Flooding Survey June 1990

River Derwent Catchment

NRA

National Rivers Authority
Severn-Trent Region

RIVER CATCHMENT AREAS

Severn-Trent Region Boundary

Catchment Boundaries

Adjacent NRA Regions

1. Upper Severn **2.** Lower Severn **3.** Avon **4.** Soar
5. Lower Trent **6.** Derwent **7.** Upper Trent **8.** Tame

NRA

National Rivers Authority
Severn-Trent Region

FLOODING SURVEY

JUNE 1990

SECTION 136(1) WATER ACT 1989

(Supersedes Section 24(5) Water Act 1973

Land Drainage Survey dated January 1986)

RIVER DERWENT CATCHMENT

AND DERBYSHIRE

FLOOD DEFENCE DEPARTMENT
NATIONAL RIVERS AUTHORITY
SEVERN-TRENT REGION
SAPPHIRE EAST
550 STREETSBROOK ROAD
SOLIHULL
W MIDLANDS B91 1QT

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REFERENCES

1 "Interim Report - Section 24(5) Survey" - Published by Severn-Trent Water Authority, July 1978.

2 "Flood Studies Report" Vols I-V, Natural Environmental Research Council (1975).

3 "The Benefits of Flood Alleviation" - E C Penning- Rowsell and J B Chatterton, published by Saxon House, Teakfield Ltd.

4 "Medway Letter" - Ministry of Agriculture and Fisheries (1933). Available in Wisdom's "Land Drainage", Sweet and Maxwell, London (1966).

5 DoE Circular 17/82 - "Development in Flood Risk Areas - Liaison between Planning Authorities and Water Authorities" published in 1982.

GLOSSARY OF TERMS

ADAS	- Agricultural Development and Advisory Service: part of the Ministry of Agriculture, Fisheries and Food (MAFF).
Arterial drainage	- The drainage channels conveying surface water run-off, effluent, etc. (excluding farm ditches, underdrainage and sewers) to the estuaries.
Benefit	- The return from investment in flood alleviation and land drainage improvement schemes.
Benefit area	- The geographical area in which direct benefit is obtained, usually either the maximum extent of flooding in an urban area or the land below the 'Medway Letter Line' in an agricultural area.
Catchment	- The geographical area from which rainfall will drain, by gravity, to a particular river and its tributaries.
Design flood	- The maximum flood for which the flood alleviation works will provide protection.
Discount rate	- The rate for converting all current and future benefits to present values.
Flood Q (T)	- The flood with a recurrence interval or return period of T years.
Floodplain	- The area of land adjacent to a watercourse which is inundated when the flow in the watercourse exceeds the capacity of the channel. The outer limit is usually the maximum extent of past recorded floods.
Freeboard	- See section 2.6.3.
Gross margin	- The gross output of an agricultural enterprise less the variable costs.
Intangible benefits	- The benefits that result indirectly from flood alleviation works, but which are not normally financially quantifiable. These can include freedom from anxiety, potential loss of life, cost of emergency services, etc.
Land potential	- An indication of soil profile characteristics such as structure, texture, depth, stoniness, etc which determines the ability of a soil to produce crop growth.
Main river	- The watercourses shown on the statutory 'main river maps' held by the National Rivers Authority and the Ministry of Agriculture, Fisheries and Food. The NRA has permissive powers to carry out works of maintenance and improvement on these rivers.
Mean annual flood Q	- The arithmetic average of annual maximum floods.
Normal water level	- The water level under average flow conditions.
Return Period	- The average length of time separating flood events of the same magnitude.
Underdrainage	- The drainage required in fields to ensure that the whole area drains satisfactorily to farm ditches or arterial watercourses. This may be tile drains, mole drains or subsoiling.
Variable costs	- Costs incurred in producing a crop, excluding fixed costs such as rent, rates and permanent labours. Variable costs include costs of seed, fertiliser, concentrates, vetinary costs, sprays and casual labour.

PREFACE

THE NATIONAL RIVERS AUTHORITY

The National Rivers Authority was established in September 1989 to be responsible for protecting and improving the water environment. It is an independent public body responsible for the regulatory functions formerly carried out by the water authorities, along with other important statutory duties. Its main tasks are:

- flood defence
- water quality and pollution control
- water resource management
- fisheries, conservation and recreation
- navigation

The NRA is a national body with a small central policy unit. Most of the employees work for the ten regional units which undertake day-to-day operations.

The NRA has a chairman, who along with other members is appointed by the Government - 12 by the Department of the Environment, 2 by the Ministry of Agriculture, Fisheries and Food and one by the Welsh Office. The MAFF appointees have a special responsibility for representing land drainage and fisheries interests.

SEVERN-TRENT REGION

The Severn-Trent Region is the second largest of the 10 regional units of the NRA both in size and population. It covers a diverse area of more than 8,000 square miles (21,600 sq km) and includes nearly 4,000 miles of rivers and watercourses.

The region is based upon the catchments of the Rivers Severn and Trent. The borders stretch from the Bristol Channel in the south to the Humber Estuary in the north, from Mid-Wales to the East Midlands.

The NRA is not responsible for navigation in the Severn-Trent Region. This is the responsibility of the British Waterways Board and a number of navigation trusts.

The headquarters of the NRA Severn-Trent Region is in Solihull, West Midlands. The Area organisation is catchment based with four areas of roughly equal size, achieved by dividing the Severn catchment at the confluence of the Severn and Teme and the Trent catchment at the Trent-Dove confluence. These areas are called Upper Severn, Lower Severn, Upper Trent and Lower Trent, with area offices at Shrewsbury, Tewkesbury, Burton-on-Trent and Nottingham. Within each area there are smaller sub-offices and depots.

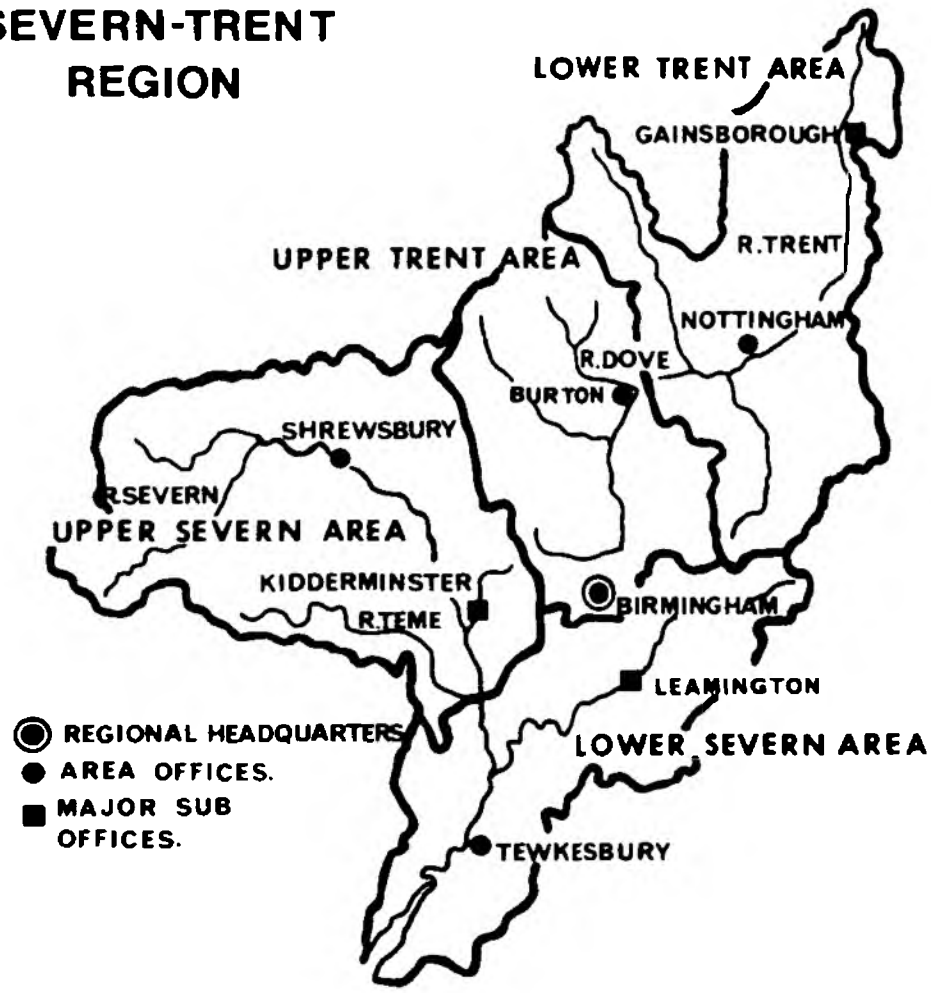
The NRA in the region works with three statutory committees which meet in public three or four times a year:-

Flood Defence Committee - This committee has 21 members appointed by the NRA, MAFF and local authorities. The committee has executive powers to discharge the NRA's flood defence and land drainage functions.

Rivers Advisory Committee - This committee is appointed by the NRA to advise on the broad framework of river basin management. It consists of representatives of local authorities, leisure groups, conservation interests, industry and agriculture and other interested parties.

Fisheries Advisory Committee - This committee has 15 members and advises the NRA on the discharge of statutory duties to maintain, develop and improve fisheries.

NRA SEVERN-TRENT REGION



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Shelton
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Burton-on-Trent
DE13 0AY
Tel: (0283) 37191

Lower Trent Area Office
Trentside
Scarrington Road
Off Ladybay Bridge
West Bridgford
Nottingham NG2 5FA
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CHAPTER 1

SUMMARY

1.0 SUMMARY

1.1 Introduction

1.1.1 This updated survey is one of eight surveys on the major river catchments in the Severn-Trent Region. Each survey provides information appertaining principally to a major catchment, extended to include the whole of the major County associated with it.

1.1.2 The primary purpose of the surveys is the identification and evaluation of flooding and land drainage problems and this summary provides information to facilitate rapid assimilation and comparison of costs, benefit/cost ratios and priority categories of these problems.

1.1.3 This survey supersedes the 1980 survey and the 1982 and 1986 revisions

1.2 Coding System

1.2.1 Every problem identified has been given a code number. The code numbers appropriate to each problem were originally classified in the "Interim Report of Survey"[1] of July 1978. That original classification remains unchanged for this Report but numbers have been added where new problems have been identified since the publication of the Interim Report. The codes applicable to catchments and County and District Councils are shown in Appendix A4 and the format of the code is as follows:

	x	xx	xxx	xx
	Catchment	County	District	Number
eg	1	83	310	27
	Upper Severn	Salop	Oswestry	Problem No.

1.3 Priority Categories

1.3.1 In order to establish a range of priorities to which an individual improvement scheme can relate, all improvement schemes have been categorised on the basis of:

(i) the size of the benefit/cost ratio
(ii) the cost of the arterial part of the improvement works (ie. excluding field drainage and ditching costs).

These categories are shown below.

Category by Benefit/Cost Ratio

CATEGORY	BENEFIT/COST RATIO	
	GREATER THAN	LESS THAN
1	2.0	
2	1.0	2.0
3		1.0

Category by Arterial Costs

CATEGORY	ARTERIAL COST (£'000)	
	GREATER THAN	LESS THAN
A	1000	
B	500	1000
C	100	500
D	50	100
E	10	50
F		10

1.4 Summary of Problem Evaluations

1.4.1 The problem evaluations which are shown in detail in Appendix A1 are summarised in Table 1. This Table shows costs, benefit/cost ratios and priority categories for every problem identified, and enables District Councils and County Councils to assimilate rapidly the total extent of improvements required in their areas and the priorities of the individual requirements within that total.

1.4.2 The page number within Appendix A1 of the evaluation of every identified problem is shown adjacent to the problem number in column 2 of Table 1.

1.4.3 It should be noted that the costs and benefits are to a December 1989 price base and that the watercourses marked * are main river or partly main river.

1.4.4 In some cases a single solution covers a number of identified problems. In these cases, the solution is detailed under the first problem number and all other relevant problem numbers are referred to it.

1.5 Summary by Priority Category

1.5.1 Tables 2 and 3 summarise, for both main river and non-main river, the numbers of problems in each category and the total cost of their associated improvement works. This summary includes only those problems in the catchment area and has been prepared primarily to provide the Ministry of Agriculture, Fisheries and Food with an overall appraisal of the total cost of improvements required throughout the Region. The total cost includes anticipated capital expenditure on current main river schemes and therefore represents a global summary of ongoing and future capital expenditure.

1.6 Identification of problems and their evaluation

1.6.1 The primary purpose of this Survey is to enable rapid identification of problems and the improvement works required to these problems. This can be done using the following system:

i) EITHER
Identify on the 1:25,000 scale maps, which accompanied the 1980 Report, the area of interest and note the code number of the benefit area or point source shown.
OR
Knowing the District or County Council in which the interest lies identify the relevant code number (see Section 1.2 of this Report and Appendix A4).

ii) Refer to the "Summary of Problem Evaluations" in Table 1 for brief details of costs, benefit/cost ratios and priority categories for the requisite watercourses in that District. All costs and benefits are at a December 1989 price base.

iii) Further information on individual schemes will be found in the detailed reports in Appendix A1. The relevant page is shown in the "Summary of Problem Evaluations".

1.6.2 The sheet numbers on the 1:25,000 scale maps in the 1980 album can be located by reference to the grid system shown on the rainfall map at the front of that album. The following diagram shows, as an example, the method for locating sheet number SK 46.

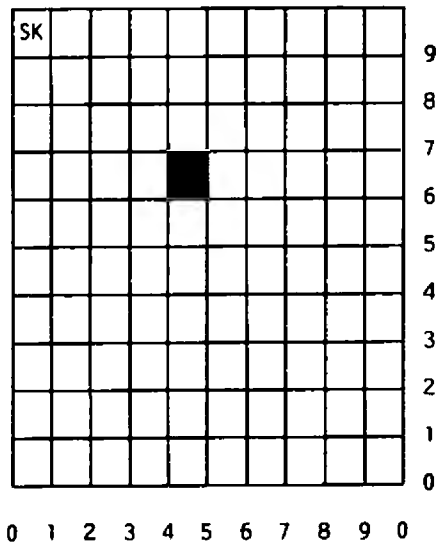

TABLE 1

SUMMARY OF PROBLEM EVALUATIONS

Note: All costs and benefits are to December 1989 price base
* Main River
# New problems since 1986 revision

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
ASHFIELD DISTRICT COUNCIL						
5-94-110-1	-	*River Erewash	SK 519 335	Scheme completed		
BASSETLAW DISTRICT COUNCIL						
5-94-210-44)						
5-94-210-45)	1	River Poulter	SK 647 755			
5-94-210-46)						
5-94-210-52)	3	*River Meden	SK 703 751			
5-94-210-53)						
BOLSOVER DISTRICT COUNCIL						
5-98-110-1	5	None	SK 502 735			
5-98-110-2	6	Millwood Brook	SK 526 745			
5-98-110-4	8	Sookholme Brook	SK 533 675			
5-98-110-5	-	Sookholme Brook	SK 520 675	Problem alleviated		
5-98-110-7	-	Common Brook	SK 445 549	Problem alleviated		
5-98-110-8	9	Suff Brook	SK 451 553	375	0.9	3C
5-98-110-10	11	Millwood Brook	SK 495 762			
6-98-110-1)						
6-98-110-2)						
6-98-110-3)	12	Alfreton & Normanton Brooks	SK 440 577	Highway/Sewerage problem		
6-98-110-4)						
EREWASH BOROUGH COUNCIL						
5-98-210-1	13	*River Trent	SK 470 308			
5-98-210-2	14	*River Trent	SK 490 312			
5-98-210-4	-	Cramfit Brook	SK 522 861	Problem alleviated		
5-98-210-6	15	Erewash Canal and Feeder Drain	SK 482 378			
5-98-210-7)						
5-98-210-8)	-	*River Erewash	included with 5-94-110-1			
5-98-210-9)						
5-98-210-10	-	Un-named	SK 476 354	Problem alleviated		
5-98-210-11)	16	Golden Brook	SK 508 335			
5-98-210-12)						
5-98-210-13	17	Golden Brook and Golden Stream	SK 453 346			
5-98-210-14	19	None	SK 452 333			
5-98-210-15	-	Old Derby Canal	SK 470 344	Problem alleviated		
5-98-210-16	-	Golden Brook Tributary	SK 461 357	Problem alleviated		
5-98-210-17)						
5-98-210-18)	20	Nut Brook	SK 482 390			
5-98-210-19)						

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
5-98-210-20)	21	Sow Brook	SK 464 398	118	0.8	3C
5-98-210-21)						
5-98-210-22)	22	Stanley Brook	SK 452 411			
5-98-210-23)						
6-98-210-1)	-	*Ock Brook	SK 420 345	Scheme completed		
6-98-210-2)						
6-98-210-3	23	Ock Brook	SK 422 359	Sewerage problem		
6-98-210-4	24	Ock Brook	SK 424 356	118	0	3C
6-98-210-5	-	Ock Brook	included with 6-98-210-3			
6-98-210-6	-	Un-named tributary of Ock Brook	SK 428 363	Problem alleviated		
6-98-210-7	25	None	SK 420 353	Highway problem		
6-98-210-8	26	Un-named tributary of Ock Brook	SK 423 366	Highway problem		
6-98-210-9	27	Collier Brook	SK 426 341			
6-98-210-10	-	*Bottle Brook	SK 360 406	Scheme completed		
6-98-210-11	28	Un-named	SK 443 334	Sewerage problem		
6-98-210-12	29	*Rivers Derwent & Trent	SK 452 315			
6-98-210-13	-	*Bottle Brook	included with 6-98-210-10			
6-98-210-14	30	Boosemoor Brook	SK 370 400	49	0.6	3E
6-98-210-15	31	Lees Brook	SK 402 374			
6-98-210-16	-	*Ock Brook	included with 6-98-210-1			
6-98-210-17	32	Dam Brook	SK 370 388	236	0.1	3C
6-98-210-18	33	Un-named trib of Ock Brook	SK 422 356			
6-98-210-19	34	None	SK 416 347			

AMBER VALLEY DISTRICT COUNCIL

5-98-310-1	-	*River Erewash	included with 5-94-110-1			
5-98-310-3)						
5-98-310-4)	-	*River Erewash	included with 5-94-110-1			
5-98-310-5)						
5-98-310-6)	35	Bailey Brook	SK 425 478	447	2.2	1C
5-98-310-7)						
5-98-310-9	37	Birchwood Brook	SK 438 541			
6-98-310-1	38	Windley Brook	SK 311 450	66	0.3	3D
6-98-310-2	39	Buckland Hollow Brook	SK 376 518			
6-98-310-3	40	Flagshaw Brook	SK 281 388			
6-98-310-4	-	None	SK 289 390	Problem alleviated		
6-98-310-5	41	Franker Brook	SK 307 468			
6-98-310-6	42	Coppice Brook Tributaries	SK 393 500			
6-98-310-7	43	River Ecclesbourne	SK 294 478	32	0.7	3E
6-98-310-8	-	*Bottle Brook	included with 6-98-210-10			
6-98-310-9	44	*River Amber	SK 387 566			
6-98-310-10	45	Gypsy Brook	SK 395 445			
6-98-310-11	46	Park Brook	SK 384 438			
6-98-310-12	47	Park Brook	SK 397 434			
6-98-310-13	48	Shipley Brook	SK 330 477	10	0.5	3E
6-98-310-14	-	None	included with 6-98-310-4			

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
6-98-310-15	49	Tributary of Markeaton Bk	SK 332 399	75	0	3D
6-98-310-16	50	None	SK 290 433	Highway problem		
6-98-310-17	51	Mercaston Brook	SK 290 419	156	0.6	3C
6-98-310-18	-	Un-named	SK 373 466	Problem alleviated		
6-98-310-19	-	Coppice Brook	included with 6-98-310-6			
6-98-310-20	55	Downmeadow Brook	SK 365 506	35	0.9	3E
6-98-310-21	54	None	SK 329 478	Highway problem		
6-98-310-22	55	Franker Brook	SK 307 498	Highway problem		
6-98-310-23	56	None	SK 323 514	Highway problem		
6-98-310-24	-	None	SK 319 376	Problem alleviated		
6-98-310-25	57	Downmeadow Brook	SK 370 503			
6-98-310-26)	-	*River Amber	included with 6-98-310-9			
6-98-310-27)						
6-98-310-28	58	None	SK 395 463			
6-98-310-29	59	Hartshay Brook	SK 395 518			
6-98-310-30	60	*River Derwent	SK 347 484	12	1.7	2E
6-98-310-31	61	Oakerthorpe Brook	SK 409 549			
6-98-310-32	62	Un-named	SK 336 429			
6-98-310-33	63	*River Derwent	SK 331 550			
6-98-310-34	64	Oakerthorpe Brook	SK 406 548			
6-98-310-35)	65	None	SK 350 542			
6-98-310-36)						
6-98-310-37	66	Un-named trib of Bottle Bk	SK 381 467			
6-98-310-38	67	Un-named	SK 376 505			
DERBY CITY COUNCIL						
6-98-410-1	-	None	SK 353 405	Problem alleviated		
6-98-410-2	-	None	SK 350 325	Problem alleviated		
6-98-410-3	68	None	SK 400 365	Sewerage problem		
6-98-410-4	69	None	SK 353 323	Sewerage problem		
6-98-410-5	70	None	SK 337 324	Sewerage problem		
6-98-410-6	71	None	SK 371 344	Highway problem		
6-98-410-7	-	None	SK 373 392	Problem alleviated		
6-98-410-8	72	*River Derwent	SK 357 384			
6-98-410-9	73	Mackworth/Markeaton Brooks	SK 332 381			
6-98-410-10)	74	None	SK 346 366	Highway problem		
6-98-410-11)						
6-98-410-12	75	*Sinfin Moor Main Drain and Cuttle Brook	SK 350 327			
6-98-410-13	76	*River Derwent	SK 360 400			
6-98-410-14	77	Markeaton Brook	SK 339 372	81	0.2	3D
HIGH PEAK DISTRICT COUNCIL						
6-98-510-1	79	Peakshole Water	SK 148 827	107	1.1	2C
6-98-510-2	-	Tributary of River Derwent	SK 208 827	Problem alleviated		
6-98-510-3	80	*River Derwent	SK 203 830			
6-98-510-4	81	Tributaries of River Dove	SK 038 683	22	0.2	3E

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
6-98-510-5	82	River Wye	SK 082 725			
6-98-510-6	-	Tributary of Peakshole Water	SK 168 837	Problem alleviated		
6-98-510-7	-	Peakshole Water	included with 6-98-510-1			
6-98-510-8	-	Tributary of Peakshole Water	included with 6-98-510-6			
6-98-510-9	83	None	SK 209 836	Highway problem		
6-98-510-10	-	Tributary of Peakshole Water	SK 161 834	Problem alleviated		
6-98-510-11	84	Grinds and Lady Booth Bks	SK 125 854			
6-98-510-12	85	Tributary of River Wye	SK 063 723			
6-98-510-13	-	Tributary of River Noe	SK 168 845	Problem alleviated		
NORTH-EAST DERBYSHIRE DISTRICT COUNCIL						
6-98-610-1	86	Westwood Brook	SK 417 601			
6-98-610-2	-	None	SK 419 574	Problem alleviated		
6-98-610-3	-	Tributaries of Westwood Bk	SK 418 604	Problem alleviated		
6-98-610-4	-	Press Brook	SK 389 630	Problem alleviated		
6-98-610-5	87	Press Brook	SK 378 644			
6-98-610-6	88	Press Brook	SK 371 644	Highway problem		
DERBYSHIRE DALES DISTRICT COUNCIL						
6-98-710-1	89	Tributary of Bentley Brook	SK 183 411	29	0.1	3E
6-98-710-2) 6-98-710-3)	-	Squashley and Chapel Brooks	SK 135 409	Problem alleviated		
6-98-710-4	90	*River Dove	SK 165 312			
6-98-710-5	91	Tributary of Cubley Brook	SK 180 362	72	0.1	3D
6-98-710-6	92	None	SK 188 363	Highway problem		
6-98-710-7	-	Tributary of Cubley Brook	SK 165 383	Problem alleviated		
6-98-710-8	-	*Henmore Brook	SK 215 474	Scheme completed		
6-98-710-9	-	Tributary of Brailsford Bk	SK 239 415	Problem alleviated		
6-98-710-10	93	*River Wye	SK 195 697			
6-98-710-11	94	Tributary of River Wye	SK 152 756			
6-98-710-12	95	Hannage Brook	SK 288 533	208	0.2	3C
6-98-710-13	96	Dale Brook	SK 231 754	55	0.6	3D
6-98-710-14	97	Tributary of River Derwent	SK 247 761			
6-98-710-15	98	Tributary of River Derwent	SK 245 762			
6-98-710-16	99	*River Derwent	SK 244 761			
6-98-710-17	-	Tributaries of River Dove	SK 120 341	Problem alleviated		
6-98-710-18	100	Tributary of Henmore Brook	SK 167 449	107	0.4	3C
6-98-710-19	101	Shirley Brook	SK 214 408			
6-98-710-20	102	Tributary of Hilton Brook	SK 228 367	23	0.8	3E
6-98-710-21	103	Marston Brook	SK 127 370	Highway problem		
6-98-710-22	104	None	SK 279 721	Highway problem		
6-98-710-23	-	None	SK 286 616	Problem alleviated		
6-98-710-24	105	None	SK 279 623	Highway/Sewerage problem		
6-98-710-25	106	Tributary of River Derwent	SK 244 577			

