

Commercial and Cruising waterways in the same proportions as in Appendix 10B to the Board's outline corporate plan as though the same pattern applied for the work on the Remainder. It will be noted also that no special allowance for 'high priority' arrears was made in the BWB programme.

12.6.5 The operating and continuing maintenance costs in Appendix 10B to the Board's outline corporate plan were not assessed on the same criteria as our own. The main differences are as follows:--

- (i) the corporate plan includes for operation and maintenance of Remainder waterways,
- (ii) allowance is made for increase in cruising amenity uses, which we consider separately in Chapter 13,
- (iii) the corporate plan includes for costs associated with the Sheffield and South Yorkshire Navigation Scheme and also the cost of operation Bridgeguard from 1974 onwards,
- (iv) capital investment in new plant is charged direct to revenue, whereas we have allowed for it to be depreciated year by year,
- (v) in Appendix 10B 'administration etc.' includes expenditure on Remainder waterways and central and interest charges, none of which are covered in this chapter: in 1974 only 76% of this total related to operation and maintenance of Commercial and Cruising waterways. We have estimated future overhead costs on the basis that three quarters of the totals under this heading will be attributable to operation and continuing maintenance.

In view of this we have inserted our own assessments of these costs in place of the figures in the corporate plan so that programme (B) will be more comparable with the other three. As in the case of programme (A) we have not increased these estimated future operating and continuing maintenance costs in the early years (see paragraph 12.6.3).

12.6.6 We are asked, in *programme (C)*, to consider the effect of delaying all works associated with arrears of maintenance for several years, with the exception of those related to public safety. We have given this careful consideration and concluded that, in addition to the immediate works costing a total of £3,000,000 mentioned in paragraph 12.4.45 and 47 there is a further proportion which cannot be put off for 5 years, i.e. items which are otherwise likely to become safety hazards within that time, and whose treatment would be significantly more expensive as a result of such a delay. The costs of these items are estimated as follows:--

Bank Protection	£2,325,000
Structures etc.	£2,270,000
Total	£4,595,000

These are net figures, allowance having been made for the possibility of devoting the funds allocated to continuing annual maintenance to critical arrears situations under each heading during these early years (with a corresponding corrective adjustment later in the programme).

12.6.7 The remaining arrears of maintenance identified in Table 12.1 could be left for five, and in some cases ten, years.

There would however be cost penalties associated with this course of action, and we have considered these under two headings, (i) changes in the character of the particular jobs and (ii) the different annual maintenance requirements before and after treatment.

12.6.8 The main consideration under (i) is that if repairs to local damage in a length of bank protection are not carried out in good time the continuing action of the water will enlarge the damage area until replacement with new piling becomes necessary. We estimate that the majority of the protection which could now be repaired satisfactorily (this is some 40% by length of the total requiring treatment) will need to be renewed if no action is taken for, say, ten years. Similarly for brickwork and masonry associated with structures such as lock chambers, bridges, tunnels, aqueducts etc. — if pointing is not attended to then bricks and stone will come loose and a part of the structure will have to be cut back and rebuilt to restore its integrity. Our calculations show that the increase in the cost of overtaking the present arrears over the Table 12.1 total if this work is delayed as in programme (C) will be some £9,400,000.

12.6.9 As far as (ii) is concerned, the costs of annual operating and maintenance requirements before the main part of the work of overtaking arrears is implemented under programme (C) will be higher than those of Table 12.2. For dredging this will not be significant as we have already suggested that the annual costs of dredging will be similar in real terms before and after the required profiles are established. Critical bank protection works cannot be delayed, and the continuing requirements of programmed maintenance must be satisfied each year if further arrears are not to accrue; other bank protection could be put off, but the extra time and money expended on the necessary regular repairs of minor collapses, leaks and subsidence due to faulty protection which will continue in the meantime will be considerable. A broad estimate indicates that the extra cost on this account would be of the order of £150,000 per annum. Postponing the treatment of the arrears will also have a similar effect on nearly all the other elements of the waterways — the cost of annual maintenance will be marginally higher because of the need to carry out repetitive minor repairs where the eventual treatment will provide a lasting solution. Furthermore the annual cost of major maintenance works and of repairing breaches and emergencies is expected to be greater until the arrears are overtaken, and this difference is estimated in Section 12.5 as £163,000. Taking account of all these considerations we estimate that the cost penalty during the early years of programme C under this heading will be of the order of £400,000 per annum.

12.6.10 The effects of the foregoing considerations are shown graphically for alternatives (A), (B) and (C) in Figs. 12.3, 12.4 and 12.5 respectively, and a corresponding illustration, Fig. 12.6, shows alternative (D) which, as discussed in Section 12.7, is the programme which in our opinion gives the best value for expenditure. Differentiation is made between the work of overtaking arrears of maintenance and expenditure on operation and continuing maintenance, and programmes (A), (C) and (D) show early completion of the works affecting public safety as mentioned in paragraphs 12.4.45 and 47 and 12.6.6. A number of considerations affecting the patterns of expenditure are common to all four cases: these are given mention in the remaining paragraphs of this section.

12.6.11 It is now five years since the last BWB assessment of arrears of maintenance throughout the system was carried out,

and that fact alone would necessitate a fresh investigation as the basis for detailed appreciation and distribution of the programme of works. The new investigation would also have to take into account the considerations discussed in Section 10.9. It will not be essential to plan the whole programme in detail before the work is commenced – for one thing the high priority items of paragraph 12.4.45 and 47 must be put in hand at the earliest opportunity, and the Board's staff are already aware of the work involved. There are, however, practical limitations to the rate at which the programme of expenditure can be built up; for example extra staff will be required to administer the works, and as the levels of expenditure on operation and continuing maintenance will be increasing simultaneously the majority of these extra staff will need to be recruited from outside and trained. It is of prime importance that the people employed in key positions in the organisation set up to administer this programme of works shall be professionally qualified and of suitable character and experience. The Board will have to consider carefully what inducements will need to be offered to persuade the right people to come forward.

12.6.12 Another question of policy, and one which will have a varying degree of application depending on the programme adopted, concerns the proportion and types of work which will appropriately be let to outside contract. This subject has been discussed in general terms for continuing maintenance work in Chapter 11, and the same arguments apply to part of the programmes due to arrears – with the following points particularly relevant:—

- (i) arrears works, although mostly similar in character to regular cyclic maintenance jobs, will only occur once so that a balance must be found between costs of specifying, letting and supervising outside contracts or increasing the direct labour infrastructure. The Board should also consider the advantages of placing the organisation and management of certain types of work in the hands of suitably experienced consultants.
- (ii) the programme is of limited time-scale, and if many extra staff are recruited to carry it out they will for the most part have to be absorbed into the Board's main organisation or run down by natural wastage at a rate depending on the alternative chosen.
- (iii) all other things being equal, however, it is in the long term interest of the Board to benefit from the experience to be gained in carrying out the work by using their own employees.

