DEPARTMENT OF THE ENVIRONMENT

THE WATERWAYS OF THE BRITISH WATERWAYS BOARD

A STUDY OF OPERATING AND MAINTENANCE COSTS

A REPORT BY
PETER FRAENKEL & PARTNERS
Planning & Design Consultants
London & Glasgow

VOLUME 1

PRICE £7

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DECEMBER 1975

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CHAPTER ONE

INTRODUCTION

Chapter 1:

Introduction

1.1 *Terms of Reference*

1.1.1 In June 1974 Peter Fraenkel & Partners were asked by the Department of the Environment to undertake a Study of the costs of operating and maintaining the waterways of the British Waterways Board, the nationalised body set up under the Transport Act 1962 to manage the waterways of the former British Transport Commission.

1.1.2 The terms of Reference for the Study, which are set out in Appendix 1A to this Chapter, were contained in a letter from the Department dated 1st March, 1974, and define the purposes and limits of the Study.

1.1.3 Before commencing the Study we sought and obtained clarification of a few points, arising from preliminary consideration of the Terms of Reference, as noted in Appendix 1B.

1.2 *General Approach*

1.2.1 The BWB waterways system comprises a total of some 3,100 km of rivers, navigations and canals, of different sizes and characteristics, with a multiplicity of structures and works. Apart from the impracticability of carrying out an examination of all parts in full detail within the desired time span, such an examination would have involved unwarranted expenditure of time and money. A consideration of no less importance was that a survey of this character would have called for a veritable library of volumes in which the results could be recorded, analysed and discussed.

1.2.2 We therefore approached the task of examining the system on a sampling basis, both as regards physical inspections of the waterways themselves and in respect of obtaining the views of those concerned with the use and upkeep of the system, whether within or outside the Board.

1.2.3 In drawing up our programme of inspections we took account of the following factors:

(a) the different character of the waterways – e.g. river navigation, artificial canal, etc.

(b) lengths of waterway representative of particular types of construction,

(c) lengths of waterway under the control of the various Area Engineers and subordinate supervisors,

(d) places indicated in the BWB Programme of 1970 as calling for a substantial volume of work to overtake arrears of maintenance,

(e) tunnels, aqueducts and other major structures of special importance.

The programme covered a total period of eight months (with a necessary relaxation of effort during short and inclement days of the winter) during which three separate survey teams inspected a total of 325 km of waterway. Spot checks were also carried out on individual features.

1.2.4 In addition to this general programme of inspections, which covered all aspects of the waterways with their structures and ancillary works, we undertook a separate series of inspections of the banks of the waterways on a random sampling basis. Bank protection requirements were known to comprise the largest single element of the BWB 1970 Programme and it was thought that our own survey should receive a double check in this respect. Subsequent analysis of results showed a close correspondence between our two surveys in respect of bank protection needs. The results are discussed in Chapter 12.

1.2.5 Our enquiries and requests for information from the Board were made at all levels from the General Manager and Chief Engineer down to Section Inspectors and other responsible officials in the field. Within the engineering and other departments we were at all times able to obtain data, both factual and expressions of opinion, on request or at short notice. We should like to take this opportunity of expressing our real appreciation of the very willing assistance rendered to us by all concerned at all times.

1.2.6 Similarly, we did not feel it practicable to seek information from or the views of every user of the waterways, whether for commerce or amenity, or those of all local authorities or the numerous associations and societies concerned. We invited and received comments from a number of representative bodies, listed in Appendix 1C.

1.3 *Exclusions*

1.3.1 We feel it desirable to emphasise that our Study does not, and was never intended to, embrace every aspect of waterways and their use. Within the Board's ambit we were instructed not to consider their commercial activities or those of the Estate Department. The activities of the Amenities Division are also excluded except in so far as they involve actual operations and maintenance work.

1.3.2 There are many examples of Remainder waterways (i.e. those not designated as Commercial or Cruising) where, in spite of a lack of any specific obligation to improve their condition, much effort has been, and continues to be, devoted to restoring them to acceptable cruising standards. This is largely due to the efforts, both physical and financial, of volunteers banded together on an ad hoc basis but in some cases assistance is given by local authorities donating funds to the Board under agreement, the Board then undertaking that the proceeds will be used entirely for the betterment of specified lengths of waterway. Where there are firm agreements of this kind, but not otherwise, we have been instructed to take account of the relevant income in assessing the economics of possible methods of treatment.

1.3.3 We have not been asked to examine or comment upon the organisation of the Board's headquarters and departmental establishments as a managerial structure. We have, however, kept in mind that within the engineering department (which covers many operational duties as well as the maintenance function) certain aspects of the organisation may affect the efficiency (and therefore the costs) of operations and maintenance and so call for consideration.

1.4 *Sequence of Report:*

1.4.1 In the course of our Study, and in compiling this Report, it did not prove feasible to follow the precise sequence of the Terms of Reference, but the Table of Contents will assist in locating specific subjects.

1.4.2 Chapter 4 gives a list of all the Board's waterways, grouped into the three categories of Commercial, Cruising and Remainder, together with a summary of their locations, types and leading dimensions. The main descriptive matter, however, fills the whole of Volume 2 of this Report and this must be read in conjunction with the maps contained in Volume 3.

1.4.3 The final chapter of the Report is a summary of our conclusions and may be referred to immediately if desired without the necessity of digesting the body of the Report.

Appendix 1A

Terms of Reference:

(As given by Department of the Environment 1st March, 1974)

Proposed Study by Civil Engineering Consultants of the Cost of Operating and Maintaining the Waterways of the British Waterways Board

(Paragraphs 1 – 6, setting out the background of the Study, are given here in outline only)

1. The British Waterways Board, set up by the Transport Act 1962, is responsible for administering the nationalised system of inland waterways in England, Scotland and Wales. The Board's first task was to review the future of their waterways and the results of this review were published in their 'The Facts About the Waterways' in 1965. The Government of the day considered the situation (Cmnd 3057 of 1966 and the Cmnd 3401 of 1967 refer) and the result was the new remit given to BWB by the Transport Act, 1968.

2. The 1968 Act graded the Board's waterways into three categories:–

'Commercial waterways' to be maintained in navigable condition for use by commercial freight carrying vessels,

'Cruising waterways' to be maintained in navigable condition for use by powered pleasure craft, and

'Remainder waterways' to be dealt with in the most economical manner possible whether by retaining, developing, eliminating or disposing of them.

3. The Board have advised the Department that in their view a major programme of civil engineering work is required to overcome what they term 'arrears of maintenance' arising from under-expenditure in past years.

4. The Department have decided that this situation should be examined in detail by independent consulting engineers, i.e. by a full investigation of the costs of operating and maintaining the Board's waterways system, and the preferable strategy for such expenditure, assuming differing levels of usage of the system, and taking due account of all the Board's obligations, statutory and otherwise.

5. The consultants will have access to information in the Department, or the British Waterways Board, including that prepared by the Board in their engineering review of the system carried out in 1970.