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
6-98-710-26	107	None	SK 271 625			
6-98-710-27	108	*River Derwent	SK 270 620			
6-98-710-28	-	*River Derwent	SK 288 607	Scheme completed		
6-98-710-29	109	None	SK 269 626			
6-98-710-30	110	None	SK 152 595			
6-98-710-31	111	None	SK 258 727			
6-98-710-32	112	Tributary of River Derwent	SK 248 752			
6-98-710-33	113	Dale Brook	SK 209 762	Highway problem		
6-98-710-34	114	Dale Brook	SK 241 817	Highway problem		
6-98-710-35	-	None	SK 215 765	Problem alleviated		
6-98-710-36	115	Hollow and Jumber Brooks	SK 220 764			
6-98-710-37	116	None	SK 141 760	Highway problem		
6-98-710-38	117	Tributary of River Wye	SK 154 744	Highway problem		
6-98-710-39	-	None	SK 240 770	Problem alleviated		
6-98-710-40	118	Tributary of River Derwent	SK 243 745			
6-98-710-41	-	Tributary of Henmore Brook	included with 6-98-710-18			
6-98-710-42	-	Squashley and Chapel Brooks	included with 6-98-710-2			
6-98-710-43	119	*River Wye	SK 221 685			
6-98-710-44	-	Hood and Dale Brooks	SK 230 815	Problem alleviated		
6-98-710-45	-	Hollow and Jumber Brooks	included with 6-98-710-36			
6-98-710-46	120	Bar Brook	SK 260 722	Highway problem		
6-98-710-47	121	Underground streams and tributary of River Derwent	SK 247 779			
6-98-710-48	122	None	SK 252 746	Highway/Sewerage problem		
6-98-710-49	123	Tributary of Bletch Brook	SK 186 543	294	0	3C
6-98-710-50	-	Snelston Brook	SK 151 434	Problem alleviated		
6-98-710-51	124	Brailsford Brook	SK 220 375	40	0.9	3E
6-98-710-52) 6-98-710-53)	125	Spinneyford Brook	SK 248 451			
6-98-710-54	-	Underground streams and tributary of River Derwent	included with 6-98-710-47			
6-98-710-55	-	Tributary of Brailsford Bk	included with 6-98-710-9			
6-98-710-56	-	Tributary of Marston Brook	SK 138 351	Problem alleviated		
6-98-710-57	126	Brocksford Brook	SK 135 334			
6-98-710-58	127	*Bradbourne/Bentley Brooks	SK 160 463	836	0.3	3B
6-98-710-59	-	Mercaston Brook	SK 266 431	Problem alleviated		
6-98-710-60	-	Henmore Brook	included with 6-98-710-8			
6-98-710-61	-	Renumbered now 6-99-310-31				
6-98-710-62	128	None	SK 201 719			
6-98-710-63	129	*River Derwent	SK 248 742			
6-98-710-64	-	Renumbered now 6-98-310-33				
6-98-710-65	130	*River Derwent	SK 245 778	167	0	3C
6-98-710-66	131	*River Wye	SK 222 680	49	0.2	3E
6-98-710-67	132	None	SK 219 691	Highway problem		
6-98-710-68	133	Mill Channel	SK 216 688			
6-98-710-69	134	Tributary of Sutton Brook	SK 188 403	Highway problem		
6-98-710-70	135	Tributary of River Dove	SK 166 476	23	1.2	2E
6-98-710-71	136	Tributary of River Ecclesbourne	SK 282 529	20	0.4	3E

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
6-98-710-72	137	Hannage Brook	SK 284 527			
6-98-710-73	-	Tributary of River Noe	SK 187 839	Problem alleviated		
6-98-710-80	138	Un-named	SK 263 649			
6-98-710-81	139	*River Wye	SK 220 670			
6-98-710-82	140	River Lathkill	SK 240 650			
6-98-710-83	141	Cubley Brook	SK 164 375			
6-98-710-84	-	Un-named tributary of Cubley Brook	included with 6-98-710-5			
6-98-710-85	-	River Derwent	included with 6-98-710-64			
6-98-710-86	142	Un-named	SK 286 612			
6-98-710-87	143	Bradbourne Brook	SK 175 499			
6-98-710-88	-	Tributary of Hannage Bk	SK 283 537	Problem alleviated		
6-98-710-89	-	Un-named	SK 325 594	Problem alleviated		
6-98-710-90	144	Tributary of Henmore Bk	SK 173 458			
6-98-710-91	-	Un-named	SK 215 681	Problem alleviated		
6-98-710-92	-	Un-named	SK 307 603	Problem alleviated		
6-98-710-93	145	#Un-named	SK 223 686			
6-98-710-94	146	#None	SK 308 613			
6-98-710-95	147	#None	SK 195 700			
SOUTH DERBYSHIRE DISTRICT COUNCIL						
6-98-810-1	148	Roadside Ditches	SK 212 333	Highway problem		
6-98-810-2	149	*River Derwent	SK 428 326			
6-98-810-3	150	*River Dove	SK 190 301			
6-98-810-4	151	Twyford, Doles and Hell Bks	SK 326 285			
6-98-810-5	152	Tributary of River Trent	SK 294 285	1016		3A
6-98-810-6	153	*River Trent	SK 353 284	52	0.1	3D
6-98-810-7	-	Tributary of River Trent	included with 6-98-810-5			
6-98-810-8	-	Twyford, Doles and Hell Bks	included with 6-98-810-4			
6-98-810-9	154	*River Trent	SK 370 286	23	0.3	3E
6-98-810-10	155	None	SK 430 300			
6-98-810-11) 6-98-810-12)	-	Twyford, Doles and Hell Bks	included with 6-98-810-4			
6-98-810-13	-	*Hilton Brook	SK 261 281	Scheme completed		
6-98-810-14	156	None	SK 274 332	Highway problem		
6-98-810-15	-	Twyford, Doles and Hell Bks	included with 6-98-810-4			
6-98-810-16	-	Roadside Ditches	included with 6-98-810-1			
6-98-810-17	157	None	SK 235 355	Highway problem		
6-98-810-18) 6-98-810-19)	158	*River Dove and Egginton Brook	SK 273 277			
6-98-810-20	-	Tributary of River Dove	SK 216 308	Problem alleviated		
6-98-810-21	159	*Etwall and Egginton Brooks	SK 264 336	755	0.7	3B
6-98-810-22	-	Tributary of River Trent	SK 441 301	Problem alleviated		
6-98-810-23	-	Twyford, Doles and Hell Bks	included with 6-98-810-4			
6-98-810-24	160	Thulston Brook	SK 410 320			
6-98-810-25	-	Un-named	SK 252 381	Problem alleviated		
6-98-810-26	161	Un-named	SK 194 311			
6-98-810-27	162	Shardlow Parish Dyke	SK 431 304			
6-98-810-28	163	Thulston Brook	SK 390 320			
7-98-810-1	164	None	SK 280 255	Highway problem		
7-98-810-2	165	None	SK 350 191	Highway problem		

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
7-98-810-3	166	Hooborough Brook	SK 294 127	216	0.4	3C
7-98-810-5	-	*Repton Brook	SK 305 270	Scheme completed		
7-98-810-6	-	Milton Brook	SK 341 273	Problem alleviated		
7-98-810-7	167	Ramsley Brook	SK 393 272			
STAFFORDSHIRE MOORLANDS DISTRICT COUNCIL						
6-99-110-1	168	River Tean and Cecilly Bk	SJ 997 429	956	0.7	3B
6-99-110-2	-	Endon and Horton Brooks	SJ 928 532	Problem alleviated		
6-99-110-3	170	River Churnet Headwaters	SJ 986 626	236	0.5	3C
6-99-110-4)	171	Ditches draining to	SJ 933 548	Highway problem		
6-99-110-5)		Horton Brook				
6-99-110-6	172	Dingle Brook and Canal feeder	SJ 955 579			
6-99-110-7	173	Horton Brook	SJ 936 576	317	1.1	1C
6-99-110-8	174	Tributary of River Churnet	SK 956 587	7	0.7	3F
6-99-110-9	-	Endon and Horton Brooks	included with 6-99-110-2			
6-99-110-10	-	Tributary of River Tean	SK 028 379	Problem alleviated		
6-99-110-11	175	Tributary of River Tean	SK 016 395	Highway problem		
6-99-110-12)	-	River Tean and Cecilly Bk	included with 6-99-110-1			
6-99-110-13)						
6-99-110-14	-	Endon and Horton Brooks	included with 6-99-110-2			
6-99-110-15	-	Ditches draining to Horton Brook	included with 6-99-110-4			
6-99-110-16	-	Tributary of River Churnet	included with 6-99-110-8			
6-99-110-17	-	Ditches draining to Horton Brook	included with 6-99-110-4			
6-99-110-18	176	*River Churnet	SK 072 427	17	0.3	3E
6-99-110-19	177	Cotton Brook	SK 055 450	176	0.4	3C
6-99-110-20	178	*River Churnet	SK 053 446	55	0.3	3D
6-99-110-21	179	River Manifold	SK 098 613			
6-99-110-22	180	River Manifold	SK 106 593			
6-99-110-23	181	Tributary of River Hamps	SK 051 554			
6-99-110-24	182	River Manifold	SK 101 588			
6-99-110-25	183	Tributary of River Dove	SK 071 666			
6-99-110-26	184	None	SK 139 547			
6-99-110-27	-	Endon and Horton Brooks	included with 6-99-110-2			
6-99-110-28	-	*River Churnet	SJ 973 572	Problem alleviated		
6-99-110-29	-	Endon and Horton Brooks	included with 6-99-110-2			
6-99-110-30	185	Leek Brook	SJ 985 539	23	1.5	2E
6-99-110-31	186	*River Churnet	SJ 980 572			
6-99-110-32	187	Ball Brook	SJ 987 568	Highway/Sewerage problem		
6-99-110-33	188	Ball Brook	SJ 992 567	Highway/Sewerage problem		
6-99-110-34	189	River Hamps	SK 080 504	796	0.1	3B
6-99-110-35	-	River Churnet	SK 071 425	Problem alleviated		
6-99-110-36	190	Un-named	SJ 979 573	49	3.4	1E
6-99-110-41	-	*River Tean	SK 020 370	Problem alleviated		
6-99-110-42	191	*River Churnet	SJ 987 503			
6-99-110-43	192	*River Churnet	SJ 981 523			

Code Number	Appendix A1 Page No.	Watercourse	Location	Arterial Cost (£'000)	Benefit/ Cost	Priority Category
EAST STAFFORDSHIRE DISTRICT COUNCIL						
6-99-310-1	-	*Rolleston Brook	SK 208 262	Scheme completed		
6-99-310-2	193	Westlands Brook	SK 100 407	78	0.2	3D
6-99-310-3	194	None	SK 212 289	Highway problem		
6-99-310-4	-	*River Churnet	SK 108 401	Problem alleviated		
6-99-310-5	195	None	SK 096 407	Highway/Sewerage problem		
6-99-310-6	-	Tributaries of River Tean	SK 029 378	Problem alleviated		
6-99-310-7	196	River Tean	SK 065 359	677	1.9	2B
6-99-310-8	-	*River Tean	SK 087 348	Scheme completed		
6-99-310-9	-	River Tean	included with 6-99-310-7			
6-99-310-10	197	None	SK 085 335			
6-99-310-11	-	*Picknall Brook	SK 088 330	Scheme completed		
6-99-310-12	198	Tributary of Marchington Bk	SK 106 309	35	0.7	3E
6-99-310-13	-	Marchington Brook	SK 137 308	Problem alleviated		
6-99-310-14	199	Marchington Brook	SK 131 302			
6-99-310-15	200	*River Dove	SK 221 288			
6-99-310-16	201	None	SK 240 277	Highway problem		
6-99-310-17	202	None	SK 210 251	Highway problem		
6-99-310-19	203	*River Dove	SK 161 301			
6-99-310-20	204	*River Churnet	SK 110 411			
6-99-310-30	205	*River Dove	SK 258 276			
6-99-310-31	206	Croxden/Nothill/Alders Brooks	SK 066 395	505	1.2	2B
6-99-310-32	207	Mill Fleam	SK 118 427			
6-99-310-33	-	Un-named	SK 089 360	Problem alleviated		
6-99-310-34	208	Un-named	SK 154 453			
6-99-310-35	209	#Marchington Brook	SK 142 314			

TABLE 2

SUMMARY BY PRIORITY CATEGORY - DERWENT CATCHMENT
NON-MAIN RIVER

	A		B		C		D		E		F	
	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEME	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)
1	-	-	-	-	1	317	-	-	1	49	-	-
2	-	-	2	1,182	1	107	-	-	2	46	-	-
3	1	1,016	2	1,752	8	1,531	6	427	10	295	1	7
TOTAL	1	1,016	4	2,934	10	1,955	6	427	13	390	1	7
										TOTAL	35	6,729

TABLE 3

SUMMARY BY PRIORITY CATEGORY - DERWENT CATCHMENT
MAIN RIVER

	A		B		C		D		E		F	
	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)	NUMBER OF SCHEME	TOTAL COST (£000s)	NUMBER OF SCHEMES	TOTAL COST (£000s)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	1	12	-	-
3	-	-	2	1,591	1	167	2	107	3	89	-	-
TOTAL	-	-	2	1,591	1	167	2	107	4	101	-	-
										TOTAL	9	1,966

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CHAPTER 2

THE SURVEY

2.0 THE SURVEY

2.1 Introduction

2.1.1 The requirement for a Survey results from the Water Act 1989, which also created the National Rivers Authority. Under Section 136(1) of the above Act the National Rivers Authority has a duty to carry out from time to time, a survey of its area in relation to flood defence functions.

2.1.2 The Ministry of Agriculture, Fisheries and Food issued Guidance Notes for Water Authorities in carrying out the original Survey and, wherever possible, suggested procedures were adopted and information incorporated within the reports.

2.1.3 In carrying out the Survey the Authority was required to:

1 Consult every local authority whose area is wholly or partially included in the area of the Water Authority.

2 Have regard to structure plans and local plans under the Town and Country Planning Act 1971.

2.2 Purposes of the Survey

2.2.1 The primary purpose of the Survey is to identify and evaluate flooding problems, both for existing problems and for potential problems which may occur as a result of increased run-off from development. Information is provided which summarises the principal solutions, costs, benefits and priorities.

2.2.2 The Surveys are required by the Ministry of Agriculture, Fisheries and Food to provide a comprehensive and logical basis for long-term planning of drainage improvements and flood alleviation.

2.2.3 The Survey will be used by this Authority to ensure rational phasing of improvements on main river, and will provide a firm basis for the supervisory role exercised by the Authority over all matters relating to its flood defence functions on all watercourses throughout the region.

2.2.4 The Survey provides comprehensive information on both main river and non-main river and can, therefore, be used by all drainage authorities and drainage bodies (local authorities) for determining capital works programmes of watercourse improvements in conjunction with the Authority's own programme of works.

2.2.5 The Authority will make use of the survey in considering any changes to the main river network.

2.3 Extent of the Survey

2.3.1 The Authority exercises a general supervisory role over all matters relating to land drainage. The Survey, therefore, identifies and examines not only problems on main river but also on other watercourses having existing or potential land drainage and flood alleviation problems.

2.3.2 No limit has been fixed by the Ministry of Agriculture, Fisheries and Food for a lower order of problems which should be considered by the Survey, but it has been indicated that a "broad brush" approach is preferable to detailed investigations of a minority of large problems. This accords with the Authority's view of its own requirements and thus the lower limit has been fixed as flooding affecting a single property or inadequate arterial conditions affecting twenty hectares of agricultural land. However, where specific requests have been made to investigate problems of lesser order these have been included wherever possible.

2.3.3 The Survey has investigated those watercourses which are currently in a satisfactory condition but where future development could necessitate improvements. This has been limited to those developments which have planning permission or have been identified in Structure and Local Plans and are likely to proceed in the near future.

2.3.4 The Survey covers only those drainage inadequacies which occur on arterial watercourses. Where drainage inadequacies on agricultural land can be resolved by underdrainage alone, these have not been included within the Survey.

2.4 Procedure

2.4.1 Of the information on drainage deficiencies required for this Survey, a considerable proportion was available within this Authority. This is particularly so of the problems on main river but also applies to major problems on non-main river. There are, however, many kilometres of non-main river on which this Authority had no information and which have, in many cases, had little or no maintenance work carried out on them. In order to ensure comprehensive coverage on such watercourses, in addition to main river, all bodies having land drainage interests were asked to provide information on drainage deficiencies. These include:

1 Ministry of Agriculture, Fisheries and Food.

2 Internal Drainage Boards.

3 County Councils.

4 District Councils.

5 Parish Councils.

6 British Waterways Board.

7 National Farmers' Union.

8 Country Landowners Association.

9 British Coal.

2.4.2 In July 1978, an 'Interim Report' was circulated to local authorities and many other organisations and bodies as part of the Authority's statutory duty under Section 24 of the Water Act 1973. This Report identified all drainage deficiencies which had been notified to the Authority and provided brief details of location and type of problem.

2.4.3 The primary purpose of the Interim Report was to seek views and comments on the identified problems so that these could be taken into account in determining solutions. Provision was also made to incorporate additional problem areas in subsequent Reports to ensure their comprehensiveness. All relevant comments have, therefore, been incorporated in the problem evaluations in Appendix A1 including those of the Nature Conservancy Council, County Conservation Trusts, Countryside Commission and fisheries, navigation and many other interests, in addition to those scheduled in Section 2.4.1. Wherever possible, the costs identified for the improvement works have included the cost of making provision for all interests which have been notified.

2.4.4 Every problem identified in the Interim Report and those notified since its publication have been investigated by visiting the site and carrying out land surveys as necessary. The extent of the investigation has largely been determined by the extent of the problems and the benefits which will result. Many minor problems have, therefore, not been examined in detail because of the high cost of providing the necessary improvement works. There are also many cases where flooding cannot be attributed to inadequacies in the arterial watercourse drainage system. In these situations, the solutions to the problems are outside the scope of this Survey and have not been determined. However, an indication is given, in each case, of the cause of the problem and these have been brought to the attention of the appropriate authority (eg. Highway Authority, British Coal, etc).

2.5 Hydrological Criteria

2.5.1 The mean annual flow for all sites of major importance, for which flow records are available, have been calculated using the appropriate method formulated in the "Flood Studies Report"[2].

2.5.2 For sites of minor importance and sites having no available flow records, the mean annual flood has been calculated from catchment characteristics using the "Flood Studies Report" six parameter equation.

2.5.3 In all cases, the relationship between Q(T) (the flood of return period T) and $\bar{Q}$ (the mean annual flood) has been derived from the "Flood Studies Report" regional growth curves.

2.6 Hydraulic Criteria

2.6.1 Urban flood alleviation schemes have been designed, wherever possible, to contain the 1 in 100 years flood. It is recognised that, in the final analysis, the design frequency chosen will be that which maximises the excess of benefit over cost but, within the scope of this Survey, this has not been possible other than in schemes of the very highest priority.

2.6.2 Culverts have generally been designed for the following flood return frequencies. (These standards have varied dependent upon economic or physical constraints):

1 Flooding of property and urban areas in general - 1 in 100 years.

2 All areas of high agricultural value including horticultural areas - 1 in 100 years.

3 Other agricultural areas - 1 in 25 years.

4 A combination of flooding transport systems and agricultural areas may justify a standard of up to 1 in 50 years.

2.6.3 For the Survey purposes the following criteria have been adopted:

1 In agricultural areas the pipe outfalls for field drainage systems are designed to be 150mm above normal water level. Where there is no field drainage system an average freeboard of 1,500mm between normal water level and ground level has been used. The freeboard requirements for under-drainage purposes may result in larger channel capacities than those required purely for flood alleviation purposes.

2 For the construction of floodbanks freeboard is dependent on the confidence limits of data used for design purposes, and for major floodbanks is normally 500mm. Small freeboards have been considered in appropriate cases. In all other cases, channel capacity is the design flood discharge with no additional freeboard.

2.7 Land Potential Category

2.7.1 The successful growth of crops depends on a suitable soil environment for germination, root anchorage and plant growth. Cropping systems are dependent on soil potential and similarly drainage standards can be linked to soil profile characteristics such as structure, texture, depth, stoniness and wetness. The Ministry of Agriculture, Fisheries and Food has assessed standards for field drainage and flood protection based upon the relationship between cropping and soil or land potential as indicated in Table 4. In providing these individual assessments the Ministry has pointed out that they are subjective and will need to be verified by detailed in-field investigations before any scheme can be agreed for grant aid purposes.

Table 4 Land Potential Categories

a	Land potential low (Normally pasture land)	1 in 2 years
a5	Land potential low/medium (Normally low grade arable land)	1 in 5 years
b	Land potential medium/high (Normally high grade arable land)	1 in 5/10 years
c	Land potential very high (Very high grade arable and horticultural land)	1 in 25/100 years

2.8 Improvement Costs

2.8.1 Costs of improvement schemes have been estimated on a standard unit cost basis wherever possible and appropriate in order to ensure uniformity and comparability of all schemes. The unit cost approach has been adopted for excavation of new channels, construction of floodbanks, bridges, pumping stations, culverts, revetment work, etc. It has not been possible to use unit costing for regrading and remodelling of existing channels or for channel clearance of undergrowth and trees as these are items which vary from watercourse to watercourse.

2.8.2 All costs include for design and supervision which on average is approximately 10% of the cost of the improvement works.

2.8.3 All costs are at a price base of December 1989.

2.8.4 The cost of field drainage for existing problems has been assessed by the Ministry of Agriculture, Fisheries and Food and has been included within the total cost of the improvement works. Field drainage costs for new problems have been assessed using a nomograph produced by Silsoe College for the Authority in 1984. Ditching costs have not been included unless this constitutes a significant proportion of the overall cost.

2.8.5 Wherever possible, the total cost of the improvement works includes the cost of making provision for navigation, fisheries, conservation and other interests of which the Authority has been notified.

2.9 Benefit Assessment

2.9.1 Benefit areas for urban problems have been determined largely from local knowledge of the extent and depth of past floods. These have been extrapolated where necessary to estimate the extent of floods with return periods in excess of recorded events. The stage/damage estimates and subsequent evaluation of annual average benefits have been derived from methods formulated in the manual entitled "The Benefits of Flood Alleviation: A Manual of Assessment Techniques"[3].

2.9.2 The areas which are likely to benefit in both agricultural and urban areas are shown on the overlays to the maps in the 1980 album. The locations of small areas of urban flooding and miscellaneous minor flooding problems are shown with a dot enclosed in a circle and identified with the appropriate code number. In the case of large urban flooding problems and agricultural drainage problems, the areas shown on the overlays and identified by code numbers are the areas which will benefit from drainage improvements.

