= River Hull =

The River Hull is a navigable river in the East Riding of Yorkshire in the north of England . It rises from a series of springs to the west of Driffield , and enters the Humber estuary at Kingston upon Hull . Following a period when the Archbishops of York charged tolls for its use , it became a free navigation . The upper reaches became part of the Driffield Navigation from 1770 , after which they were again subject to tolls , and the section within the city of Hull came under the jurisdiction of the Port of Hull , with the same result .

Most of its course is through low @-@ lying land that is at or just above sea level , and regular flooding has been a long @-@ standing problem along the waterway . Drainage schemes to alleviate it were constructed on both sides of the river . The Holderness Drainage scheme to the east was completed in 1772 , with a second phase in 1805 , and the Beverley and Barmston Drain to the west was completed in 1810 . Since 1980 , the mouth of the river has been protected by a tidal barrier at the estuary , which can be closed to prevent tidal surges entering the river system and causing flooding upriver .

Most of the bridges which cross the river are movable , to allow shipping to pass . There are six swing bridges ; four bascule bridges , two of which have twin leaves , one for each carriageway of the roads which they carry ; and three Scherzer lift bridges , which are a type of rolling bascule bridge . Scott Street Bridge , which is now permanently raised , was originally powered from a high pressure water main maintained by the first public power distribution company in the world .

= = Course = =

The source of the River Hull is in the Yorkshire Wolds . It rises from a series of springs to the west of Driffield , near the site of the medieval village of Elmswell . The Elmswell Beck flows eastwards from these , and is joined by the Little Driffield Beck , which flows southwards from Little Driffield . It continues as the Driffield Beck , flowing around the south @-@ western edge of Driffield , where it is joined by the Driffield Trout Stream . After the junction , it becomes the River Hull or the West Beck and flows to the east , before turning south to reach Corps Landing . For much of the route below Driffield , the Driffield Navigation runs parallel to the river .

The river from Corps Landing to its mouth is navigable . At Emmotland , it is joined by the Frodingham Beck , which is also navigable , and leads to the canal into Driffield , which forms the major part of the Driffield Navigation . Scurf Dyke joins from the west and is followed by Struncheon Hill lock , which marks the end of the Navigation , and the official start of the navigable River Hull . Below here , the river is tidal . The tidal range of tides can be up to 7 feet (2 @.@ 1 m) in winter and 4 feet (1 @.@ 2 m) in summer . Just above the lock , the Beverley and Barmston Drain , which collects water from the catchwater drains on either side of the main channel , flows under the navigation in a tunnel , and runs just to the west of the river almost to its mouth . Below the lock , the surrounding land is almost at sea level , and the river is constrained by flood banks on both sides .

On its route southwards , the river passes the former junction with Aike Beck , once navigable to Lockington Landing , but the stream was subsequently re @-@ routed to join the Arram Beck . The Leven Canal used to join on the east bank , but the entrance lock has been replaced by a sluice . The Arram Beck flows in from the west , and then the river is crossed by Hull Bridge , the cause of repeated disagreement between the owners of the Driffield Navigation and the Corporation of Beverley , who owned the bridge . Just above Beverley Beck , which joins from the west , is Grovehill Bridge , now a lift bridge but once a ferry bridge .

Once the river reaches the outskirts of Hull , its course is marked by a series of bridges , most of which open to allow boats to pass . There are swing bridges , lift bridges and bascule bridges , and the river becomes part of the Port of Hull . The river , which is the dividing line between West and East Hull , bisects the city 's industrial area . The bridges can cause ship traffic delays during high tides , though river traffic is less than it once was . The Beverley and Barmston Drain rejoins the river above Scott Street Bridge . Below North Bridge , an unused dry dock on the west bank marks the former entrance to Queens Dock . Below Drypool Bridge , a muddy basin on the east bank was

once the entrance to Drypool Basin and Victoria Dock . The river reaches its confluence with the Humber estuary in the centre of Kingston upon Hull . At its mouth , a tidal barrier has been constructed to prevent tidal surges from entering the river . In the past , these had regularly flooded the town and the flat countryside to the north .

= = History = =

The River Hull has served as a navigation and a drainage channel , and has been subject to the conflicts that this usually creates , as water levels need to be raised for navigation , but lowered for efficient drainage . In 1213 , the Archbishops of York laid claim to the river , and declared their right to navigate on a 24 @-@ foot (7 @.@ 3 m) channel . A number of fish @-@ weirs made navigation difficult , and the Archbishop negotiated their removal in 1296 , so that a wharf could be established at Grovehill to serve the town of Beverley . By 1321 , river rights had been extended to the charging of tolls . One @-@ third of a shilling (1 @.@ 7 p) was charged for each bushel carried on the river between Emmotland and the Humber , but the merchants of Hull were unhappy with this ; eventually the river had free navigation , and goods could be carried on it without toll . The Arram Beck was also exempt from all tolls . It has remained free , except for 1 mile (1 @.@ 6 km) from the mouth , which is part of the Port of Hull and is under the control of Hull Corporation .