12.6.13 In all of the alternatives we have shown the expenditure tailed off into the continuing levels of Table 12.2; it will be best if this can be a gradual process in phase with natural wastage throughout the Board's organisation. For the work content, the majority of the outstanding instances of arrears will have been dealt with in the main part of the programme so that works carried out towards the end will be less distinguishable from normal continuing maintenance jobs and the two activities will naturally become parallel and merge.

12.7 Discussion and Conclusions

12.7.1 The general form and time scales of the first three programmes designed to overtake the arrears of maintenance dictate to some extent the way in which the work would be

planned and carried out. Some work would be let to outside contractors in each case for example, and it is inevitable that this must be a high proportion of programme (A). Programme (B) was designed to be carried out largely by direct labour, while (C) must include significant activity by contractors in the early part of the main arrears programme with some continuity through almost to the end.

12.7.2 In developing programme (D), which in our opinion will give the best value for expenditure in overtaking arrears and operating and maintaining the Board's Commercial and Cruising waterways, we have tried to recognise the following considerations in the most advantageous overall manner:—

- (i) the portion of the arrears identified as high priority items from public safety aspects should be undertaken immediately and completed within 18 months. Most of this is new bank protection and urgent repairs to structures and both of these are kinds of work which can be let to outside contractors.
- (ii) an exact assessment of the other constituent parts of the programme throughout the system would be made during the same period, and recruitment and training of staff planned and implemented in phase with the detailed programme of works.
- (iii) at the same time sufficient work would be carried out to ensure that further situations critical to public safety, water supply or operational considerations do not develop.
- (iv) the abnormal works, and those jobs not necessarily requiring considerable waterway expertise, would be let to outside firms as soon as the contracts can be properly designed, specified and supervised. We have shown this category virtually completed during the third year.
- (v) by thorough assessment and proper phasing of works it would be possible to avoid the cost penalties discussed in Section 6 of this Chapter, both the increases in annual costs and those due to a change in the character of the deterioration.
- (vi) by the fourth year the direct labour force needed to tackle the remaining arrears will have been assembled and trained and a steady rate of working (as indicated in Fig. 12.6) built up.
- (vii) the majority of the arrears programme would appropriately be undertaken by the Board's own labour for reasons given in Chapter 11 and Section 12.6 above, and we have shown this effort at a constant level, consistent with the relative urgency of the works and an economical level of staff, from the fifth to the tenth year.
- (viii) the phasing of the last part of the work of eliminating arrears from the tenth year onwards, will be governed by the rate at which natural wastage and absorption of staff into the Board's continuing staff complement takes place. We calculate that this run-down of the organisation and manpower set up for the arrears programme would be complete before the end of the 15-year period.

12.7.3 We have been asked to facilitate comparisons of the

four programmes by calculating for each of them a 'Net Present Cost' (NPC) by discounted cash flow analysis at a 10% discounting rate. This has been done and the results of these calculations are given in the second part of Table 12.13. Although at first glance programme (D) does not appear to give the best value for expenditure, the costs of overtaking arrears of maintenance in programmes (B) and (D) are not directly comparable; furthermore even a low level of inflation has a marked effect on the discounting calculations.

12.7.4 The arrears of maintenance identified by the BWB in 1970, and hence the costs of overtaking them, are less than we have found in our inspections in 1974/5. A number of differences in approach to the two surveys have been brought out in Section 10.9, and in addition there is one further point to be noted: in Section 6 of this chapter we discussed the consequences of delaying the work of overtaking arrears for a number of years and concluded that, if a large part of the work is put off until the latter half of the programme, the total cost will increase appreciably. In compiling their draft outline corporate plan from the 1970 Survey the Board did not find this a significant consideration and no such allowance was made, even though the Appendix 10B programme shows half of the work being carried out after the eighth year. It is clear that many items containing elements of arrears of maintenance have deteriorated considerably in the five years since the BWB Survey and a 15-year programme can no longer be framed without taking this into account. Programme (B) is therefore not comparable with the other three as it stands — the total cost of overtaking arrears should be increased. We suggest that this addition would be somewhat less than we have calculated for programme (C), but would nevertheless increase the NPC figure by several million pounds.

12.7.5 Discounted cash flow analysis would normally indicate an advantage in postponing works for a number of years. In the case of programme (C), however, the considerations of paragraph 12.6.6 reduce the amount of work which can be put off, and when the increases in the cost of the arrears works and of continuing maintenance costs discussed in paragraphs 12.6.8 and 12.6.9 are also taken into account this expected advantage is eroded to such an extent that the total NPC for this programme is calculated to be higher than that for (D). Any inflation will have a further effect on this comparison, making programme (C) still more expensive than (D) in present day terms, as shown below.

12.7.6 We are directed in the Terms of Reference to give all estimates of cost at March 1974 prices, and have done so throughout the report. In considering alternative programmes of works over a time-span of 15 years, however, we cannot reasonably compare discounted total costs without at least indicating the effect that certain notional rates of inflation would have on the NPCs of Table 12.13. We have re-calculated the values for each programme assuming constant positive rates of inflation of 5%, 10% and 20% per annum, and the effect on the NPCs is as follows:—

Inflation rate p.a.:—	0	5%	10%	20%
NPC for programme (A): £M	96	127	172	336
NPC for programme (B) £M	82*	115*	164*	350*
NPC for programme (C) £M	90	126	180	387
NPC for programme (D) £M	87	121	169	351

*unadjusted, see paragraph 12.7.4.

From these figures it may be seen that as the rate of inflation rises programme (D) becomes increasingly more attractive from this point of view than either (B) or (C).

12.7.7 Programme (A) has the highest NPC of the four unless inflation runs at over 10%, but in any case its full value in comparison with the others can only be assessed by reference to the advantages and disadvantages to the Board of letting the majority of this arrears work to outside contractors. It is our opinion in all the circumstances that it is not in the Board's best interest to adopt this programme because the arguments for calling in contractors, discussed in Chapter 11, turn against that course of action when the works considered include more than those for which no particular waterway expertise is required.

12.7.8 Paragraph 14 of the Terms of Reference asks for identification of and our comments on any additional benefits that would result from carrying out each of the programmes, with particular reference to the making possible of (i) increased traffic, (ii) greater water sales, (iii) improved convenience to waterway users, (iv) improved amenity and (v) reduced claims for damage to third parties. Our assessments of arrears of maintenance and future costs of maintaining and operating the present system have not been concerned directly with any of these aspects, so that the benefits discussed below are incidental to the main purpose of this aspect of the study and the programmes. In view of our reservations as to the relevance of programme (B) to the present state of the waterways (paragraph 12.7.4 etc.), we shall confine our comments to the other three.