6. Firms of consulting engineers are invited to submit a project report describing how they would propose to carry out the study defined in the remainder of this document within the timescale envisaged.

Scope of the Study:

7. The consulting engineers are required to investigate each of the Board's waterways by such inspection and/or consultations as they consider necessary either with any persons in the employment of the Board or elsewhere.

8. The consulting engineers must take into account:

a. The statutory responsibilities, duties and obligations placed on the Board by the Transport Act 1962, the Transport Act 1968, the Reservoirs (Safety Provisions) Act 1930, the Factories Acts, the Water Resources Acts 1963 and 1971, the Brine Pumping (Compensation for Subsidence) Acts of 1891 and 1952, the Mines and Quarries Act 1954, the Coalmining (Subsidence) Act 1957, the Public Health Act 1936, the Town Planning Acts and all other public or local Acts which may have relevance to the operation and maintenance of the Board's waterways.

b. The Board's obligations at common law towards adjoining landowners or property owners which have relevance to the maintenance of the waterways.

c. All existing contractual obligations which the Board have entered into which have a bearing on the operation and maintenance of any of the waterways.

d. The Board's General Canal Byelaws and the British Waterways Act 1971 in so far as these have a bearing on operation and maintenance of the waterways.

e. Any aspects of public safety not already covered in (a) to (d) above.

9. The consulting engineers must consider, and define, the standards of maintenance which the obligations (a) to (e) in paragraph 8 above imply for individual waterways. They must also consider and define the methods of maintenance, and the strategy for timing of maintenance, which in their opinion would be most economical, and give estimates of cost.

10. The consulting engineers must examine, and define, the extent to which their assumptions or conclusions regarding maintenance standards, and maintenance strategies, under paragraph 9 above are different from the standards and assumptions adopted by the Board in 1970 in their engineering review.

Information required by the Department

(A) *Present Condition of the Waterways*

11. By suitable inspection and consultation the engineers should provide a general description of the waterways system, including aqueducts and reservoirs. They should give details of the condition of banks, structural installations, water waterways, towpaths, and all works currently the responsibility of the Board. They should include particulars for each waterway of the following factors:–

a. Extent of use for commercial freight carrying.

b. Extent of commercial uses other than freight carrying, e.g., hire cruiser bases, hotel boats etc.

c. Extent of use for cruising under licence or registration from the Board.

d. Extent of use for angling.

e. Extent of use for environmental or naturalists' studies.

f. Extent of use for discharge of surface water and storm sewage.

g. Extent of use for discharge of sewage and industrial effluent.

h. Extent of use for supplying industrial water.

i. Extent of use for supplying water for abstraction for public water supply.

j. Extent of use of 'remainder waterways' for cruising or local amenities, under existing or prospective agreements with the local authority or local authorities.

k. Extent and nature of waterway-related private investment.

l. Purpose and use of the waterway from the engineering viewpoint as a component of the network as a whole.

m. Any special structures or features, including those scheduled as ancient monuments, or buildings of special architectural or historic interest, or which serve other parts of the network (e.g., reservoir systems).

n. Any special problems affecting the waterway (e.g., mining or brine subsidence effects).

12. The consulting engineers should identify any parts of the 'commercial' and 'cruising' waterways where the level of maintenance hitherto has been such that the conditions are currently below those standards defined in paragraph 9 above. They should identify any cases where urgent attention is required to ensure public safety and give an indication of the necessary works and associated costs.

(B) *Costs of Operating and Maintaining 'Commercial' and 'Cruising' Waterways in Navigable Condition at Present Levels of Traffic*

13. The consulting engineers should advise on the necessary works and the associated annual costs (over the period up to 1989) of operating and maintaining the waterways to the standards defined by paragraph 9 above, according to the following alternative programmes:–

a. Any arrears of maintenance identified under Section (A) above to be made good in the initial years.

b. The arrears of maintenance identified and defined by BWB to be carried out as proposed by BWB (viz as in Appendix 10B to their draft outline corporate plan).

c. No attempt to make good any arrears as at (a) or (b) above (excepting public safety work) in the initial years.

d. Any other programme which in the opinion of the consultants would result in the optimum value for expenditure.

14. The consultants should identify and comment on any additional benefits that would result from carrying out each of the programmes, with particular reference to the making possible of increased traffic, greater water sales, improved convenience to waterway users, improved amenity and reduced claims for damage to third parties.

15. The consultants should comment on the relative merits of the alternative programmes.

(C) *Costs of Operating and Maintaining 'Commercial' and 'Cruising' Waterways in Navigable Condition with Increased Levels of Traffic:*

16. Assuming a general increase in traffic of (a) 100% and (b) 200% above the present levels, the consultants should advise on any increased works required, and any effect on operating and maintenance costs under the alternative strategies discussed in Section (B) above. They should also consider and comment on the extent to which further growth in waterways usage might be limited by physical considerations, and discuss how and at what costs these limitations might be overcome.

(D) *The Cost of Providing for Specific Navigational Standards*

17. The consultants should consider what elements of the costs of operation and maintenance identified in Section (B) above result from maintaining the waterway concerned at 'cruising waterway' standard and also, where appropriate, the higher 'commercial waterway' standards. They should then advise on these costs disregarding the need to provide for 'commercial' and 'cruising' navigation. In making this assessment it would be necessary to consider the extent to which the maintenance standards and strategy defined in paragraph 9 above are dictated by the navigational requirements.

(E) *Remainder Waterways*

18. The consultants should advise, in respect of each remainder waterway, on the annual operating and maintenace costs associated with the most economical treatment, taking account of the obligations under Section 107 of the Transport Act 1968, and any firm contractual obligations relating to the particular waterway. The consultants should provide an assessment in any case of a length or part of a remainder waterway where elimination seems a possible course of action, of the likely costs of elimination, taking account of interest on the capital involved.

Costing Assumption

19. All estimates of costs are to be at March 1974 prices.

Completion of Report

20. The Department wish the final report from the consultants to be submitted within one year from receipt of formal instructions to proceed.

Appendix 1B

Clarification of Terms of Reference

(As obtained by discussion with the Department on the 12th & 20th March and in a letter dated 27th March, 1974).

(a) The Study is to comprise a fresh and independent investigation of the matters in question and must not be regarded as or restricted to a review of the BWB programme prepared in 1970. At the same time, due regard should be had to the contents of that programme.

(b) A full inspection of the entire waterway system is not expected but only so far as is necessary to achieve a realistic assessment of conditions.

(c) Works on "Remainder" waterways over and above those necessary to meet statutory requirements are not to receive consideration, except where work undertaken by agreement with local authorities has placed obligations on BWB. In such cases financial contributions receivable from the local authorities may be regarded as legitimate offsets against expenditure. No account is to be taken of any work involving the use of voluntary labour.

(d) With regard to "Commercial" waterways although few developments are immediately in prospect their possible effects may be taken into account, if thought necessary, on their respective merits. However, the report was not concerned with capital developments, but with the maintenance of the waterways.