2.9.3 Areas of inland agricultural land which will derive benefit from drainage operations have been defined, for the purpose of this Survey, as follows:

i) Land within an area bounded by a line 2.4m above the highest recorded flood level as defined in the "Medway Letter"[4].

ii) Where no flooding has occurred but normal water levels restrict outfall conditions for field drains, the benefit area is the area bounded by a line 2.4m above bank top level.

2.9.4 Annual average benefits for agricultural areas have been assessed by the Ministry of Agriculture, Fisheries and Food from the land potential (see Table 4) and from the potential change in gross margin which will result from improved drainage. These assessments will require verification by detailed studies if schemes are incorporated in capital programmes.

2.9.5 The maximum benefits from most agricultural improvement schemes can be achieved only if the individual farmers carry out ditching and install field drainage following the improvement to the receiving watercourses. In practise the benefits will, therefore, be phased in as field drainage is installed and due account will be taken of this phasing when individual detailed schemes are prepared.

2.9.6 If the improvement of a watercourse is an essential pre-requisite of planning permission for any housing or industrial development, such that without the improvement planning permission would not be approved, then the benefits attributable to future development by the off-site improvement of watercourse have been assessed as a proportion of the increase in the value of the land after planning permission is granted.

2.9.7 The benefits have been assessed, for both urban and agricultural problems, using a base date of December 1989. It should be appreciated that benefits, particularly in agricultural schemes, may not follow normal inflationary trends.

2.10 Test Discount Rate

2.10.1 The test discount rate which has been used for the assessment of the net present value of future costs and benefits is the Government's recommended current rate for public investment of 6%. The life of improvement schemes, other than those involving pumping stations, has been assumed as 50 years for the purpose of the net present value analysis.

2.10.2 Maintenance costs after improvements have been carried out are assumed, on average, to be of a similar order to those before. In some cases, maintenance costs will be lower whereas in others, particularly where maintenance has been neglected in the past, costs will be higher.

2.11 Benefit/Cost Ratios

2.11.1 The comparison of benefit with cost enables an assessment to be made of the worthwhileness of any proposed improvement. For the purpose of this Survey a scheme is considered as being possibly viable if the benefit to cost ratio is greater than unity. However, if an improvement scheme progresses to a capital programme it may be necessary to compare it with benefit/cost ratios for other competing schemes to enable a choice to be made.

2.11.2 The greater the excess of benefit over cost the higher the return for capital employed and, therefore, in purely economic terms, a scheme having a high benefit/cost ratio would have a higher priority than a scheme having a lower value. However, due weight must also be given to other factors such as risk to human life, amenity and environmental considerations. These factors are intangible and require a subjective assessment, in conjunction with economic factors, to determine the overall priorities of schemes.

2.12 Priority Category

2.12.1 The Survey has made no attempt to determine priorities which take into account intangible benefits; schemes have been categorised solely on the basis of tangible benefits which can be assessed in purely economic terms. It will be the responsibility of the promoting authority to determine the weight to be given to intangible benefits and, therefore, the overall priorities to be attached to schemes in its area.

2.13 Inflation Factors

2.13.1 Costs and Benefits for problems contained in the 1986 revision have been updated to a December 1989 price base as follows:

Arterial Costs - Baxter (Regional) Index

Underdrainage Costs - Retail Price Index

Agricultural Benefit - Using information supplied by Silsoe College based on changes in weighted gross margins

Urban and Road Benefits - Retail Price Index.

CHAPTER 3

GENERAL DESCRIPTION

3.0 GENERAL DESCRIPTION

3.1 Description of the Region

3.1.1 The boundary of the Severn-Trent Region of the National Rivers Authority is formed by the watersheds of the River Trent and the River Severn. The area of 21,600 sq. km extends from the Humber estuary in the north to the Severn estuary in the south, and is bounded by the Anglian, Yorkshire, North West, Welsh, Wessex and Thames Regions of the NRA. The Severn-Trent Region is divided into eight catchments the boundaries of which are the watersheds of the major sub-catchments of the River Severn and the River Trent. These catchments and the location of the region is shown in Fig.1.

3.1.2 The Severn-Trent Region of the National Rivers Authority is responsible for the two major tidal estuaries of the River Severn and the River Trent but other than these areas it has no coast line. The River Trent is tidal as far as Cromwell Lock, about eight kilometres downstream of Newark, and the River Severn is tidal as far as Gloucester.

3.1.3 The highest part of the Trent region is the Pennines in the north west where the River Derwent rises at an altitude of 630 metres. Altitude decreases across the Trent basin to the River Trent itself and then rises in the east to a height of between 60 metres and 120 metres. In the central region the catchments of the Rivers Severn and Trent are separated at the headwaters of the River Tame and the River Stour by a ridge of between 200 metres and 270 metres high.

3.1.4 The topography of the Severn basin is dominated by the Welsh Hills in the west at a maximum elevation of 830 metres and the Cotswold Hills in the south-east at an elevation of 330 metres. A prominent feature in the south-west is the Malvern Hills which rise to a height of 430 metres.

3.1.5 The average annual rainfall over the whole of the region is 775mm and this ranges from a maximum of over 2,000mm in the Welsh Hills to approximately 600mm in the Trent Valley in the rain shadow of the Pennines. The variation is largely associated with altitude. The lowlands generally have little seasonal variation but upland areas are wetter in winter than in summer. Similarly, in the upland areas, snowfall is a significant form of precipitation.

3.1.6 The geology of the region varies from the resistant Pre-Cambrian and Palaeozoic rocks in west Shropshire to the softer clays, shales and limestone bands of the Lower Lias in east Leicestershire and Warwickshire. The Pre-Cambrian and Palaeozoic rocks are characterised by the rugged landscape of Wales, the Border Counties and the carboniferous limestone formations in Derbyshire, while the more recent formations in the east have weathered to form the rolling scarps and vales typical of Leicestershire.

3.1.7 The total population of the Region is 8.3 million people with some 2.5 million in the Severn catchment and 5.8 millions in the Trent. Approximately 2.6 million people live in the West Midlands conurbation which straddles both catchments. The other major centres of population are Nottingham (280,000), Leicester (282,000), Stoke-on-Trent (250,000) and Derby (215,000). Many of these conurbations, and particularly that of the Black Country area, are situated in the vicinity of the headwaters of major rivers and have a significant effect on the river flows throughout their lengths.

3.1.8 The National Rivers Authority assumes a direct responsibility for 3,573 km of main river on which capital improvements and maintenance are carried out as necessary. Areas which have been protected from flooding, to various standards, on this length of main river total over 1,000 sq. km. Much of this area is protected by floodbanks of which the total length is 820 km, all of which is maintained on a regular basis by the Authority.

3.2 Description of the Dove and Derwent Basins

3.2.1 The catchment areas of the Rivers Dove and Derwent both generally have steep gradients, resulting in short time of concentration. The rivers are young in geological terms, are fast flowing and have high dominant discharges. The Dove flows for half of its length over Keuper Marl, frequently with gravel seams at normal water level. These factors allow erosion and consequent shoaling, and the river regime is unstable in its lower reaches. Larger erosions have jeopardised the stability of flood defences and it has been necessary to stabilise the banks at many points by stone revetments. By comparison, the lower reaches of the Derwent require less extensive and less costly maintenance.

3.2.2 The floodplains of both rivers and their tributaries are restricted in their upper reaches resulting in little storage. Consequently, the more serious flood incidents cause considerable damage due to the depth and velocity of the water. A notable example occurred in August 1971 on the River Hamps at Waterhouses when, after a thunderstorm, flooding up to three metres deep severely damaged property in the village. Matlock, too, has suffered from extensive flooding but an improvement scheme has now been completed, which provides protection from floods up to a frequency of once in 50 years.

3.2.3 The floodplains of the lower reaches of the Dove and the Derwent are very wide. Extensive earth embankments have been constructed to protect villages and agricultural land from flooding in the Dove valley between Egginton and Marchington. These areas are protected from flooding of severities up to that of the one in one hundred year event. Other areas of farmland are protected by minor banks against much smaller floods. Through Derby, the Derwent is confined generally to its natural channel by flood defences, because development has encroached within the floodplain close to the river.

3.2.4 In order to alleviate flooding from the River Churnet, the NRA propose to carry out an improvement scheme in Leek commencing in 1991.

CHAPTER 4

THE NATIONAL RIVERS AUTHORITY'S SUPERVISORY ROLE

4.0 THE NATIONAL RIVERS AUTHORITY'S SUPERVISORY ROLE

4.1 Introduction

4.1.1 Section 136(1) of the Water Act 1989 states that the National Rivers Authority shall exercise a general supervision over all matters relating to flood defence. This general supervision includes all watercourses, both main and non-main, and is exercised in part by consenting to works on or in watercourses, by the enforcement of bye-laws and by liaison with Planning Authorities responsible for development control.

4.2 Land Drainage Bye-laws

4.2.1 Section 34 of the Land Drainage Act 1976 (as amended by the Water Act 1989) allows Drainage Authorities to "make such bye-laws as they consider necessary for securing the efficient working of the drainage system in their area". Consent is required in compliance with particular bye-laws covering control of certain operations in or adjacent to rivers or the floodplain of rivers (generally confined to main rivers). Such operations include erection of fences, tree planting, disposal of rubbish, excavation affecting the bed and banks of rivers, erection of jetties or walls, etc.

4.2.2 In order to eliminate minor inconsistencies in the bye-laws inherited from the Severn and Trent River Authorities, the Severn Trent Water Authority made new bye-laws which were confirmed by the Ministry of Agriculture, Fisheries and Food on the 26 April 1979. By the provisions of the Water Act 1989 these Byelaws are now enforced by the National Rivers Authority, Severn-Trent Region. All references to Severn Trent Water Authority, STWA or Water Authority should now read National Rivers Authority.

4.3 Statutory Consents

4.3.1 It is essential that a rational and consistent approach is adopted for standards not only on main rivers but also on non-main rivers, where alterations to existing conditions can seriously affect the main river system downstream. The maximum benefits can be achieved only if all works which require consent are identified, so that a consistent standard can be attained throughout the region.

4.3.2 The issue of a Land Drainage Consent implies that, if the work is carried out in accordance with the drawings and documents submitted, there will be no detriment to land drainage operations or consequential flooding. Prior to issue of a consent Local Authorities, Internal Drainage Boards, Navigation Authorities and others are consulted as necessary.

4.3.3 A Consenting Manual has been produced for the Authority's internal use which details principles to be adopted and formalises the Authority's policy on various types of development so that consistent advice can be given to planners.

4.4 Planning Liaison and Development Control

4.4.1 In addition to exercising control over drainage works by consenting procedures, the Authority also seeks to control operations likely to adversely affect drainage interests through its planning consultation with Local Authorities. The Town & Country Planning General Development Order 1988 obliges local planning authorities to consult the NRA before determining planning applications. The majority of new developments which require land drainage improvements are identified in this way and advice is given to the planners about the effects of the proposals in relation to flooding and land drainage.

4.4.2 The Department of the Environment Circular 17/82[5] issued in 1982 emphasised the need for Planning Authorities to consult the Water Authorities in respect of development and caravan and camping sites in flood risk areas, and the effects of run-off from new developments. The National Rivers Authority must now be consulted on such matters.

4.4.3 The major floodplain areas are identified on the maps which accompanied the 1980 report. In general, the areas shown envelop those areas which have been flooded by past recorded events. They do not, therefore, relate to a particular frequency flood event.

4.4.4 Many areas within floodplains have been protected by improvement schemes which will, in general terms, consist of either channel improvements or flood embankments. These areas are also identified on the maps and the level of protection is indicated.

4.4.5 In particular, Local Authorities are advised that, for developments which are likely to increase the risk of flooding, the developer should be informed that works will be required to watercourses to remedy the situation. If these works are outside the area of the application, the developer is required to show that provision has been made to carry out the works, as conditions applicable to such works cannot be applied to planning permissions. If the developer does not make arrangements for the watercourse improvement the Planning Authority can refuse the application.

4.4.6 Where works are required to a non-main watercourse to accommodate the additional run-off from developments, the developer may carry out the work, by agreement with the riparian owners, at his own expense. If agreement is not possible he may request the Local Authority to carry out the works and reimburse the authority accordingly. In the case of main river, works will normally be carried out by the National Rivers Authority with an appropriate contribution from the developer.

4.4.7 At the present time, negotiations take place between the developer(s) and the National Rivers Authority or Local Authority into the proportion of the improvement cost of the off-site watercourse which is to be met by the developer(s).

CHAPTER 5

MAIN RIVER SYSTEM

5.0 MAIN RIVER SYSTEM

5.1 Statutory Provisions

5.1.1 The main river system is the system of watercourses identified on the statutory set of main river maps held by the National Rivers Authority and the Ministry of Agriculture, Fisheries and Food (MAFF). Main river powers extend to any structure in the bed or bank of the watercourse which controls the flow of water into or out of the watercourse. Powers for carrying out work on main river are exercisable by the National Rivers Authority and by others with the Authority's consent.

5.1.2 The main river map may be altered by the Ministry of Agriculture, Fisheries and Food at the request of the National Rivers Authority. Before doing so, the Minister must give notice of his intention and this is usually carried out by advertising in local newspapers. All objections to the proposals will be considered by the Minister.

5.1.3 In relation to watercourses which are not designated as main river the Authority has certain regulatory powers but has no powers to carry out work using Flood Defence finance.

5.1.4 A 1:250,000 scale map showing the main river system within the Severn-Trent Region as at January 1990 is available.

5.2 Principles for Main River Extension

5.2.1 The following criteria are used by the National Rivers Authority, Severn-Trent Region in deciding whether to make an application to MAFF for changing the status of a watercourse from non-main to main river.

1 Main River shall be continuous from the estuary to a suitable point (eg a bridge or other structure) where:-

(a) the population in the remainder of the upstream catchment is less than 10,000

or

(b) the average width of flood plain in the remainder of the upstream catchment is less than 300 metres per kilometre of watercourse

or

(c) there is no single community greater than 3,000 persons further upstream.

Whichever is the furthest point upstream.

2 Main river shall also extend upstream to the point of discharge of:-

(a) outfalls from sewage works with an average daily flow greater than 5 megalitres

(b) untreated water reservoirs that impound more than 1,000 megalitres

(c) the downstream outfall of an internal drainage board.

3 Where balancing storage is provided as an essential part of the system of surface water drainage, consideration should be given to extending main river up to the point of intake of such balancing storage.

4 However, a flexible approach will be adopted and consideration may also be given to extension of main river in particular circumstances (eg to receive the surface water drainage from a motorway, an embanked watercourse or to be the upstream boundary of urban areas for development control and byelaw purposes).

5.3 Local Authority Improvements

5.3.1 Where non-main watercourses accord with the above policy, and improvements are carried out by Local Authorities to standards approved by this Authority, the Authority may recommend to the Ministry of Agriculture, Fisheries and Food that the watercourses should be included as part of the main river system.

CHAPTER 6

THE LAND DRAINAGE ROLE OF LOCAL AUTHORITIES

6.0 THE LAND DRAINAGE ROLE OF LOCAL AUTHORITIES

6.1 Interaction with the National Rivers Authority's role

6.1.1 The powers available to Local Authorities (both District and County Councils) under the Land Drainage Act 1976 (as amended by the Water Act 1989) for carrying out works of maintenance and improvement on non-main rivers are complementary to those of the National Rivers Authority on main river. In almost all cases the powers are permissive, but most Councils now accept the responsibility that this implies and are prepared to carry out improvement schemes in conjunction with those of the National Rivers Authority on main river. In this way, many serious impediments to the overall drainage system are gradually being eliminated.

6.2 Powers of District Councils

6.2.1 District and Metropolitan District Councils have powers under Section 98 of the Land Drainage Act 1976 (as amended by the Water Act 1989) to carry out works on non-main river for the purpose of preventing flooding or remedying or mitigating any damage caused by flooding.

6.3 Powers of County Councils

6.3.1 County Councils have powers under Section 99 of the Land Drainage Act 1976 (as amended by the Water Act 1989) to execute land drainage schemes, at the request of owners and occupiers who will benefit from the schemes.

6.3.2 Section 100 of the Land Drainage Act 1976 (as amended by the Water Act 1989) enables County Councils to execute land drainage works compulsorily for the improvement of agricultural land, and apportion any expenses among the beneficiaries.

6.3.3 County Councils may exercise Section 98 powers by agreement with, or by default of, a District Council.

6.4 Maintenance of the Flow of Watercourses

6.4.1 Where the proper flow of water in a non-main river is impeded, both District and County Councils may, under Section 18, of the Land Drainage Act 1976 (as amended by the Water Act 1989), serve notice on the person concerned to remedy the situation.

CHAPTER 7

INTERNAL DRAINAGE BOARDS

7.0 INTERNAL DRAINAGE BOARDS

7.1 Constitution

7.1.1 Many Internal Drainage Boards were first constituted in the nineteenth century by individual Acts of Parliament. However, all Internal Drainage Boards are today constituted, or continued in being, in accordance with the provisions of the Land Drainage Act 1976 (as amended by the Water Act 1989) which defines Internal Drainage Districts as such areas as will derive benefit or avoid danger as a result of drainage operations. These areas are generally located in lowland regions where special drainage problems exist and where collective benefit will be derived from drainage operations.

7.1.2 Within the Region there are 32 Internal Districts of which 24 are in the Trent catchment and eight are in the Severn catchment. In most cases a District is administered by a Board consisting of elected members but the Sow and Penk District is administered directly by this Authority.

7.1.3 The basis for the determination of Internal Drainage District boundaries was laid down by the Minister of Agriculture and Fisheries in 1933 in a decision letter known as the "Medway Letter" [4]. This letter, which is now regarded as the authoritative pronouncement for all cases which have arisen since then, identified the area of benefit or avoidance of danger by reason of drainage operations by reference to flood contours (in relation to freshwater drainage) or tide levels (in relation to sea defence and salt water inundations).

7.2 Income

7.2.1 The income of Internal Drainage Boards is derived in the main from:

i) Drainage rates levied on land and buildings within the Drainage District.
ii) Ministry of Agriculture, Fisheries and Food grant aid for capital schemes undertaken by the Boards.
iii) Contributions, in appropriate cases, from the National Rivers Authority towards the cost incurred by the Boards in handling water flowing through the District from upland areas.

7.3 Designated Watercourses

7.3.1 The Boards are empowered under Section 6 of the Land Drainage Act 1976 (as amended by the Water Act 1989) to exercise a general supervision over all matters relating to the drainage of land within their Districts, and are empowered by Section 17 of that Act to carry out work on all non-main river watercourses within their area. In practice, most Boards designate certain watercourses in their area on which they carry out regular maintenance and other minor watercourses are left to riparian owners to maintain or improve.

7.4 Maintenance of the Flow of Watercourses

7.4.1 Where the proper flow of water is impeded, an Internal Drainage Board may serve notice under Section 18, Land Drainage Act 1976 (as amended by the Water Act 1989), on the person concerned to remedy the situation. This applies to all watercourses in the Drainage District other than main river on which notice would normally be served by the National Rivers Authority.

CHAPTER 8

FLOOD DEFENCE MAINTENANCE

8.0 FLOOD DEFENCE MAINTENANCE

8.1 Objectives

The main objectives for flood defence maintenance can be summarised as follows:

- to preserve the stability, continuity and integrity of flood defences

- to ensure the satisfactory operation of pumping stations, outfalls, sluices and other flood defence structures.

- to ensure that the river systems (channels, floodplain and washland) are capable of containing and transmitting flood waters and tidal surges up to the appropriate target return period.

- in carrying out its operations to preserve and 'further' the river environment.

8.2 Responsibility for Maintenance

The Authority is given powers under Section 17, Land Drainage Act 1976 (as amended by the Water Act 1989) to maintain watercourses designated as main river. It does not have similar powers for the maintenance of non-main rivers which are normally considered the responsibility of the riparian owners although Internal Drainage Boards, District Councils and, in certain cases County Councils have permissive powers on these watercourses.

8.3 Maintenance Programmes

An Asset Management Plan is being developed which will identify maintenance expenditure profiles which will ensure an appropriate Level of Service (LOS) for Flood Defence.

This Level of Service is expressed in terms of a target flood capacity which is calculated from an analysis of the land use benefiting from flood protection.

A major survey of Flood Defence Assets will be carried-out as part of this Asset Management Plan. Many of these assets are approaching the end of their original design life, therefore, this survey will confirm whether the current maintenance practices are adequate or not.

The Asset Management Plan will determine:-

- the target Level of Service

- the existing Level of Service

- the gap or shortfall between the target and existing Level of Service

- objective maintenance programmes appraised by cost benefit techniques. These will be further refined, following full consultation, to ensure that balanced programmes are produced which accommodate environmental interests.

The Region has recently commissioned a new Rivers Information and Maintenance System (RIMS) which assists this development of objective maintenance programmes.

In addition the Region carries out Best Operational Practice Reviews to ensure that full benefit is taken of any new developments in the industry; the resultant cost savings enable our operations to extend over more of the main river network.

Furthermore, post project appraisals are carried-out to ensure that the various models and techniques which have been developed and used are valid.

The Region also funds an annual environmental enhancement programme.

CHAPTER 9

FLOOD DEFENCE AND CONSERVATION

9.0 FLOOD DEFENCE AND CONSERVATION

9.1 Introduction

9.1.1 When carrying out improvements to watercourses due regard is taken of other interests which may be affected by such improvements. Other functions of the NRA are consulted during the detailed design phase of schemes. However, in the past, conservation interests relating to watercourses have not always received their due regard and for this reason particular emphasis has been given in this Survey to these aspects. Therefore, the problem evaluations in Appendix A1 give specific information on conservation and environmental interests where these may be affected by the suggested improvements. In addition, statutory conservation sites and County Trust Reserves are delineated on the maps which accompanied the 1980 report and scheduled in Appendix A3.

9.2 Statutory Provisions for Nature Conservation

9.2.1 Section 8(1) of the Water Act 1989 states that the National Rivers Authority has a duty to "further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological and physiographical features of special interest".

9.2.2 Guidance notes on land drainage and conservation have been circulated jointly by the Department of the Environment, MAFF and the Welsh Offices to all Water Authorities and Internal Drainage Boards in relation to duties under previous legislation. These guidelines are currently being updated to take into account the Water Act 1989.

9.2.3 The relevant functions of the Nature Conservancy Council and the Countryside Commission are given in Appendix A6.

9.2.4 The Authority's standard land drainage consent form has been amended to inform applicants of the need to comply with any duties or responsibilities for the conservation or protection of the environment (including flora and fauna).

9.3 Liaison with Conservation Interests

9.3.1 The Authority attaches great importance to liaison with conservation interests for all land drainage proposals which affect watercourses. These may be summarised as:

i) Improvement schemes identified in the 5 year capital programme for flood defence.

ii) Maintenance work on watercourses.

iii) Proposals for main river variations.

iv) Water Act 1989, Section 136(1) Flooding Survey.

9.3.2 The Authority's area staff have been issued with guidelines on the consultation which is necessary between area staff and conservation/recreation staff where works involve improvement or maintenance of rivers and watercourses.

9.3.3 The principal links between the area offices and conservation and amenity bodies are the Area Conservation and Recreation Officers.

CHAPTER 10

FLOOD WARNING SYSTEM

10.0 FLOOD WARNING SYSTEM

10.1 Investigations have shown that within the Severn-Trent Region of the National Rivers Authority considerable public benefit can accrue from accurate, reliable and well disseminated flood forecasts which provide the general public with adequate warning of flood events. The warnings can provide time for items to be moved from ground floors of residential and commercial properties, for boat owners to secure their crafts, campers and caravanners to evacuate sites, etc.

10.2 The National Rivers Authority has powers to provide and operate a flood warning system by Section 32 of the Land Drainage Act, 1976 (as amended by the Water Act 1989). The main provisions of the system which operates throughout the Region are:

i) To monitor weather conditions and flows and levels in rivers and to forecast future water levels.
ii) To provide warnings of potential floods in areas likely to be affected.
iii) To provide an advice and information service to the general public.
iv) To deploy area staff and equipment as necessary.
v) To liaise with other emergency services.

