= River Weaver =

The River Weaver is a river , navigable in its lower reaches , running in a curving route anti @-@ clockwise across west Cheshire , northern England . Improvements to the river to make it navigable were authorised in 1720 and the work , which included eleven locks , was completed in 1732 . An unusual clause in the enabling Act of Parliament stipulated that profits should be given to the County of Cheshire for the improvement of roads and bridges , but the navigation was not initially profitable , and it was 1775 before the first payments were made . Trade continued to rise , and by 1845 , over £ 500 @,@ 000 had been given to the county .

The major trade was salt . The arrival of the Trent and Mersey Canal at Anderton in 1773 was detrimental to the salt trade at first , but ultimately beneficial , as salt was tipped down chutes from the canal into barges on the river navigation . Access to the river was improved in 1810 by the Weston Canal , which provided a link to Weston Point , where boats could reach the River Mersey at most states of the tide , as the water was deeper . The navigation was completely reconstructed between 1870 and 1900 , with the original locks being replaced by five much larger locks , capable of handling 1000 @-@ tonne coasters . With the opening of the Manchester Ship Canal , a new lock was constructed at Weston Marsh , which gave direct access to the ship canal without having to pass through the docks at Weston Point . All water from the river entered the canal nearby , and any surplus was released into the Mersey through the Weaver sluices , which were located just upstream of the junction .

A notable feature is the Anderton Boat Lift , which is near Northwich , and links the Weaver with the Trent and Mersey Canal some 50 feet (15 m) above . It was opened in 1875 , to allow canal boats to reach the Weaver , and although closed on safety grounds in 1983 , it was refurbished and reopened in 2002 . Many of the structures of the navigation are of historical importance , and are grade II listed . They include the Hayhurst swing bridge and Northwich Town bridge , which are believed to be the earliest swing bridges powered by electricity . Both have a sectional pontoon , which is immersed in the river and carries about 80 per cent of the weight of the bridge . Dutton Horse Bridge , which carries the towpath over the weir stream at Dutton , is one of the earliest surviving laminated timber structures . Dutton railway viaduct , which was built by Joseph Locke and George Stephenson for the Grand Junction Railway , is grade II * listed , and a civic celebration was held on its completion , as there had been no deaths and no serious injuries to the workers during its construction .

= = Route = =

The River Weaver is slightly more than 50 miles (80 km) long . From its source in the hills of west Cheshire near Peckforton Castle , it initially flows in a south @-@ easterly direction towards the border with Shropshire , fed by tributaries some of which rise in north Shropshire . The first of three canal crossings occurs just before the village of Wrenbury , when the Llangollen Canal crosses its course . After flowing through the village , it passes to the west of the Cheshire village of Audlem , where it starts to flow approximately northwards across the Cheshire Plain . Shortly afterwards , the Shropshire Union Canal is carried over it on Moss Hall aqueduct . The first significant town on the river is the market town of Nantwich , where an early 19th @-@ century stone bridge , with a single span , crosses the river . Continuing northwards , it passes under the Middlewich Branch of the Shropshire Union Canal before the village of Church Minshull . The aqueduct carrying the canal was designed by Thomas Telford and was built of brick with stone bands between 1827 and 1833 . The river flows through a central arch , and there are flood relief arches on each side of the channel . The two waterways run roughly parallel for several miles . They diverge near Winsford , the current head of navigation , and at Northwich the river turns to flow north @-@ west across north Cheshire .

Below Winsford , the course of the river has been altered several times , by the construction of cuts and locks , to enable small ships to trade on it . The river formerly joined the River Mersey at Weston Marsh , but since the construction of the Manchester Ship Canal , begun in 1887 , it has

flowed into the canal , from where surplus water enters the Mersey by the Weaver sluices , just upstream of the junction . The tidal river section below Frodsham has been bypassed by the Weston Canal since 1810 , and is no longer navigable , as Frodsham Lock is derelict .