The outlet of the river onto the Humber is thought to have changed in the early medieval period . The original outlet has been identified at a place called Limekiln creek . A second channel Sayers creek was cut or widened , with both outlets existing simultaneously at one point . Limekiln creek was subsequently reduced in flow to the level of a drain .

The lower river was bordered by salt marshes in medieval times , when efforts were first made to drain them . Further upstream , channels were cut through the fens in the twelfth and thirteenth centuries by the monks of Meaux Abbey , primarily to enable travel by boat , but these gradually became part of the drainage system . John Smeaton , when asked by the merchants of Driffield to advise on ways to allow keels to reach their town , suggested a small cut of about 1 @.@ 2 miles (1 @.@ 9 km) including one lock , from the river near Wansford . The merchants sought a second opinion , and John Grundy , Jr. suggested a much longer canal , running for 5 miles (8 @.@ 0 km) from Fisholme on the Frodingham Beck . When fully opened in 1770 , the new route was some 3 miles (4 @.@ 8 km) shorter than the river , which follows an extremely winding course in its upper reaches . The river above Aike was now considered to be part of the Driffield Navigation , and tolls were charged for its use . Also in this period the first cut of the Holderness Drain was made , enabled by an act of 1964 , originally outfalling onto the river . In addition to the drainage works to the east of the river , the banks were raised for 17 miles (27 km) on the east side , to prevent flooding .

Although beyond their jurisdiction , the Navigation commissioners attempted to extend their powers , to improve the river below the junction with Aike Beck . They particularly wanted to replace the stone Hull Bridge , near Beverley , with a swing bridge , which would make it easier for keels to reach Frodingham bridge . The Corporation of Beverley objected , because the bridge was the main route of communication between Beverley and Holderness , and the commissioners instead dredged parts of the river to improve access . Plans to improve Hull Bridge were again resisted by Beverley Corporation in 1799 , but an agreement was finally reached in 1801 , and an Act of Parliament was obtained in July of that year . William Chapman acted as engineer , as the act authorised the construction of towpaths , a new cut between Bethels Bridge and the lock at Struncheon Hill , to avoid a long loop in the river , and rebuilding of the bridge . The bridge cost £ 500 , half of which was met by Richard Bethell , the owner of the Leven Canal , on condition that the tolls for passing through it were reduced significantly .

Passage through Hull had long been difficult , because of the number of ships which used the river for loading and unloading goods . In 1794 , the merchants of Beverley had advocated the building of docks at Hull , with a separate entrance , so that traffic to the upper river would not be impeded , while the Driffield Navigation had unsuccessful attempted to get a clause inserted into the Act of Parliament which the Hull Dock Company obtained in 1840 , to ensure free passage for vessels ,

and the removal of tolls for boats not using the docks . The Navigation Company also received complaints from the Beverley and Barmston Drainage Commissioners , who believed that water levels were being kept at a higher level than was good for drainage .

In 1980 , the Environment Agency constructed a tidal barrier at the mouth of the river . The structure spans the river , and a huge steel gate , weighing 202 tonnes , can be lowered into the waterway , effectively sealing the river from the Humber , and preventing tidal surges from moving up the river and flooding parts of the city and the low @-@ lying areas beyond . The gate is lowered between eight and twelve times a year , and protects around 17 @,@ 000 properties . In 2009 , a £ 10 million upgrade of the structure was started , to ensure it would stay operational for a further 30 years . The upgrade included a new drive mechanism , which raises and lowers the gate , and pivots it when it is at the top of the structure , so that it lies horizontally rather than vertically . It also included a new control system . Plans have been considered to build a barrage at the mouth of the Hull where it joins the Humber Estuary to maintain a constant water level as it passes through the city . The idea was first raised by the Abercrombie report , which considered how to redevelop Hull after significant destruction during the Second World War . The estimated cost of such a project was around £ 195 million in 2007 .

= = Traffic = =

Because the river was a free river , there are no figures for traffic on the lower river . However , it connected to a number of waterways on which tolls were collected , and so an indication of the traffic can be gained from the figures for these waterways . The main cargoes on Beverley Beck in 1730 were coal , bricks , turfs and wool , together with cereal crops , consisting of wheat , barley , oats and malt . Receipts from tolls more than doubled between 1732 and 1748 , after which the tolls were let to an independent collector . The annual rent charged for this privilege doubled again between 1748 and 1792 . There was a steady expansion of trade on the Driffield Navigation during the same period , as the dividends paid to shareholders rose from 1 @.@ 5 to 4 per cent . In 1789 , Bainton , Boyes and Co negotiated a lump sum payment to cover coal from the Aire and Calder Navigation to their new carpet factory and the export of their carpets in the downstream direction . The factory later became a corn mill .