(e) The Board's docks at Sharpness, Gloucester and Weston Point are to be excluded from the Study, as are also the commercial centres at Brentford, Birmingham, Leeds, etc. No account is to be taken of any estate or properties that are leased to other parties.

(f) No account need be taken of work being carried out or costs incurred under Operation Bridgeguard, but the obligation that will fall on BWB to maintain bridges thereafter to new standards must receive consideration.

(g) No changes of classification of the three grades of waterway have been made by statutory procedure since those scheduled in the Transport Act 1968 became effective.

Appendix 1C

Representative Bodies Consulted

Association of Pleasure Craft Operators

Berkshire County Council, Planning Dept.

Central Water Planning Unit, DOE

Gwent County Council, Planning Dept.

Inland Waterways Amenity Advisory Council

Inland Waterways Association

Inland Waterways Association (Inland Shipping Group)

Kennet and Avon Canal Trust Ltd.

Ladyline Ltd.

Ministry of Agriculture, Fisheries and Food, Land Drainage Dept.

Nature Conservancy Council

Ship and Boat Builders National Federation

Shropshire County Council, Planning Dept.

Thames Water Authority

Water Data Unit, DOE

CHAPTER TWO

THE WATERWAYS

Chapter 2:

The Waterways

2.1 *Their Origins*

2.1.1 The waterways controlled by the British Waterways Board are of many different kinds and had their origins in a great variety of circumstances. For details of the history and development of these waterways, in both their commercial and engineering aspects, many excellent and authoritative books are available, published for the most part within the last 25 years. (Reference may be made to them for fuller particulars – see Bibliography at Appendix 2A). In order, however, that certain factors affecting operation and maintenance of the waterways may be fully appreciated it is necessary to draw attention to their more important physical characteristics.

2.1.2 The earliest kind of waterway generally developed in Great Britain was the river navigation, in which a natural watercourse subject to shallows, bends and floods was made navigable by the construction of weirs, past which the craft made their way by staunches or flashes. Over the years improvements were gradually introduced, notably by the construction of locks located in artificial cuts of various lengths; on the BWB system navigations of this kind are represented by the River Severn and the River Trent.

2.1.3 A later development was the canalised river, in which a river too small for navigation in its own right yet had sufficient flow of water to enable craft to be worked through locks. Two principal changes brought about by this development were the general provision of towing paths and the universal adoption of locks, because of the need to conserve water supplies. Examples of canalised rivers within the BWB system include the Aire & Calder Navigation, the River Soar Navigation and the navigations of the Rivers Lea and Kennet.

2.1.4 By the end of the first quarter of the 18th century most of the main rivers of the country had been made navigable, giving stimulus by the middle of the century to the Industrial Revolution. This in turn led to the construction of artificial canals, in which the only use made of rivers was to draw off their water as means of supply for the independent channel.

2.1.5 By about 1760, the first wholly artificial canal appeared, the Bridgwater canal now part of the Manchester Ship Canal system. The engineer employed was the celebrated James Brindley and with the benefit of this experience he subsequently acted as engineer for numerous canals built at the end of the 18th century, most of which are still contained within the BWB system.

2.1.6 Brindley evolved the idea of a system of artificial waterways linking the four great estuaries of England (Severn, Mersey, Humber and Thames) and forming a cross in the Midlands. The first section of the system to be constructed was the Grand Trunk canal, now known as the Trent and Mersey Canal, linking the estuary of the Mersey near Runcorn with the navigable part of the River Trent at Shardlow. The canal was built as a wholly artificial cut, rising out of the Cheshire Plain by locks to a tunnel at Harecastle and then falling by locks through the Potteries and by way of Burton on Trent.

2.1.7 In constructing this artificial canal Brindley introduced a number of techniques which have remained as typical elements of canal construction to the present day. There was first a need to make the channel watertight, for which Brindley perfected the practice of clay puddling. In some cases this involved the formation of cores of puddled clay in one or both banks of the waterway, in other cases it necessitated a blanket of clay extending right across the bed also.

2.1.8 Secondly, the disposition of locks was approached more scientifically with the object of providing level pounds (i.e. the sections between consecutive locks) of as great a length as possible and then concentrating in groups the locks needed to overcome the changes of level. The long level pounds followed the natural contours of the ground closely in order to minimise the amount of the earthworks; any embankments and aqueducts needed for crossing valleys of streams and rivers were thus kept low. Thirdly, deep cuts were avoided, tunnels being driven where a ridge had to be penetrated.

2.2 *Early Development*

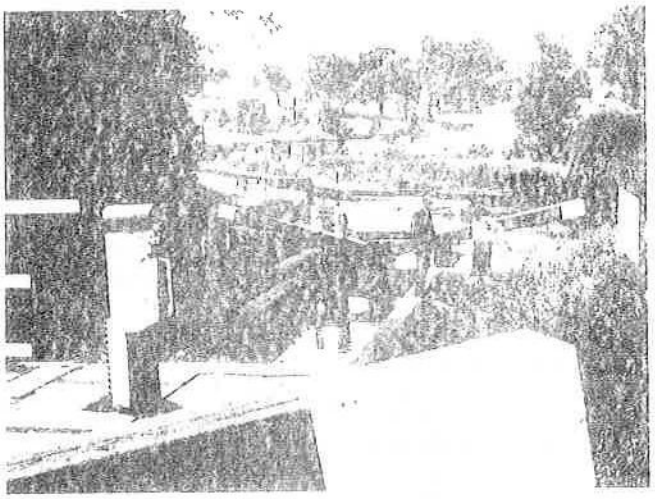
2.2.1 As the success of the first artificial canals was demonstrated enthusiasm grew for their extension and, by the end of the 18th century, Brindley and his contemporaries were followed by others, notably Jessop, Rennie and Telford, whose canals showed successive advances in technical developments. Much of the work of these pioneers stands today as a testimony to their skill, and indeed to their artistic ability. Telford's aqueduct at Pontcysyllte and Rennie's at Lancaster are of this calibre and are still in service after more than 170 years.

2.2.2 Two types of structure are peculiar to waterways, the lock and the aqueduct. The latter takes several forms, being of masonry, cast iron, or in modern times of reinforced concrete or steel. Its purpose is to carry the waterway across a valley without change of level; without it there would be the inconvenience of a flight of locks to be worked down and up, with consequence wastage of time and loss of water. The lock is virtually the only device remaining, in this country, whereby craft may be transferred from one level to another. The only lift still in existence is the Board's Anderton Lift where the boats are kept afloat in caissons moved vertically by electric power.

2.2.3 One effect of placing locks in groups and using long level pounds, with a minimum expenditure on earthworks and aqueducts, was inevitably to make the course of artificial canals tortuous rather than direct. The amount of water consumed by locks is directly related to their size, so that when artificial trunk canals came to be planned there was a strong incentive to use smaller locks (and therefore smaller boats) than the broad locks customary on the canalised rivers. The Trent and Mersey Canal was accordingly provided with locks capable of accommodating boats 22m. long and 2.13m. wide, and this became the standard "narrow gauge" for most of the artificial canals subsequently constructed in the Midlands.