= = History = =

The river runs through the Cheshire salt @-@ producing area , but was not deep enough to allow boats to reach the salt mines . It was tidal for around 7 miles (11 km) to Pickering 's wharf , and salt from the mines was carried by pack horse to the wharf , where it was loaded into barges . These used the ebbing tide to carry them back down the river . By the early 17th century , coal was being transported into the area so that it could be used to evaporate the brine , and as the industry expanded , there were calls to improve the river to simplify this trade . There was opposition to the initial schemes , however , from landowners who feared flooding and from carriers who feared a loss of trade , which resulted in Bills laid before Parliament in 1711 , 1715 , 1718 and 1720 being defeated .

= = = Construction = = =

In 1720 the first Act of Parliament to authorise improvements to the river was obtained by three gentlemen of Cheshire . The act was dated 23 March 1720 and authorised work between Frodsham bridge and Winsford bridge . Rates for tolls were set , which were to be reduced by 20 per cent once the cost of construction had been met , and profits were then to be used to maintain bridges and highways within Cheshire . Each year the Justices of the Peace were to meet to decide which structures should benefit from this source of revenue . The Act included powers to improve the Witton Brook from the Weaver to Witton Bridge . Following a plea by the owner of brine workings near Middlewich , who felt they would be disadvantaged by the new navigation , a separate Act was obtained on 7 June 1721 to authorise improvements to the River Dane , but did not result in any work being undertaken .

Progress was slow , as only Richard Vernon of the original three undertakers was actively engaged on the project , and he could not reach agreement with the Commissioners . The stalemate was broken when Vernon died in 1726 , and new undertakers were appointed . The work on the Weaver was completed by 1732 , at a cost of £ 15 @,@ 885 . Eleven timber locks and weirs had been constructed , but no work had been carried out on the Witton Brook . The river had been improved by dredging and the construction of a series of cuts , with locks and weirs to manage the drop of around 50 feet (15 m) over the 20 miles (32 km) between Winsford and the River Mersey . Barges of up to 40 tons could reach Winsford , and boats called Weaver flats were the predominant vessels . These either sailed up the river , or were bow @-@ hauled by teams of men .

The navigation was not initially profitable , and the amount of money owing to the undertakers gradually rose to a peak of £ 19 @,@ 659 by 1740 . Toll receipts improved , and by 1757 , the debts had been reduced to £ 9 @,@ 809 . In September 1757 , merchants from Liverpool complained about the run @-@ down state of the navigation to Liverpool Corporation , who offered to pay for a survey . The merchants then offered to take over the navigation , but the commissioners wanted to keep control of it , and paid £ 17 @,@ 000 to the undertakers , which repaid the outstanding debt and bought the navigation rights . The deal was completed on 11 October 1758 . The commissioners largely ignored the survey which had been carried out by Henry Berry , and decided to enlarge the locks to 17 @.@ 3 feet (5 @.@ 3 m) wide . Work began on a new cut , lock and weir at Pickerings , but in 1759 , the navigation was cut in half by the collapse of a salt pit at Northwich . The commissioners discovered that they could not sue for damages , as the provisions of the 1721 Act no longer covered the way in which they were operating , and so a second Act of Parliament was obtained on 22 May 1760 . This changed the way in which the debts were managed , and gave the commissioners powers to sue and to appoint a management committee . It also stipulated that all locks should be 90 by 17 @.@ 3 feet (27 @.@ 4 by 5 @.@ 3 m) with a draught of 4 @.@ 5 feet (1 @.@ 4 m) , but the actual depth exceeded 6 feet (1 @.@ 8 m) .

Debts continued to increase , as the commissioners borrowed more money to fund the improvements . The new weir and lock at Pickerings failed in 1761 and both had to be rebuilt . Work had started on Witton Brook in 1756 , but the plans were revised in 1764 to increase the navigable depth to 4 @.@ 5 feet (1 @.@ 4 m) , and this work was completed in 1765 .

