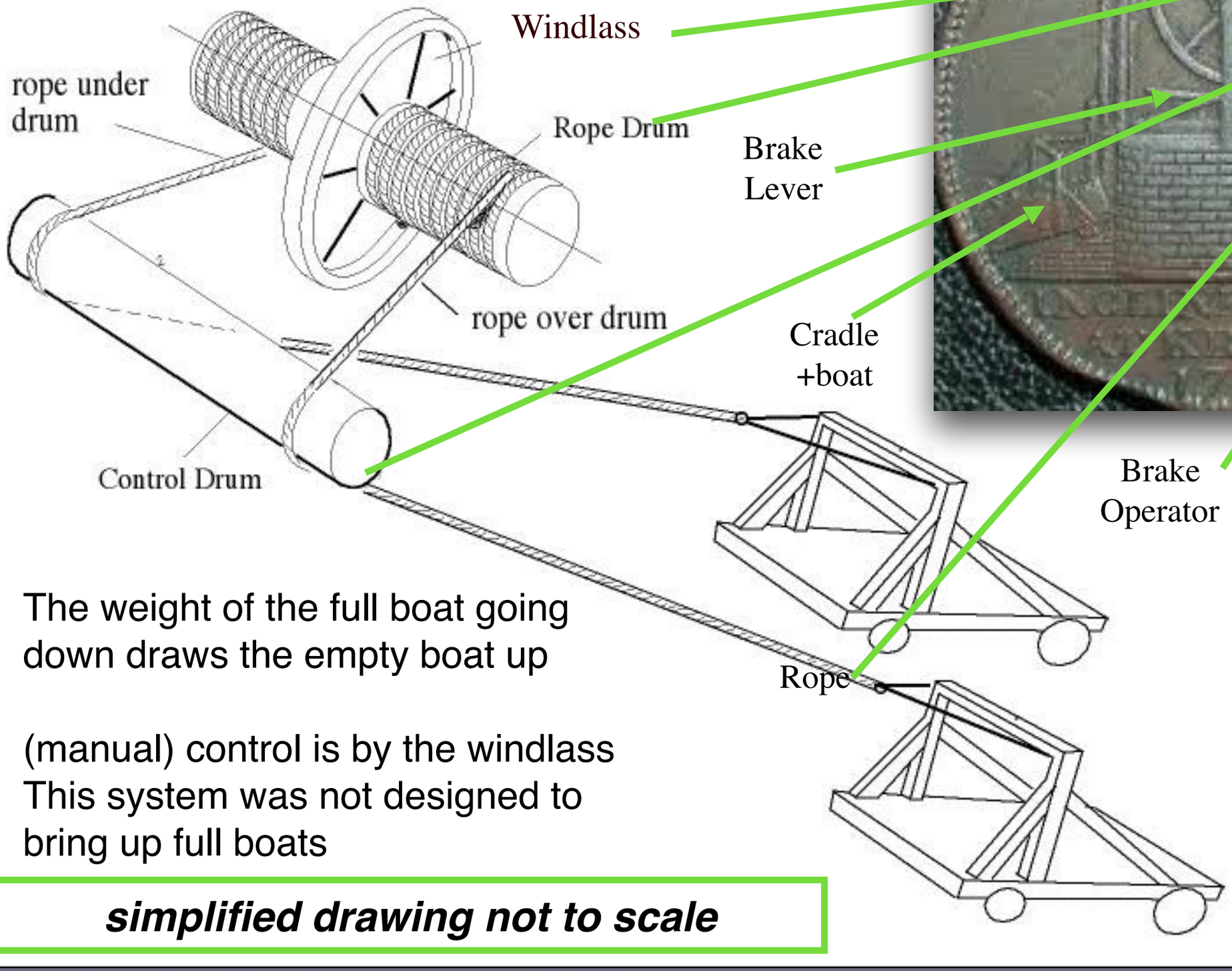
To move 30 full boats down would likely require a 10/12 hour day. But bearing in mind that boats would almost certainly have to be moved in daylight.