2.2.4 The first lock of these dimensions actually to be constructed was not on the Trent and Mersey Canal itself but on the Staffordshire and Worcestershire Canal, built by Brindley

at the same time to link the Trent and Mersey with the Severn – the third arm of his Cross. This canal left the Trent and Mersey at Great Haywood, rose to a summit near Wolverhampton and then dropped through a succession of locks from Compton to Stourport on Severn. Just below Compton, at Botterham, the expedient was adopted of telescoping two successive locks into a "riser", in which the lower gates of the upper lock also served as the upper gates of the lower lock. Subsequently, this device was extended, at other places, into the "staircase" in which three, four and even five locks were brought together in a connected sequence.



The bottom lock of the Watford flight on the Grand Union Canal (PFP)

2.2.5 The lock spacing on the Staffordshire and Worcestershire Canal allowed of the general alignment being fairly straight, but it was otherwise with the Birmingham Canal built shortly afterwards to that city from a junction with the S.& W. at Aldersley. On leaving Aldersley a flight of 21 locks took the Birmingham Canal up to the "Wolverhampton Level", a length of 22.5 km all on one level from Wolverhampton to Smethwick. This was laid out as a contour canal and was so tortuous that half a century later it was found possible, by introducing cuttings, tunnels and realignment, to reduce this length to about 14.5 km, a saving of 35%.

2.2.6 The fourth arm of Brindley's Cross took rather longer to complete and, on the Thames, Oxford was reached only in 1790. The Oxford Canal, as originally laid out, was an outstanding example of a contour canal but under economic pressures of a later time the northern half was straightened so as to reduce the navigation by 22 km. (The southern half was never improved in this way; the summit length of 18 km from Marston Doles to Claydon is less than 8 km as the crow flies.) The original and improved routes are shown in Fig. 2.1.

2.2.7 At the peak of canal promotion, in 1792, the Grand Junction Canal (later part of the Grand Union) was authorised to link the mid point of the Oxford Canal at Braunston more directly with the lower Thames at Brentford. For this new trunk route it was decided that the narrow gauge would be too restrictive and locks, bridges, tunnels and aqueducts were all designed to accommodate the barge, or wide boat, of 4.25m beam, thus reverting to the earlier "broad gauge" type of canal.

2.2.8 By about 1830 Telford, in planning the Birmingham and Liverpool Junction Canal (later part of the Shropshire Union) was cutting straight across country at the expense of deep cuttings and high embankments – but still on the narrow gauge.

2.2.9 Steam locomotion appeared on the waterways quite early, some of the first trials of steamboats taking place on the Forth and Clyde Canal in the opening years of the 19th century. However, steam power became a practicable enterprise for waterways only after the pressure of railway competition had made itself felt, but from the middle of the century onwards tugs and various other adaptations of mechnical power were used to an ever increasing extent.

2.2.10 Steam power was succeeded in a few cases (e.g. for tunnel haulage) by electricity, but it was more generally replaced by diesel engines from the first decades of the 20th century. The steam boiler had taken up useful cargo space and the more compact diesel unit enabled much of this to be recovered.

2.3. *Expansion and Decline*

2.3.1 In the late 19th century the fortunes of the various waterway undertakings were, on the whole, declining and many of the more vulnerable ones had abandoned the struggle before the economy of the internal combustion engine could be exploited. Despite this a few companies persevered with improvement schemes, and even the cutting of new or branch canals, although these were mainly on the canalised rivers and river navigations where commercial traffics were holding up well.

2.3.2 Mention is made here of the following by way of example:

(a) The River Weaver was improved in the second half of the nineteenth century by the construction of new and larger locks, mechanically operated and dredging to accommodate a towed train of barges with a total payload of 1000 tonnes.

(b) The Anderton Lift, giving a connection between the Trent and Mersey Canal and the Weaver Navigation for barges or pairs of narrow boats, was opened in 1875 and reconstructed for electric powered operation in 1908.

(c) On the Aire and Calder Navigation deepening of the waterway and enlargement of locks were undertaken from about 1870 and a novel system of 40 tonne compartment boats introduced for the conveyance of coal from the Yorkshire pits to Goole Docks. A train of up to nineteen of these boats (known as "Tom Puddings") was towed to the docks, where the individual units were then hoisted out of the water and inverted for discharge into ships' holds.

(d) The New Junction Canal was opened in 1905 to connect the Sheffield and South Yorkshire Navigation with the Aire and Calder Navigation near Goole, thus enabling the compartment boat system to extend its operations on to the S. & S.Y. waters.