= = = Development = = =

The proposed Trent and Mersey Canal was seen as a threat by the Trustees of the Navigation , for it ran parallel to the River Weaver for some distance near Anderton . However , the commissioners pressed on with upgrading the river , completing new locks at Barnton in 1771 and at Acton Bridge in 1778 . They also set about repaying their debts , which were liquidated in July 1775 , resulting in some of the profits being given to the County of Cheshire , as stated in the original Act .

The Trent and Mersey was completed in May 1777 , and had an immediate effect on trade , which dropped by 25 per cent , particularly in the Winsford area . The downturn was short lived , as the salt trade developed , figures reaching their former levels by 1783 , and climbing another 40 per cent to 171 @,@ 719 tons by 1790 . Ultimately , the Trent and Mersey generated significant trade for the Navigation , for in 1793 a system of chutes was constructed at Anderton , to enable salt from narrow boats on the canal to be tipped into Weaver flats moored in a dock some 50 feet (15 m) below the level of the canal .

The steady increase in traffic encouraged the trustees to press on with improvements . Witton Brook was widened in 1788 , and the lock was raised , but subsidence caused by the salt mining resulted in a new lock being needed in 1826 . A longer @-@ term solution was provided by the decision to move Northwich lock to a new site below the town . When the work was finished in 1829 , Witton Brook lock was no longer necessary , and was removed . New cuts and locks were built through the 1790s at Vale Royal , Newbridge , Hartford and Hunts , and Butty Meadow lock was removed . In response to petitions , the construction of a towing path suitable for horses was started in 1792 , and was completed as far as Anderton by mid @-@ 1793 . It was later extended to Winsford , and bow @-@ hauling of boats by men was ended .

= = = The Weston Canal = = =

Below Frodsham , barges carrying salt had to negotiate a tidal section of the river to reach the Mersey , from where the cargo would be taken to Liverpool or Manchester for distribution worldwide . Water levels were inadequate for the Mersey Flats at neap tides , resulting in them having to wait for days at Frodsham . In 1796 , users of the navigation suggested that it should be extended to Weston Point , where the water was deeper . The trustees wanted to pay for this extension by raising tolls , but the users objected , and it took several years to work out a deal which suited both parties . Finally , the Trustees obtained a third Act on 8 August 1807 , which authorised the construction of a cut from Frodsham to Weston Point . The trustees insisted that their own engineer , John Johnson , should oversee the work , but the project was too large for him , and ran over time and budget . He was sacked in 1809 , after serving the navigation for 29 years , and Thomas Telford was asked to complete the work . He managed the project with Samuel Fowls as engineer . At Weston Point , a new lock connected the cut to a basin , and tide gates connect the basin to the Mersey . This cut was called the Weston Canal and was completed in 1810 . A fourth Act was obtained on 2 May 1825 , which altered some of the details of the previous Act , and an Act of 22 May 1829 noted that the Weston Canal had been completed . It stated that the Trustees had built a basin , piers and a lighthouse at Weston Point , that the Weston Canal was officially a branch of the River Weaver , and that the Trustees would make no additional charges for using the section . No tolls had been collected since 1816 , once the construction costs had been repaid .

= = = Progress = = =

The trustees investigated the idea of a junction canal from Winsford to the Middlewich branch of the

Ellesmere and Chester Canal in 1830 , but felt that water supply would be a problem . New cuts were constructed at Barnton , Crowton and Aston Grange between 1832 and 1835 , and they then planned to construct a second lock beside each of the original locks . William Cubbitt was asked for advice on whether the river could be adapted for seagoing ships , and although he said it could , he did not think it would be cost effective . Work was then started on making the river 7 @.@ 5 feet (2 @.@ 3 m) deep throughout , and building double locks suitable for 100 @-@ ton vessels which were 88 by 18 feet (26 @.@ 8 by 5 @.@ 5 m) . By 1845 , Winnington , Acton and Hunts locks had been improved . Trade was good , with tolls generating £ 38 @,@ 363 in 1845 from the carriage of 778 @,@ 715 tons of goods . All of the improvements had been funded from the toll revenue , and over £ 500 @,@ 000 had been given to the County of Cheshire , in line with the original Act .