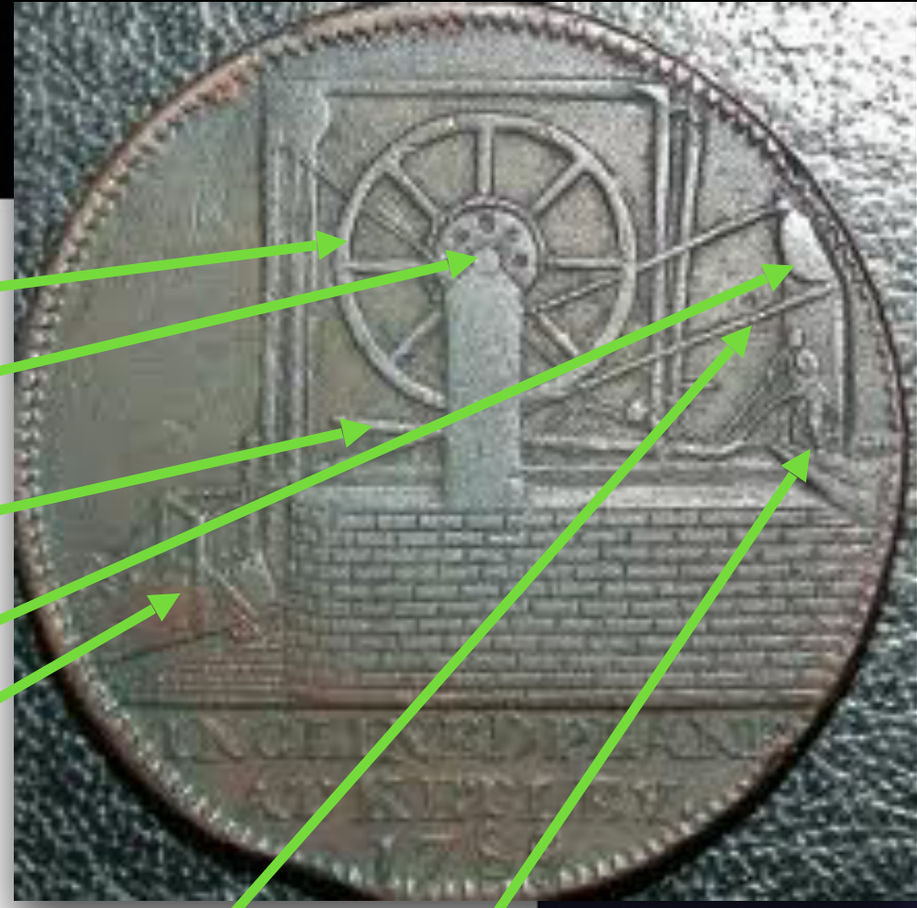
• the lock system

- A double guillotine lock, allowing one boat to be pulled up by the full one going down, controlled by a large windlass



How it works





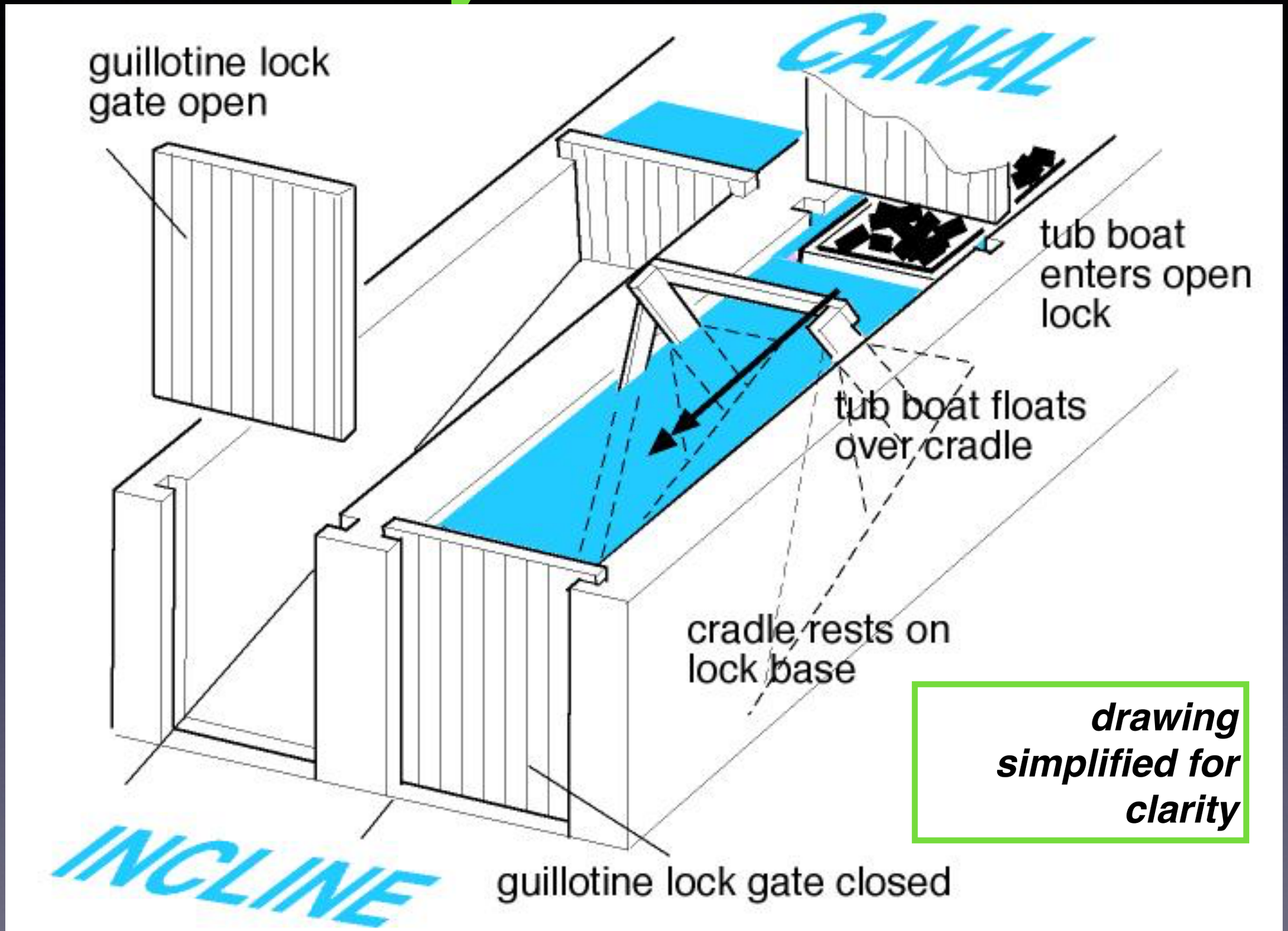
The weight of the full boat going down draws the empty boat up