10.3 The procedure for issuing warnings is normally initiated by the Meteorological Office providing forecasts of rainfall or snowmelt. This information, together with the continual assessment of the detailed catchment situation by the interrogation of the network of rainfall and river flow and level recorders, enables the Authority to forecast and monitor the progression of floods through the river basins.

10.4 When danger areas have been assessed this information has to be passed to the public in those areas. This service is normally provided by the Police who advise the public by loudspeaker, local radio broadcasts and other appropriate methods. This system, however, cannot operate in some areas where localised storms can outpace the forecasting and warning procedure. Therefore, the service is limited to those areas where more than 4 hours warning can be given.

10.5 It is particularly difficult to provide warnings for transient groups of people such as caravanners, campers and boaters. When sites for caravans and camping are being considered the Authority will always advise planning authorities against their location in areas which are subject to periodic inundation. The protection of such sites from flooding is normally difficult, expensive and contrary to Authority policy regarding the use and management of floodplains. The joint DoE/MAFF/WO Circular 17/82 highlights this special risk problem.

10.6 Although major benefits can be attributed to a reliable flood warning system, such a system cannot, in itself, be considered as a satisfactory alternative to structural improvements which will reduce the risk of flooding. The Authority's policy is to continue to provide increased flood alleviation measures, at the same time as providing an effective flood forecasting service, which will give early warning of flooding in unprotected areas and also in the event that flood defences are likely to be overtopped.

CHAPTER 11

PROGRAMMING OF FUTURE WORK

11.0 PROGRAMMING OF FUTURE WORK

11.1 This Survey has identified and evaluated a wide range of flood defence problems throughout the Region. The responsibility for resolving the problems and financing the improvement works falls initially upon the riparian owner although drainage authorities have permissive powers to undertake works.

11.2 In many cases, the necessity for improvement is often due to increased channel flows resulting from developments in the upstream catchment, which, in recent years, have been approved by planning departments of Local Authorities. Where improvements due to development are required on main river, responsibility is normally accepted by this Authority, whereas on non-main river the responsibility is normally that of the District Council in urban areas, and the County Council in agricultural areas (other than in Drainage Districts where the Internal Drainage Board has a responsibility).

11.3 Improvement works on watercourses in individual catchments need to be co-ordinated to ensure that works in one area are compatible with those in another. This Authority is the body responsible for the co-ordination and supervision of flood defence throughout the area, and publishes annually its 5 year programme. The co-ordinating role can be carried out effectively only if all drainage bodies produce programmes of work which satisfactorily integrate to provide the maximum benefit to flood defence. This Survey provides the basis for the determination of such programmes of work.

11.4 Financing of flood defence works varies, dependent on the drainage body promoting the work. Most improvements, other than those needed as a requirement of future development, are eligible for grant aid from the Ministry of Agriculture, Fisheries and Food providing the improvement can be shown to have a satisfactory benefit/cost ratio (see Section 2.11). The sources of finance generally available to drainage bodies are indicated in Appendix A5.

11.5 In the future, the Survey will be updated at intervals of approximately three years. In order to ensure this operation is kept to a minimum in terms of manpower and financial resources, the Authority wishes to be kept informed of all improvement schemes which have been completed and of any additional problems which may be identified from time to time.

APPENDIX A1

PROBLEM DESCRIPTIONS

AND EVALUATIONS

IDENTIFICATION

Problem code number(s):	5-94-210-44/45/46, 5-98-110-3
Watercourse:	River Poulter (non-main river)
Location:	Hardwick Grange/Nether Langwith (Bassetlaw and Bolsover District Councils)
OS Map reference:	SK 647 755 and SK 528 703

NATURE OF PROBLEM

There was risk of flooding to property in the Village of Nether Langwith in February 1977. The River Poulter is in an area liable to some effects of mining subsidence.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Whilst a certain amount of flooding occurs in the locality of Nether Langwith no reports of serious flooding of property have been received.

There could be some risk under conditions more severe than 1977, but it is considered that this could be alleviated by improved maintenance of the watercourse rather than needing extensive works. There are, however, areas of poor drainage upstream (5-98-110-3).

DEVELOPMENT

Future development in the catchment is not expected to have any significant effect on river flows.

BENEFITS

The urban benefits are small and the agricultural benefits negligible.

SUBSIDENCE

This reach of the River Poulter flows through an area which is indicated as being liable to future subsidence.

CONSERVATION

5-94-210-44/46 are known sites of natural history interest.

FISHERIES

Parts of the Poulter can be considered a good coarse fishery.

IDENTIFICATION

Problem code number(s):	5-94-210-52/53, 5-94-510-1/2/3/4, 5-98-110-9
Watercourse:	River Meden (main river)
Location:	West Drayton/Pleasley (Bassetlaw, Mansfield and Bolsover District Councils)
OS Map reference:	SK 703 751, SK 496 633

NATURE OF PROBLEM

The lower reaches of the River Meden were improved in 1964, but other than some pioneer improvement work, minor channel improvement at Gleadthorpe and subsidence remedial works, no substantial improvements have been carried out on the upper reaches. Eight properties have been reported as affected by flooding at Pleasley and some at Warsop. Apart from these areas the River Meden flows mainly through a rural valley where the problems are lack of freeboard, and surface water drainage problems resulting from mining subsidence. In addition the structural stability of the Mill Dam at Pleasley is suspect.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 2 years
		(ii)	Structures	1 in 10/25 years
(c)	**Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

STWA carried out a capital scheme from Church Warsop to Hind Carr Wood and a small scheme at Pleasley Vale. The section from Thoresby Lake to Budby along with improvements at Pleasley was not improved due to insufficient benefits. Both schemes were rechargeable to British Coal.

CONSERVATION

Officially designated SSSI's exist at Warsop Vale (Hills, Holes & Sookholme Brook, SK 555 678) and Thoresby Lane (SK 630 703). Consultations will take place prior to any scheme design with the Nature Conservancy Council and any other interested bodies, on the possible effects of drainage work.

A County Site of Natural History Interest is located at SK 544 660 (Oxpasture Subsidence). A site of natural history interest is located within the benefit area.

SUBSIDENCE

The Meden is liable to the effects of future mining subsidence.

FISHERIES

Thoresby Lake is a good trout fishery. From Warsop downstream the Meden is a good coarse fishery.

IDENTIFICATION

Problem code number(s):	5-98-110-1
Watercourse:	None
Location:	Elmton (Bolsover District Council)
OS Map reference:	SK 502 735

NATURE OF PROBLEM

Flooding of an unclassified road and part of a field occurs on infrequent occasions. There is a satisfactory diversion and the benefits from improvements will not justify an improvement scheme. No watercourse is involved.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	5-98-110-2
Watercourse:	Millwood Brook (non-main river)
Location:	Creswell (Bolsover District Council)
OS Map reference:	SK 526 745

NATURE OF PROBLEM

Flooding of 14 properties along the A616 in Cresswell occurred in February 1977. The flooding is caused by a watercourse which passes through a series of inadequate and silted culverts. Water unable to pass through these culverts overflows onto the A616 and then into adjacent properties.

Further flooding occurred in April 1981 involving basements and threatening property upstream.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 10 years
		(ii)	Structures	1 in 10 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The improvements considered would take the form of regrading of 1.86 km of channel, contruction of 320 m of floodbank, and the cleaning out and repair of existing culverts and bridges. The works would be carried out to protect against a 10 year event only, as the location and lengths of some of the existing culverts would appear to make it economically unsound to provide 100 year protection by channel improvements. It may, however, be possible to provide storage for flows above the 10 year magnitude at a site upstream of Creswell, the Hollinhill/Markland Grips area. From a visual inspection this site appears to be suitable but a detailed investigation of the potential of the area needs to be undertaken.

Flows were calculated using the unit hydrograph method. The design scheme costed above will provide for a capacity of 3.5 cumecs (100 year = 6.2 cumecs).

Bolsover District Council have cleaned out the existing culverts and regraded a length of channel which has reduced the extent and frequency of flooding. A scheme for the construction of floodbanks has been completed.

DEVELOPMENT

27 ha of residential development is proposed in the Creswell/Clowne area.

BENEFITS

Prior to improvements, 14 properties would have been affected by a 10 year flood and some 50 shops, commercial premises and dwellings might have suffered flood damage during a 100 year event.

SUBSIDENCE

The Millwood Brook is partly within an area which could be subject to mining subsidence, the area including Hollinhill/Markland Grips.

RECREATION, FISHERIES AND AMENITY

These facilities would not be affected by improvement works but if a flood storage scheme is adopted these may offer the possibility of some improvement in some amenity aspects.

CONSERVATION

A site of Special Scientific Interest is recorded at Hollinhill and Markland Grips. Cresswell Craggs is downstream of the length considered.

IDENTIFICATION

Problem code number(s):	5-98-110-4
Watercourse:	Sookholme Brook (non-main river)
Location:	Shirebrook (Bolsover District Council)
OS Map reference:	SK 533 675

NATURE OF PROBLEM

An inadequate culvert on this tributary of the River Meden caused flooding at a Water Reclamation Works and an industrial site. The Local Authority have carried out improvements to the culvert and a section of the watercourse. A further improvement in conditions may be achieved by improvements to Sookholme Brook downstream of the Reclamation Works (5-94-510-6).

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

CONSERVATION

The Nottinghamshire Trust for Nature Conservation has designated this area a high grade County Site for Natural History Interest.

SUBSIDENCE

The watercourse is in an area which might be subject to future mining subsidence.

FISHERIES

Part of the brook course is fished.

IDENTIFICATION

Problem code number(s):	5-98-110-8
Watercourse:	Suff Brook (non-main river)
Location:	Pinxton Wharf (Bolsover District Council)
OS Map reference:	SK 451 553 to SK 453 543

NATURE OF PROBLEM

At times of high flows in the River Erewash, the Suff Brook backs up through the railway embankment and frequently floods properties, gardens and roads. Some flooding can also be attributed to Erewash water being unable to drain due to blocked culverts. Past mining subsidence has also created low areas which pond flood water.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	374,780	
		(ii)	Field drainage	£		£374,780
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	25,020	
		(iii)	Roads/Railways	£		
		(iv)	New Development	£	300,250	£325,270
(c)	**Benefit/cost ratio**					0.9
(d)	**Priority category**					3C

IMPROVEMENT WORKS

Investigations have shown that the existing channel is inadequate and should be enlarged and regraded for 0.9 km. This also includes several bridges which need to be rebuilt.

The culvert beneath the railway at Pinxton Wharf has subsided and is inadequate to accept the design flows. It should be reconstructed and two blocked off culverts within the adjacent scrap yard re-opened. Some regrading work is necessary immediately downstream of the railway embankment within the derelict canal which carries the watercourse through to the Erewash. The estimated flood discharge is 4.7 cumecs (100 year) from a catchment area of 1.2 sq km.

DEVELOPMENT

Development in the Suff Brook catchment as indicated in the Structure Plan has been taken into account in the proposals, although some of the development has already proceeded in anticipation of the improvement.

BENEFITS

The benefits have been calculated based upon an estimated eight properties which would flood in the 100 year event. The agricultural areas, which are permanent pasture, are not expected to benefit from these improvements.

RECREATION, FISHERIES AND AMENITY

The Pinxton Wharf site is part of the Nottinghamshire County Councils amenity development of the disused Pinxton Canal. Part of Suff Brook contains coarse fish.

IDENTIFICATION

Problem code number(s):	5-98-110-10
Watercourse:	Millwood Brook (non-main river)
Location:	Clowne (Bolsover District Council)
OS Map reference:	SK 495 762

NATURE OF PROBLEM

There are three interrelated land drainage problems at Clowne:

1) Flooding of Rotherham Road (A618) due to insufficient freeboard.
2) The retained high water level of Harlesthorpe Dam.
3) Flooding of Station Road, due mainly to inadequate culvert openings and channel capacity.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in years
	(ii)	Structures	1 in years
(c) **Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Problem 1 Improvement works have been completed and appear successful.

Problem 2 A Panel 1 Engineer's Report has been prepared and it is understood that the owner has carried out some of the recommendations. The District Council is monitoring the situation.

Problem 3 Improvement works have been completed and appear successful.

FISHERIES

There is an active fishing lake at Harlesthorpe Dam which is privately owned.

IDENTIFICATION

Problem code number(s):	6-98-110-1/2/3/4
Watercourse:	Alfreton and Normanton Brooks (non-main river)
Location:	Blackwell (Bolsover District Council)
OS Map reference:	SK 440 577 to SK 449 568

NATURE OF PROBLEM

Ford and Water Lanes, agricultural land and a sewage works suffer from flooding, most recently in 1975. In 1979 STWA completed the 'main river' works on the Alfreton Brook downstream of Fordingbridge Lane (channel works 1 in 10 years; structures 1 in 25 years) which will accommodate augmented river flows due to increased run-off from the Alfreton and Mansfield areas.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Non-main river improvements have been carried out by Nottinghamshire County Council and Bolsover District Council between SK 443 578 and SK 449 568. These works were completed in 1979 and since then no further flooding problems have occurred.

The original inadequate road culvert beneath Water Lane has been replaced with twin 600 mm diameter culverts. This has considerably reduced the risk of flooding from a tributary of Normanton Brook. Flooding of the road and some gardens still occurs but this is due to a sewerage problem and/or inadequate road drainage. No further land drainage works are proposed.

FISHERIES

The fisheries interest at these sites has improved as a result of the land drainage scheme.

IDENTIFICATION

Problem code number(s):	5-98-210-1
Watercourse:	River Trent (main river)
Location:	Sawley (Erewash Borough Council)
OS Map reference:	SK 470 308

NATURE OF PROBLEM

The A453 trunk road is affected by major floods. This road is in the floodplain of the River Trent and the benefits from flood alleviation will not justify the extensive improvement works required.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	5-98-210-2 and 5-98-310-2
Watercourse:	River Trent (main river)
Location:	Sawley (Erewash Borough Council)
OS Map reference:	SK 490 312

NATURE OF PROBLEM

Several properties including public houses are situated in the River Trent floodplain at the junction of the Erewash Canal and the River Trent. The area has become a centre for water-based recreational activities and any flood risk to property is that which would reasonably be expected in view of its location.

For practical purposes any alleviation measures should be directed towards providing adequate flood warning in order to minimise damage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The former STWA completed a scheme for raising minor flood defences to a 1 in 10 year standard.

CONSERVATION

This site adjoins a small area of marsh which is of some local interest.

IDENTIFICATION

Problem code number(s):	5-98-210-6
Watercourse:	Erewash Canal and Feeder Drain (non-main river)
Location:	Sandiacre (Erewash Borough Council)
OS Map reference:	SK 482 378

NATURE OF PROBLEM

Poor drainage and some surface flooding affects approximately 4 ha of wasteland and 1 ha of pasture. Drainage improvements are considered both uneconomical and impractical as they would involve the lowering of the Erewash Canal water level and improvement to the downstream overflow arrangements.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

FISHERIES

The lower reaches of the canal are extensively fished.

IDENTIFICATION

Problem code number(s):	5-98-210-11/12
Watercourse:	Golden Brook (non-main river)
Location:	Long Eaton (Erewash Borough Council)
OS Map reference:	SK 508 335, SK 482 334

NATURE OF PROBLEM

Under major flood conditions extensive flooding occurs within the urban area of Long Eaton from the Golden Brook and its tributary the Harrington Drain. In February 1977 this affected some 60 properties, including a post-war residential estate which had been previously flooded in December 1960. The flooding is due to urban encroachment on the floodplain and watercourse resulting in inadequate capacity for flows, and these are further impeded at the outfall of the Brook when the River Erewash is also in flood.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

(a) Work completed: Automation of penstock control on Golden Brook at the canal. Major improvements in Oakley's Road area. Construction of a pumping station on the outfall to the floodplain. Improvements between the M1 and West Park. A new culvert under Wilsthorpe Road and the diversion of a sewer. Construction of floodbanks to the south of Golden Brook and on the north side of Harrington Drain.

(b) Work to be carried out: Improvements to Breaston lagoon. This should be completed in 1990/91. When completed, the level of protection will be 1 in 100 years.

CONSERVATION

The existing flood storage lagoon at Breaston is now classified as a nature reserve.

FISHERIES

The Brook contains coarse fish.

IDENTIFICATION

Problem code number(s):	5-98-210-13
Watercourse:	Golden Brook, Golden Stream (non-main river)
Location:	Breaston (Erewash Borough Council)
OS Map reference:	SK 453 346 to SK 473 337

NATURE OF PROBLEM

The culverted crossings under Draycott Road, on both watercourses, are inadequate to deal with higher rates of run-off owing to the configurations of the culverts and their entries. Eleven properties were flooded above floor level in 1977, and about 30 suffered sub-floor flooding. These problems were the subject of a consultant's study and a report has been prepared for the Local Authority.

In addition, 60 ha of agricultural land are subject to flooding and poor drainage because of inadequate freeboard, both upstream and downstream of Draycott Road.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in 5 years
	(ii)	Structures	1 in 5 years
(c) **Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£_____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	
	(iv)	Future development	£	£_____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The following improvements were completed in 1989:

Golden Stream (Protection level 1 in 30 years)

1) Regrading of field ditch to the south of Gregory Avenue
2) Construction of a bund north of Gregory Avenue
3) Streamlining of the confluence of agricultural drainage from east and west adjacent to Western Mare School
4) New channel part open cut, part culvert through Western Mare playing fields
5) New culverts under Draycott Road

Golden Brook (Protection level 1 in 50 years)

1) Realignment of the Brook north of Draycott Road and streamlining of culvert entrance
2) Bund to the west of the Brook, north of Draycott Road, and flood protection wall to the boundary of No 50 Draycott Road with a bund to the northern boundary of the same property
3) Concrete flood defence wall adjacent to Draycott Road (north side to prevent overtopping of water onto the highway

4) Streamlining the outfall from Draycott Road culvert and widening and regrading downstream (adjacent to the "Crescent")
5) Reconstruction of accommodation bridge over the brook at the end of Marlborough Road.

FISHERIES

The Brook contains coarse fish.

IDENTIFICATION

Problem code number(s):	5-98-210-14
Watercourse:	None
Location:	Draycott (Erewash Borough Council)
OS Map reference:	SK 452 333

NATURE OF PROBLEM

Flooding of the railway line in the cutting occurs on average two or three times a year, occasionally stopping services between Nottingham and Derby. The flooding is attributed to inadequate track drainage, but the problems have increased following the infilling of the Derby Canal.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

British Rail are investigating proposals to alleviate flooding as prt of the future electrification of the line. The flood alleviation proposals will be promoted as part of the British Rail Bill through Parliament and are anticipated to cost a minimum of £0.5M. It is anticipated that the track side drainage and the run-off from the infilled Derby Canal will be discharged to a suitable outfall point in the Derwent Division.

IDENTIFICATION

Problem code number(s):	5-98-210-17/18/19
Watercourse:	Nut Brook (non-main river)
Location:	Stanton to Ilkeston (Erewash Borough Council)
OS Map reference:	SK 482 390 to SK 449 425

NATURE OF PROBLEM

The natural course of the Nut Brook is affected by the now disused Nut Brook Canal and by industrial development. Flooding of the Stanton Ironworks complex takes place under major flood conditions. The Stanton Ironworks site is vulnerable to flooding from events with an estimated recurrence interval of 15 years or greater. Areas of agricultural land served by the Brook are flooded. Some allotments have suffered frequent inundation in recent years and about 1 ha of land is more or less permanently flooded. Further urban development is planned and the upper part of the catchment is affected by opencast coal workings.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in 2/10 years
	(ii)	Structures	1 in 25 years
(c) **Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	
	(iv)	Future development	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

A balancing scheme has been completed by Derbyshire County Council upstream., but problems still exist downstream.

Flood discharge estimated by Flood Studies Report methods is 3 cumecs (2 year) from a total catchment of 43 sq km.

DEVELOPMENT

Further development in the Nut Brook catchment will require additional flows to be balanced.

CONSERVATION

5-98-210-17 adjoins an area of species rich grassland.
5-98-210-19 had only recently become flooded, but in this relatively short time it has become a locally important ornithological site.

IDENTIFICATION

Problem code number(s):	5-98-210-20/21
Watercourse:	Sow Brook (non-main river)
Location:	Kirk Hallam (Erewash Borough Council)
OS Map reference:	SK 464 398 to SK 440 387

NATURE OF PROBLEM

The Sow Brook is a tributary of the Nut Brook and flows mainly through agricultural areas. The problem is mainly one of improvement of the arterial drainage and there is some flood risk to two properties at Dale and minor road flooding.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in years
(b) **Agricultural**	(i)	Channel	1 in 5 years
	(ii)	Structures	1 in 25 years
(c) **Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	118,200	
	(ii)	Field drainage	£	25,020	£143,220
(b) **Present value of benefits**	(i)	Agriculture	£		
	(ii)	Buildings)	£	115,100	
	(iii)	Roads/Railways)	£		£115,100
(c) **Benefit/cost ratio**					0.8
(d) **Priority category**					3C

IMPROVEMENT WORKS

The watercourse will require regrading over a length of approximately 2 km and improved discharge capacity will be required at road crossings including Dale Ford. Works may also be necessary on the lake downstream of Sow Brook Lane.

CONSERVATION

5-98-210-21; Ponds near the Sow Brook at this location are of botanical interest and it is thought to be certain that work on the Sow Brook at this point would affect the eastern pond and possibly the others also.

5-98-210-20; This site is a wet, rush-dominated grassland, a habitat considered rare in such a locality, and one which has developed an ornithological interest.

FISHERIES

The Brook contains coarse fish.

IDENTIFICATION

Problem code number(s):	5-98-210-22/23
Watercourse:	Stanley Brook (non-main river)
Location:	Kirk Hallam/Stanley (Erewash Borough Council)
OS Map reference:	SK 452 411 to SK 409 408

NATURE OF PROBLEM

The Stanley Brook is in a poorly maintained condition, which has contributed to some flooding of property in its higher reaches at Stanley where agricultural drainage is also affected.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in 5 years
	(ii)	Structures	1 in years
(c) **Land potential category**			a5

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£_____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	
	(iv)	New development	£	£_____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

A drainage scheme to regrade the watercourse from SK 421 403 to SK 416 401 was completed by Derbyshire County Council in 1986. Works have been successful downstream of the road bridge. The field upstream of the bridge floods occasionally due to the brook overtopping its banks upstream of the improvement and flowing overland.

DEVELOPMENT

Further development in the Stanley Brook catchment as indicated in the latest structure plan amounts to 17 ha.

FISHERIES

The Brook contains coarse fish.

IDENTIFICATION

Problem code number(s):	6-98-210-3/5
Watercourse:	Ock Brook (non-main river)
Location:	Ockbrook (Erewash Borough Council)
OS Map reference:	SK 422 359

NATURE OF PROBLEM

Flooding occurs to Hillcroft Drive and Flood Street and results from inadequacies in the surface water drainage system. Works to watercourses will not alleviate the problem so the solution is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-210-4
Watercourse:	Ock Brook (non-main river)
Location:	Ockbrook (Erewash Borough Council)
OS Map reference:	SK 424 356

NATURE OF PROBLEM

Flooding has occurred to 3 houses in Collier Lane and 3 houses in Cole Lane when the culvert under Cole Lane becomes wholly or partially blocked by debris. Flooding last occurred in February 1977.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	118,200	
		(ii)	Field drainage	£		£118,200
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	2,500	
		(iii)	Roads/Railways	£		£2,500
(c)	**Benefit/cost ratio**					0
(d)	**Priority category**					3C

IMPROVEMENT WORKS

The proposed solution requires the replacement of the culvert with a bridge, and tree clearance and regrading of the Brook upstream and downstream of Cole Lane.