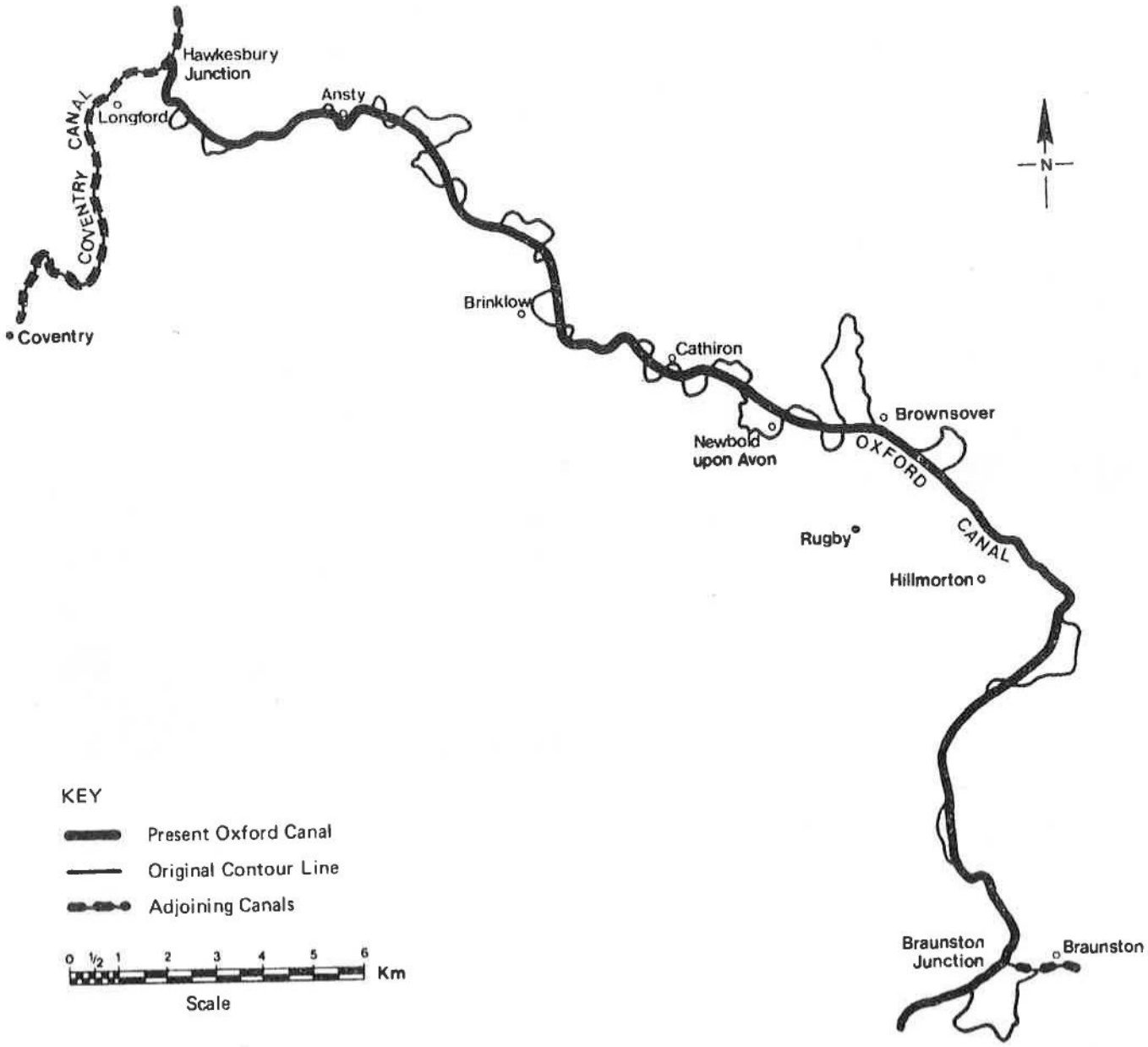
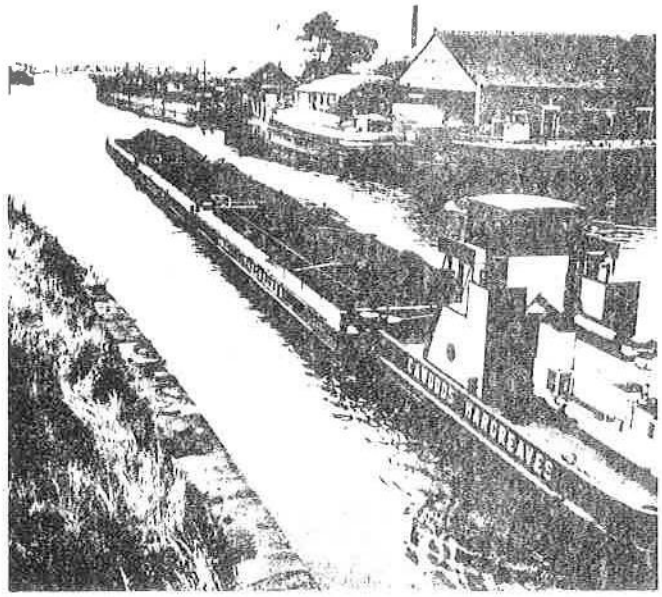


Fig. 2.1 SHORTENED CONTOUR CANAL



Yorkshire coal traffic (photograph by Derek Pratt)

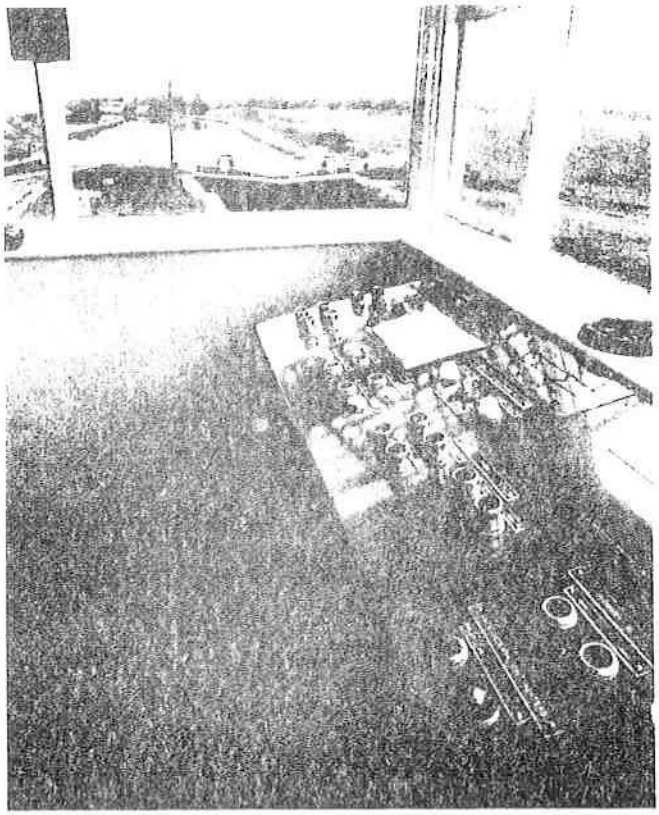
(e) In the 1930's the Grand Union Canal had just been formed by an amalgamation of the former Regents Canal, Grand Junction Canal and three canals linking the latter with Birmingham. It then proceeded to put in hand a comprehensive scheme of development in which the locks between Napton and Birmingham were reconstructed and bank revetment works carried out, with a view to enabling 4.25m beam barges to reach Birmingham. In fact, this objective was never achieved, as funds available did not allow of the removal of the last of the restricting bridge jaws or the completion of dredging.

(f) On the Sheffield and South Yorkshire Navigation a new lock at Long Sandall, below Doncaster, was built in 1959 to replace the old one, only 20m. long, which formed a bottleneck for the trains of Tom Puddings. At the present time parliamentary powers have been obtained for further enlargement of the capacity of this waterway so as to allow BACAT barges (brought into the Humber estuary on board sea-going vessels) to navigate up the canal in trains.

(g) The river Trent has had its navigation capacity progressively improved by the reconstruction, enlargement and mechanisation of its locks; that at the tidal limit, Cromwell Lock, in 1960 and the Town Lock at Newark, in 1953.

2.3.3 For many of the waterways, however, it was another story as for a variety of reasons they passed into the control of railway companies about the middle of the nineteenth century. This matter is dealt with in the next chapter but the general effect was to discourage rather than encourage further developments.

2.3.4 One very important result of this situation was a failure to take any steps to remedy a grave defect that had existed throughout the whole history of the country's waterways – the lack of uniformity of size of craft permitted by the locks and other fixed structures. Virtually the only recognition of what we should now call a construction module was the ability of most wide locks on the artificial canals to accept a pair of the (more or less) standard narrow boats.



