Proposed boatlifts in England after Anderton

Most of England's inland waterways were built and owned by private companies, unlike other countries, where government finance was provided. (One or two British canals, constructed at the start of the 19th century, did receive Government support, but this was more to provide employment than to create a transport system.) The British Government's attitude to economic development was one of 'laissez faire'. For canals, this meant that no national standards were established for boat or lock dimensions, resulting in a wide variation in size across the country. Goods sent across country by canal would sometimes need transhipment which increased costs, and if canals belonging to two or three companies were used, it was often impossible to obtain a single toll for the whole journey.

The difficulty of determining the cost of a long-distance journey by canal increased when railways took over some canals in the mid-nineteenth century. They increased canal tolls to their maximum where the canal was in competition with the railway, reducing railway tolls at the same time. Government tried to control this virtual railway monopoly but with little success. (Footnote the various committees and Acts to 1873) The result was that the private canal companies found it almost impossible to finance improvements to their waterway. Canal development in 19th century was described by the Bowes Committee (1958) as reported by the 1906 Royal Commission as: 'The confused and undecided action of Parliament', which, after permitting in the 1840s enough railway acquisitions of canals 'to introduce a hopeless chaos into the waterway system' and stultify any development by private enterprise, attempted in the 1870s to remedy matters by measures 'powerless to cure a situation inherently vicious'.

The more successful navigations, such as the Aire & Calder Navigation and the Weaver Navigation, were able to enlarge and improve their locks and to provide new facilities such as the compartment boat hoists at Goole and Anderton Lift. These developments encouraged others, and from the 1880s there were many proposals for new and enlarged waterways, mainly to link the industrial areas around Birmingham and Wolverhampton with the four main estuaries - the Mersey, Humber, Thames and Severn. Both lifts and inclined plans, the latter based on Blackhill on the Monkland Canal and Foxton on the Grand Union canal (dates), were included in such plans over the following eighty years.

The first suggestion for an improvement of the waterways from Birmingham was made in 1883 by Samuel Lloyd. His National Canal was to be similar in size to those in France and Belgium with part of the cost being provided by the Commissioners on Depression in Trade as a way of providing employment. Definite schemes soon followed. In 1884, H. J. Marten, Engineer to the Severn Navigation, proposed an improvement of the Worcester & Birmingham Canal using enlarged locks and inclined planes for boats capable of carrying 200 tons. The following year he reported on the London to Birmingham route, initially suggesting 250 ton boats, later for 130-140 ton boats. The scheme reduced the number of locks and included lifts, though the cost, £1.25 million, was considered uneconomic. Further discussion centred on the Birmingham to the Bristol Channel route, Mr. Keeling, Engineer for the Gloucester & Berkeley Canal, suggested enlarging the Worcester & Birmingham Canal for 200-250 ton boats with locks and an incline at Tardebigge at a cost of £600,000. The Birmingham Chamber of Commerce also became involved in supporting investigation of the two routes. A Bill for The Birmingham & Humber Navigation Company was advertised in 1887, but no further action was taken.

The following year the Royal Society of Arts held its first conference on Canals and Inland Navigation where all the schemes were discussed. Samuel Lloyd had increased the size of National Canal which was now for 600 ton boats and he anticipated using lifts, while Mr. Jebb, Engineer for the London & North Western Railway, stated that he had designed inclines, similar to Blackhill, to avoid locks on the railway-owned Birmingham Canal Navigations.

An improved canal from Birmingham to the Mersey, for 250 ton boats, was proposed in 1890 by Sir James Brunlees and Mr. McKerrow. Its route was via Wolverhampton, Penkridge, Stafford, Stone, Stoke, Tunstall, Kidsgrove, Wheelock and Winsford where it joined the Weaver Navigation. It was designed for 300-400ton boats and used hydraulic lifts. These were to link canals at the following levels: Birmingham 387 ft, two lifts (c42ft each) up to Wolverhampton 472.75ft, down four lifts (c

45ft each) to River Penk 296ft, then level for 21 miles, four lifts (c40ft each) up tot Trentham 460ft and the eight lifts (c50ft each) down to Winsford 54.5ft. The cost was estimated at £5 million.