12.7.9 With regard to (i) there are two ways in which capacity of the system to absorb increased traffic will be improved after the arrears are overtaken; by more efficient use of the water supplies and with easier navigation after the waterways are dredged to full profile. Water losses will be reduced when the works on reservoirs, feeders, pumps, lock gates and sluices, etc. have been completed, and the bank protection work will also have a significant effect. In all cases the bank protection work is spread throughout the programme, though the other works mentioned will be substantially complete at earlier dates. The dredging required to provide full navigation is not critical for any other engineering reason (no danger to public safety or irreversible deterioration as in the case of structures will occur) so that from this point of view we do not expect that it will be completed until the latter half of the programmes. The advantages foreseen will therefore tend to appear gradually, but will not be marked until two thirds of the programmed total work has been completed. In this respect programme (A) shows the benefit earliest, and there is little to choose between the other two.

12.7.10 In considering (ii), one of the major factors affecting new contracts for water sales is the customer's confidence that supplies will be maintained in the long term. The implementation of a programme of works to bring the Commercial and Cruising waterways up to the standards required by the Transport Act 1968, and setting up a regime of programmed maintenance thereafter, is likely to have an appreciable effect on the state of customer confidence and hence on water sales. Any increase in the system's ability to service water sales agreements will stem from increased efficiency of water management; the aspects of the arrears works which will affect this have been mentioned with reference to increased traffic above. Sale-and-return agreements will not benefit physically, except in cases where circulation demands a fully dredged channel, but are subject to the same psychological considerations. Any benefit can be expected to be realised when the works are seen to be under way — later from programme (C) than the others.

12.7.11 For (iii), the waterway users will benefit substantially in the long run. Commercial and Cruising craft alike will be able to pass each other freely, negotiate locks and generally use the whole system in the knowledge that it is operationally in good condition for navigation throughout. It is mainly the work on structures, particularly locks, and dredging which are directly linked to the improvement and, as we have seen, it is not in the Board's best interest for long-term economy and quality of workmanship to let many of these items to outside contractors. It seems therefore that improved convenience to waterway users will not be noticeable early in the programmes, and will appear earliest under programme (A), latest under (C).

12.7.12 Considering (iv), for amenity uses of the waterways the main detail of interest is ease of access throughout the system, and this will improve when the presently unsatisfactory towpaths are backfilled and levelled. In the more general sense the aesthetic appeal of the waterways as an operational system improves with its overall condition, structures such as bridges forming focal points while agricultural and 'good-housekeeping' aspects provide the background. Many tow-path lengths will not be reinstated until bank protection on that side of the canal is carried out, so that from both these points of view the benefits will not appear in substance until the programme is nearing an end, and here again programme (A) will show them soonest.

12.7.13 Lastly, for (v), it will never be possible to eliminate claims for damage to third parties, for the same reasons that breaches and emergencies cannot all be avoided. Under the present system, which is so close to 'breakdown maintenance', many repair works cannot be put in hand until public safety or the integrity of the waterway is threatened. After the arrears are overtaken, however, the more rational 'programmed maintenance' approach will ensure that all the Board's obligations are met as far as can be reasonably foreseen, and it must follow that claims for damage to third parties will then reduce to a practical minimum. A further hidden benefit will be that the Board's employees will not have to spend so much of their time placating members of the public whose land is being eroded, and so on. Programme (C) is the least satisfactory in this respect and, though this is in general a lesser consideration than those set out in paragraph 12.7.2, it may help to decide certain priorities. This question of claims has also been mentioned in Section 12.5.

12.7.14 In view of the importance of the considerations supporting programme (D) set out in paragraph 12.7.2, and bearing in mind that programme (B) is not directly comparable and that programmes (A) and (C) have the disadvantages discussed in paragraphs 12.7.5 to 12.7.7, we are confident that a programme in the form of (D) represents the best value for expenditure over the 15-year period.

Table 12.1

Arrears of Maintenance as at December 1974

Estimated Costs of bringing the Board's Commercial and Cruising waterways up to a condition compatible with continuing programmed maintenance thereafter (at March 1974 prices).

Area Totals	Bank Protection £000	Dredging £000	Structures (see also Table 12.3) £000	Other Items (see also Table 12.4)) £000	TOTALS £000
Scotland	430	40	475	515	1,460
Wigan	2,160	635	1,160	460	4,415
Castleford	3,700	455	440	775	5,370
Northwich	6,180	620	1,555	925	9,280
Nottingham	1,655	310	295	375	2,635
Birmingham	5,890	635	1,395	995	8,915
Gloucester	425	330	470	345	1,570
London	1,965	495	975	530	3,965
Commercial Waterways Totals	4,370	1,175	1,155	1,675	8,375
Cruising Waterways Totals	18,035	2,345	5,610	3,245	29,235
Combined Totals	22,405	3,520	6,765	4,920	37,610

Table 12.2

Estimated Annual Maintenance and Operating Costs after Overtaking Arrears (at March 1974 prices)

Area Totals	Bank Protection £000	Dredging £000	Structures (see also Table 12.3) £000	Other Items (see also Table 12.4) £000	Operating Costs £000	Special Items (see also Table 12.5)* £000	TOTALS £000
Scotland	15	25	20	20	60	205	345
Wigan	85	60	115	80	25	535	900
Castleford	145	100	90	210	225	385	1,155
Northwich	245	240	195	120	80	840	1,720
Nottingham	65	170	70	75	60	540	980
Birmingham	235	95	260	260	80	845	1,775
Gloucester	15	95	30	110	85	240	575
London	80	70	195	185	150	660	1,340
Commercial Waterways Totals	175	470	165	440	460	990	2,700
Cruising Waterways Totals	710	385	810	620	305	3,260	6,090
Combined Totals	885	855	975	1,060	765	4,250	8,790

*distributed in proportion to lengths of waterway

Table 12.3

Maintenance of Structures (from Tables 12.1 and 12.2)

Breakdown into Categories

Description	Cost of Overtaking Arrears £000	Future Annual Maintenance £000
Lock chambers and approaches	975	225
Lock gates	1,320	375
Lock paddles, sluices etc.	275	85
Stop planks, grooves, flood gates	220	25
Canal sluices, weirs	135	20
River weirs, dams sluices	45	25
Culverts	680	100
Public road bridges	105+	(750)*
Accommodation bridges	2,595	(500)*
Aqueducts	225	40
Tunnels	190	80
Totals:—	6,765	975

* included in Table 12.5 budget estimates

+ excluding operation Bridgeguard

Table 12.4

Maintenance of Other Items (from Tables 12.1 & 12.2)

Breakdown into Categories

Description	Cost of Overtaking Arrears £000	Future Annual Maintenance £000
Reservoirs and feeders	95*	65*
Ditches and other feeders	40	75
Hedges, fences boundary walls	590	170
Towing path repairs	380	105
Clearance of vegetation	365	65
Access roads	170	15
Other maintenance headings	85	230
Operational property and equipment	1,195	335
Sub-totals	2,920	1,060
Area and Section office administration	2,000	+
TOTAL	4,920	1,060

* excluding inspecting engineers' requirements under Reservoirs Acts
+ see Table 12.5

Table 12.5

Annual Budget Allowances for Administration Costs, Special Items and Funds

Description	Annual Budget £000
Administration and other Overheads	
Departmental costs +	1,050
Area and Section costs	700
Special Items	
Specialist services and major works	600
Breaches and emergencies	100
Funds and Special Provisions	
Reservoirs	200
Mining subsidence	350
Public road bridges	750*
Accommodation bridges	500*
TOTAL (carried to Table 12.2)	4,250

+ see paragraph 12.6.5.