Further improvements to make the river suitable for coasters began in 1856 , when Edward Leader Williams was appointed as engineer . He oversaw the complete reconstruction of the navigation between 1870 and 1900 , a programme which was designed to ensure that the river remained attractive to carriers , and which ensured its profitability . The 12 locks of the 1830s were replaced by five much larger locks , and most of the bridges were replaced by swing bridges , which enabled coasters of up to 1000 tons to use the river .

Construction of a connection between the river and the Trent and Mersey Canal was begun in 1871 and completed in 1875 . Because of the difference in level , a vertical boat lift was designed by Edwin Clark , using counterbalanced tanks which were linked by a hydraulic system . A descending tank caused hydraulic fluid to enter the pistons which raised the other tank . The design was a success , but the fluid became contaminated , resulting in corrosion of the pistons . The lift was replaced by a new design , where each tank was attached to its own counterbalance weight by wire ropes and pulleys , with small electric motors to overcome friction . The new lift was built over the top of the old one , so that it could continue to be used until the new one was ready , and the work was carried out by staff of the Navigation , supervised by the engineer J A Saner . It was completed in 1906 , and continued in use until 1983 , when it was closed on safety grounds due to corrosion .

It had been expected that use of the chutes to transfer salt between the canal and the river would cease once the lift was opened , but by the turn of the 19th century , although there were 190 @,@ 000 tons of cargo using the lift each year , 38 @,@ 000 tons of salt were still being transferred by chute . From the middle of the 19th century , some of the salt traffic transferred to the railways , and the use of pipelines through which the brine was pumped also affected trade , but as that source of revenue declined , a chemical industry developed in the area around Northwich , which became the major source of income for the Navigation .

= = = Locks = = =

The locks on the river are paired , with two lock chambers side @-@ by @-@ side , and in most cases the larger lock also has intermediate gates , so that ships of varying length can be accommodated , without undue waste of water . The maximum size of the locks is 196 by 35 feet (60 by 11 m) above the Anderton boat lift , and 213 by 37 feet (65 by 11 m) below it . The lock at Weston Point Docks is slightly narrower , at 213 by 36 feet (65 by 11 m) . The boat lift is designed for canal craft rather than ships , and so can hold vessels up to 72 by 14 feet (21 @.@ 9 by 4 @.@ 3 m) with a draught of 4 feet (1 @.@ 2 m) .

= = Connections = =

Access to the navigation was improved for traditional canal boats with the opening of the Runcorn and Weston Canal , which was completed in 1859 . The canal left the Weston Canal at Weston Point , and provided a link to Runcorn Docks , near which two flights of locks connected to the Bridgewater Canal . This link was severed in 1966 , when the Runcorn to Widnes road bridge was constructed . Half of the Runcorn and Weston Canal was filled in at the same time .

Significant change occurred when the Manchester Ship Canal was opened in 1894 . The tidal section of the river below Frodsham now flowed into the ship canal , rather than the River Mersey ,

and the exit lock from Weston Docks also joined the canal rather than the estuary . A new ship lock was constructed at Weston Marsh , which provided a more convenient route to the ship canal than the alternative route through Weston Point docks . The Weston Canal has been little used since . Although it is possible for pleasure craft to reach the Weaver from the Ship Canal , it is a commercial waterway , and most leisure users are dissuaded from doing so by the amount of paperwork and the requirements of the operating company .

Situated just below Northwich , the Anderton Boat Lift is now the normal route for leisure boats to reach the river . Following its closure in 1983 , a Trust was created to campaign for its restoration . The lift became a Scheduled Ancient Monument in 1994 , and work eventually started on its refurbishment in 1999 . It reopened in 2002 , and is once more hydraulically powered . The use of modern hydraulic fluids is expected to prevent the problem of corrosion suffered when it was originally built .