IDENTIFICATION

Problem code number(s):	6-98-210-7
Watercourse:	None
Location:	Ockbrook (Erewash Borough Council)
OS Map reference:	SK 420 353

NATURE OF PROBLEM

Flooding occurs to the Borrowash By-pass at the junction of Victoria Avenue and the A52 road. Flooding, which last occurred in February 1977, results from inadequate farm and highway ditches. Works to watercourses will not alleviate the problem and the solution is, therefore, outside the scope of the Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-210-8
Watercourse:	Un-named tributary of Ock Brook (non-main river)
Location:	Ockbrook (Erewash Borough Council)
OS Map reference:	SK 423 366

NATURE OF PROBLEM

Flooding occurs to Moor Lane and Dale Road, the last occasion being February 1977. The flooding results from the inadequacy of the highway surface water drainage system and a solution to the problem is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-210-9
Watercourse:	Collier Brook (non-main river)
Location:	Borrowash (Erewash Borough Council)
OS Map reference:	SK 426 341

NATURE OF PROBLEM

Occasional flooding occurs from the watercourse running adjacent to the boundary of Lilley's Narrow Fabrics, Draycott Road, Borrowash. As no serious flooding to the factory or road occurs at this location, no alleviation works are proposed at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

COMMENT

Part of the problem was the presence of a surface water sewer which partially obstructs the road culvert. This pipe has now been removed as part of development infrastructure, and considerable improvements have been realised.

IDENTIFICATION

Problem code number(s):	6-98-210-11
Watercourse:	Un-named (non-main river)
Location:	Draycott (Erewash Borough Council)
OS Map reference:	SK 443 334

NATURE OF PROBLEM

Flooding occurred to property on Wilne Road and the boiler room at Draycott School in October 1965, July and August 1973 and February 1977. Minor flooding has also occurred to agricultural land.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Flooding on Wilne Road largely results from the surcharging of the foul sewerage system and, as such, the solution is outside the scope of this Survey.

The flooding to the boiler room at Draycott School is partially attributable to groundwater percolation and, although improvements to the watercourse will have a slight effect on this problem, it will not solve it. The solution is also, therefore, outside the scope of this Survey.

The culvert inlet upstream of the School has been improved and the Borough Council are considering increasing the ditch size upstream to provide greater flood storage.

IDENTIFICATION

Problem code number(s):	6-98-210-12
Watercourse:	Rivers Derwent/Trent (main river)
Location:	Shardlow (Erewash Borough Council)
OS Map reference:	SK 452 315

NATURE OF PROBLEM

Agricultural land and Wilne Lane, both within the floodplains of the Rivers Derwent and Trent, are flooded from time to time. Inundation of this area during times of high flows in the rivers is essential to protect urban areas downstream, and no proposals can be recommended for the improvement of this problem.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Improvements to Wilne Drain and the Great Wilne defences were included in the Shardlow FAS completed in 1981.

IDENTIFICATION

Problem code number(s):	6-98-210-14
Watercourse:	Boosemoor Brook (non-main river)
Location:	Breadsall (Erewash Borough Council)
OS Map reference:	SK 370 400

NATURE OF PROBLEM

Flooding occurred in February 1977 for a duration of 3 to 6 hours to eight properties and a minor road. Flooding has occurred frequently in the past as a result of inadequate channel and culvert capacity.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	49,010	
		(ii)	Field drainage	£		£49,010
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	30,030	
		(iii)	Roads/Railways	£		£30,030
(c)	**Benefit/cost ratio**					0.6
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The recommended improvements consist of widening the channel and installing new box culverts under Rectory Road to provide a design capacity of 7.2 cumecs. The Borough Council have expressed an interest in the scheme.

BENEFITS

No appreciable benefits will result from alleviation of the flooding of the minor road and these have, therefore, not been calculated.

IDENTIFICATION

Problem code number(s):	6-98-210-15
Watercourse:	Lees Brook (non-main river)
Location:	Spondon (Erewash Borough Council)
OS Map reference:	SK 402 374

NATURE OF PROBLEM

Minor flooding occurs to agricultural land and the highway. The flooding is not serious and the cost of remedial works will far outweigh the benefits gained. Therefore, no recommendation can be made for improvements.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-210-17
Watercourse:	Dam Brook (non-main river)
Location:	Breadsall (Erewash Borough Council)
OS Map reference:	SK 370 388

NATURE OF PROBLEM

Five houses, a shop and a telephone exchange (subsequently converted to a house) on Brookside Road and Rectory Lane were flooded in 1965 and 1977 for durations of 3 to 6 hours. Minor roads have also been flooded.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	236,400	
		(ii)	Field drainage	£		£236,400
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	17,510	
		(iii)	Roads/Railways	£		£17,510
(c)	**Benefit/cost ratio**					0.1
(d)	**Priority category**					3C

IMPROVEMENT WORKS

The recommended solution will provide a design capacity of 6.4 cumecs and requires:

i) The construction of a new box culvert at the junction of Rectory Lane/Brookside Road/Croft Lane.
ii) The replacement of several access bridges to property on the south side of Brookside Road.
iii) Regrading, lining and the construction of low flood walls to the section upstream of the new culvert.
iv) Deepening and widening of the channel downstream of the new culvert.

BENEFITS

It has been estimated that the 100 years flood will affect twelve houses, a shop and a minor road. The benefit from alleviation of flooding to the road is small and has not, therefore, been assessed.

IDENTIFICATION

Problem code number(s):	6-98-210-18
Watercourse:	Un-named tributary of Ock Brook (non-main river)
Location:	Ockbrook (Erewash Borough Council)
OS Map reference:	SK 422 356

NATURE OF PROBLEM

Surcharging of an old brick highway culvert has caused flooding to Collier Lane and has, on several occasions, threatened to flood a bungalow adjacent to the culvert entrance. The problem is worsened by an obstructive trash grid at the upstream end which frequently becomes choked with debris. It is also believed that the culvert is restricted internally by the presence of a 'service' pipe.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The Borough Council have expressed an interest in the problem and are intending to investigate the problem in the future.

IDENTIFICATION

Problem code number(s):	6-98-210-19
Watercourse:	None
Location:	Borrowash (Erewash Borough Council)
OS Map reference:	SK 416 347

NATURE OF PROBLEM

A builder's yard and the garden of No. 34 Derby Road are flooded regularly as a result of surface water run-off from adjacent agricultural land. No obvious existing watercourse or culvert exists to carry this water away and the flow presently just runs overland and onto the road.

The farm ditches serving this area have recently been improved and this has exacerbated this problem such that in extreme rainfall, property may be threatened.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The Borough Council are aware of this problem and are intending to carry out an investigation in the near future.

IDENTIFICATION

Problem code number(s):	5-98-310-6/7
Watercourse:	Bailey Brook (non-main river)
Location:	Loscoe to Langley Mill (Amber Valley District Council)
OS Map reference:	SK 425 478 to SK 456 463

NATURE OF PROBLEM

There is flooding at various points along the watercourse between Loscoe Dam and the River Erewash. The Trent bus garage on Station Road has been affected by flooding in the past. The main problems appear to be the result of inadequate channel and culvert capacity, owing in part to lack of maintenance and blockages. Also two properties adjacent to Loscoe Dam are threatened during severe floods because of the storage produced by inadequate flood weirage.

The Brook requires improvement to provide for development in the catchment and there is a need for co-ordination in the phasing of development and land drainage works.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	10	years
	(ii)	Structures	1 in	25	years
(b) **Agricultural**	(i)	Channel	1 in	3	years
	(ii)	Structures	1 in		years
(c) **Land potential category**				a	

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	446,850	
	(ii)	Field drainage	£	7,510	£454,360
(b) **Present value of benefits**	(i)	Agriculture	£	50,010	
	(ii)	Buildings	£		
	(iii)	Roads/Railways	£		
	(iv)	New Development	£	930,780	£980,790
(c) **Benefit/cost ratio**					2.2
(d) **Priority category**					1C

IMPROVEMENT WORKS

A scheme has been produced by Amber Valley District Council based on stated design flows of 1 in 25 years for structures and 1 in 10 years for open channel. The Council's calculations were based on the rational method of flood prediction, and give lower flows than those predicted by the Flood Studies Report. It is, however, important that the property should not flood in a 50 or 100 year event, although some out of banks flooding would be acceptable. The estimates derived from the Local Authority's preliminary report may be subject to some revision.

The Local Authority scheme comprises the regrading of 1,150 m of open channel together with culverting or re-culverting of 220 m of watercourse. British Coal will be carrying out improvement works immediately downstream of Loscoe Dam as part of its proposed opencast workings. It is proposed that consideration be given to replacement of the inadequate weir on Loscoe Dam with a larger open weir and spillway (subject to the requirements of the Inspecting Engineer under the Reservoirs Act). Some tree clearing and improved maintenance is necessary on open channel lengths.

The stated 1 in 25 year flood flow from the fully developed catchment of 13.6 sq km is 7.20 cumecs at the Erewash Confluence (1 in 10 year - Flood Studies Report).

Some channel improvements have been carried out downstream of the Trent bus garage on Station Road.

DEVELOPMENT

The catchment can conveniently be split into two parts, upstream of Loscoe Dam and downstream. Upstream, a total of 21.9 ha of future development are proposed comprising 21.5 ha residential and 0.4 ha industrial. Downstream, there are 66.5 ha of future residential and 4.7 ha of industrial development proposed. In the fully developed catchment the urban proportion will be 41.6%, the design flows allow for the future development.

BENEFITS

(i) Urban: The value of benefits attributable to buildings derives entirely from the betterment to future development within the catchment, assuming that the total proposed area (93.1 ha) is realised, at £10,010/ha.

(ii) Agricultural: It is difficult to assess an average gross margin as the area north-west of Mansfield Road is derelict, with little or no agricultural production, and part of the area east of the railway is similarly semi-derelict. The only agricultural land is the area around Lacey Fields Farm where drainage does not appear to be a serious limiting factor.

RECREATION AND AMENITY

Some of the flooded land is designated a recreation area by Amber Valley District Council.

CONSERVATION

The Derbyshire Naturalists Trust have expressed interest in maintaining the area between the Brook and Bailey Brook Drive as a nature reserve, though it is not officially designated as such at present. The Council's proposals will have no detrimental effect on the area from the Naturalists' viewpoint and it should be possible to provide an adequate drainage system on the Brook, compatible with other proposals for land use.

FISHERIES

The Brook contains coarse fish.

COMMENT

The District Council are investigating a scheme for on-site balancing when opencast mining is completed.

IDENTIFICATION

Problem code number(s):	5-98-310-9
Watercourse:	Birchwood Brook (non-main river)
Location:	Somercotes (Amber Valley District Council)
OS Map reference:	SK 438 541 and SK 448 537

NATURE OF PROBLEM

The watercourse is affected by development in its upper reaches, the run-off from which is partially controlled by balancing ponds. The channel is in need of some improvement but the area is partly the subject of opencast mining proposals in the near future.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£		
	(ii)	Field drainage	£		£
(b) **Present value of benefits**	(i)	Agriculture	£		
	(ii)	Buildings	£		
	(iii)	Roads/Railways	£		
	(iv)	New development	£	267,720	£267,720
(c) **Benefit/cost ratio**					
(d) **Priority category**					

IMPROVEMENT WORKS

Preliminary investigations have shown that the existing channel is inadequate and should be enlarged and regraded. All structures would require some work to be carried out in order to accept appropriate design flows. The lower section of the watercourse, upstream of the Erewash confluence, is within an area designated for Open Cast Mining Development. The necessary standards for improvement of the watercourse should be considered in conjunction with restoration of that area. No estimate of cost has therefore been provided. The unbalanced flood discharge estimated by the Flood Studies Report methods is 9.2 cumecs (100 year) from a total catchment area of 4.3 sq km.

DEVELOPMENT

New development in the Birchwood Brook catchment, as indicated in the County Structure Plan, amounts to 145 ha. This development is currently taking place. The surface water run-off will be flow balanced.

BENEFITS

Flood damage to property is negligible and only the proposed development benefits have been taken into account. Future development benefits have been allowed at £10,010/ha and provide a benefit value of £267,720. The agricultural areas, which are permanent pasture, are not expected to benefit from these improvements.

IDENTIFICATION

Problem code number(s):	6-98-310-1
Watercourse:	Windley Brook (non-main river)
Location:	Windley (Amber Valley District Council)
OS Map reference:	SK 311 450

NATURE OF PROBLEM

An inadequate channel section and obstructive culverts cause flooding to Windley Hall, Windley Cottage, the cheese factory and the associated grounds, garages etc.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	66,310	
		(ii)	Field drainage	£		£66,310
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	17,510	
		(iii)	Roads/Railways	£		£17,510
(c)	**Benefit/cost ratio**					0.3
(d)	**Priority category**					3D

IMPROVEMENT WORKS

The proposed scheme consists essentially of the provision of a floodbank together with an improved channel section and new culverts at the accesses to the Windley Hall complex. These works will provide for a design capacity of 11.3 cumecs.

BENEFITS

The principal benefits of the scheme are flood protection to the Windley Hall buildings and its garden.

CONSERVATION

Windley Hall is a listed building.

NOTE

Surface water problems were also reported in Windley Village on Flower Lilies Drive and the steeply inclined B5024 Windley-Turnditch Road. These problems however, fall outside the scope of this Survey.

IDENTIFICATION

Problem code number(s):	6-98-310-2
Watercourse:	Buckland Hollow Brook (non-main river)
Location:	Pentrich (Amber Valley District Council)
OS Map reference:	SK 376 518

NATURE OF PROBLEM

A private road off the B6013 and adjacent land and pasture land at Lower Hartshay are subject to flooding caused by the backing up of the minor watercourse when the River Amber is in flood. It is anticipated that flooding from the Brook would be alleviated considerably if improvements were carried out on the River Amber.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-3
Watercourse:	Flagshaw Brook (non-main river)
Location:	Kirk Langley (Amber Valley District Council)
OS Map reference:	SK 281 388

NATURE OF PROBLEM

The Flagshaw Brook runs through the front garden of Lilac Cottage, then underneath the adjacent cottage and finally a piped culvert under Church Lane before flowing to the Mackworth Brook as open channel.

The gardens and garages of the two cottages are subject to infrequent flooding together with a section of Church Lane.

As no serious flooding occurs to property or land, flood alleviation works have not been considered at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-5
Watercourse:	Franker Brook (non-main river)
Location:	Turnditch (Amber Valley District Council)
OS Map reference:	SK 307 468

NATURE OF PROBLEM

In times of flood, Franker Brook and surface water from Cowers Lane surcharge the Brook culvert under the B5023 and flood the gardens of The Hawthorns. Since no serious flooding to property occurs, no alleviation works are proposed.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£ ____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£ ____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-6/19
Watercourse:	Coppice Brook tributaries (non-main river)
Location:	Belper/Ripley (Amber Valley District Council)
OS Map reference:	SK 393 500 to SK 344 471

NATURE OF PROBLEM

Flooding occurs to three houses at Bullsmoor, eight houses and a School at Farm Close/Alton Road and two farms. The railway line in Belper also floods as does land in the floodplain of the Coppice Brook and its tributaries. Flooding occurred in December 1965, Summer 1973 and February 1977.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 10 years
		(ii)	Structures	1 in 50 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Bullsmoor

Flood alleviation works consisting of replacement box culverting and watercourse improvements were completed in 1983.

Farm Close/Alton Road

A new length of box culvert has been provided behind the Belper High School and the County Council have improved the road culvert below Kilburn Road. These works were completed in 1983.

Coppice Brook (Generally)

A 30,000 m^3 balancing reservoir (1 in 25 years standard) has been constructed near Belper High School. This was completed in 1984 and a further balancing reservoir and other channel improvement works are planned for the future. These future works will allow further development to take place within this catchment area.

COMMENT

The Consulting Engineers Report dated 1978, commissioned by the District Council, identified £1.135m (1978 price base) of engineering works to alleviate flooding. The Council has an ongoing programme of improvement works to phase expenditure.

IDENTIFICATION

Problem code number(s):	6-98-310-7
Watercourse:	River Ecclesbourne (non-main river)
Location:	Turnditch (Amber Valley District Council)
OS Map reference:	SK 294 478

NATURE OF PROBLEM

One property, South View, situated near the confluence of the River Ecclesbourne and Sherbourne Brook, suffers regularly from flooding (five times in the last 20 years).

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	31,710	
		(ii)	Field drainage	£		£31,710
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	22,520	
		(iii)	Roads/Railways	£		£22,520
(c)	**Benefit/cost ratio**					0.7
(d)	**Priority category**					3E

IMPROVEMENT WORKS

It is suggested that a floodbank is constructed around South View combined with a road ramp and the filling/shaping of a disused ford to provide a 1 in 100 years standard.

NOTE

Flooding of agricultural land adjacent to the River Ecclesbourne occurs but investigations have shown that existing freeboard is approximately 1.8 m under normal flow conditions. It is considered that the reduction in frequency of flooding effected by further channel improvement would only yield marginal increases in gross margins. The benefits and costs of such a scheme have, therefore, not been evaluated.

FISHERIES

The Ecclesbourne is a good trout fishery and consultation will be necessary.

IDENTIFICATION

Problem code number(s):	6-98-310-9/26/27
Watercourse:	River Amber (main river)
Location:	South Wingfield (Amber Valley District Council)
OS Map reference:	SK 387 566 to SK 347 515

NATURE OF PROBLEM

530 ha of the River Amber washland (two thirds of which is pasture and the remainder industrial, housing, wastelands or woods) suffer from flooding and inadequate arterial drainage. Flooding has occurred in 1965, 1973 and 1977. A church, 2 houses and a factory have been flooded.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**			a	

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£		
		(ii)	Field drainage	£	150,130	£150,130
(b)	**Present value of benefits**	(i)	Agriculture	£	147,250	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£147,250
(c)	**Benefit/cost ratio**					
(d)	**Priority category**					

IMPROVEMENT WORKS

The NRA is not intending to implement any comprehensive flood alleviation works on the River Amber in the foreseeable future due to the lack of benefit. Certain limited alleviation works may be carried out in the long term provided that a favourable benefit/cost ratio can be achieved.

BENEFITS

The owner of a large proportion of the benefit area is opposed to an improvement scheme.

FISHERIES

This site is an existing coarse fishery.

IDENTIFICATION

Problem code number(s):	6-98-310-10
Watercourse:	Gypsy Brook (non-main river)
Location:	Horsley Woodhouse (Amber Valley District Council)
OS Map reference:	SK 395 445

NATURE OF PROBLEM

The road flooding problem, reported in the vicinity of the Gypsy Brook culvert on Wood Lane, is the result of heavy silting of the old stone culverts and inadequate surface water drainage at the local low spot. Minor road flooding last occurred in July 1982 but the road was still passable.

Such remedial measures involving maintenance and surface water drainage works fall outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-11
Watercourse:	Park Brook (non-main river)
Location:	Horsley (Amber Valley District Council)
OS Map reference:	SK 384 438

NATURE OF PROBLEM

The Park Brook passes under Smalley Mill Road through a culvert which surcharges and floods the road under storm conditions. As no serious flooding to land or property occurs no alleviation works are proposed at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-12
Watercourse:	Park Brook (non-main river)
Location:	Smalley (Amber Valley District Council)
OS Map reference:	SK 397 434

NATURE OF PROBLEM

The Park Brook flows towards the Smalley Mill district then, more steeply, through private gardens from the rear and under Wood Lane through twin 0.6 m diameter pipes. The piped culvert is of insufficient capacity during flood conditions when water spills onto Wood Lane and re-enters the Brook approximately 70 m further along the road. Two properties were flooded in 1973 by stormwater running off the high ground at the rear, down towards Wood Lane.

A floodbank was erected privately in the field behind the affected properties immediately after the flood event in 1973, and improvement works to the upstream section of the Brook were carried out.

No flooding to property has been reported since 1973, but Wood Lane is still affected during storm conditions. As no serious flooding now occurs, alleviation works are not proposed at this stage.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-13
Watercourse:	Shipley Brook (non-main river)
Location:	Blackbrook (Amber Valley District Council)
OS Map reference:	SK 330 477

NATURE OF PROBLEM

Two semi-detached houses and the A517 road flooded for up to two hours in 1977 and again in 1978 as a result of inadequate culverts under the A517. The road and gardens have been flooded on numerous occasions since 1978.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	10,090	
		(ii)	Field drainage	£		£10,090
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings)	£		
		(iii)	Roads/Railways)	£	5,000	£5,000
(c)	**Benefit/cost ratio**					0.5
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The solution proposed is the provision of a new culvert to provide for a design capacity of 8.5 cumecs.

IDENTIFICATION

Problem code number(s):	6-98-310-15
Watercourse:	Un-named tributary of the Markeaton Brook (non-main river)
Location:	Quarndon (Amber Valley District Council)
OS Map reference:	SK 332 399

NATURE OF PROBLEM

Two semi-detached houses were flooded in 1977 due to the inadequate capacity of culverts upstream and downstream of the property. Several other properties are at risk from slight inundation from major flood events.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	74,960	
		(ii)	Field drainage	£		£74,960
(b)	**Present value of benefits**	(i)	Agriculture	£		-
		(ii)	Buildings	£	1,250	
		(iii)	Roads/Railways	£		£ 1,250
(c)	**Benefit/cost ratio**					0
(d)	**Priority category**					3D

IMPROVEMENT WORKS

The works envisaged consist of the provision of culverts under Kedleston Road, Church Road, the Barn Brook access and Brook Close access. Preliminary channel clearance is also necessary from upstream of Brook Close to the Kedleston Road culvert.

BENEFITS

The principle benefit is flood alleviation to six properties.

IDENTIFICATION

Problem code number(s):	6-98-310-16
Watercourse:	None
Location:	Weston Underwood (Amber Valley District Council)
OS Map reference:	SK 290 433

NATURE OF PROBLEM

Due to inadequate highway drainage, surface water from high ground floods Bullhurst Lane. Works to watercourses will not alleviate the flooding and so the problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-17
Watercourse:	Mercaston Brook (non-main river)
Location:	Mercaston (Amber Valley District Council)
OS Map reference:	SK 290 419

NATURE OF PROBLEM

Under normal flow conditions the Mercaston Brook has limited freeboard which results in the poor land drainage of 45 ha of agricultural land. In flood conditions the channel is inadequate and causes the agricultural land to be inundated. Minor flooding also occurs to an unclassified road to Mugginton.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	2 years
	(ii)	Structures	1 in	years
(c) **Land potential category**				a

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	155,680	
	(ii)	Field drainage	£	25,020	£180,700
(b) **Present value of benefits**	(i)	Agriculture	£	113,910	
	(ii)	Buildings	£		
	(iii)	Roads/Railways	£		£113,910
(c) **Benefit/cost ratio**					0.6
(d) **Priority category**					3C

IMPROVEMENT WORKS

The works comprise essentially of an agricultural improvement scheme over 1.9 km of Mercaston Brook between Mercaston Hatchery and Kedleston Park. The works are designed to provide a channel with a minimum capacity to convey a 2 year flood event and to give 1.5 m of freeboard. This will allow the development of agricultural potential.

Three schemes were originally considered:-

i) A comprehensive land drainage and road flood alleviation improvement to 5.1 km of Mercaston and Black Brook;

ii) a shorter pure land drainage scheme of 1.9 km of Mercaston Brook between Mercaston Hatchery and Kedleston Park (see above);

iii) a road flood alleviation scheme for the Brailsford to Turnditch road (see 6-98-710-59).

The comprehensive land drainage scheme over 5.1 km of the Mercaston Brook was not considered viable as the Mercaston Hatchery (Trent Fish Culture Company Limited) rely upon Mercaston Brook for abstraction purposes connected with the valuable trout rearing industry. Any works to the watercourse upstream of the abstraction point would be detrimental to fish rearing both during the construction period and for some time afterwards until the natural river regime was re-established. The compensation works envisaged are expected to be costly and may require separate cost evaluations for possible water supply alternatives.

Flooding originally reported on the minor road to Mugginton which would have been alleviated by this comprehensive scheme has not been made the subject of a separate investigation because no serious flooding to roads or property occurs.

FISHERIES

This Brook is an important fishery particularly for coarse fish and consultation is necessary.