* see also Table 12.3.

Table 12.6

Cruising Waterways – Arrears of Bank Protection by Areas

Area	Net Bank Length km	Repair Works				Now or Replacement Works				Totals All Works £000
		Length km	Proportion %	Average Cost £/m	Total Cost £000	Length km	Proportion %	Average Cost £/m	Total Cost £000	
Wigan	538	51.6	9.6	4.27	220	114.9	21.3	16.89	1,941	2,161
Castleford	47	12.7	27.0	2.45	32	30.7	64.9	38.44	1,178	1,210
Northwich	790	162.6	20.6	2.94	479	240.3	30.4	21.08	5,066	5,545
Nottingham	268	51.1	19.0	3.15	161	58.1	21.7	22.32	1,296	1,457
Birmingham	838	177.1	21.1	3.62	642	201.0	24.0	26.12	5,250	5,892
Gloucester	70	3.4	4.8	5.01	17	4.7	6.7	23.57	110	127
London	520	32.2	6.2	4.35	140	82.0	15.8	18.32	1,502	1,642
Total	3,071	490.7	16.0	3.44	1,691	731.7	23.8	22.34	16,343	18,034

Table 12.7

BWB 1970 Survey Arrears of Maintenance on Commercial and Cruising Waterways, and Corresponding PFP Totals

	BWB 1970 Arrears		PFP 1974/5 Arrears at PFP March 1974 Costs £000
	BWB 1970 Costs £000	PFP March 1974 Costs £000	
Bank Protection	11,987	19,916	22,405
Dredging	2,204	3,917	3,520
Structures	3,543	5,834	6,765
Other Items	1,687	3,153	4,920
Totals:	19,421	32,820	37,610

Table 12.8

Extrapolated Survey Results for Individual Commercial Waterways

Note: This Table should be read only in conjunction with paragraphs 12.4.49 to 12.4.52.

Waterway Ref. No.	Waterway Name	Waterway Length km	Bank Protection £000	Dredging £000	Structures £000	Other £000	Total Costs £000
	Scotland						
47	Caledonian Canal	96.5	284	28	305	294	911
48	Crinan Canal	14.5	146	12	170	124	452
	Castleford Area						
34a	Sheffield & South Yorkshire Navigation	62.5	1,143	164	76	190	1,573
34b	New Junction Canal	9	43	16	19	24	102
35	Aire & Calder Navigation	85.5	1,068	181	115	227	1,591
36	Calder & Hebble Navigation	15	239	31	46	42	358
	Northwich Area						
22	Weaver Navigation	32	635	333	132	106	1,206
	Nottingham Area						
28	Trent Navigation	88	195	—	37	28	260
	Gloucester Area						
15	Gloucester & Sharpness Canal	27	238	187	70	45	540
16	River Severn Navigation	69	59	122	88	110	379
	London Area						
1a	River Lee Navigation	49.5	320	99	98	23	540
	Commercial Waterway Totals: *—	548.5	4,370	1,173	1,156	1,213	7,912

*Excluding Administration Costs

Table 12.9

Extrapolated Survey Results for Individual Cruising Waterways

Note:— This Table should be read only in conjunction with paragraphs 12.4.49 to 12.4.52.

Waterway Ref. No.	Waterway Name	Waterway Length km	Bank Protection £000	Dredging £000	Structures £000	Other * £000	Total Costs £000
Wigan Area							
45	Leeds & Liverpool Canal	215	1,293	483	961	153	2,890
40	Lancaster Canal	68.5	868	154	197	53	1,272
Castleford Area							
33	Ripon Canal & River Ure Navigation	15	50	9	31	43	133
36	Calder & Hebble Navigation	20	1,048	52	120	55	1,275
37	Huddersfield Broad Canal	6	112	5	33	17	167
Northwich Area							
8	Coventry Canal	7.5	107	5	10	8	130
18	Staffordshire & Worcestershire Canal	28.5	312	4	89	37	442
Shropshire Union Canal							
21a,b,c	Main Line and Middlewich Branch	124	1,981	64	348	128	2,521
21d	Llangollen Branch	75	995	108	193	74	1,370
23	Trent & Mersey Canal	122	1,558	75	533	121	2,287
40	Peak Forest Canal	10.5	22	6	67	13	108
41	Macclesfield Canal	44.5	570	25	186	44	825
Nottingham Area							
23	Trent & Mersey Canal	26.5	458	103	52	9	622
Grand Union Canal							
26	Erewash Canal	1.5	1	—	6	6	13
27h	River Soar Navigation	41.5	526	132	95	13	766
28	Trent Navigation	21.5	74	—	22	20	116
30	Fossdyke & Wicham Navigations	71	54	28	21	24	127
31	Chesterfield Canal	41	344	46	63	19	472
Birmingham Area							
Grand Union Canal							
27a	Leicester Section (N)	37	904	59	78	43	1,084
5	Leicester Section (S)	37.5	494	5	138	36	673
6	Main Line	63	1,273	144	248	144	1,809
7	Stratford-on-Avon Canal	20	329	27	55	22	433
8	Coventry Canal	53.5	272	67	77	55	471
9	Ashby Canal	34	480	42	69	39	630
10	Oxford Canal — North	38.5	715	63	97	38	913
17	Worcester & Birmingham Canal	48	148	39	178	60	425
18	Staffordshire & Worcestershire Canal	47	853	66	140	45	1,104
19	Stourbridge Canal	8.5	41	—	50	16	107
20a	BCN — Main Lines	37	173	49	151	45	418
20b	Birmingham & Fazeley Canal	24	209	72	113	54	448
Gloucester Area							
12	Kennet & Avon Canal	39.5	127	19	312	75	533
London Area							
16	River Stort Navigation	22	35	36	72	11	154
Grand Union Canal							
2	London Lengths	37	58	—	46	25	129
3	Main Line	159	723	273	409	102	1,507
4b	Aylesbury Arm	10	40	6	48	6	100
4c	Northampton Arm	8	88	—	42	4	134
11	Oxford Canal — South	80.5	699	80	258	51	1,088
Cruising Waterway Totals:*		1,743	18,034	2,346	5,608	1,708	27,690