Toll rentals continued to increase on the Beverley Beck , rising from £ 190 to £ 435 between 1793 and 1835 . Some 31 @,@ 185 tons of cargo were carried in 1838 . In 1817 , a steam packet service started to run between Driffield and Hull . Three return trips each week were made , but the journey times were too long , and an advertisement in 1825 indicated that the engine had been altered and an express steam packet service would commence . Three boats were recorded as trading between Driffield and Hull every other day in a directory of Yorkshire published in 1823 . Traffic for 1832 included 7 @,@ 394 chaldrons of coal , 18 @,@ 173 quarters of wheat , 7 @,@ 745 quarters of oats , 19 @,@ 396 quarters of barley and 4 @,@ 555 sacks of flour . An additional 1 @,@ 564 quarters of wheat and 8 @,@ 194 sacks of flour were carried to or from Foston Mill , reached from Frodingham Beck . A regular carrier also operated between the Leven Canal and Hull once a week .

Between 1848 and 1905 , traffic on Beverley Beck more than trebled , from 33 @,@ 498 tons to 101 @,@ 540 tons . Coal and other minerals accounted for around one quarter of the traffic in 1905 , while goods carried in 1906 included fertiliser , burnt ore , flour and scrap metal . Commercial traffic continued into the 1970s , when tolls of £ 2 @,@ 365 were collected on 28 @,@ 169 tons of cargo . Traffic on the Driffield Navigation was relatively steady between 1871 and 1905 , falling slightly from 35 @,@ 654 to 32 @,@ 666 tons . Goods carried included coal , linseed , cottonseed , wheat , flour and artificial manures . In 1922 , £ 7 of income was received from pleasure craft using the navigation . Traffic declined during the 1930s , with commercial traffic finally ceasing in 1944 . The Leven Canal carried 4 @,@ 242 tons in 1888 and 4 @,@ 546 in 1905 , but then succumbed to road competition , and closed in 1935 .

= = Drainage = =

The problems of flooding of the land adjacent to the river were addressed by the construction of catchwater drains to both sides of it . The east side of the river was protected by the Holderness Drainage scheme . John Grundy worked on plans for the scheme which would protect 11 @,@ 000 acres (4 @,@ 500 ha) of low @-@ lying land to the north @-@ east of Hull . John Smeaton was also involved , although the final report was largely Grundy 's work , and an Act of Parliament to authorise the work was passed on 5 April 1764 . The Trustees for the scheme wrote to Grundy and Smeaton in May 1764 , asking them to work on the project . Grundy 's wife had died only a fortnight previously , and the two engineers corresponded , but besides valuable comment on Grundy 's plans for the outfall sluice , Smeaton had no further involvement , and it was Grundy who ran the project , which included 17 miles (27 km) of barrier bank along the east side of the river . John Hoggard acted as Superintendent for the scheme , while Joseph Page was appointed as resident engineer , to oversee the construction of the drains and the outfall sluice . Grundy made regular visits until October 1767 , by which time the sluice and the main drainage channels were completed , at which point he and Page moved on , while Hoggard oversaw additional work on the drains and banks , which lasted for several more years . By the time of its completion in 1772 , the scheme had cost £ 24 @,@ 000 .

Despite the Holderness scheme , there were still problems near Leven and Weel , and William Jessop spent a month inspecting the area before writing a report in July 1786 . His plan advocated separating the water which fell on the uplands to the north and flowed through the low @-@ lying areas , from the local drainage of those low @-@ lying areas . George Plummer carried out most of the subsequent survey work on Jessop 's behalf , although Jessop surveyed the River Hull in 1787 , to identify how the outfall could be improved . Jessop visited the works from time to time , making seven visits between 1789 and 1792 , while the day to day oversight of the scheme was handled by Plummer as resident engineer . Plummer was succeeded by Anthony Bower , who was engineer from 1792 to 1795 , and the whole scheme was completed in 1805 , having cost £ 16 @,@ 000 .

In 1796 , Robert Chapman was asked to report on possible solutions for flooding to the west . His report formed the basis for the Beverley and Barmston Drainage Act , which was passed by Parliament in June 1798 . Chapman was appointed as engineer for the scheme , which would cost £ 115 @,@ 000 , and would provide flood defences and drainage for 12 @,@ 600 acres (5 @,@ 100 ha) of land to the west of the river . The project included the construction of 23 miles (37 km) of drainage cuts , and building embankments along 20 miles (32 km) of the river . At Hull , an outfall sluice was constructed , and the drain passed through tunnels under eleven waterways , including the Beverley Beck . 27 bridges were built to carry roads over the drain , and the whole project was finished in 1810 .