Further developments were proposed at a conference on Inland Navigation held by the Institute of Mining Engineers in 1895. Amongst the speakers was J. A. Saner from the Weaver Navigation who preferred lifts to inclines because of the amount of land needed and because of surging in the caissons on inclines. Mr. Salt responded that he though locks were cheaper, even when including the cost of back-pumping water. Of the proposed improvements, the one from Birmingham to the Severn was considered easiest as it was the shortest and only one canal company was involved. However, at the time this route was only used by a small percentage of trade to and from Birmingham. The most important route was to the Mersey, and this also passed through Stoke-on-Trent which would supply more traffic. The problem was that at least four canal companies would be involved, two of them railway owned. Lyonel Clark (Edwin Clark's son) had worked on the scheme which was for 400 ton boats. The route was set out so that the canal was away from mining areas as subsidence would cause problems for the lifts. Only those at Wolverhampton were likely to be affected. The cost of a 50 foot double caisson hydraulic lift was estimated at £30.000.

1897 saw yet another proposal, for an improvement of the Staffordshire & Worcestershire canal from the Severn to Aldersley, near Wolverhampton. An extension to Wolverhampton was considered too expensive as it was around 200 feet higher than Aldersley. The canal was designed for the 250 ton boats then using the Severn and seven inclined planes were to be built similar to that at Foxton.

In 1904 the Royal Society of Arts published a paper on The British Canal Problem. Discussion centred around how to finance canal improvement, with public trusts, ownership by local authorities or nationalisation all being suggested. A Royal Commission was set up by Parliament to look at the condition of Britain's waterways. It lasted from 1906-1910 and examined all aspects of Britain's canals. With regard to improved canals, 300 ton boats were regarded as the minimum size. A scheme by J. A. Saner to link Birmingham to the four estuaries was considered. A cheaper version, mainly using existing waterways enlarge for 100 ton boats was also costed, but no action was taken by the Government. Saner also presented his ideas to the Institute of Civil Engineers where the discussion was of interest. Mr. Thomas, designer of the Foxton incline, highlighted the benefit of lifts or inclines on the approaches to summit levels. Because of them, the majority of water needed for a canal could be supplied from a lower level, solving one of the main problems for new canals in England where water supplies were always at a premium.

Little further planning was undertaken until after the First World War. In 1920, an interim report (though no final report) was produced for the Ministry of Transport. It suggested the improvement of the River Trent to Nottingham, a scheme carried out by the local authority and the Trent Navigation Company using grant aid from the Government. A second interim report suggested dividing the canal system into regions owned by public Trusts which could later be amalgamated, reflecting to some extent what had been decided for the railways, though nothing was done regarding canals.

In 1923, a Special Canals Committee was set up by Birmingham Corporation, the City Engineer and J. A. Saner reporting to them in 1925. The route chosen was via the BCN to Horsley Fields, a new canal to Autherley, the Staffs & Worcs Canal to Baswich (Stafford), a new canal to Aston Lock, the Trent & Mersey Canal to Middlewich, and finally a new canal to the Weaver. It was designed for 100 ton barges, 80ft x 14ft x 5ft, with counter-balanced lifts like Anderton, the caissons for the lifts being 82ft x 15ft x 5.5ft. They were to be located at: Tipton (20ft), Wolverhampton (100 ft possibly with tunnel at lower end), Aldersley (30ft), Gailey (45.5ft), Penkridge(27ft), (then three locks to Stafford) Stafford (27ft), Meaford (71.5ft), (a lock at Trentham) Stoke (50ft), Lawton Upper (50.75ft), Lawton Lower (61ft), Tetton (37.75ft), Moulton (77ft possibly with tunnel at lower end). The total length of the new canal was 82 miles with 24 lifts or locks. The time for operation of each lift was assumed to be 12 mins so that 12,000tons could be handled daily - perhaps 6,720,000tons per year. The cost was estimated at £6.6 million. In the following year, Saner obtained the institute of Transport's Gold Medal for his paper on "Overcoming Differences of Level in Canals'. In this he noted, 'In the case of a lift, however, it may even be necessary to construct an aqueduct for the upper approach, and there is almost certain to be