*Excluding Administration Costs

Table 12.10

Costs of Major Maintenance Works 1971 – 1975

Subject \ Year	1971 £	1972 £	1973 £	1974 £	1975 (part) £
Anderton Lift	—	7,006	49,566	265,897	88,795+
Tunnels*	3,315	14,357	23,586	58,269	10,638+
Aqueducts	8,715	13,159	2,285	14,114	3,027+
Embankments	1,396	—	22,693	—	—
Trent Navigation	23,286	14,443	19,304	49,781	2,148+
River Weirs	32,060	16,914	—	4,000	—
Totals	68,772	65,879	117,061	392,061	104,608+
Totals indexed to March 1974 prices	96,000	89,000	140,000	370,000	83,000+

* Mainly the Harecastle Tunnel

+ Three months only.

Table 12.11

Cost Estimates for Outstanding Major Maintenance Works

Structure	Canal	Estimate £000	Estimate by (date)	Estimate (indexed to March 1974) £000
Stanley Ferry Aqueduct	Aire & Calder	480	Husband & Co and BWB (1974)	450
R. Don Aqueduct	New Junction Canal	20	Mott, Hay & Anderson (1974)	19
R. Went Aqueduct	" " "	30.6	" " " "	29
Chequer Lane Aqueduct	" " "	18.5	" " " "	18
Low Lane Aqueduct	" " "	61.4	" " " "	59
Pontcysyllte Aqueduct	Llangollen Branch	70	Husband & Co. (1975)	56
Harecastle Tunnel	Trent & Mersey Canal	80	BWB (1974)	76
Anderton Lift	" " "	20	BWB (1974)	19
County Lock Weir Reading	Kennet & Avon Canal	60	BWB (1975)	48
Brotherton Weir	Aire & Calder Navigation	200	BWB (1974)	190
Hazleford Lock	Trent Navigation	53	BWB (1974)	50
Beeston Weir	" "	310	BWB (1975)	250
Sawley Weir	" "	25	BWB (1975)	20
Stoke Lock	" "	250	BWB (1975)	200
TOTAL				£1,484,000

Table 12.12

Costs of Breaches and Other Emergencies 1971-75

Year	Waterway	Incident	Location	Cost of Repairs £	Claims paid £	Total Costs & Claims indexed to March 1974
1971	Chesterfield Canal	B	Osberton	2,087	52	
"	" "	B	Ranby	4,339	—	
"	Leeds & Liverpool Canal	NB	Hamblethorpe	5,180	—	
"	G.U.C. River Soar	B	Barrow	15,354	227	
"	Trent & Mersey Canal	E	Meadow Lane	50,000	—	
"	Gloucester & Sharpness Canal	E	Gloucester	22,351	—	
1971 Totals				99,311	279	£140,000
1972	Staffordshire & Worcestershire Canal	B	Wightwick	2,959	779	
1972 Totals				2,959	779	£ 5,000
1973	Peak Forest Canal	B	Disley	155,375	365,549*	
"	G.U.C. Leicester Section	B	S. Kilworth	5,014	—	
"	Llangollen Branch	E	Trevor	18,805	—	
1973 Totals				179,194	365,549	£640,000
1974	Leeds & Liverpool Canal	E	Parbold	5,495	—	
"	Grand Union Canal	B	Stoke Hammond	4,304	—	
"	Aire & Calder Navigation	B	Brotherton	4,000	—	
"	Lancaster Canal	E	Wyre Aqueduct	5,500	—	
"	Gloucester & Sharpness Canal	E	Saul Junction	6,023	—	
1974 Totals				25,322	—	£ 25,000
1975	Grand Union Canal	NB	Wolverton	46,000	—	
"	Llangollen Branch	B	Hampton	5,652	1,066	
1975 Totals+				51,652+	1,066+	£ 42,000+
				Total 1971 - 1975		£752,000

B = Breach

NB = Near Breach,

E = Emergency

* = Outstanding claims, not finalised

+ = Three months only.

Table 12.13

Alternative Programmes – Total and Discounted Costs

Programme	Arrears £M	Continuing Annual Expenditure £M	Total Expenditure 15 years £M	Net Present Cost (Discounted for Interest at 10% pa)		
				Arrears	Annual Expenditure £M	Total
				£M	£M	£M
A	40.6	8.8	171.7	30.5	65.3	95.8
B	32.8*	8.8	163.9*	16.4*	65.3	81.7*
C	47.0	9.2/8.8	180.1	22.3	67.4	89.7
D	37.6	8.8	168.7	22.0	65.3	87.3

* from BWB 1970 Survey – see also paragraph 12.7.4.