Modern lock control equipment at Lemonroyd on the Aire & Calder Navigation (PFP)

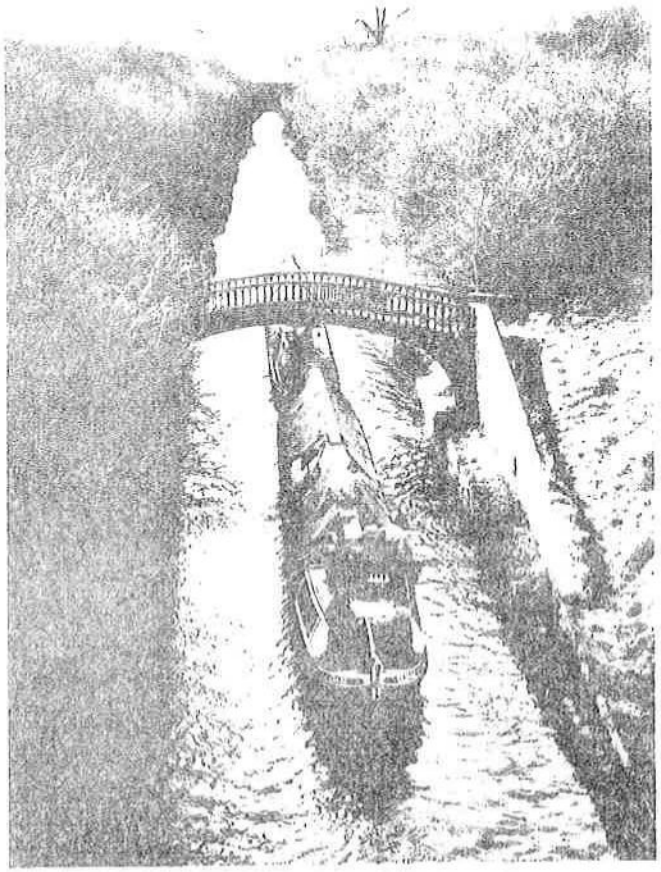
2.3.5 It is true that the early decision to utilise narrow locks was largely with a view to economising in water, but their perpetuation in situations where they formed bottlenecks was a major factor in preventing the establishment of long haul traffic with uniform standards of commercial significance. Undoubtedly these factors were eventually decisive in leading to virtual cessation of commercial traffic on the artificial canals within the third quarter of the present century. As a consequence there was a gradual decline in the condition of these waterways, leading to closure in some cases.

2.4 *Present Situation*

2.4.1 The BWB system as it now exists is substantially as it was forty years ago so far as its basic physical characteristics are concerned. In saying this we do not overlook the improvements that have been made on the River Trent, the Aire and Calder and the Sheffield & South Yorkshire Navigations, but these are special cases. The continuance of commercial traffic in other cases was artifically prolonged by conditions of the second World War but when nationalisation supervened in 1948 its decline was not long in being confirmed.

2.4.2 Nationalisation for the first time brought under one ownership the majority of the country's waterways, the principal exception being the Manchester Ship Canal and its subsidiary the Bridgwater Canal. Independent waterways and those in railway ownership were brought under common

control, together with the Caledonian and Crinan Canals that had hitherto been controlled directly by the government. More than twenty five years have now elapsed, during which there have been a number of changes in the mechanism of government control culminating in the setting up at the end of 1962 of the British Waterways Board. It is a curious fact that the first weeks of the new Board's existence should have coincided with one of the most severe and prolonged cold spells in recent history. Waterways have always been subject to the serious handicaps that such conditions place on their operation – traffic delays when frozen in and the laborious and costly tasks of ice-breaking – but on this occasion the dislocation of commercial traffic was so great that much of what remained forsook the artificial canals and never returned.



A pair of camping boats (motorboat and butty) at Fenny Compton on the Oxford Canal (PFP)

2.4.3 Whether by coincidence or otherwise it is now seen that the establishment of the BWB was the precursor not only of the disappearance of commercial traffic on its narrower gauge waterways, but of the emergence in a very definite way of cruising for recreation and pleasure. Such a use had generally been discouraged when efforts were still being made to preserve canals for commercial traffic, but the case was now altered. The new Board very quickly made a study of all their waterways and in 1965 produced a report ("The Facts about the Waterways") which offered guide lines for their future treatment, having regard to all kinds of possibilities from commercial exploitation to pleasure use, amenity development and even elimination. This paved the way for the Transport Act 1968 which divided the waterways into three distinct categories of Commercial, Cruising and Remainder, with material changes in the nature and extent of the Board's obligations for their own use and upkeep.

Marina at Braunston (PFP)

2.4.4 It is in this context that our present Study has been undertaken. The implications and consequences of such a remarkable amalgam of ancient history and contemporary needs are examined in the succeeding chapters but it seems desirable to emphasise one point as we close this chapter.

2.4.5 The waterways of the country have been the subject of official enquiry on several occasions, notably the Royal Commission of 1906-9, the British Transport Commissions's Rusholme Board of Survey (1955) and the Minister of Transport's Bowes Committee of Inquiry (1958). These were all primarily directed to studying the strength or weakness of the case for retaining the waterways in commercial use, and therefore took special notice of the serious nature of the dimensional limitations outlined above. Because these limitations do not apply to the larger gauge waterways (i.e. the river navigations and some canalised rivers) much the same standpoint can be taken in considering their commercial use today.

2.4.6 But for the narrow gauge canals the former disadvantages do not necessarily apply to cruising conditions.

Winter cruising on the Watford – Foxton Summit of the Grand Union Canal (PFP)

The vast majority of cruising craft do not exceed the beam of about 2.13m that the narrow locks can accommodate; although some cruisers are conversions of the traditional 22m long narrow boats, most are shortened versions. With very few exceptions, therefore, cruising craft are able to make use of all the Board's navigable waterways as they stand; one effect has been the quite significant amount of work undertaken by volunteer labour in restoring to a navigable condition lengths of canal that have for years fallen into desuetude.

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CHAPTER THREE

LEGAL OBLIGATIONS

Chapter 3:

Legal Obligations

3.1 *Introduction*

3.1.1 We are required to take into account the legal obligations of the British Waterways Board, both under statute and otherwise, so far as they have relevance to the operations and maintenance of the Waterways. Such obligations arise and are discussed under several headings as follows.

3.2 *Special Legislation:*

The situation is a complex one as, at the outset, a total of something like 600 Acts of Parliament cover the formation of the individual waterways, going back over a period of some 200 years.

3.2.1 Up to about the middle of the 18th century, acts of parliament were passed authorising various improvements on rivers, on which a public right of navigation had generally existed independently of any express statutory provision.

3.2.2 From about 1765 waterways projects were in the hands of joint stock companies and it was the practice for a new act to be obtained for the promotion of each waterway; these acts gave to the promoters powers to acquire lands, to construct works, to take water and generally to operate and maintain the undertaking as a navigable waterway for public use. The act usually provided for a public right of navigation on payment of tolls, which right continued through subsequent changes of canal ownership until modified by the Transport Act, 1968, as detailed below.

3.2.3 The nature of the powers to take water depended on the type of waterway concerned. In some cases particular sources were specified, but more usually the undertaking was empowered to abstract water found within a specified distance of the canal itself and to construct reservoirs. The abstractions were subject to payment being made to persons having a valuable interest in the water, such as mill owners, and there would be definite restrictions on the amount to be taken or the manner in which it was done. There were a number of special cases in which the construction of canals or reservoirs or the use of rivers was made subject to the supply of compensation water or other measures for the conservation of water supplies.