The Navigation is managed by British Waterways , as far as Winsford Bridge . Beyond this are Winsford Bottom Flash and Winsford Top Flash . Both are shallow lakes , resulting from subsidence in the underlying salt mines . It is possible for some canal boats to explore the Bottom Flash , but the depth of water is limited , and great care is needed . The Flash is used for yacht racing by the Winsford Flash Sailing Club , which is based on the 90 @-@ acre (36 ha) lake .

= = Tourism = =

The Weaver is a river of contrasts , with quiet wooded reaches and heavily industrialised sites . Commercial shipping has largely ceased , but the ship @-@ sized locks remain . For leisure boaters , most of the movable bridges provide a clearance of 8 feet (2 @.@ 4 m) , although the swing bridge at Newbridge , on the Vale Royal cut , only has headroom of 6 @.@ 3 feet (1 @.@ 9 m) . Boats which require the bridges to be opened must give prior notice . There is a salt museum at Northwich , which was renamed as the Weaver Hall Museum and Workhouse in 2010 , to reflect its expanding scope and the historic building in which it is housed , and a visitor centre at the Anderton lift , which is popular with boaters and non @-@ boaters alike . There are , however , few facilities for the recreational boater .

Rowing is popular on the River Weaver , with competitive clubs in Runcorn , Northwich , and Acton Bridge (The Grange School) . Fishing is another pastime which takes place along the river . Several clubs lease fishing rights for different parts of the river from British Waterways , as it holds populations of bream , three types of carp , chub , dace , eels , perch , pike , roach , rudd and tench . Fishing matches are regularly organised at weekends .

The lower reaches of the Weaver between Frodsham railway viaduct and the Manchester Ship Canal are used for sailing . The Weaver Sailing Club is based at Frodsham , and uses a 2 @.@ 5 @-@ mile (4 @.@ 0 km) stretch of the river for activities which include youth training and racing of several types of dinghy sailboats . Their training courses are accredited by the Royal Yachting Association .

= = Structures = =

The navigation has a number of structures which , because of their age , have historic value and are listed on the Listed Building register . At Vale Royal , the lock built in 1860 was retained as a sluice channel when a new lock was built in the 1890s . A swing bridge crosses the chamber . The sluice at the upstream end is supported by two cast iron arches on rusticated piers . A swing bridge , made of wood and iron , crosses the small lock , which was the large lock until the construction of the new large lock in the 1890s . This has three sets of gates , and could accommodate a train of four barges when the outer gates were used . Again , a swing bridge crosses the lock . The gates are opened by a Pelton water turbine mechanism , and other features include a water levelling mechanism and a system for removing rubbish from behind the gates using jets of water which are controlled mechanically . The lock keeper 's cottage is also grade II listed . It was built in the 1850s , but was moved northwards by 20 yards (18 m) during the 1890 reconstruction .

Below the locks , a five @-@ arched red sandstone viaduct , constructed in 1837 , crosses the valley . It was built by Joseph Locke , and carried the Grand Junction Railway . Hunt 's locks also consist of a pair , the smaller one from the 1860s and the larger one , with three sets of gates , from the 1890s . Steel semaphore signals control access to the locks , and again the movement of the gates employs a Pelton turbine . The weir to the east of the locks has a walkway supported by rusticated piers and five cast iron arches , which also support the floodgates . The structure is Baroque in style .

Northwich railway viaduct spans both the lock cut and the weir stream , and was built in the 1860s . It consists of 48 round arches , constructed of blue bricks and red sandstone , with iron spans over the channels . It is around 980 yards (900 m) long , provides 39 feet (12 m) of headroom over the navigation , and also crosses the River Dane . Hayhurst swing bridge carries the A5509 road over the navigation , and was manufactured by A Handyside and Co . Ltd . , of Derby and London , in 1899 . It is an asymmetric bowstring lattice girder bridge , and its timber @-@ framed weatherboarded control cabin is also listed . This and Town bridge , which is located a little further downstream and is of a similar design , are believed to be the two earliest swing bridges in Britain to be powered by electricity . Both bridges were designed by J. A. Saner , who was the Navigation 's engineer , and incorporate a sectional pontoon , which is immersed in the river and carries about 80 per cent of the weight of the bridge . Because of the risk of subsidence from the salt workings , the bridges are fitted with screw jacks which allow the deck level to be maintained . Hayhurst bridge was refurbished in 2004 at a cost of £ 33 @.@ 5 million . Winnington bridge , the next downstream , was built between 1908 and 1909 , to replace the first bridge which was built in 1901 . The original design was flawed , and hence the bridge was replaced after only 7 years . A pedestrian walkway was later fitted on the downstream side of the new bridge .