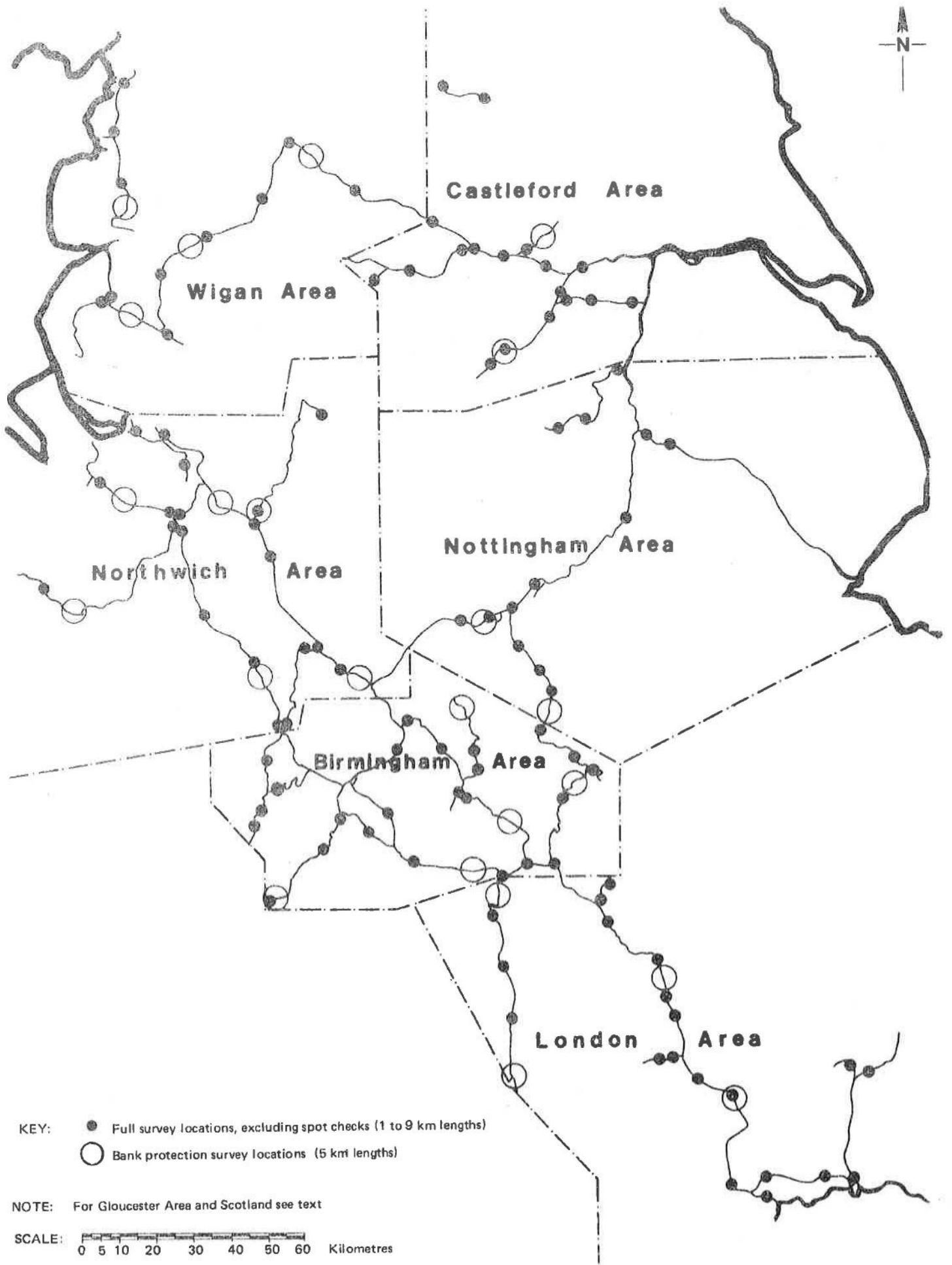


Fig. 12.1 MAIN SURVEY LOCATIONS ON COMMERCIAL AND CRUISING WATERWAYS

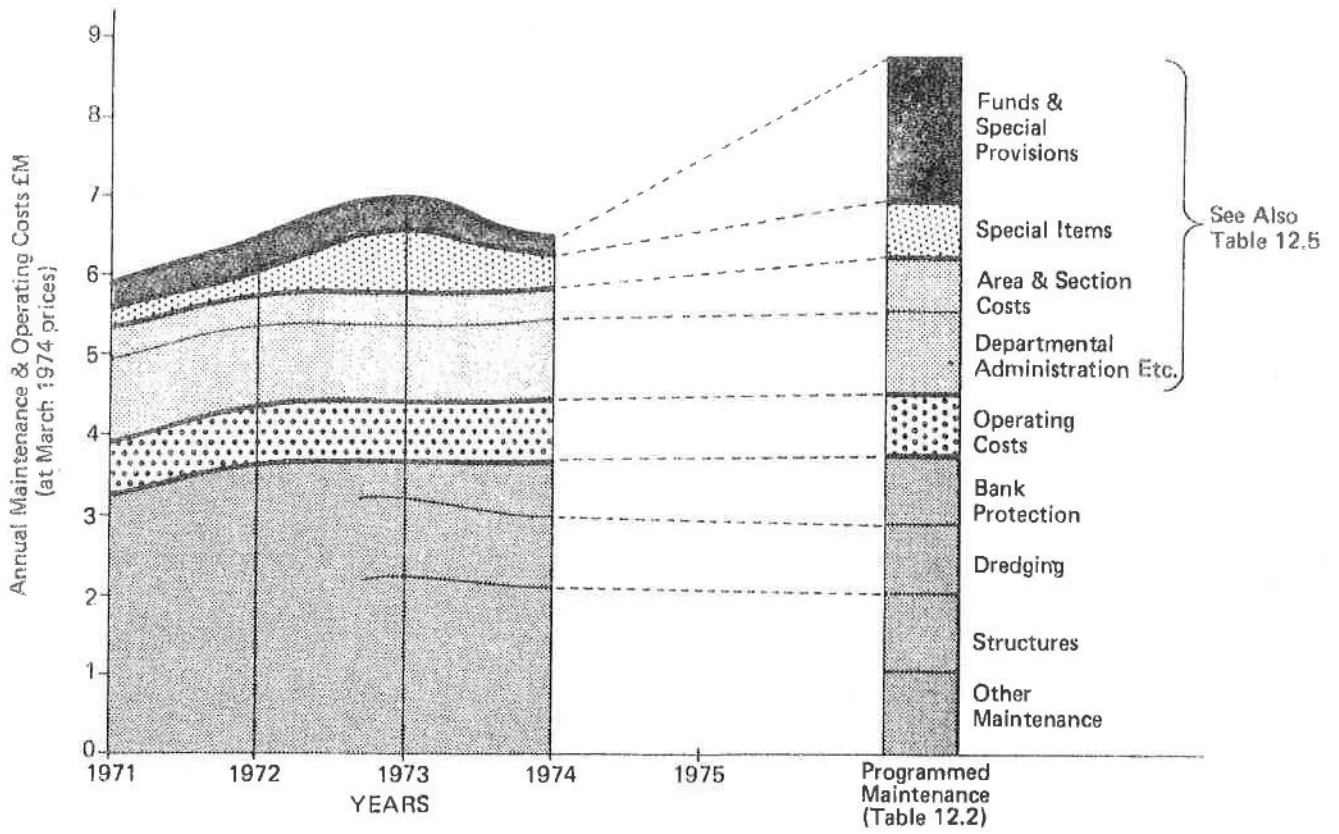


Fig. 12.2 FUTURE OPERATING & PROGRAMMED MAINTENANCE COSTS COMPARED WITH PAST EXPENDITURE.