IDENTIFICATION

Problem code number(s):	6-98-310-20
Watercourse:	Downmeadow Brook (non-main river)
Location:	Nether Heage (Amber Valley District Council)
OS Map reference:	SK 365 506

NATURE OF PROBLEM

The watercourse passes under the Nether Heage - Heage Road at the site of a former mill. The existing culvert carrying the flow was originally a relief channel, the main channel has been subsequently filled in. The capacity of this relief channel is insufficient and causes regular inundation of two cottages nearby.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in years
	(ii)	Structures	1 in years
(c) **Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	34,590	
	(ii)	Field drainage	£		£34,590
(b) **Present value of benefits**	(i)	Agriculture	£		
	(ii)	Buildings	£	30,030	
	(iii)	Roads/Railways	£		£30,030
(c) **Benefit/cost ratio**					0.9
(d) **Priority category**					3E

IMPROVEMENT WORKS

The improvement works comprise the provision of a new culvert, an improved channel section, floodbanks and a new farm access bridge, to cater for a design discharge of 10.1 cumecs.

BENEFITS

The principal benefit is urban flood alleviation to five properties.

IDENTIFICATION

Problem code number(s):	6-98-310-21
Watercourse:	None
Location:	Blackbrook (Amber Valley District Council)
OS Map reference:	SK 329 478

NATURE OF PROBLEM

Flooding of a minor road (Holyseat Lane) occurs due to the inadequacy of highway drainage. The solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-22
Watercourse:	Franker Brook (non-main river)
Location:	Shottle (Amber Valley District Council)
OS Map reference:	SK 307 498

NATURE OF PROBLEM

Surface water collects at the lowest point of Shottle Lodge Lane due to inadequate surface water drainage. No alleviation works have been evaluated since surface water problems fall outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-23
Watercourse:	None
Location:	Alderwasley (Amber Valley District Council)
OS Map reference:	SK 323 514

NATURE OF PROBLEM

Surface water runs down Sandyford Lane from high ground and floods the road junction and the corner of an adjacent field. The problem is due to inadequacies in the highway drainage system and the solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-25
Watercourse:	Downmeadow Brook (non-main river)
Location:	Heage (Amber Valley District Council)
OS Map reference:	SK 370 503

NATURE OF PROBLEM

Up to ten cottages in the "Bowling Alley" and the Black Boy Inn are liable to flooding due to the surcharging of the existing culvert.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The suggested scheme consists essentially of the replacement of an undersized culvert by a 165 m reinforced concrete box culvert designed to provide a discharge of 3 cumecs.

The District Council have designed a flood alleviation scheme to improve the situation. The scheme consists of a new length of box culvert, which, when combined with a new downstream flow control will provide both increased flow capacity and flood balancing storage within the culvert.

DEVELOPMENT

New housing development is taking place immediately to the north of "Bowling Alley". This could exacerbate the problem.

BENEFITS

The principal benefit of the scheme is urban flood alleviation to ten properties and a public house.

IDENTIFICATION

Problem code number(s):	6-98-310-28
Watercourse:	None
Location:	Denby (Amber Valley District Council)
OS Map reference:	SK 395 463

NATURE OF PROBLEM

Several properties on south side of Church Street, Denby have been flooded. The site had a history of flooding prior to the construction of the houses.

Flooding occurred in Denby in July 1982 when 4 other semi-detached houses were flooded. Also affected were gardens and open land to the north of the Village.

High water levels on the nearby Bottle Brook caused flooding to gardens in Oakland Close and Denby Lane near Bottle Brook Houses, and was probably exacerbated by increased run-off from recent reinstatement works, carried out by British Coal on the opencast site lying north of the Village.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

British Coal have carried out various land drainage improvement works in the area. Amber Valley District Council have also undertaken a Drainage Improvement Scheme in the Village. This work has included the regrading, re-alignment and general improvement of approximately 300 m of the major brook course through the Village. The work was completed in 1984 and no problems have been experienced since then.

IDENTIFICATION

Problem code number(s):	6-98-310-29
Watercourse:	Hartshay Brook (non-main river)
Location:	Hammersmith (Amber Valley District Council)
OS Map reference:	SK 395 518

NATURE OF PROBLEM

Asher Lane and the access to Eggerton Mill flooded in July and August 1973. No internal flooding to property or flooding to agricultural land occurs at this location and no alleviation works are considered necessary.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-30
Watercourse:	River Derwent (main river)
Location:	Belper (Amber Valley District Council)
OS Map reference:	SK 347 484

NATURE OF PROBLEM

Two cottages in Wyver Lane close to the edge of the River Derwent floodplain are inundated regularly. Eight other properties are at risk during severe flood events. Surface water problems and high ground water levels add to the general risk of flooding. Most serious flooding has occurred in 1958 and 1965. The worst event is estimated as the 1 in 30 years return period.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	11,530	
		(ii)	Field drainage	£		£11,530
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	20,020	
		(iii)	Roads/Railways	£		£20,020
(c)	**Benefit/cost ratio**					1.7
(d)	**Priority category**					2E

IMPROVEMENT WORKS

The proposed works consist of the improvement of an existing flood defence wall, the provision of a new access to the allotment and the raising and improvement of existing field accesses to ensure the proposed flood defence level. These proposed works will provide a design standard of 1 in 100 years.

No provision has been made in the estimate for the improvement of surface water drainage and no solution to the possible groundwater problems has been evaluated.

BENEFITS

The principal benefit is the alleviation of flooding to ten properties on Wyver Lane.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

COMMENT

The sluices serving East Mill just downstream of the cottages cause the high water table which results in poor land drainage.

IDENTIFICATION

Problem code number(s):	6-98-310-31
Watercourse:	Oakerthorpe Brook (non-main river)
Location:	Alfreton (Amber Valley District Council)
OS Map reference:	SK 409 549

NATURE OF PROBLEM

Flooding of the A615 road and adjacent gardens in Amber Grove and Derwent Grove occurred in 1978 and 1980. The main problem is that the existing culverts beneath the A61 road are inadequate. The situation is further worsened by an obstructive grid at the upstream inlet which frequently becomes obstructed with debris and garden rubbish. The brookcourse also requires regular cleaning and dredging both upstream and downstream of the culverts in order to operate efficiently.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-32
Watercourse:	Un-named (non-main river)
Location:	Duffield (Amber Valley District Council)
OS Map reference:	SK 336 429

NATURE OF PROBLEM

Low lying houses are subject to flooding exacerbated by an inadequate culvert. A grid placed in the stream is causing a further obstruction.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£ ____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£ ____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-310-33
Watercourse:	River Derwent (main river)
Location:	Whatstandwell (Amber Valley District Council)
OS Map reference:	SK 331 550

NATURE OF PROBLEM

The Whatstandwell caravan site is immediately adjacent to the River Derwent and is at risk from the normal inundation of the Derwent Washlands.

It is estimated that out of the 116 caravans on site, 67 caravans and 2 wooden chalets would have water above floor level and water would pass underneath 6 more from a flood of the 1965 magnitude (1 in 50 years). An adjacent factory is also subject to flooding.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

COMMENTS

The majority of the caravans remain on site all year, approximately 5 or 6 are permanently occupied and there are berths for several tourers and a large field available for camping in the summer months. A flood warning system is in operation.

Evaulation of costs and benefits for solutions to this type of problem fall outside the scope of this Survey.

FISHERIES

This is a good trout and coarse fishery site and consultation is essential.

IDENTIFICATION

Problem code number(s):	6-98-310-34
Watercourse:	Oakerthorpe Brook (non-main river)
Location:	Oakerthorpe/Alfreton (Amber Valley District Council)
OS Map reference:	SK 406 548 to SK 383 551

NATURE OF PROBLEM

The catchment area of the Oakerthorpe Brook was originally identified as part of the Alfreton/Mansfield Growth Zone and considerable development was planned within the area. Although the total anticipated development has not been carried out, a significant amount has, nevertheless, actually taken place within the area. In order to accommodate the original planned increase in run-off due to the growth zone, this Brook and other watercourses within the zone were to be improved. In accordance with this intention, the Local Authority commissioned a report by Consulting Engineers which subsequently identified a number of improvements that are required to the channel and associated structures. As yet, none of these identified improvements have been carried out.

The unimproved Brook does not at present appear to be a source of serious flooding problems. However, no extreme rainfall or flooding conditions have been experienced since 1978 and the Brook has not been 'tested' since the latest developments have been completed.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

CONSERVATION

Oakerthorpe Brook forms part of Oakerthorpe Nature Reserve which is managed by the Derbyshire Naturalists Trust. It is a well used teaching site and the brook supports breeding Kingfishers.

IDENTIFICATION

Problem code number(s):	6-98-310-35/36
Watercourse:	None
Location:	Crich (Amber Valley District Council)
OS Map reference:	SK 350 542

NATURE OF PROBLEM

Flooding has occurred on several occasions to properties adjacent to Crich Market Place. The cause of this appears to be a combination of run-off from an adjacent playing field, spring drainage and the contribution of a number of old uncharted surface water culverts in the area.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The District Council have investigated the problem and no economically viable solution is obvious. No improvement works are proposed at this stage.

IDENTIFICATION

Problem code number(s):	6-98-310-37
Watercourse:	Un-named tributary of Bottle Brook (non-main river)
Location:	Denby (Amber Valley District Council)
OS Map reference:	SK 381 467

NATURE OF PROBLEM

Local flooding occurs just upstream of the confluence of this small tributary and the Bottle Brook. As a result, Denby Community Centre has been inundated on several occasions, most recently in March 1983 and October 1985. The watercourse is also eroding the underside of the foundations of the Community Centre.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

This site is a natural low spot which lies within the floodplain of the Bottle Brook. The site is also subject to mining subsidence and has sunk considerably over recent years. Protection of the building itself from major flooding would be difficult to achieve and uneconomic.

Some minor flood protection could be achieved by the construction of 45 m of concrete floodwall and bank protection together with some low earth banking. The concrete bank protection could be constructed to act as underpinning to support the building foundations and prevent future collapse. The estimated cost of these minor works is £16,500.

IDENTIFICATION

Problem code number(s):	6-98-310-38
Watercourse:	Un-named (non-main river)
Location:	Heage (Amber Valley District Council)
OS Map reference:	SK 376 505

NATURE OF PROBLEM

Flooding has occurred to No. 38 Ripley Road, Heage due to surcharging of an inaequate culvert. The small watercourse running through the property has been culverted in part using both 200 mm diameter pipes and 300 mm diameter pipes successively. These then lead to a larger road culvert which discharges into what is believed to be a very steep 260 mm diameter culvert downstream.

The source of the flooding is the 200 mm diameter upstream culvert which is barely capable of carrying the estimated 1 in 1 year flood flow.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The proposed solution would be replacement of the 200 mm culvert with larger pipes.

300 mm dia pipe would provide 1 in 5 year min capacity.
350 mm dia pipe would provide 1 in 50 year min capacity.
375 mm dia pipe would provide 1 in 100 year min capacity.

IDENTIFICATION

Problem code number(s):	6-98-410-3
Watercourse:	None
Location:	Spondon (Derby City Council)
OS Map reference:	SK 400 365

NATURE OF PROBLEM

Flooding occurs to Locko Road in Spondon and results from surcharged culverts. Since no serious flooding to property, land or roads occurs at this location, no improvement works are proposed at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

COMMENT

The Spondon Central Re-drainage Scheme is being carried out and should resolve the problem.

IDENTIFICATION

Problem code number(s):	6-98-410-4
Watercourse:	None
Location:	Sinfin (Derby City Council)
OS Map reference:	SK 353 323

NATURE OF PROBLEM

A section of the road and two properties on Thackery Street flood from surcharging foul and surface water drains during storm conditions. This problem falls outside the scope of this Survey and no alleviation works are proposed.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Some temporary alleviation works have been carried out to the sewerage system.

IDENTIFICATION

Problem code number(s):	6-98-410-5
Watercourse:	None
Location:	Sinfin (Derby City Council)
OS Map reference:	SK 337 324

NATURE OF PROBLEM

A section of Marston Close floods from surcharging foul and surface water drains during storm conditions. This type of problem falls outside the scope of this Survey and no alleviation works are proposed.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

COMMENT

The City Council are carrying out a long term study of this problem. A successful solution will probably depend on proposed improvement works to the Hell Brook being carried out.

IDENTIFICATION

Problem code number(s):	6-98-410-6
Watercourse:	None
Location:	Osmaston (Derby City Council)
OS Map reference:	SK 371 344

NATURE OF PROBLEM

Flooding occurs to London Road at the junction with Ascot Drive as a result of the inadequate highway drainage system. The solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-410-8
Watercourse:	River Derwent (main river)
Location:	Darley Abbey (Derby City Council)
OS Map reference:	SK 357 384

NATURE OF PROBLEM

Flooding occurs to a minor road (Haslams Lane) in the floodplain of the River Derwent. This inundation is essential for the protection of areas downstream and improvement works cannot be recommended.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£ ____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£ ____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

FISHERIES

This is a good trout and coarse fishery site and consultation is essential.

IDENTIFICATION

Problem code number(s):	6-98-410-9
Watercourse:	Mackworth/Markeaton Brooks (non-main river)
Location:	Markeaton (Derby City Council)
OS Map reference:	SK 332 381 and SK 332 379

NATURE OF PROBLEM

Annual road flooding occurs for short durations in two places on Markeaton Lane due to the surcharging of Markeaton and Mackworth Brooks/culverts. Since no serious traffic disruption or land flooding occurs at this location, no alleviation works are proposed at this stage.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-410-10/11
Watercourse:	None
Location:	Derby (Derby City Council)
OS Map reference:	SK 346 366

NATURE OF PROBLEM

Road re-surfacing on Bridge Street and Brook Street has raised the road levels higher than nearby shops. As a result surface water collects at the entrance to the premises at these newly created 'low spots'. This is a surface water drainage problem and falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-410-12
Watercourse:	Sinfin Moor Main Drain/Cuttle Brook (main river)
Location:	Sinfin Moor (Derby City Council)
OS Map reference:	SK 350 327 to SK 369 302

NATURE OF PROBLEM

The main drains and culverts in this area are regularly maintained by the Internal Drainage Board. MAFF are of the opinion that little agricultural benefit will accrue as a result of land drainage works to the arterial watercourse. Furthermore, arterial drainage is thought to be adequate for field drainage purposes.

No further works are therefore proposed at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

DEVELOPMENT

There is an existing planning embargo upon developments on the outskirts of Derby which discharge to the drains in the Sinfin Moor Area. The embargo has been imposed to protect the Internal Drainage Board area from the effects of increased flows which will result from development. Although there are no significant problems in the Board's area at the moment, large scale development would cause an unacceptable deterioration in the general land drainage situation.

There are no practical works which can be undertaken to allow the removal of the development embargo. However, development is allowed if surface water balancing facilities are provided which limit the run-off from the site to that which would have occurred from the undeveloped land. Some land within this area has been developed and surface water balancing has been provided.

BENEFITS

Much of the area is already producing 5 tonnes of corn per hectare. Any increase on this would be as a result of management rather than drainage.

IDENTIFICATION

Problem code number(s):	6-98-410-13
Watercourse:	River Derwent (main river)
Location:	Allestree (Derby City Council)
OS Map reference:	SK 360 400

NATURE OF PROBLEM

Flooding occurs to agricultural land in the floodplain.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Flooding still occurs to agricultural land adjacent to the road within the River Derwent floodplain. This flooding is essential to the protection of areas downstream and no improvement works can be recommended.

FISHERIES

This is a good coarse fishery site and consultation will be necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-98-410-14
Watercourse:	Markeaton Brook (non-main river)
Location:	Markeaton (Derby City Council)
OS Map reference:	SK 339 372

NATURE OF PROBLEM

Residential property on Watson Street was inundated from the main Markeaton Brook in February 1977. On that occasion 6 terraced properties were inundated and 4 others threatened. Sturgess School has now been demolished.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	80,720	
		(ii)	Field drainage	£		£80,720
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	12,510	
		(iii)	Roads/Railways	£		£12,510
(c)	**Benefit/cost ratio**					0.2
(d)	**Priority category**					3D

IMPROVEMENT WORKS

It is proposed to reduce the water levels by:

i) Building a new weir at a lower level immediately upstream of Moore Eady. This will also necessitate the provision of a stilling pond, a new channel and a new access bridge to the allotments;

ii) forming a new crest at a lower level on the existing side flow weir adjacent to former school the School.

The flood defence measures proposed to the rear of property on Watson Street consist of floodbanks, revetment and a blockwork floodwall.

The City Council have carried out upsteam maintenance works on the Markeaton Brook to ensure that the Markeaton flood relief channel operates efficiently during flood conditions. The City Council are not at present proposing to carry out any further works to directly improve this problem. An improved control scheme could provide some alleviation to the present problem.

FISHERIES

A private fishing club attached to the '102 Social Club' have licensing rights to the elevated waterway upstream of Moore Eady. This is a good coarse fishery site.

CONSERVATION

The ponds at this site form a habitat for breeding Mallard and Kingfishers and interesting floral species, especially trees. The local community consider the ponds to be of educational importance and of enough significance to clear the ponds as part of the "Save the Village Pond Campaign."

IDENTIFICATION

Problem code number(s):	6-98-510-1/7
Watercourse:	Peakshole Water (non-main river)
Location:	Castleton (High Peak District Council)
OS Map reference:	SK 148 827 to SK 154 833

NATURE OF PROBLEM

Flooding has occurred on six occasions since 1947 for durations of up to 24 hours. This has affected a large number of residential properties, two shops, a farm and a road.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	106,670	
		(ii)	Field drainage	£		£106,670
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	115,100	
		(iii)	Roads/Railways	£		£115,100
(c)	**Benefit/cost ratio**					1.1
(d)	**Priority category**					2C

IMPROVEMENT WORKS

The proposed improvement scheme requires the removal of large quantities of bed material/sediment from the watercourse between Peak Cavern and Spital Bridge. The work includes stone pitching revetment/pointing to existing channel walls, the removal of a weir and general improvements to the channel between Tricket Bridge and Spital Bridge.

BENEFITS

The alleviation of road flooding will provide only minor benefits and no assessment has been made. It has been estimated that 27 houses, two shops, one farm and a minor road will be affected by the 1 in 100 year flood.

IDENTIFICATION

Problem code number(s):	6-98-510-3
Watercourse:	River Derwent (main river)
Location:	Bamford (High Peak District Council)
OS Map reference:	SK 203 830

NATURE OF PROBLEM

Part of the Bamford Recreation Ground is within the floodplain of the River Derwent and floods on infrequent occasions. The inundation of the floodplain is essential for the protection of areas downstream and no improvement works can, therefore, be recommended.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-510-4
Watercourse:	Tributaries of the River Dove (non-main river)
Location:	Dove Head/Brand Side (High Peak District Council)
OS Map reference:	SK 038 683

NATURE OF PROBLEM

Flooding of a minor road occurs where streams are culverted under the road. The flooding is as a result of inadequate culvert capacity.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in 50 years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	22,490	
		(ii)	Field drainage	£		£22,490
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£	4,630	£4,630
(c)	**Benefit/cost ratio**					0.2
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The works proposed involve the provision of a new culvert to provide a capacity of 2.3 cumecs, together with headworks and tailworks. Stone pitching revetment is necessary to the Dove Head Springs tributary where it runs immediately adjacent to the road, but these protection works are the responsibility of the Highway Authority as the erosion is affecting the stability of the road. The cost of this revetment is not included within the scheme cost.

CONSERVATION

This site has an interesting mixture of calcifuge and calcicole plant species in a short distance and diversity of species is high. Much of the interest could be retained if the improvement is carried out carefully.

IDENTIFICATION

Problem code number(s):	6-98-510-5
Watercourse:	River Wye (non-main river)
Location:	Ashwood Dale, Buxton (High Peak District Council)
OS Map reference:	SK 082 725

NATURE OF PROBLEM

The River Wye flows through a large culvert at the side of the A6. The Devonshire Arms public house is built directly over this culvert and is consequently at risk from flooding from high river levels, surface water run-off and culvert blockages. This property suffered from minor flooding in 1972 but, as serious flooding has never occurred, flood alleviation measures have not been investigated.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

FISHERIES

This is a trout and grayling fishery and consultation is required before works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-510-9
Watercourse:	None
Location:	Bamford (High Peak District Council)
OS Map reference:	SK 209 836

NATURE OF PROBLEM

The flooding to Leeside Road originates from springs rising in the steep foreslopes of Bamford Edge. The water discharges naturally to the road and the highway drainage system is inadequate to cope with the run-off. The solution is, therefore, outside the scope of this Survey as works to watercourses will not alleviate the problem.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-510-11
Watercourse:	Grinds Brook and Lady Booth Brook (non-main river)
Location:	Edale (High Peak District Council)
OS Map reference:	SK 125 854 and SK 142 862

NATURE OF PROBLEM

Flooding occurs to Edale Recreation ground, farm outbuildings and a road at Nether Booth.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Investigations have shown that no serious flooding of the recreation ground and outbuildings has occurred and no remedial works are necessary. The flooding at Nether Booth results from the blockage of a trash grid upstream of the road culvert and can be alleviated by the instigation of a programme of planned maintenance.

IDENTIFICATION

Problem code number(s):	6-98-510-12
Watercourse:	Un-named tributary of River Wye (non-main river)
Location:	Buxton (High Peak District Council)
OS Map reference:	SK 063 723

NATURE OF PROBLEM

Slight flooding occurs at the junction of Ashbourne Road (A515) and Harper Hill Road where the watercourse is culverted. As no serious flooding to property, land or roads occurs, no alleviation works have been considered.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-610-1
Watercourse:	Westwood Brook (non-main river)
Location:	Morton (North-East Derbyshire District Council)
OS Map reference:	SK 417 601

NATURE OF PROBLEM

The abandoned Stonebroom Sewage Works suffers from flooding but as no other serious flooding to property or land occurs at this location no improvement works are proposed.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Some minor improvement works involving the removal of rubbish, cutting of undergrowth and hand regrading has been carried out on a 450 m long stretch of the Morton Brook immediately upstream of its confluence with the Westwood Brook. This work has provided some minor alleviation to the problem. As there is no serious problem of flooding to property or land, no further improvement works are proposed.

IDENTIFICATION

Problem code number(s):	6-98-610-5
Watercourse:	Press Brook (non-main river)
Location:	Press, Old Tupton (North-East Derbyshire District Council)
OS Map reference:	SK 378 644

NATURE OF PROBLEM

Minor flooding occurred from the Press Brook at Brookfields Caravan Park, Old Tupton in June 1982.

The only damage sustained was to a low-lying caravan used as an office. This has now been replaced by a permanent brick building elsewhere on the site with a higher floor level. The problem may have been caused by lack of maintenance to the brookcourse or the presence of obstructive summer bank growth. As there is no serious flooding to either dwellings or agricultural land, flood alleviation works are considered inappropriate.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-610-6
Watercourse:	Press Brook (non-main river)
Location:	Press (North-East Derbyshire District Council)
OS Map reference:	SK 371 644

NATURE OF PROBLEM

In June 1982, 2 low-lying cottages on Press Lane opposite Corner Farm were very close to being flooded. The problem appears to have been caused by lack of maintenance to the road culvert and upstream watercourse, combined with the ponding of carriageway surface water in the natural depression directly in front of the cottages.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

In order to remove the accumulated floodwater, 2 holes were made in the solid stone roadside wall opposite the cottages. This allowed water to escape to the Brook below and has coped with similar problems since. As it is considered that the main problem is due to inadequate highway drainage, the problem falls outside the scope of this survey.

IDENTIFICATION

Problem code number(s):	6-98-710-1
Watercourse:	Tributary of Bentley Brook (non-main river)
Location:	Hales Green, near Yeaveley (West Derbyshire District Council)
OS Map reference:	SK 183 411

NATURE OF PROBLEM

A tributary of Bentley Brook has flooded Brookside Cottage and the adjacent garage at infrequent intervals. Flooding of property last occurred in 1977, but the garden floods regularly.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	28,830	
		(ii)	Field drainage	£		£28,830
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	2,750	
		(iii)	Roads/Railways	£	negligible	£2,750
(c)	**Benefit/cost ratio**					0.1
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The works envisaged consist of the provision of a new culvert under the road, a re-aligned brook section and a low floodbank around the affected property to provide for a design discharge of 0.7 cumecs.