Saltersford locks were built in 1874 , using red sandstone and limestone , and replaced a lock built on the Barnton cut between 1832 and 1835 . The Pelton turbines which control the gates were built to Stoney 's patent , and carry plates which indicate that they were manufactured by Hanna , Donald & Wilson of Paisley . Acton Bridge is a symmetrical bowstring girder swing bridge , which was built in situ between 1931 and 1933 , on an island in the centre of the river . It was first swung across the channel on 10 August 1933 . J. A. Saner was again the designer . Dutton locks are of a similar design and age to those at Saltersford , and the Pelton turbines were made by Northern Foundry Co . Ltd. of Oldham , who are described as turbine makers on the cast @-@ iron covers . Dutton sluice , some 160 yards (150 m) to the north @-@ east of the lock , was built in the 1870s , in a similar Baroque style to Hunt 's weir , but is larger , with eight arches each carrying a sluice gate . Where the weir stream rejoins the main channel , the towpath is carried over it on Horse Bridge , which was designed by J. A. Saner , the Navigation 's engineer , in 1915 , and erected in 1916 . It is one of the earliest surviving laminated timber structures , and consists of two arches , both over 100 feet (30 m) long . Below the locks , Joseph Locke and George Stephenson built another viaduct for the Grand Junction Railway , which was completed in 1836 and is grade II * listed . It has 20 arches , and was built at a cost of £ 54 @,@ 440 by a London civil engineering contractor called David McIntosh . A civic celebration was held on its completion , as there had been no deaths and no serious injuries to the workers during its construction . The navigation has since been re @-@ routed , and now passes through a different arch of the structure .

The weir at Frodsham was built in 1785 , although it has been altered subsequently . The main curved section is 49 yards (45 m) wide , and there are two 16 @-@ foot (5 m) sluices at the southern end . The adjacent lock , which was designed by Robert Pownall and George Leigh in 1781 , was modified in 1830 and later , but most traffic was using the Weston cut by the time of the 1890s upgrade , and so it retained some of its original features . It is derelict , and water flow is controlled by a concrete and steel sluice erected in the mid 20th century . A red sandstone and limestone bridge carries the A56 road over the channel below the lock . It was built in 1850 , and has three 27 @-@ yard (25 m) arches . The A56 crosses the main channel on Sutton swing bridge , which was built in the 1920s . There have been problems with the stability of the road surface , and options to secure its long @-@ term future and appearance were discussed in 2010 . Frodsham viaduct , completed in 1850 and built in brown bricks with a cast @-@ iron central arch , was built

for the Birkenhead , Lancs & Cheshire Junction Railway by the contractor Thomas Brassey . The engineer for the project was Alexander Rendel .

= = Oxygen levels = =

In August 2012 , oxygen levels in the river were found to be low , following the death of thousands of fish . The Environment Agency were notified and aerated the water while they investigated the cause of the problem . This was thought to result from naturally occurring algae , which deplete the oxygen on which the fish depend , and may also have been affected by a reaction between hydrogen peroxide , which is used to improve oxygen levels in the water , and traces of detergent . The reaction results in an unpleasant @-@ looking foam building up on the surface , although the foam is not hazardous . The Winsford and District Angling Association , who use the river for fishing , believe it will take many years to restore the six species of fish affected by the incident .

= = Points of interest = =