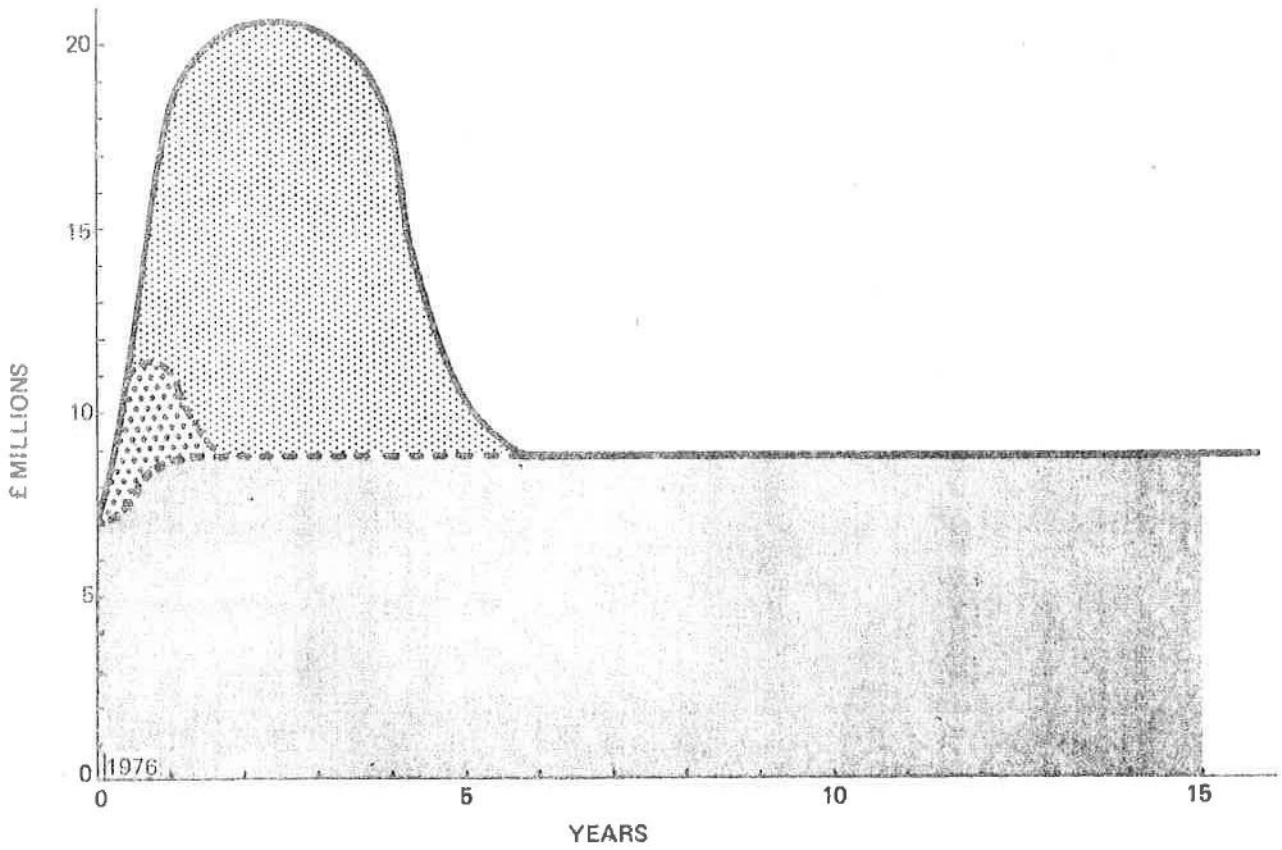


Fig. 12.3 PROGRAMME (A)

-  Arrears of Maintenance
-  High Priority Arrears
-  Operation & Continuing Maintenance

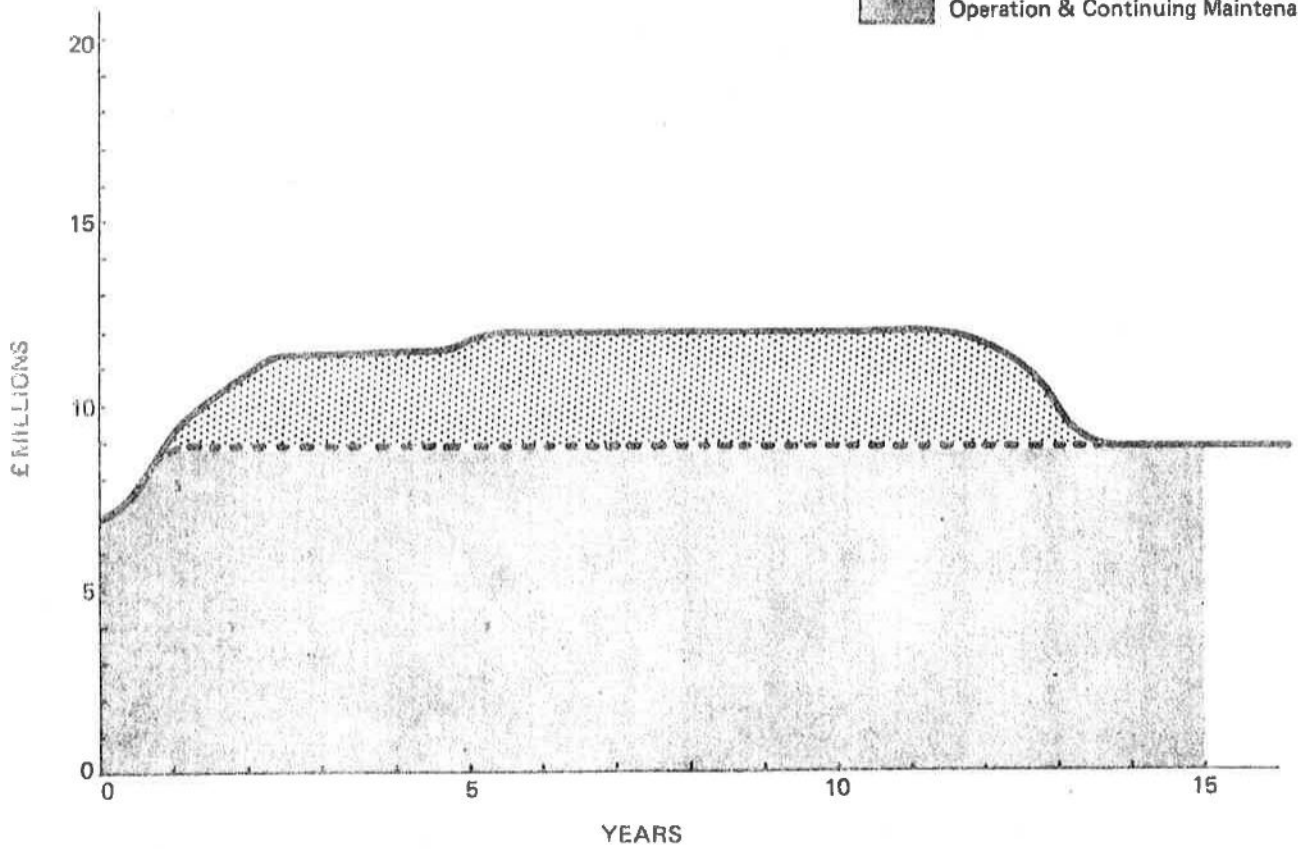


Fig. 12.4 PROGRAMME (B)