(manual) control is by the windlass
This system was not designed to bring up full boats

simplified drawing not to scale

There is a small human figure (brake operator) on the medallion which suggests the windlass must have been 12/14ft diameter

• the lock system



• the lock system

drawing simplified for clarity

windlass

Both top lock entrances closed

CANAL

bottom cradle

Rope to bottom

Cradle + empty boat at bottom of incline

water pumped out of lock, full boat sinks onto cradle

INCLINE

top lock exit closed

top lock exit open

Rails

• the lock system

windlass

Both top lock entrances closed

CANAL

Rope to bottom cradle

drawing simplified for clarity

Cradle + empty boat at bottom of incline

INCLINE

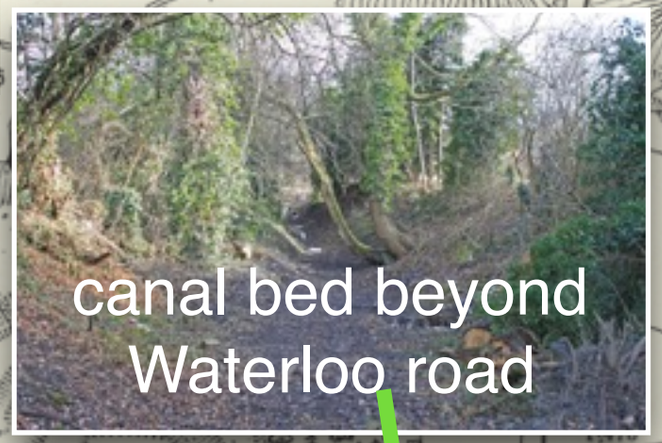
Rails

both top lock exits open

water pumped out of lock, full boat sinks onto cradle

the Ketley ironworks

Original ironworks and pool now covered by modern factory



Site of Ironworks

Lower holding basin

Upper holding basin

Tunnel

Incline

Ketley Town

Warehouse pool?

The Ketley end of the canal is referred to as at ‘warehouse pool” suggesting something purpose made. The distinctly rectangular pool marked might suggest that that is where it was. A boat dock would have been necessary alongside the works. Boats could not have been docked in a random manner for unloading.

Closure

Great Britain had been at war for much of the eighteenth century, and wars consume a lot of iron. Hence the incentive to produce as much as possible.

But the Napoleonic wars ended in 1815, and the nation had no major wars to fight.

The country as a whole suffered an economic depression and social unrest. 2 years of bad harvests exacerbated the problems.