deep cutting below. …In good ground, and where a considerable difference in level exists, an alternative is to place the lift in a well or shaft and make the lower approach in tunnel, as is proposed for one or two lifts in the contemplated improvement of the Birmingham-Mersey route in England.' He considered locks and inclines to be better for river basin areas, while vertical lifts were better when traversing a ridge between two river basins. Electricity was best for operating lifts where available, though hydraulics, where there was no electric power, was cheaper than generating electricity. Lifts were better than locks for a difference in level of over 30ft for boats up to 400 tons.

Again nothing was done, and it was not until 1933 that a further scheme was proposed. In that year John F. Pownall published his first book 'Transport Reform in Great Britain'. In this he suggested that a canal, used for both water supply and transport, could be built along the 310ft contour which connected many of the industrial centres of Britain. The canal, 1,300 miles in length and of European dimensions, was to link Cornwall to Edinburgh and Wales to East Anglia. Eighteen lifts were included to link the canal to ports and rivers. Over the next thirty he published many articles on what became known as The Grand Contour Canal with many detail variations: in 1935 there were five lifts; in 1942 thirty-three, some to other canals and some to sea level. The main ones, with their height, were: Hertford (190ft), Bristol (310ft), Southampton (220ft), Donnington (210ft), Leicester (200ft?), Birmingham BCN (143ft in tunnel), Birmingham Tame Valley (98ft), Kidderminster (two lifts to the Severn), Stone (?), Wrexham (250ft?), Alsager (two lifts to the Weaver), a further lift up to Stoke-on-Trent, Preston (310ft), other small lifts to existing canals in Lancashire and Cheshire, Wakefield (260ft), Hartlepool (310ft), Newcastle (310ft).The main disadvantage of the scheme was that it was based on moving goods around Britain rather than to and from ports so it was never really considered economically viable. There were also problems over mixing water supply and transport which would have required some form of lock, details of which were very vague. The idea survived into the 1960s, the Inland Waterways Association published a booklet advocating investment in inland waterways which included a section of the Grand Contour Canal around 600 miles in length.

Towards the end of the Second World War planning was begun for peace-time improvements. In 1943, J. A. Saner came out of retirement to produce a report for the Ministry of War Transport on 'Provision of a Waterway between the River Mersey, via the Weaver to Wolverhampton with branches to Newcastle and Stone'. It was designed for 100 ton barges, 100ft x 14ft x 5ft, with four lifts, similar in design to Niederfinow, with caissons 105ft x 25ft x 6.6ft for one 100 ton boat or 3 narrow boats. They were to be situated at Church Minshull (45.7ft), then lift 2 (80.3ft) after 7.5 miles, then lift 3 (80.3ft) after 2.5 miles, then lift 4 (80.4ft) after 2 miles. The route was a new line midway between the Shropshire Union Canal and the Trent & Mersey Canal, passing to the west of Stafford and then running near the Staffs & Worcs Canal to Autherley. Goods were then to be carried to and from Wolverhampton area by lorry.

A second Report on 'A Waterway from the Weaver to Wolverhampton' was produced by Saner's successor as the Weaver's Engineer, C. M. Marsh. Designed for 100ton barges, 93ft x 14.66ft x 5.33ft, with lift caissons 110ft x 17ft x 7.5ft. There were to be two caissons per lift acting independently. The route continued up the Weaver from its current head of navigation at Winsford, eventually meeting the Shropshire Union Canal near Audlem and then following the canal to Aldersley. There were to be four lifts: no.1 Audlem Town (58ft), no.2 Audlem Hillside (52ft), no.3 Adderley (52.8ft), no.4 Tyrley (38.2ft). In effect the lifts replaced the existing locks on the Shropshire Union Canal. Once again, nothing was done, though the scheme was mentioned once more in the 1958 Report of Committee of Inquiry into Inland Waterways.