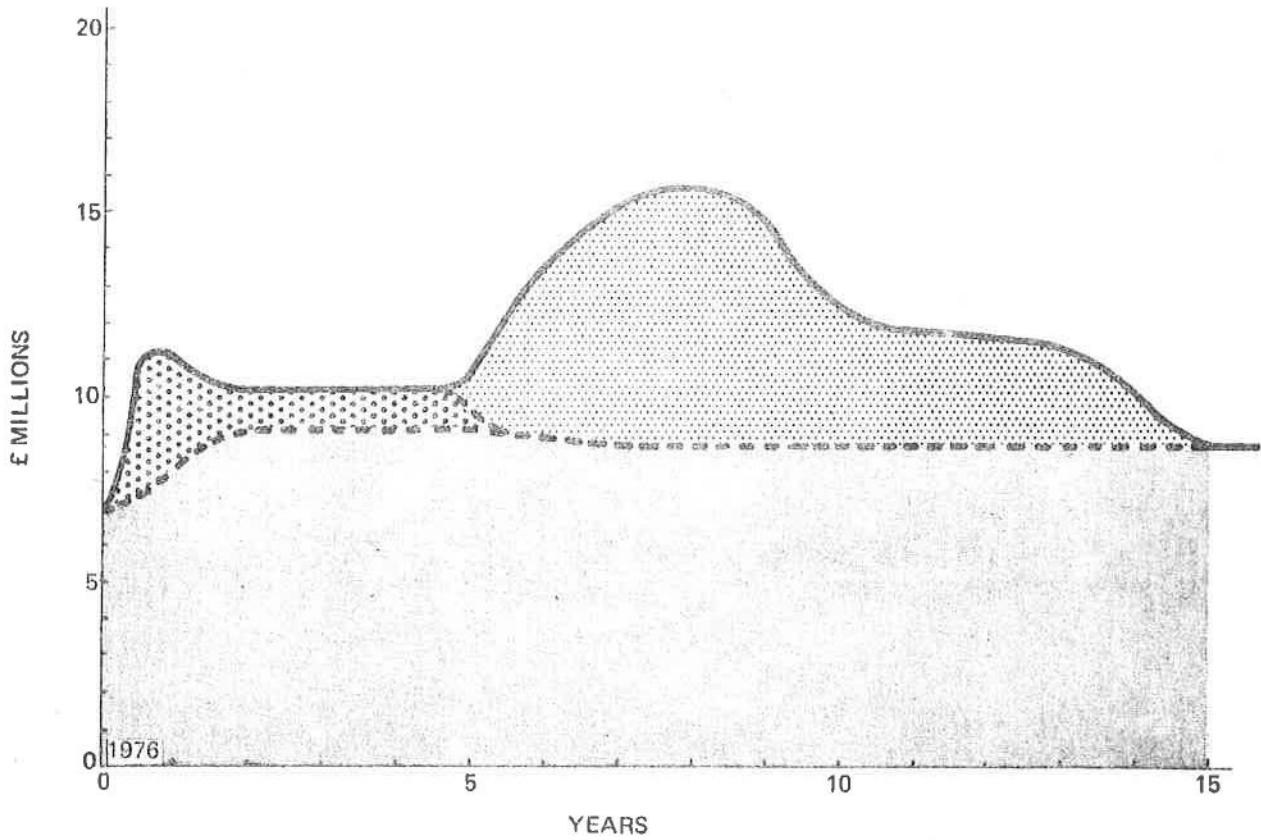


Fig. 12.5 PROGRAMME (C)

-  Arrears of Maintenance
-  High Priority Arrears
-  Operation & Continuing Maintenance

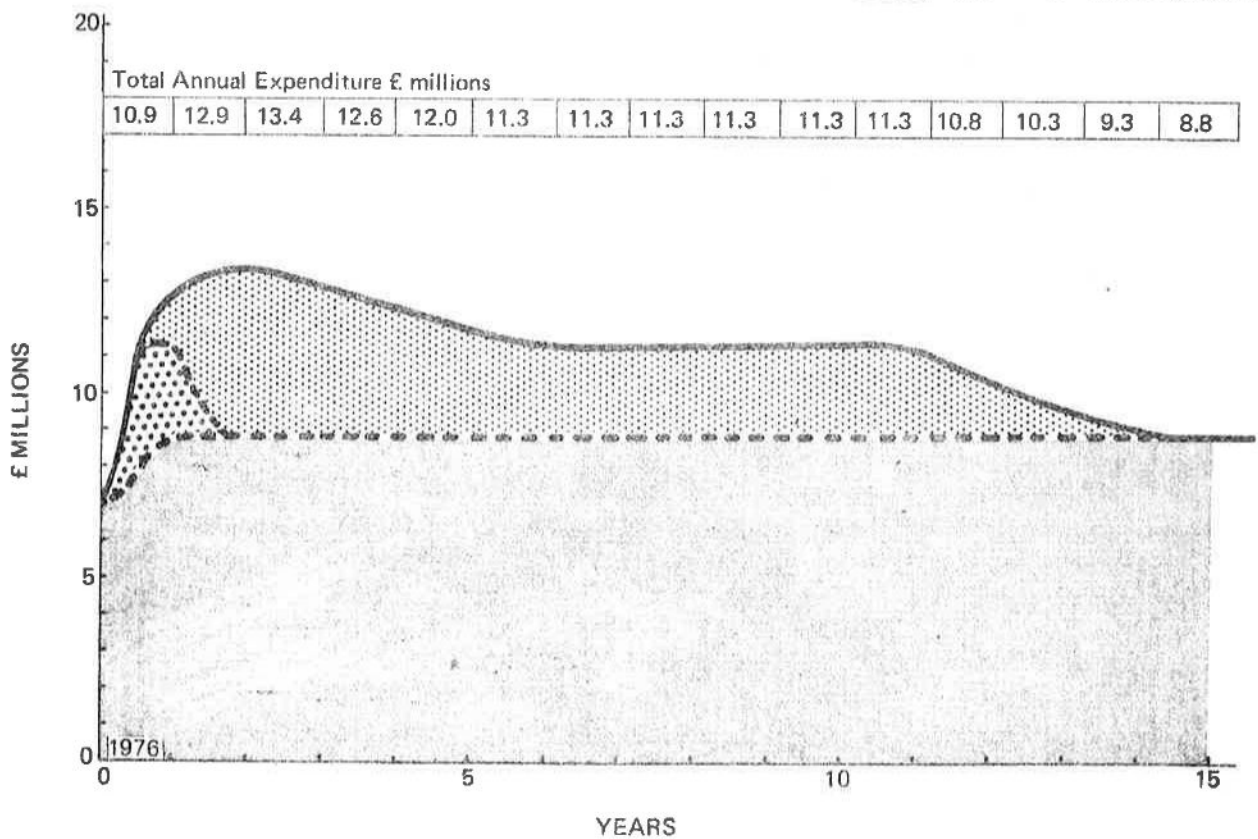


Fig. 12.6 PROGRAMME (D)