BENEFITS

The principal benefit is flood protection to one cottage, a garage and outhouses.

COMMENT

One of the two culvert pipes is completely blocked. Improved maintenance by the Highway Authority would help to alleviate the problem.

IDENTIFICATION

Problem code number(s):	6-98-710-4
Watercourse:	River Dove (main river)
Location:	Sudbury (Derbyshire Dales District Council)
OS Map reference:	SK 165 312

NATURE OF PROBLEM

Extensive washland flooding occurs from the River Dove. The Sudbury to Draycott Road crosses the floodplain and is also inundated from time to time, the last occasion being February 1977.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Inundation of the River Dove floodplain is essential at times of high flow to provide storage for flood water which would otherwise create problems for urban areas downstream. Restriction of this storage area is not possible at this stage.

FISHERIES

This is a good trout and coarse fishery site and consultation is essential.

IDENTIFICATION

Problem code number(s):	6-98-710-5/84
Watercourse:	Un-named tributary of Cubley Brook (non-main river)
Location:	Boylestone (Derbyshire Dales District Council)
OS Map reference:	SK 180 362

NATURE OF PROBLEM

The watercourse is in very poor condition with many natural obstructions. The road culverts are inadequate and Audishaw Lane is often submerged. Nearby domestic properties were inundated in August 1957. Several farms are subject to flooding at Boylestone.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	72,070	
		(ii)	Field drainage	£		£72,070
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	5,000	
		(iii)	Roads/Railways	£		£5,000
(c)	**Benefit/cost ratio**					0.1
(d)	**Priority category**					3D

IMPROVEMENT WORKS

The works envisaged are floodbanks around the affected property together with the provision of new culverts under Audishaw Lane.

Some minor improvements to the Brook have been carried out.

BENEFITS

The principal benefits are flood alleviation to domestic properties and the alleviation of access traffic disruption.

IDENTIFICATION

Problem code number(s):	6-98-710-6
Watercourse:	None
Location:	Boylestone (Derbyshire Dales District Council)
OS Map reference:	SK 188 363

NATURE OF PROBLEM

Inadequate surface water drainage causes flooding problems near to Claremont Farm, Boylestone. Works to watercourses will not alleviate the flooding and so the problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-10
Watercourse:	River Wye (main river)
Location:	Ashford in the Water (Derbyshire Dales District Council)
OS Map reference:	SK 195 697

NATURE OF PROBLEM

Part of this problem concerns the flooding of cellars and basements of houses on the north side of Church Street and results from inadequate surface water drainage or groundwater percolation and is, therefore, outside the scope of this Survey. Flooding also occurs from the River Wye, to gardens at the rear of Wye House and Cherry Close, but as no serious flooding to property occurs at this location, no improvement works are proposed at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

FISHERIES

This is a trout and grayling fishery and consultation is required before works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-710-11
Watercourse:	Tributary of River Wye (non-main river)
Location:	Tideswell (Derbyshire Dales District Council)
OS Map reference:	SK 152 756

NATURE OF PROBLEM

Flooding in Tideswell occurs at regular intervals and often for durations of up to several days. The main cause of this is the inadequate surface water culvert running roughly North-South through the town beneath Manchester Street, Queen Street and Buxton Road. This is believed to consist mainly of an old 24" diameter pipe with some small sections of open channel. It is likely that this pipe has a number of restrictions at various points along its length.

Surcharging of the culvert occurs at its inlet at the top of Manchester Street and also at manholes on Fountain Square and Queen Street. Serious road flooding also occurs in numerous places and Derbyshire County Council have to divert water using sandbags to prevent flooding to properties. A high degree of highway maintenance is also required in the area to keep the frequency of road flooding to a minimum.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The cost of alleviating this problem will obviously be very high and no future improvements are planned at the present time.

IDENTIFICATION

Problem code number(s):	6-98-710-12
Watercourse:	Hannage Brook (non-main river)
Location:	Wirksworth (Derbyshire Dales District Council)
OS Map reference:	SK 288 533

NATURE OF PROBLEM

There are three possible causes of flooding at this location:

i) The channel capacity upstream of the Water Lane culvert is restricted and overflow occurs into Brooklands Avenue near to the footbridge;

ii) A 0.9 m weir and trash grid obstructs the Water Lane culvert;

iii) The existing culvert consists of part 1.2 m reinforced concrete culvert, part an old stone arch. The route of the culvert is tortuous, passing under the weaving factory yard and under a railway embankment. The capacity of the culvert is inadequate to cater for flood flows.

From a combination of the above events, the lower floors of the weaving factory have been inundated on several occasions. The owners have carried out several flood alleviation measures, but the factory is still at risk from inundation by Hannage Brook.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	207,570	
		(ii)	Field drainage	£		£207,570
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	42,540	
		(iii)	Roads/Railways	£		£42,540
(c)	**Benefit/cost ratio**					0.2
(d)	**Priority category**					3C

IMPROVEMENT WORKS

The works envisaged consist of the regrading and resectioning of the brookcourse adjacent to Brooklands Avenue, the removal of the obstructive weir and trash grid, and the provision of a new flood relief channel.

BENEFITS

The data for the benefit evaluation was supplied by the factory manager and was based on estimates of damage to stock, machinery and business losses due to disruption.

IDENTIFICATION

Problem code number(s):	6-98-710-13
Watercourse:	Dale Brook (non-main river)
Location:	Stoney Middleton (Derbyshire Dales District Council)
OS Map reference:	SK 231 754

NATURE OF PROBLEM

Flooding occurs when Dale Brook surcharges and discharges floodwater onto the A623 road and eventually inundates six properties in The Nook. The most recent flooding was in November 1985, and occurs once every 2 to 3 years.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 50 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	54,770	
		(ii)	Field drainage	£		£54,770
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	30,030	
		(iii)	Roads/Railways	£	2,500	£32,530
(c)	**Benefit/cost ratio**					0.6
(d)	**Priority category**					30

IMPROVEMENT WORKS

Channel/Culvert improvements would be impracticable in these circumstances and so it is proposed to:

a) intercept the floodwater on the road and divert the flow back into the watercourse (£13,620) and
b) alleviate local flooding in The Nook by the improvement of a short section of the channel (£29,510).

The interception works consist of localised road shaping and the provision of a number of road gullies which discharge floodwater off the A623 road directly to the watercourse. A short length of channel improvement upstream of the Boot Factory weir is also necessary.

The local flooding in The Nook is to be alleviated by the removal of various obstructive structures/weirs and the provision of new culverts to the 50 year standard (5 cumecs).

BENEFITS

The principal benefit of the scheme is urban flood alleviation to eight houses.

IDENTIFICATION

Problem code number(s):	6-98-710-14
Watercourse:	Tributary of River Derwent (non-main river)
Location:	Froggatt (Derbyshire Dales District Council)
OS Map reference:	SK 247 761

NATURE OF PROBLEM

In times of severe storms (1973 and 1977) surface water is not directed into defined watercourses but flows over steeply sloping ground and into Chequers Inn. The water also accumulates on the B6054 road from the adjoining fore-slopes of Froggatt Edge and flows around the property from the road. The Inn is also affected by flows from springs which continuously discharge through the garage of the property. Works to watercourses will not alleviate this problem and the solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-15
Watercourse:	Tributary of River Derwent (non-main river)
Location:	Froggatt (Derbyshire Dales District Council)
OS Map reference:	SK 245 762

NATURE OF PROBLEM

Flooding occurred to property and a minor road in July/August 1973 and January 1977.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

i) The watercourse runs alongside the road in a series of stone culverts, the blockage of which has caused the flooding. Works have recently been carried out to prevent the blockage of these culverts and no further work is recommended.

ii) A separate problem in the same area involves high groundwater levels and surface water run-off from high ground immediately above Stoke View and Stonecroft. Works to watercourses will not alleviate this problem and the solution is, therefore, outside the scope of this Survey.

IDENTIFICATION

Problem code number(s):	6-98-710-16
Watercourse:	River Derwent (main river)
Location:	Froggatt (Derbyshire Dales District Council)
OS Map reference:	SK 244 761

NATURE OF PROBLEM

Flooding occurs to Stokes Lane and to agricultural land in the floodplain of the River Derwent. Poor land drainage outfall conditions contribute to standing water remaining for long periods on the floodplain. Alleviation of this problem requires comprehensive investigation of the whole of the River Derwent floodplain to ensure that improvements in one area do not reduce standards in others. This investigation is outside the scope of the Survey and, therefore, no works can be recommended at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-710-18/41
Watercourse:	Un-named tributary of Henmore Brook (non-main river)
Location:	Clifton (Derbyshire Dales District Council)
OS Map reference:	SK 167 449 to SK 168 446

NATURE OF PROBLEM

The problem watercourse extends from the upstream culvert under the A515 Clifton By-pass to the By-pass access adjacent to the Vicarage and Primary School. Eight properties along this stretch of watercourse have a history of flooding due to restricted channels and culverts. New residential development immediately adjacent to the watercourse is also at risk. The culvert under the By-pass on the upstream side has been designed to throttle flood flows and utilise the flood storage created by the By-pass embankment. This storage is insufficient for severe flood events.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	106,670	
		(ii)	Field drainage	£		£106,670
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	40,030	
		(iii)	Roads/Railways	£	negligible	£40,030
(c)	**Benefit/cost ratio**					0.4
(d)	**Priority category**					3C

IMPROVEMENT WORKS

The works recommended involve:-

i) an increase in the flood storage upstream of the existing throttle by means of embankment;

ii) the regrading and improvement of the watercourse between the upstream and downstream culverts including the provision of new access culverts for recent residential development adjacent to the watercourse;

iii) the removal of a trash grid and obstructive pipes in the existing downstream culverts.

These improvements will provide for a design discharge capacity of 9.8 cumecs.

BENEFITS

The principal benefit is flood protection to an estimated ten properties and the grounds of Clifton Hall.

IDENTIFICATION

Problem code number(s):	6-98-710-19
Watercourse:	Shirley Brook (non-main river)
Location:	Shirley (Derbyshire Dales District Council)
OS Map reference:	SK 214 408

NATURE OF PROBLEM

A short section of Mill Lane and adjacent fields suffer from minor flooding. As there is no serious flooding to either buildings or agricultural land, alleviation works are considered inappropriate.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

CONSERVATION

The brook side immediately south of the road supports two species of considerable interest, both scarce in Derbyshire (water whorl grass and Catabrosa aquatica). Any work on the bank would remove these two species.

IDENTIFICATION

Problem code number(s):	6-98-710-20
Watercourse:	Un-named tributary of Hilton Brook (non-main river)
Location:	Lower Thurvaston (Derbyshire Dales District Council)
OS Map reference:	SK 228 367

NATURE OF PROBLEM

Two properties flood and another property suffers inundation of garden and garage. Derbyshire County Council has recently installed new culverts under Longford Lane and Thurvaston Road.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 50 years
		(ii)	Structures	1 in 50 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	23,060	
		(ii)	Field drainage	£		£23,060
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	17,510	
		(iii)	Roads/Railways	£		£17,510
(c)	**Benefit/cost ratio**					0.8
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The works consist of resectioning the main channel between the two culverts on Longford Lane and Thurvaston Lane, preliminary channel clearance to both tributaries upstream of the confluence and a new farm access bridge downstream of Longford Lane, to provide for a design capacity of 5.5 cumecs.

BENEFITS

The principal benefit consists of flood protection to three domestic properties.

IDENTIFICATION

Problem code number(s):	6-98-710-21
Watercourse:	Marston Brook (non-main river)
Location:	Waldley (Derbyshire Dales District Council)
OS Map reference:	SK 127 370

NATURE OF PROBLEM

Flooding of the road at Waldley occurs due to inadequate capacity of roadside ditches. Works to the watercourse will not alleviate the flooding and so the problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-22
Watercourse:	None
Location:	Baslow (Derbyshire Dales District Council)
OS Map reference:	SK 279 721

NATURE OF PROBLEM

Flooding of the A619 Baslow to Chesterfield Road results from inadequate surface water drainage from a campsite access road, car park and adjacent rising ground. Works to watercourses will not alleviate the flooding and, therefore, the solution is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-24
Watercourse:	None
Location:	Darley Dale (Derbyshire Dales District Council)
OS Map reference:	SK 279 623

NATURE OF PROBLEM

Flooding of the A6 near St. Elphins School, Darley Dale, Matlock results from inadequate surface water drainage from large paved areas within the school grounds. Works to watercourses will not alleviate the flooding and, therefore, the solution is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-25
Watercourse:	Un-named tributary of River Derwent (non-main river)
Location:	Grangemill (Derbyshire Dales District Council)
OS Map reference:	SK 244 577

NATURE OF PROBLEM

The watercourse is culverted downstream of a disused mill/converted house. The open channel sections, farm access culverts and the road culvert downstream are all of insufficient capacity and flooding of the road, farm outbuildings, farmyard and public house car park occurs.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Impounding works on the watercourse have been constructed by the owner and included in these works is the utilisation of the original 1.2 m stone arch mill outfall. This appears to adequately divert flood flows away from the existing flood area and no further works have been considered. No flooding has been reported for several years.

IDENTIFICATION

Problem code number(s):	6-98-710-26
Watercourse:	None
Location:	Darley Dale (Derbyshire Dales District Council)
OS Map reference:	SK 271 625

NATURE OF PROBLEM

Flooding of Four Lane Ends road junction and extensive areas of agricultural land in the floodplain occurs. This flooding which occurs during high flows in the River Derwent is essential to protect urban areas downstream and improvement works cannot be recommended.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-27
Watercourse:	River Derwent (main river)
Location:	Darley Dale (Derbyshire Dales District Council)
OS Map reference:	SK 270 620

NATURE OF PROBLEM

Flooding occurred in 1965 to houses on Main Street, two road haulage firms and farm outbuildings. This is also associated with extensive flooding to the River Derwent floodplain.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in years
	(ii)	Structures	1 in years
(c) **Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The STWA completed a flood alleviation scheme at Darley Bridge which will provide protection for properties, but will not reduce inundation of the floodplain as this is essential for flood protection downstream. The scheme involved the provision of floodbanks, the diversion of a small tributary of the River Derwent and the construction of flood walls and two road ramps. There has been no further inundation of properties since completion of the scheme.

FISHERIES

This is a good trout and coarse fishery site and consultation is essential.

IDENTIFICATION

Problem code number(s):	6-98-710-29
Watercourse:	None
Location:	Darley Dale (Derbyshire Dales District Council)
OS Map reference:	SK 269 626

NATURE OF PROBLEM

Flooding occurs to Church Road at Churchtown and is within the floodplain of the River Derwent. Inundation of the floodplain during times of high flow in the River Derwent is essential to protect urban areas downstream, and remedial works cannot be recommended.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-30
Watercourse:	None
Location:	Biggin (Derbyshire Dales District Council)
OS Map reference:	SK 152 595

NATURE OF PROBLEM

Flooding in isolated low locations results from inadequate capacity of farm and highway ditches. Serious flooding has been prevented by recent drainage works carried out by Derbyshire County Council. Works to watercourses will not alleviate the flooding and, therefore, the solution is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-31
Watercourse:	None
Location:	Baslow (Derbyshire Dales District Council)
OS Map reference:	SK 258 727

NATURE OF PROBLEM

Surface water run-off from Baslow Edge floods the steeply inclined Bar Road. The incidence of flooding has been reduced by the provision of improved surface water drainage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Works were undertaken by Derbyshire Dales District Council in 1988 which diverted flow from Bar Road, via a large silt trap, into its former route through an existing stone culvert across meadowland.

This appears to have alleviated the problems to a large degree.

IDENTIFICATION

Problem code number(s):	6-98-710-32
Watercourse:	Tributary of River Derwent (non-main river)
Location:	Curbar (Derbyshire Dales District Council)
OS Map reference:	SK 248 752

NATURE OF PROBLEM

Surface water run-off from high ground immediately above Stokeview and Stonecroft causes flooding problems. However, works to watercourses will not alleviate the flooding and so the problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-33
Watercourse:	Dale Brook (non-main river)
Location:	Middleton Dale (Derbyshire Dales District Council)
OS Map reference:	SK 209 762

NATURE OF PROBLEM

Middleton Dale is a steeply inclined valley with high rocky cliffs and quarries on both sides of the A623 road. The flooding of the road is due to flash run-off from the surrounding cliffs which flows naturally down the road surface. Works to the Dale Brook, which flows parallel to the road, will not alleviate the flooding and the solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

CONSERVATION

Middleton Dale has been notified to the Planning Authorities by the Derbyshire Naturalists Trust as a site of the utmost biological importance, principally for its botanical interest.

IDENTIFICATION

Problem code number(s):	6-98-710-34
Watercourse:	Dale Brook (non-main river)
Location:	Hathersage (Derbyshire Dales District Council)
OS Map reference:	SK 241 817

NATURE OF PROBLEM

Flooding of a Class 'B' road results from inadequate road ditches. Work to watercourses will not alleviate the flooding and, therefore, the solution is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-36/45
Watercourse:	Hollow and Jumber Brooks (non-main river)
Location:	Eyam (Derbyshire Dales District Council)
OS Map reference:	SK 220 764 and SK 216 766

NATURE OF PROBLEM

In recent years, property at Town End around The Square has flooded from Hollow Brook. Flooding also occurs near to the junction of Hawkhill Road and Church Street from a combination of surface water and Jumber Brook.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Some improvement works have already been carried out at Town End by Derbyshire Dales District Council Highways Department. Any further works will only be considered if major problems occur in this area at some time in the future.

IDENTIFICATION

Problem code number(s):	6-98-710-37
Watercourse:	None
Location:	Tideswell (Derbyshire Dales District Council)
OS Map reference:	SK 141 760

NATURE OF PROBLEM

Flooding of the road occurs as a result of inadequacies in the highway drainage system. The solution to this problem is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Some minor works have been carried out by Derbyshire County Council which have considerably alleviated this problem.

IDENTIFICATION

Problem code number(s):	6-98-710-38
Watercourse:	Tributary of River Wye (non-main river)
Location:	Tideswell (Derbyshsire Dales District Council)
OS Map reference:	SK 154 744

NATURE OF PROBLEM

Flooding occurs to the B6049 road at Tideswell Dale as a result of flash run-off from the surrounding hills. The watercourse runs parallel and adjacent to the road in a series of open channel/culverted sections but works to the watercourse will not alleviate the problem completely. No works can be recommended at this stage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-40
Watercourse:	Tributary of River Derwent (non-main river)
Location:	Calver (Derbyshire Dales District Council)
OS Map reference:	SK 243 745

NATURE OF PROBLEM

Minor flooding occurs to a road and garden from an underground stream which discharges into a water trough on Main Street, Calver. The flow passes through two watercourses which are partially culverted and, in the case of both watercourses, the natural flow is impeded by various obstructions. As the flooding is minor and any improvement works would be in gardens where the water forms a feature, no works can be recommended.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-43
Watercourse:	River Wye (main river)
Location:	Bakewell to Rowsley (Derbyshire Dales District Council)
OS Map reference:	SK 221 685 to SK 259 655

NATURE OF PROBLEM

250 ha of the River Wye washland are subject to flooding and inadequate arterial drainage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**			a	

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£		
		(ii)	Field drainage	£	75,060	£75,060
(b)	**Present value of benefits**	(i)	Agriculture	£	75,010	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£75,010
(c)	**Benefit/cost ratio**					1.0
(d)	**Priority category**					3F

BENEFIT

It has been estimated by MAFF that only minimal benefit could be achieved as a result of an improvement in the freeboard to the arterial watercourse. Field drainage costs alone, necessary to achieve this benefit, are greater than the value of agricultural enhancement. No works are therefore proposed.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

COMMENT

There is a general reluctance by the landowners to accept any works on the river because of the risk of damage to fishing sites.

IDENTIFICATION

Problem code number(s):	6-98-710-46
Watercourse:	Bar Brook (non-main river)
Location:	Baslow (Derbyshire Dales District Council)
OS Map reference:	SK 260 722

NATURE OF PROBLEM

Surface water drainage problems exist adjacent to the public conveniences/council car park.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Works to the watercourse will not alleviate this problem. Therefore, the solution is outside the scope of this Survey.

IDENTIFICATION

Problem code number(s):	6-98-710-47/54
Watercourse:	Underground streams and un-named tributary of River Derwent (non-main river)
Location:	Nether Padley (Derbyshire Dales District Council)
OS Map reference:	SK 247 779

NATURE OF PROBLEM

Numerous underground watercourses and soughs traverse St. Helens Close, flooding gardens and garages. The flooding cannot be alleviated by works to the watercourse and the problem is therefore outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-48
Watercourse:	None
Location:	Curbar (Derbyshire Dales District Council)
OS Map reference:	SK 252 746 and SK 255 746

NATURE OF PROBLEM

Bar Road and Hillside Cottages at the junction of The Hillock and Bar Road, are at risk from flooding from surcharged surface water sewers. Two other cottages on Bar Road are at risk from road drainage and also from a brook/well which forms an ornamental feature to the rear of the property. The solution to these problems is outside the scope of the Survey as works to watercourses will not solve the problem.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-49
Watercourse:	Un-named tributary of Bletch Brook (non-main river)
Location:	Parwich (Derbyshire Dales District Council)
OS Map reference:	SK 186 543 to SK 191 542

NATURE OF PROBLEM

The watercourse that flows through Parwich is in poor condition, with many undersized culverts, and passes immediately adjacent to several houses.

On rare occasions quite a number of domestic properties and a public house have been inundated.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	294,060	
		(ii)	Field drainage	£		£294,060
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	8,760	
		(iii)	Roads/Railways	£		£8,760
(c)	**Benefit/cost ratio**					0
(d)	**Priority category**					3C

IMPROVEMENT WORKS

The works envisaged consist of the improvement of approximately 0.5 km of arterial watercourse. Generally a 100 year channel capacity is to be provided by means of an increased channel section, but provision of floodbanks and floodwalls are necessary at various locations.

New culverts under the main road(s) and several replacement access/footbridges are also required. The design capacity of the improvement work has been estimated at 11 cumecs.

CONSERVATION

Local interest is shown for the preservation of an old sheepwash immediately upstream and opposite to the Sycamore Inn.

IDENTIFICATION

Problem code number(s):	6-98-710-51
Watercourse:	Brailsford Brook (non-main river)
Location:	Longford (Derbyshire Dales District Council)
OS Map reference:	SK 220 375

NATURE OF PROBLEM

The weir at Longford retains a high water level in the Mill Pond immediately below the confluence of the Brailsford Brook and Shirley Brook. In times of flood the Mill Pond overtops its banks and regularly inundates two cottages. The weir height was reduced by 0.45 m in 1971 by Derbyshire County Council and some dredging works were also carried out.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 100 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in years
	(ii)	Structures	1 in years
(c) **Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	40,360	
	(ii)	Field drainage	£		£40,360
(b) **Present value of benefits**	(i)	Agriculture	£		
	(ii)	Buildings	£	35,030	
	(iii)	Roads/Railways	£		£35,030
(c) **Benefit/cost ratio**					0.9
(d) **Priority category**					3E

IMPROVEMENT WORKS

The only satisfactory solution would be to remove the weir at Longford Mill and regrade the mill pond up to the confluence of Brailsford and Shirley Brooks. Channel resectioning and a farm access bridge will be necessary downstream of Longford Bridge. These works will provide for a design capacity of 21.4 cumecs.

BENEFITS

Agricultural benefits may be available but have not been included in this evaluation.

FISHERIES

The Scheme would necessitate the loss of private fishing facilities at Longford.