The history of Britain's proposed new waterways reflects its earlier history. There was a lack of Government interest in transport and developing a co-ordinated system. The proposals themselves were varied, with many different sizes being suggested for the boats to operate on the canal, and there was always uncertainty over which route created the best economic advantage.

1846 Select Committee on railway amalgamation with canals
1854 Railway & Canal Traffic Act
1872 Select Committee (on canals?)
1873 Railway and Canal Traffic Act
1881 Select Committee (on canals?)
1883 Select Committee on Canals.
Samuel Lloyd first proposes scheme for canals from Birmingham to four estuaries.
1884 H J Marten, Eng to Severn Nav, proposed improvement of the W&BC, continued 1886-90 for 200 ton waterway using locks and inclined planes (as per Monkland).

Mr Keeling first proposes Birmingham and Bristol Channel Improvement Scheme
1885 PIANC Conference, Brussels - What are the advantages of the different systems of locks?

H J Marten reports on 250 ton waterway Birmingham-London. Second report for locks 160 x 14.5 x 7 for 130-140ton boats, some locks have 27.5ft fall-compound locks? Cost £1.25 million. Economic and physical difficulties make this improvement unlikely.
1886 Feb 17, meeting to appoint engineer for improvement of Birmingham to the Severn route. A similar scheme was proposed for route to London.
1887 Bill for The Birmingham and Humber Navigation Company proposed but not proceeded with. Possibly for improving the Tame and associated waterways to 60 ton standard.

Mr Keeling suggests improvement of Birmingham to Severn for 200-250ton boats with 13 locks 110 or 220 x 20 x 8 and an incline at Tardebigge, cost £600,000.
1888 Samuel Lloyd, A National Canal between the Four Rivers. Railway and Canal Traffic Bill will help reduce railway price fixing to the disadvantage of canals. New canal should be at least the same size as French or Belgian waterways. Smaller canals would act as feeders. The canal proposed to help the Commissioners on Depression in Trade. Lloyd suggests a National Canal.

May 10-11, Royal Society of Arts Conference on Canals and Inland Navigation. Vernon-Harcourt mentions improvement of Birmingham-Bristol Channel (300ton?), and suggests A&CN and L&LC, and route to London. Jebb (LNWR) says he has designed inclines, similar to Blackhill, for use on the BCN. Marten's suggestions for the London-Birmingham route: lock size to be 160 x 14.5 x 7, improvement to 250ton standard too great, by using lifts and compound locks present number reduced from 154 to 90 and further reduced to 75 by avoiding the Avon crossing at Warwick. Lloyd gives dimensions of his National Canal 8-10ft deep by 100ft wide for boats up to 600tons, lifts to be used but no description.
1890 Birmingham to Mersey proposed by Sir James Brunlees and Mr McKerrow via Wolverhampton, Penkridge, Stafford, Stone, Stoke, Tunstall, Kidsgrove, Wheelock and Winsford. Designed for 300-400ton boats using hydraulic lifts.
Birmingham 387 ft, two lifts (c42ft each) to Wolverhampton 472.75ft, down four lifts (c 45ft each) to River Penk 296ft, then level for 21 miles, four lifts (c40ft each) at Trentham to 460ft and the eight lifts (c50ft each)down to Winsford 54.5ft. Cost £5 million.
1891-4 River Severn deepened to Worcester.
1894 Private Report by G W Keeling for Lord Dudley, Sir B Hingley and Mr Corbett (Droitwich Salt Works) etc.
1895 Inst. of Mining Engs. Conference on Inland Navigation. Saner states that inclines need too much land and the surge causes problems with boats in the caissons, he advocates a lock/caisson size of 150 x 18 x 7. Mentions proposed Birmingham-Mersey via Potteries canal for 250ton boats working in trains of four. Vernon-Harcourt states that there were proposals for improvement of the routes from Birmingham to the Mersey (see 1890), Severn (see 1887, though lifts suggested in place of some locks and incline to increase size to that of improved Severn Navn) and Thames (Marten's plan, but lifts suggested in place of some locks).
The Severn route was regarded as best as it was the shortest and only involved one canal which was not railway owned. The Weaver reached other industrial areas than Birmingham so