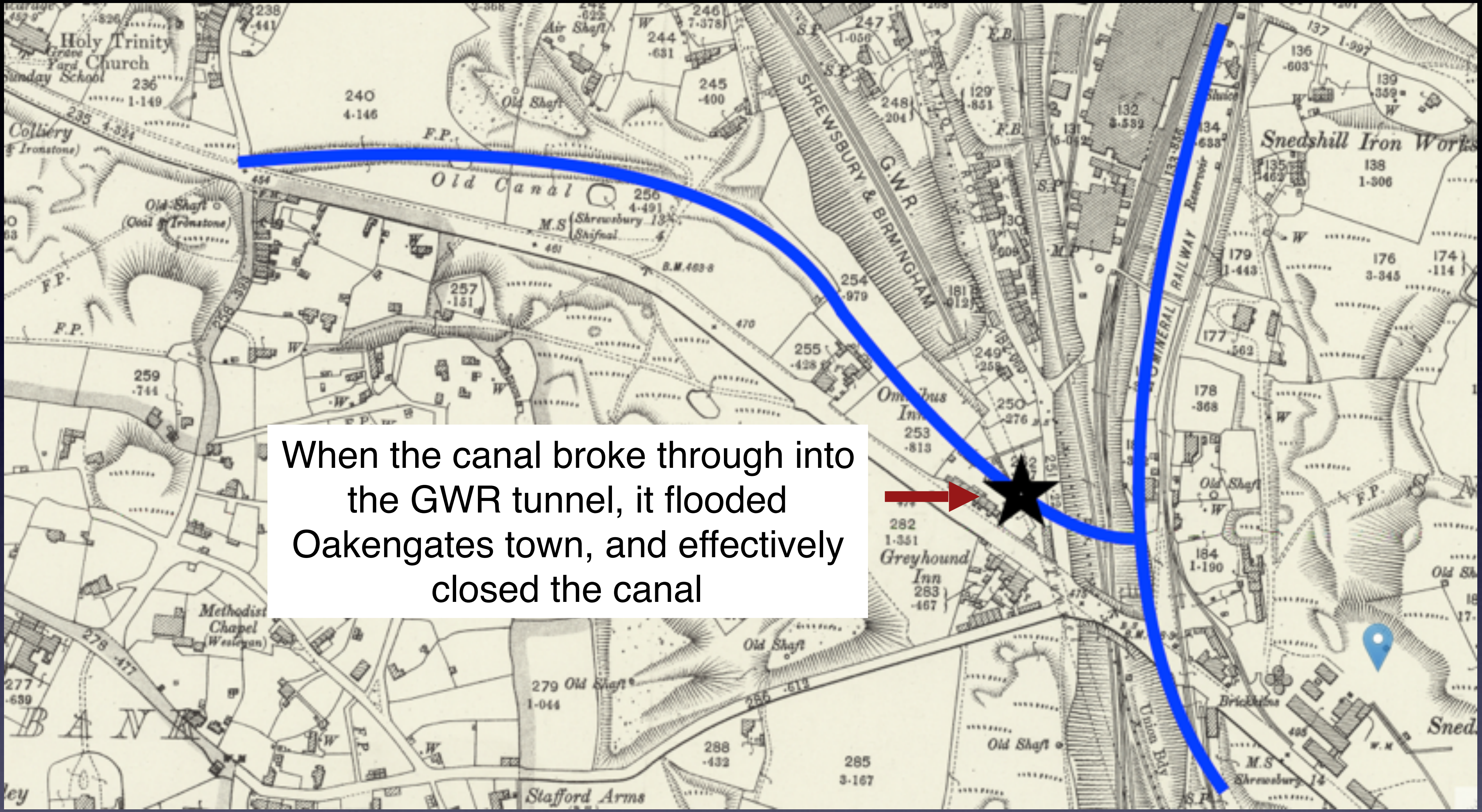
1816 was called ‘the year without a summer’.

When more money has to be used to buy food, and governments are not spending on warfare, there’s less money in circulation for other goods.

When the demand for iron fell, the foundry would have become unprofitable, and canal use declined. Reynolds could not foresee the colossal expansion in railways and shipbuilding that was to come in the next 20 years or so, driving up the demand for iron again.

This may have been why Reynolds closed the Ketley in 1816, and gave up the mineral lease in 1818, eliminating the main purpose of the canal.

Disaster



In July 1855 the canal broke through into the GWR tunnel, drained the entire summit level and flooded Oakengates.
This closed the Ketley canal as a functional part of the system, but with some parts of it repaired and still ‘in water’, it’s possible that it could have have been used to deliver coal to the wharf at Red Lees until sometime after that date, presumably from small mines along its route.
By the 1880s the canal was segmented and obviously disused

I’ll be happy to send a pdf copy of this to anyone who wants one, contact me at:

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I’d also like any serious errors pointed out; some of this presentation is guesswork because no documented information is available, so mistakes are possible.

Norman Pagett 16/4/2019
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