3.2.4 Provisions were also inserted in these enabling acts for the benefit or protection of landowners and other parties affected by the construction of the waterway. In this way rights of cattle watering, fishing, boating, etc., were reserved to them in many cases. More particularly the waterway undertaking would be required to provide and maintain accommodation bridges where lands in single ownership, or access to them, had been severed, and to fence off the towing path from adjoining lands. Where a canal interrupted land drainage, culverts had to be constructed and maintained to carry the drainage. The undertakers were also made responsible for constructing and maintaining highway bridges where highways were intersected by canals.

3.2.5 One effect of railway development was at first to stimulate improvement schemes on certain individual canals. Between 1825 and 1840 for example, the Trent and Mersey Canal undertook the construction of a second larger tunnel at Harecastle, the Birmingham Canal and the Oxford Canal both embarked on major schemes of straightening and improvements and the Birmingham and Liverpool Junction Canal was constructed as an alternative route between Wolverhampton and the Mersey Estuary. A little later there was a swing towards a general takeover of canals by railways and between 1845 and 1847 four fifths of all the canals that were eventually railway-controlled were so absorbed, including the Birmingham Canal Navigations and the Shropshire Union Canal.

3.2.6 In due course the enactment of the Regulation of Railways Act, 1873, was directed at restraining the debilitating influence of railways over canals; proposals for takeover were regarded as matters for public concern and it was provided that the railways should be obliged to maintain their canals in good and navigable condition. Where the management effectively passed into railway hands it can be understood that in practice neglect and indifference could readily detract from this intention.

3.2.7 Many railway-owned canals became very unprofitable to maintain in a navigable state, and the railway companies sought to relieve themselves of that obligation by promoting private Bills. For example, during the war of 1939-45 abandonment Acts covering some 325 km of waterway were passed, including much of the Shropshire Union system, although abandonment had not in all cases taken place by 1948. Some closed canals were not abandoned completely, being retained in order to supply water to other canals, or sell it to industry, or to preserve the rights of riparian landowners.

3.2.8 The waterways transferred to the British Transport Commission on the 1st January, 1948, included 17 independent undertakings with a total length of 1830 km, all the railway owned or controlled waterways with a total length of 1550 km and the government owned Caledonian and Crinan canals in Scotland totalling 110 km, a grand total of 3,490 km.

3.2.9 The legal position remained substantially unaltered until the dissolution of the British Transport Commission at the end of 1962 and the establishment of the British Waterways Board on the 1st January, 1963, on which date the Board took over the ownership and management of the Commission's waterways. The Board inherited some 480 km of closed waterways, the closure Acts dating from 1921 to 1962. Two further closures were made in 1965, affecting another 65 km. In addition; some 240 km, which had not been statutorily closed, had lapsed into dereliction and become unnavigable.

3.2.10 The duties of the British Waterways Board were set out in Section 10 of the Transport Act, 1962, and their financial obligations in Section 18. There was, nevertheless, provision in Section 23 for grants to be made from Treasury Funds to meet any deficit on revenue account for the first 5 years and during that period certain reliefs were given. However, no provision was made for capital reconstruction, the net commencing capital debt being £16.3 million which involved an annual payment by the Board of £726,000 by way of interest.

3.2.11 During the 5 years from the 1st January, 1963, the Board's obligation to maintain a waterway was suspended if it had not been navigable at any time in the period of six months

prior to the 2nd November, 1961. This period was extended for a further year by the Transport Finance Act 1966. After the end of 1968 however, all waterways not officially closed were to be kept fully navigable. The Transport Act 1962 obliged the Board to review unprofitable canals. By this time, the traditional commercial traffic had ceased over most of the "narrow" and "broad" canals and was declining rapidly over the rest. There was, however, a growing interest in the use of canals for pleasure boats.

3.2.12 By sections 104-115 of the Transport Act 1968 radical changes in the duties and obligations of the Board were made. These changes reflected the very substantial alteration in use of the waterway system which had taken place in the 21 years since nationalisation and, in particular, recognised the importance of cruising, pleasure and amenity use of the waterways in contrast with the former preoccupation with primarily commercial activities.

3.2.13 The salient changes brought about by the Transport Act 1968,were:–

(a) the division of all the waterways into three categories, Commercial, Cruising and the remainder.

(b) an obligation to preserve and maintain for navigational use the waterways in the Commercial and Cruising categories substantially in accordance with conditions obtaining during 1967.

(c) the abolition of other public and private rights of navigation over the Board's waterways deriving from any local enactments, of the maintenance obligations under Section 17 of the Regulation of Railways Act, 1873, and of similar maintenance obligations in local enactments.

(d) a new obligation imposed on the Board to deal with all waterways not in the category either of Commercial or Cruising waterways, i.e. the remainder (termed for the sake of convenience the "Remainder waterways") in the most economical manner e.g. either retention, elimination or disposal, as most appropriate.

(e) local and certain other statutory and charitable authorities were given powers to enter into agreements with the Board for maintaining or taking over any Remainder waterways or parts thereof and to assume full responsibility or (in the case of local authorities) for making financial contributions towards the cost of maintenance in inland waterways.

(f) the Board were made responsible by Section 117 of the Act for maintaining public road bridges vested in them to a standard enabling them to carry a weight of traffic which ordinarily uses, or may reasonably be expected to use, the highway or such other standard as the Secretary of State may by order prescribe. (This obligation is being dealt with by special procedure under operation "Bridgeguard" as described in Chapter 10.)

3.2.14 One other Act that should be mentioned here is the British Waterways Act 1971, (amended by the British Waterways Act 1974) under which registration of pleasure boats using the Board's river waterways, and of houseboats on rivers and canals, became compulsory. The Board then decided that all commercial carrying craft using the Cruising waterways should be subject to licensing, the traditional practice of charging tolls thereupon ceasing, so bringing them into line with pleasure craft on these waterways.

3.3 *General Legislation*

3.3.1 The undertaking of the BWB is of course subject to all relevant general legislation, the full consequences of which cannot be discussed here in detail. As an example, operations at the Repair Yards and Maintenance Workshops must comply with the provisions of the Factories Acts and Regulations made thereunder. There are, however, certain areas of legislation that require particular mention.

3.3.2 The waterways of the BWB fall within the ambit of the Rivers (Prevention of Pollution) Acts 1951-61 and the Control of Pollution Act 1974 (when its provisions are in force) and the Board (while not the pollution authority) are responsible for complying with their provisions in respect of pollution and its prevention on all rivers, canals, reservoirs and feeders under their jurisdiction. The various Regional Water Authorities have the duty of ensuring compliance with the Acts.

3.3.3 Under Section 22 of the Highways Act 1971 highway authorities have power to discharge surface water from roads through drains into any inland waters whether natural, artificial or tidal. Subsection (12) provides, however, that they may not use or interfere with any watercourse or works vested in or under the control of a navigation authority without the consent of that authority, which consent must not be unreasonably withheld. It is therefore open to the Board to require reasonable arrangements to be made for coping with such water when it reaches the system, and to receive proper compensation. The "highway authorities" include the Secretary of State for the Environment, who is responsible for drainage of trunk roads and motorways which are vested in him.