would create more traffic. Mr. Salt estimated that locks were much cheaper than lifts even with back-pumping. He asks if the route to the Severn is the best as much more traffic goes to Liverpool and London. Mr. Keeling said that Tardebigge was more suitable to an incline than lifts but the other sites could have lifts. Lyonel Clark said that the Mersey route lift sites had to be away from mining areas, only those near Wolverhampton being a problem. Boat size was 100 x 22 x 9.5 with a capacity of 380-400 tons. Cost of a 50ft double caisson lift was £30,000.Mr. Shepherd states that lifts operate at 20feet per minute.

1897 D Marten reports on improving the Staffs & Worcs from Stourport to Wolverhampton to suit Severn boats 225 ton (85 x 19 x 6) with seven inclines as per Foxton. Terminus at Aldersley, too expensive to continue up to Wolverhampton level.

1901 Canal Traffic Bill, prepared by Bristol Chamber of Commerce and support by Associated Chamber. Proposed formation of public canal trusts but opposed by railways.

1902 PIANC Conference, Düsseldorf - Surmounting of Great Ascents.

1904 Royal Society of Arts paper on The British Canals Problem by Arthur Lee. Manchester Chamber of Commerce has suggested nationalization of the canal system. Author suggests that ownership by local authorities better.

1905 PIANC Conference - Surmounting Great Differences of Level.
B H Thwaite The Transport Possibilities of Our Inland Navigable Waterways

1906 Royal Commission established which reported 1909-10.

Saner at ICE, discussion: Mr. Thomas says that lifts best at approach to summit levels so that more water could be obtained from lower sources. Mr Lowcock (had looked at improving Upper Avon as route to Birmingham) said 300tons should be the minimum boat size, anything less not worth the trouble.

1920 Report of Civil Engineering Dept of the Ministry of Transport. The first interim report suggested the improvement of the Trent which was carried out by Nottingham Corporation and the Trent Navigation Company assisted by Government grants. The second interim report suggested dividing the canal system into regions owned by public Trusts which could later be amalgamated, reflecting to some extent what had been decided for the railways. No final report was issued.

1923 Oct 12, Special Canals Committee of Birmingham Corporation ask for report on water transport and best new route for the city.
Dec 8, Report given to Birmingham Corporation.

1925 Jan, Report to City of Birmingham Canals Committee given by Herbert Humphries (City Eng) and J A Saner (Weaver Nav), route via BCN to Horsley Fields, deviation to Autherley, S&W to Baswich (Stafford), deviation to Aston Lock, T&M to Middlewich, deviation to R Weaver. For 100 ton barges, 80 x 14 x 5. Caissons for lifts 82 x 15 x 5.5.
Lifts at: Tipton (20ft), Wolverhampton (100 ft possibly with tunnel at lower end), Aldersley (30ft), Gailey (45.5ft), Penkridge(27ft), then three locks to Stafford, Stafford (27ft), Meaford (71.5ft), a lock at Trentham, Stoke (50ft), Lawton Upper (50.75ft), Lawton Lower (61ft), Tetton (37.75ft), Moulton (77ft possibly with tunnel at lower end). Total length 82 miles with 24 lifts or locks. Vertical lifts like Anderton are recommended, particularly at Wolverhampton and Moulton. Time for operation assumed at 12 mins so that 12,000tons could be handled daily - perhaps 6,720,000tons per year. Cost £6.6 million.