= = River crossings = =

There are several bridges in the Hull area which cross the River Hull . Details of them are shown in the following table , starting from that furthest north and moving south to the river mouth .

The present Drypool bridge was designed by W. Morris , the Hull City Engineer , and it was built in Hull . The previous wrought iron swing bridge , which had opened in 1888 , was too narrow , with a carriageway which was 16 feet (4 @.@ 9 m) wide . It was closed in May 1959 , so that it could be demolished and Morris 's new bridge opened in March 1961 .

Scott Street bridge had gradually deteriorated , and a public consultation was held in 1986 , to determine its future . By that time a 10 @-@ ton weight limit had been imposed on traffic using the bridge , because of its poor structural state . Three suggestions were made as to its future . These were to close and demolish it , to refurbish it at an estimated cost of £ 1 @.@ 6 million , and to build a new bridge on the same site but a different alignment , to eliminate the awkward turn at the west end , which was costed at £ 2 million . None of these actions have been taken , as the bridge leaves were raised in 1994 , and have remained raised ever since . Consideration was given in 2007 to preserving two of the hydraulic rams which operated the bridge , during planning to demolish the structure . The Hull Hydraulic Power Company was set up in 1872 , and by 1876 was operating a

pumping station on Machell Street . This supplied water to a high pressure main which ran from Wellington Street to Sculcoates Bridge , and was used by local industries to power machinery , including the bridge when it was constructed . Although the power company closed in the 1940s , it made Hull the first city in the world to have a public system of power distribution .

The design for the Ennerdale Link road included a tunnel under the river . Initial investigations suggested that there was a layer of boulder clay below the alluvium of the river bed , and that a chalk aquifer was below the clay . Construction work started in July 1991 . A cofferdam was built on the east bank , and the cutting which would have provided access to the twin @-@ bore tunnel was nearly excavated when a 6 @.@ 6 @-@ foot (2 @.@ 0 m) hole appeared in the river bed , and the entire site flooded . A 3 @-@ month investigation took place , which suggested that it would be difficult to finish the tunnel and maintain the integrity of the aquifer . Despite some £ 10 million having been spent on the project , it was abandoned in 1993 . A contract for a replacement bridge was awarded in June 1995 and the river was crossed by twin lift bridges , which were opened in April 1997 . The project had cost £ 30 million , compared to an original budget of just £ 13 million .

A tunnel was successfully constructed under the river in 2001 . The 6 @.@ 2 @-@ mile (10 @.@ 0 km) long sewer runs from the city centre to a treatment works at Salt End . It was excavated using two tunnelling machines , which were manufactured in Canada and were named Maureen and Gloria . The tunnel was officially opened on 21 August 2001 , when a Mini car was driven through it , recreating scenes from the film The Italian Job . Before 1897 , there had been a ferry at Grovehill , and a shipyard on the east bank , owned by Joseph Scarr . To assist his workers to reach the shipyard , Scarr designed and built a ferry bridge , which cost him £ 300 . It consisted of a large rectangular pontoon , above which was fitted a bridge deck with handrails . Two jack screws enabled the deck to be raised or lowered in relation to the pontoon , so that it remained at approximately the same height , whatever the state of the tide . On the eastern bank , Scarr constructed a variable @-@ height landing , but the landing on the west bank was constructed by Beverley Council , and was fixed . Scarr campaigned to have a variable landing here as well , and was prepared to fund it , but his requests were always rejected . The fixed landing made access to the bridge difficult at high tides . When a boat needed to pass , the west end was freed , and the pontoon swung round to lie parallel to the bank , either upstream or downstream , depending on the state of the tide . It would then be winched back into position by a small barrel winch . At night the bridge was closed and moored beside the bank .

Responsibility for the bridge was taken over by Beverley Council before the Second World War . Its condition deteriorated , and in 1948 , they attempted to replace it with a footbridge around 400 yards (370 m) further upstream . Because the ferry rights had been in existence for more than 600 years , an Act of Parliament was needed , and this was thwarted by a petition containing 84 signatures , presented by the people of Weel to the House of Lords . Plans for a new lift bridge were drawn up , and it was opened on 19 October 1953 .

In 1913 , the Hull Bridge upstream of Beverley , which had caused so much disagreement in the 18th century until it had been replaced in 1801 , was demolished by the County Council , who installed a steel rolling bridge in its place . Once the Tickton Bypass bridge had been built a short distance upstream , it no longer needed to carry road traffic , and it was replaced by a footbridge in 1976 .

At the other end of the river , the Millennium Bridge was opened in 2001 . There was once a ferry at this point , before 1865 , which gave access to the Victoria Dock , opened in 1850 . South Bridge replaced the ferry in 1865 , making it easier for workers to reach the dock . The swing footbridge was closed in 1934 , but was not demolished until 1944 .

= = Points of interest = =