3.3.4 A large number of instances now exist in which the Board have had to assume responsibility for disposing of drainage of this kind. Drainage accepted into a Commercial or Cruising waterway is subject to conditions of consent in which the future is safeguarded; on a Remainder waterway, the existence of these drainage commitments could and does present a serious embarrassment in the event of its being desired to dispose of or eliminate the waterway.

3.3.5 Section 333 of the Public Health Act 1936 gives the Board protective provisions, similar to the foregoing, in respect of the powers of drainage authorities to lay sewers under Section 15 of that Act.

3.3.6 A number of consequences arise from the Town and Country Planning Act 1971 (and the corresponding Act for Scotland). "Deemed permission" for development of operational land for the purposes of the Board's undertaking is granted by virtue of the General Development Order 1973. (This does not include property development, with which this Report is not concerned). Apart from the need to obtain planning permission for such development, the Planning Acts apply to the Board. Article 3 and Class XVIII B.2 of Schedule 1 to the General Development Order 1973 permit development by way of improvement, maintenance and repair of a Remainder waterway and works used in connection therewith.

3.3.7 The effects of legislation dealing with Ancient Monuments, Listed Buildings and Conservation Areas, including the

Town and Country Amenities Act, 1974, are discussed in Chapter 6.

3.3.8 Subsidence of the ground as a result of coal mining and brine pumping operations is liable to have serious consequences for the safety of legislation for many years and currently the position is covered by the Coal Mining (Subsidence) Act, 1957, and the Brine Pumping Acts, 1891 and 1952. The whole matter is discussed more particularly in Chapter 7.

3.3.9 In recent times the waterways have been affected by a number of acts of parliament covering various aspects of nature conservation. Insofar as they have an effect on the operation and maintenance of Commercial and Cruising waterways, and on the various possibilities of dealing with Remainder waterways, they are referred to in Chapters 6 and 15.

3.3.10 Since 1945 successive enactments dealing with water and water resources in the national interest have had a very material effect in modifying the Board's rights to take and use water. Their consequences, particularly those of the Water Resources Act, 1963, and the Water Act, 1973, are discussed in Chapter 9.

3.3.11 Reference will also be found in Chapter 9 to the Reservoirs (Safety Provisions) Act, 1930, and the Reservoirs Act, 1975.

3.4 *Common Law*

3.4.1 In a Study of this kind, having limited objectives, it is impossible to deal in detail with, or even consider, the full impact that common law may have. In some respects the position will differ in Scotland from what it is in England and Wales.

3.4.2 It is evident that the Board have various obligations towards their neighbours in respect of such matters as trespass and injurious affection, as well as towards the public in matters of safety. In general such obligations will subsist irrespective of whether the waterway is in the Commercial, Cruising or Remainder category.

3.4.3 With regard to safety, however, there is one aspect of common law that is of particular importance in relation to artificial waterways. The fact that an undertaker has impounded and has control of large quantities of water, sometimes above the level of adjoining land, imposes a duty on him to keep that water within bounds and to exercise reasonable precautions to do so. If, by reason of a serious leak or breach, the water should escape and cause flooding or damage to property the Board might be liable for the consequences. The rate at which the water would escape is apt to increase very rapidly if the resulting scour should progressively weaken the banks and cause them to disintegrate – a major outrush of water could well endanger lives or otherwise prove disastrous. The Board have been able to establish, however, that their liability, in the view of the Courts, rests on negligence. They must exercise such care as is reasonably foreseeable in the circumstances.

3.5 *Contract*

3.5.1 The Board and their predecessors have over the years entered into innumerable contracts for various purposes. Some of those most relevant to this study are for the sale of water to industry and for the construction of works affecting the waterways for the benefit of other parties.

3.5.2 In general all such contracts contain clauses which fully preserve the Board's interests and indemnify them against any consequential expense. Many of them are for a limited term or provide for review at reasonable intervals. We are aware that there are exceptions in the case of certain older agreements inherited by the Board but it would appear that the Board take all possible steps to renegotiate on more realistic and favourable terms whenever opportunity permits.

3.5.3 Where water is abstracted, or its use is made available, for industrial purposes it is the general rule that the supply is given subject to availability. The effects of such obligations are referred to in more detail in Chapters 5 and 9, but it may be noted here that the greater part of the water so taken is in fact returned to the system.

3.5.4 In certain cases agreements for works may be of indefinite duration; for example, with regard to the construction of bridges. Where a highway authority constructs a new bridge over a waterway it will act under statutory powers and a specific agreement may not be necessary. On the other hand a private developer may build a bridge by agreement; the Board would then impose conditions safeguarding their interests.

3.6 *The Present Position*

3.6.1 The foregoing review of the Board's legal obligations will suffice to indicate the very wide field involved and the complexity of the questions that may and do arise from time to time. For present purposes we do not consider it necessary to go further into these questions but there are one or two observations on the present situation, as we see it, that we feel it desirable to make.

3.6.2 The original parliamentary powers for waterways appear to have been enabling and permissive, and so not to impose on an undertaker any lasting obligation to keep a waterway open, whether for navigation or for any other purpose. Statutory public and private rights of navigation were terminated by the Transport Act, 1968, and so far as we can as ascertain no other navigation rights (except for those of custom and usage on natural river navigations) now remain but those conferred by that Act.

3.6.3 On the other hand the Board has certainly acquired or assumed obligations in the course of years from which it would now be extremely difficult, if not impracticable, to get free. Before deciding – in the case of a Remainder waterway, for example – that it could be closed or eliminated, consideration needs to be given in each case to the nature and extent of the obligations involved. These questions are reviewed in Chapter 15.

3.6.4 Facilities, such as accommodation bridges (tunnels in a few cases) provided to maintain access to or between severed lands originally in single ownership, may no longer be needed if there is a change of ownership on one side. In that case the bridge may be removed (or transferred) if the maintenance burden could be relieved thereby. Further reference to this is made in Chapter 10.

3.6.5 There are cases, however, where rights of way as a footpath or bridleway have been acquired by the public over what were originally private accommodation bridges – such

bridges would then need to be retained indefinitely. Other public rights of way on foot have been established along certain stretches of towing path – such uses are governed by general legislation and a local authority may enter into an agreement with the Board for improving and thereafter maintaining the towing path to a particular standard. Such towing paths are identified on definitive maps prepared by the local authorities, and further lengths could possibly be added.

3.6.6 In the particular case of compensation water, conditions may have changed radically since the original obligations were imposed. Where this is so it is open to the Board to negotiate modifications of the arrangements with the appropriate authority, normally now the Regional Water Authority, with a view to making better use of resources. We note in Chapter 9 (paragraph 9.4.5) that this is in fact being done, as opportunity arises, with mutual benefit to the Board and the Authorities.

3.6.7 There is one further point to which attention may be drawn at this point, which concerns the obligations of the BWB to maintain towing paths. Although the matter is not specifically covered by statute the Board have formed a view of the implications of the Transport Act 1968 in this respect that we find difficult to reconcile with engineering considerations. Whatever the purely legal position may be we have felt it necessary to define their obligations from a different point of view; the question is accordingly dealt with fully in section 5 of Chapter 10.