1926 Saner's paper "Overcoming Differences of Level in Canals', award paper for Inst. Of Transport. 'In the case of a lift, however, it may even be necessary to construct an aqueduct for the upper approach, and there is almost certain to be deep cutting below.
…In good ground, and where a considerable difference in level exists, an alternative is to place the lift in a well or shaft and make the lower approach in tunnel, as is proposed for one or two lifts in the contemplated improvement of the Birmingham-Mersey route in England.'
Locks and inclines better for river basin area, vertical lifts when traversing a ridge between two river basins. Note re weight on foundations. Electricity best for power where available, hydraulic where no power as cheaper than generating electricity. Lifts better than locks for difference in level of over 30ft for boats up to 400 tons.

1930 Royal Commission on Transport made suggestions as to the establishment of regional public Trusts, but did not recommend any major improvements or new waterways.

1933 Pownall publishes A National Waterway Scheme (Modern Transport 17 Aug 1935) and booklet Transport Reform in GB. Canal to be 1,300 miles in length (Cornwall to Edinburgh, Wales to East Anglia) Eighteen lifts were included.

1935 Pownall's Grand Contour Canal now 848 miles in length with five lifts, cost £150 million. Opposed by Wilson, engineer of the Grand Union who were already improving their route.

1942 Pownall publishes The Projected Grand Contour Canal. Size of vessels 1,500ton. Watersheds in England all c300 ft (230-410ft). GCC to be at 310ft contour. Lifts: Hertford (190ft), Bristol (310ft), Southampton (220ft), Donnington (210ft), Leicester (200ft?), Birmingham BCN (143ft in tunnel), Birmingham Tame Valley (98ft), Kidderminster (two lifts to Severn), Stone (?), Wrexham (250ft?), Alsager (two lifts to Weaver), a further lift up to Potteries, Preston (310ft), other small lifts to existing canals in Lancs/Ches, Wakefield (260ft), Hartlepool (310ft), Newcastle (310ft). Total number of lifts now 33. Pownall was opposed to public funding of such projects.

1943 Dec, Min. of War Transport, Report on Provision of a Waterway between the River Mersey, via the Weaver to Wolverhampton with branches to Newcastle and Stone by J A Saner. For 100 ton barges; 100 x 14 x 5; caissons 105 x 25 x 6.6; for one 100 ton boat or 3 narrow boats. Lifts at Church Minshull (45.7ft), 7.5 miles to lift 2 (80.3ft), 2.5 miles to lift 3 (80.3ft), 2 miles to lift 4 (80.4ft). This appears to have been a new line of canal midway between the SUC and the T&M passing to the west of Stafford and then running near the S&W to Autherley.

1944 Aug, Report on Waterway Weaver to Wolverhampton by C M Marsh. For 100ton barges; 93 x 14.66 x 5.33; caissons 110 x 17 x 7.5. Two caissons per lift acting independently. Lifts: no.1 Audlem Town (58ft), no.2 Audlem Hillside (52ft), no.3 Adderley (52.8ft), no.4 Tyrley (38.2ft). New line with locks Winsford to Audlem and then following SUC.

1951-66 Pownall publishes more than twenty papers on the Grand Contour Canal.

1951 He suggests the canal can be built in stages, starting in the Chilterns to supply water to London Water supply was an important consideration for this canal scheme.

1952-3 Pownall's scheme now for 1,221 miles at 310ft and 90 miles at a lower level. A consortium is formed to promote the canal (from water industry). Cost £400 million.

1958 Report of Committee of Inquiry into Inland Waterways proposes continuation of improvement of the GUC and further research into a Wolverhampton to Weaver canal.

1965 IWA publishes scheme for 600 mile Grand Contour Canal at cost of £600 million.

Recent proposals: Foxton, Watford Gap, Avon to GU, Weaver to SUC.