IDENTIFICATION

Problem code number(s):	6-98-710-52/53
Watercourse:	Spinneyford Brook (non-main river)
Location:	Bradley (Derbyshire Dales District Council)
OS Map reference:	SK 248 451

NATURE OF PROBLEM

The lowest section of Brunswood Lane and the footpath to Houghpark Farm are subject to flooding. As no serious flooding occurs to buildings or agricultural land at this location alleviation works are considered inappropriate.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-57
Watercourse:	Brocksford Brook (non-main river)
Location:	Doveridge (Derbyshire Dales District Council)
OS Map reference:	SK 135 334

NATURE OF PROBLEM

Flooding occurs to Brocksford Hall School playing fields which are partially situated in the floodplain of the River Dove. As the storage in the floodplain is essential for the protection of areas downstream, and the benefits from the relief of flooding to playing fields is very low, flood alleviation works cannot be recommended at this stage.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-58
Watercourse:	Bradbourne/Bentley Brooks (part main river)
Location:	Ashbourne to Bradbourne (Derbyshire Dales District Council)
OS Map reference:	SK 160 463 to SK 194 529

NATURE OF PROBLEM

185 ha of agricultural land, mainly grassland, suffer from inadequate arterial drainage.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	2 years
	(ii)	Structures	1 in	25 years
(c) **Land potential category**				a

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	836,040	
	(ii)	Field drainage	£	12,510	£848,550
(b) **Present value of benefits**	(i)	Agriculture	£	277,830	
	(ii)	Buildings	£		
	(iii)	Roads/Railways	£		£277,830
(c) **Benefit/cost ratio**					0.3
(d) **Priority category**					3B

IMPROVEMENT WORKS

The scheme required to develop the possible land drainage benefits, consists of river regrading to achieve a minimum freeboard of 1.5 m. It would be necessary to underpin five road bridges and to replace a number of farm access bridges and footbridges.

BENEFITS

There is little prospect of any changes in farm management, and gross margin increases are expected to be minimal.

CONSERVATION

The land adjoining the north bank of the Brook is a sedge marsh. This type of marsh is now scarce in Derbyshire.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-98-710-62
Watercourse:	None
Location:	Great Longstone (Derbyshire Dales District Council)
OS Map reference:	SK 201 719, SK 199 718 and SK 199 715

NATURE OF PROBLEM

Flooding on Church Lane near St. Giles Church is due to inadequate farm/highway ditches. Flooding near Grange Cottage is due to inadequate farm ditches, and flooding of property below the garage on Main Street is from a natural spring source in the garage yard. Improvements to watercourses will not alleviate these problems and no works are therefore proposed. The solution of these problems is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-63
Watercourse:	River Derwent (main river)
Location:	Calver (Derbyshire Dales District Council)
OS Map reference:	SK 248 742

NATURE OF PROBLEM

The Calver caravan site is immediately adjacent to the River Derwent and as such is at risk from the normal inundation of the Derwent Washlands. It is estimated that out of a total of 38 caravans on site, 18 would have been flooded to a depth of 0.45 m and 4 would have floodwater passing underneath them from a flood of the 1965 magnitude (1 in 75 years).

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

COMMENT

Whilst all the caravans remain on site for the whole year, none are occupied in the winter.

A flood warning system is in operation. Evaluation of costs and benefits for a solution to this type of problem fall outside the scope of this Survey.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-710-65
Watercourse:	River Derwent (main river)
Location:	Grindleford (Derbyshire Dales District Council)
OS Map reference:	SK 245 778

NATURE OF PROBLEM

Upstream of Grindleford Bridge, two bungalows and a service station, and downstream a post office, 3 houses and the cellars of five houses are subject to very occasional inundation from the River Derwent. Flooding occurred most recently in 1965.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	167,210	
		(ii)	Field drainage	£		£167,210
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	5,750	
		(iii)	Roads/Railways	£		£5,750
(c)	**Benefit/cost ratio**					0
(d)	**Priority category**					3C

IMPROVEMENT WORKS

Essentially the solution consists of a raised footpath, with a ramped access to the playing fields on the west side of the river, to prevent floodwaters getting onto the road and into the Post Office and nearby buildings. It will also be necessary to provide a low floodwall to protect two semi-detached houses and cellars to five other properties adjacent to the A6011. Two bungalows and a petrol filling station suffer from occasional inundation on the East bank upstream of Grindleford Bridge and sheet pile revetments are proposed to alleviate flooding.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-710-66
Watercourse:	River Wye (main river)
Location:	Bakewell (Derbyshire Dales District Council)
OS Map reference:	SK 222 680

NATURE OF PROBLEM

The River Wye overtops its banks and occasionally floods gardens of property on Wye Bank and Wye Bank Grove.

The flooding has also occasionally reached foundation level of 10 of these properties in Wye Bank and Wye Bank Grove. The water table is high in this particular location.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	49,010	
		(ii)	Field drainage	£		£49,010
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	10,010	
		(iii)	Roads/Railways	£		£10,010
(c)	**Benefit/cost ratio**					0.2
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The improvement works consist of the provision of floodbanks to the rear of property on Wye Bank Grove, and a raised footpath on the South side of the recreation ground adjacent to property on Wye Bank. These remedial works will provide for a design standard of 1 in 100 years.

RECREATION, AMENITY AND FISHERIES

The preservation of the natural habitat of the watercourse is important in this instance due to the valuable trout fishing rights exercised along this reach of the River Wye. It is not envisaged that the proposed works will be in any way detrimental to the natural habitat of the River Wye.

IDENTIFICATION

Problem code number(s):	6-98-710-67
Watercourse:	None
Location:	Bakewell (Derbyshire Dales District Council)
OS Map reference:	SK 219 691

NATURE OF PROBLEM

Occasional surface water flooding has been reported on the A619 Baslow Road. This is a surface water problem and is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-68
Watercourse:	Mill Channel (non-main river)
Location:	Bakewell (Derbyshire Dales District Council)
OS Map reference:	SK 216 688

NATURE OF PROBLEM

No serious flooding to property or roads occurs at this location and hence no alleviation works have been considered or benefits evaluated.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-69
Watercourse:	Un-named tributary of Sutton Brook (non-main river)
Location:	Yeaveley (Derbyshire Dales District Council)
OS Map reference:	SK 188 403

NATURE OF PROBLEM

An old rectangular stone culvert passes under the road at Yeaveley and is joined to two smaller pipes in the access drive between two cottages. These cottages are flooded when the culvert surcharges. The culvert is situated at a local low spot and surface water run-off is likely to be a contributary factor.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The suggested scheme consists essentially of the provision of a new 600 mm culvert to pass under the road and outfall downstream of the cottages, assuming that the new culvert can be installed without diverting the foul sewer which runs alongside.

The 2 small culvert pipes immediately downstream of the road culvert have been replaced by a single 400 mm diameter culvert which appears to have provided some alleviation. No flooding has occurred since 1977 but the culvert is thought to be inadequate for more extreme flood events.

Some minor flooding still occurs due to poor highway surface water drainage.

IDENTIFICATION

Problem code number(s):	6-98-710-70
Watercourse:	Tributary of River Dove (non-main river)
Location:	Mapleton (Derbyshire Dales District Council)
OS Map reference:	SK 166 476

NATURE OF PROBLEM

4 houses flood directly from the watercourse. 2 terraced cottages, 1 bungalow and a detached house are also at risk, but suffer more frequently from the inadequacy of the surface water drainage system, which results from poor outfall facilities into the watercourse. Flooding of agricultural land and roads also occurs.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 50 years
		(ii)	Structures	1 in 50 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	23,060	
		(ii)	Field drainage	£		£23,060
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	27,520	
		(iii)	Roads/Railways	£		£27,520
(c)	**Benefit/cost ratio**					1.2
(d)	**Priority category**					2E

IMPROVEMENT WORKS

Property flood protection to a 1 in 50 years standard (0.9 cumecs) can be achieved by diverting the watercourse into a new channel through a culvert under the road. Road and farm ditches should be improved in conjunction. The scheme will improve the surface water drainage system by improvement of the outfall conditions. Agricultural land and roads flood as a result of normal floodplain inundation and any alleviation works will require comprehensive investigation of the whole of the catchment.

IDENTIFICATION

Problem code number(s):	6-98-710-71
Watercourse:	Un-named tributary of the River Ecclesbourne (non-main river)
Location:	Millers Green, Wirksworth (Derbyshire Dales District Council)
OS Map reference:	SK 282 529

NATURE OF PROBLEM

The MPI cavity wall insulation factory is on the site of the former Speedwell Mill. The reception area of the factory and the car park are frequently inundated by overflow/high water levels in the watercourse.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in 100	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	20,180	
		(ii)	Field drainage	£		£20,180
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	7,510	
		(iii)	Roads/Railways	£		£7,510
(c)	**Benefit/cost ratio**					0.4
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The flood alleviation works envisaged consist of the provision of floodbanks, 175 m of pioneer channel clearance, a penstock and flap valve to an existing outfall and the fluming of a highway bridge.

BENEFITS

The principal benefits consit of flood alleviation to the factory. No damage to stock or machinery is expected in severe flooding events.

COMMENT

No measures are proposed to alleviate possible existing groundwater problems.

FISHERIES

This stretch is a feeder to a trout fishery and consultation is required.

IDENTIFICATION

Problem code number(s):	6-98-710-72
Watercourse:	Hannage Brook (non-main river)
Location:	Millers Green, Wirksworth (Derbyshsire Dales District Council)
OS Map reference:	SK 284 527

NATURE OF PROBLEM

Flooding to the B5023 Wirksworth-Duffield Road occurs at frequent intervals. The flooding occurs at a local low spot and is due to blocked surface water drains. The ovoid stone culvert under the road has its capacity reduced by a sewer crossing. However, local observations of flooding over a considerable length of time would indicate that this is not a cause of the road flooding. No serious traffic delays occur. The solution and economic assessment of surface water flooding problems fall outside the scope of this Survey.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Derbyshire County Council have carried out some minor works but it is not yet known whether these have been totally successful in alleviating the problem.

IDENTIFICATION

Problem code number(s):	6-98-710-80
Watercourse:	Un-named (non-main river)
Location:	Darley Dale (Derbyshire Dales District Council)
OS Map reference:	SK 263 649

NATURE OF PROBLEM

Northwood Club, properties on the north side of Northwood Lane and Matlock Transport lorry park are subject to flooding due to an inadequate watercourse and culvert.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-81
Watercourse:	River Wye (main river)
Location:	Near Bakewell (Derbyshire Dales District Council)
OS Map reference:	SK 220 670

NATURE OF PROBLEM

Land drainage outfalls are submerged in the Haddon Estates area and riverside land is deteriorating.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The landowners do not wish to consider dredging because of the importance of the river for fishing.

IDENTIFICATION

Problem code number(s):	6-98-710-82
Watercourse:	River Lathkill (non-main river)
Location:	Lathkill Lodge (Derbyshire Dales District Council)
OS Map reference:	SK 240 650

NATURE OF PROBLEM

Flooding occurs at Lathkill Lodge near the confluence of the Rivers Wye and Lathkill. The flow in the river is regulated at a nearby weir by Fishery Wardens which could be the source of the problem.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-83
Watercourse:	Cubley Brook (non-main river)
Location:	Cubley (Derbyshire Dales District Council)
OS Map reference:	SK 164 375

NATURE OF PROBLEM

Cubley Mill Farmhouse is subject to flooding from Cubley Brook.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-86
Watercourse:	Un-named (non-main river)
Location:	A6, Bakewell Road, Matlock (Derbyshire Dales District Council)
OS Map reference:	SK 286 612

NATURE OF PROBLEM

Occasional flooding occurs to a new property on the west side of Bakewell Road opposite Stanton Moor View. The source of the problem is a length of old, rough and inadequate stone culvert beneath both the A6 road and private land beyond. The problem is made worse by frequent blockages in the culvert as a result of debris being thrown in further upstream.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The highway culvert under the A6 has been replaced by Derbyshire County Council. There is the possibility of works downstream of the A6, or balancing above, which is now being considered in connection with possible new development above the A6.

IDENTIFICATION

Problem code number(s):	6-98-710-87
Watercourse:	Bradbourne Brook (non-main river)
Location:	Fenney Bentley (Derbyshire Dales District Council)
OS Map reference:	SK 175 499

NATURE OF PROBLEM

Two cottages at Fenney Bentley are subject to flooding from the Bradbourne Brook as they are situated in the floodplain.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-90
Watercourse:	Un-named tributary of Henmore Brook (non-main river)
Location:	Clifton (Derbyshire Dales District Council)
OS Map reference:	SK 173 458

NATURE OF PROBLEM

The existing culverts beneath Nestles Factory yard, the factory itself and the railway are inadequate and cause flooding to both the site and the adjacent A515 road. The culvert beneath the road has been replaced in recent years but regularly becomes silted up near the entrance thereby worsening the problem.

If further development is allowed to take place on the old airfield site upstream of this problem, then the flooding situation will become worse.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-710-93
Watercourse:	Un-named (non-main river)
Location:	Bakewell (Derbyshire Dales District Concil)
OS Map reference:	SK 223 686

NATURE OF PROBLEM

An old stone sough crosses meadowland above certain properties in Coombs Road, it then follows a route through the grounds of these properties. The route has been traced and found to be in reasonable order. The crossing under Coombs Road appears to have been disturbed at some time in the past and is causing a build up in the sough above Coombs Road. This results in the emergence of water in the low laying field area to the rear of the properties in question. On occasions this has reached such a level as to flood garden areas and outflow onto the public highway in Coombs Road.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

IDENTIFICATION

Problem code number(s):	6-98-710-94
Watercourse:	None
Location:	Matlock (Derbyshire Dales District Council)
OS Map reference:	SK 308 613

NATURE OF PROBLEM

Discharge from Sand Lane and the catchment above often causes direct flow onto the public highway in Gritstone Road. This is a surface water problem and falls outside the scope of this survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£ _____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£ _____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

IDENTIFICATION

Problem code number(s):	6-98-710-95
Watercourse:	None
Location:	Ashford in the water (Derbyshire Dales District Council)
OS Map reference:	SK 195 700

NATURE OF PROBLEM

The cultivation of meadowland which slopes towards Pennyunk Lane caused significant flooding in the village of Ashford in the Water in 1983. Substantial soil erosion occured with large amounts of silt being transported in suspension into the village centre. The problem arises from the cultivation of meadowland and can only be improved by a change in farming methods aimed at reducing the risk of reoccurrence.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

IDENTIFICATION

Problem code number(s):	6-98-810-1/16
Watercourse:	Roadside Ditches (non-main river)
Location:	Bent Lane, Church Broughton (South Derbyshire District Council)
OS Map reference:	SK 212 333

NATURE OF PROBLEM

Two properties have been inundated from roadside ditches, which surcharge in times of heavy rain due to changed farming methods and undersized culverts connecting the ditches together. A solution would be to provide adequate culverts under the roads and carry out routine maintenance to the roadside ditches.

Works to arterial watercourses will not alleviate the flooding and so the problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The Highway Authority have replaced an inadequate culvert beneath the road with a larger pipe. This has alleviated the problem of property inundation. The garden of No. 1 and the adjacent field still flood.

IDENTIFICATION

Problem code number(s):	6-98-810-2
Watercourse:	River Derwent (main river)
Location:	Ambaston (South Derbyshire District Council)
OS Map reference:	SK 428 326

NATURE OF PROBLEM

Ambaston Village lies wholly within the washlands of the River Derwent. Three groups of farm buildings, eight domestic properties and a sewage pumping station have been flooded on rare occasions when the extensive River Derwent floodplain has been inundated. The most serious flooding occurred in 1960 and 1965.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

A flood alleviation scheme consisting mainly of an earth ring bank around the village has been provided by Hoveringham Gravels. This bank, which also acts as a screen for quarrying activities, is built high enough to provide protection from at least the 1 in 100 year flood level. It must be noted, however, that during a prolonged flood event a risk of minor flooding still exists within the defence due to floodwater percolating through the porous gravels underlying the bank.

In recent flood events a temporary pump has been used to reduce the build up of water within the defence due to rainfall and possible percolation.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-810-3
Watercourse:	River Dove (main river)
Location:	Scropton (South Derbyshire District Council)
OS Map reference:	SK 190 301 and SK 195 300

NATURE OF PROBLEM

Flooding has occurred, for durations of between 1 and 3 days, in December 1960, April 1971 and January/February 1977. This has affected Brook House and Mill Green, Scropton-Sudbury Road, Church Broughton Road, Scropton-Hatton/Tutbury Road and extensive areas of land adjacent to the river.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Existing flood defences at Brook House have been raised and property at Mill Green has had flood defences constructed around it. The agricultural land adjacent to the river and the Scropton Village roads are within the normal floodplain of the River Dove. The storage in the floodplain is essential for the protection of areas downstream and flood alleviation works for this area cannot be recommended at this stage.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-810-4/8/11/12/15/23
Watercourse:	Twyford Brook/Doles Brook/Hell Brook (non-main river)
Location:	Findern (South Derbyshire District Council)
OS Map reference:	SK 326 285 to SK 304 314 and SK 319 334

NATURE OF PROBLEM

The existing watercourse does not provide sufficient freeboard between field level and water level to allow proper drainage. Development in the upper reaches of the Doles Brook and Hell Brook has increased the magnitude and frequency of flood flows causing more frequent inundation of the farm land. Eleven properties in Findern have been surrounded by flood water under extreme flood conditions.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£ 1,016,000		
		(ii)	Field drainage	£		£1,016,000
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		
		(iv)	Development	£		£ _____
(c)	**Benefit/cost ratio**					
(d)	**Priority category**					3A

IMPROVEMENT WORKS

A preliminary design for an Improvement Scheme on the Hell Brook was produced by STWA. This scheme would provide 1 in 10 year flood protection to a large area of agricultural land. The scheme would also provide flood protection to 19 properties and enable considerable improvements to be made to existing foul and surface water sewerage systems. These improvements will be possible because of improved Brook capacity and drainage freeboard. A lowering of water levels within the Hell Brook would also enable the Doles Brook to be improved for much of its length. The proposed extent of the scheme is from a point just downstream of Rykneld Road to the confluence with the River Derwent.

BENEFITS

The principal benefits associated with the scheme will be improved drainage to farmland and reduction in the frequency of flooding of farmland caused by run-off from the development.

The improved channel capacity will allow for the development of 83 ha of land within the catchment area of the brooks without the provision of surface water storage facilities, a requirement for all development in this area at the moment.

CONSERVATION

The SNPC has expressed an interest in the site at 6-98-810-23 and would welcome consultation over the site at 6-98-810-8.

IDENTIFICATION

Problem code number(s):	6-98-810-5/7
Watercourse:	Tributary of the River Trent (non-main river)
Location:	Willington (South Derbyshire District Council)
OS Map reference:	SK 294 285

NATURE OF PROBLEM

9 houses, a shop, a public house and a church (now converted into a shop) flooded in 1977. This has been estimated as the 1 in 25 years event.

The flooding of Willington has four possible causes:

i) The surcharging of inadequate channel sections, obstructive and undersized culverts;
ii) discharge from a British Waterways sluice to regulate canal water levels;
iii) the proximity of the River Trent giving high groundwater levels in the gravel sub-strata;
iv) backing up from the River Trent when tributary outfalls are restricted.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in 100	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£_____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£_____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Due to change of ownership of several houses which have been subject to inundation, the new riparian owners have reconstructed their access ways over this brook, and several have constructed their own floodbanks and floodwalls. The South Derbyshire District Council has been able to undertake heavy maintenance works and has also regraded and deepened the brook. These measures will alleviate flooding, but cannot remove it due to the inability to lower the River Trent flood levels, into which this brook discharges.

South Derbyshire District Council are currently examining the catchment with a view to undertaking works during 1990/91 because the upstream catchment includes the Toyota development site.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-98-810-6
Watercourse:	River Trent (main river)
Location:	Barrow-on-Trent (South Derbyshire District Council)
OS Map reference:	SK 353 284 to SK 358 284

NATURE OF PROBLEM

Barrow-on-Trent lies on the banks of the River Trent. Properties along Church Lane border these extensive washlands and suffer occasional inundation in major floods. Church Lane itself is impassable for several days when the Trent is in flood causing difficult access problems.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	51,890	
		(ii)	Field drainage	£		£51,890
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	7,510	
		(iii)	Roads/Railways	£		£7,510
(c)	**Benefit/cost ratio**					0.1
(d)	**Priority category**					30

IMPROVEMENT WORKS

Works would include the construction of a low blockwork floodwall around The Crow Trees and Trent Side Cottages combined with a road ramp adjacent to the River Trent. Eve Cottages would also be protected by a reinforced wall with removable floodboards at the access point for Church Lane.

BENEFITS

The principal benefits consist of flood relief to four domestic properties.

COMMENT

Access to all the properties on Church Lane is possible via Chapel Lane during flood conditions. Alternative provision of access was not therefore considered necessary.

FISHERIES

This is a good coarse fishery site and consultation will be necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-98-810-9
Watercourse:	River Trent (main river)
Location:	Swarkestone (South Derbyshire District Council)
OS Map reference:	SK 370 286

NATURE OF PROBLEM

The Village of Swarkestone lies directly on the banks of the River Trent and as such is at risk from major floods. Two properties were inundated and several others put at risk by the 1947 flood.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	23,060	
		(ii)	Field drainage	£		£23,060
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	6,260	
		(iii)	Roads/Railways	£		£6,260
(c)	**Benefit/cost ratio**					0.3
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The works envisaged consist of the provision of floodbanks designed to the 100 year standard to protect the Village of Swarkstone.

BENEFITS

The principal benefits are flood alleviation to five properties in Swarkestone and the alleviation of access traffic disruption.

FISHERIES

This is a good coarse fishery site and consultation will be necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-98-810-10
Watercourse:	None
Location:	Shardlow (South Derbyshire District Council)
OS Map reference:	SK 430 300

NATURE OF PROBLEM

The drainage of land between Aston-on-Trent and Shardlow is in the low lying area immediately between the River Derwent and the River Trent. Local flooding can also occur behind the floodbanks protecting Shardlow from the Derwent and Trent respectively.

Minor local flooding of land and roads is due to inadequate farm/highway ditches. Works to arterial watercourses will not alleviate the flooding and so the problem falls outside the scope of this Survey.

Maintenance/improvement works to farm/highway ditches will give some measure of alleviation to the flooding, but due to the low lying nature of the land and the proximity of the Rivers Derwent and Trent, the effectiveness of a scheme will be limited because the main river outfall conditions cannot be significantly improved.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-810-14
Watercourse:	None
Location:	Etwall (South Derbyshire District Council)
OS Map reference:	SK 274 332

NATURE OF PROBLEM

Surface water collects at a local low spot underneath the railway bridge near Bearwardcote, Etwall. Works to the watercourse will not alleviate the flooding so the problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-810-17
Watercourse:	None
Location:	Sutton-on-the-Hill (South Derbyshire District Council)
OS Map reference:	SK 235 355

NATURE OF PROBLEM

Flooding occured to Yew Tree Farm in 1975 and May 1979, from surface water running along Back Lane due to the inadequate road drainage system. The District Council has carried out improvement works to the road drainage on Back Lane and no further flooding has occurred to date. Infrequent surface water flooding occurs at the Sutton Lane Ends road junction but this problem falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-810-18/19
Watercourse:	River Dove and Egginton Brook (main river)
Location:	Egginton (South Derbyshire District Council)
OS Map reference:	SK 273 277

NATURE OF PROBLEM

Agricultural washland, private gardens of two properties and Church Road are subject to periodic flooding. However, this flooding represents normal inundation of the Dove washland and flood alleviation works are not anticipated.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

CONSERVATION

Adjoining gravel pits are of importance for birds. These pits have been notified as Biological Sites on the register of important sites.

FISHERIES

This is a good trout fishery and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-98-810-21
Watercourse:	Etwall and Egginton Brooks (main river)
Location:	Egginton (South Derbyshire District Council)
OS Map reference:	SK 264 336 to SK 276 278

NATURE OF PROBLEM

The existing watercourse does not provide sufficient freeboard between the water level and the adjacent fields to allow adequate drainage to the farm land.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 2 years
		(ii)	Structures	1 in 25 years
(c)	**Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	755,320	
		(ii)	Field drainage	£	242,700	£998,020
(b)	**Present value of benefits**	(i)	Agriculture	£	625,120	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£	35,030	£660,150
(c)	**Benefit/cost ratio**					0.7
(d)	**Priority category**					3B

IMPROVEMENT WORKS

The proposed scheme includes for regrading the channel over a length of 7.3 km, underpinning of four road bridges and two railway bridges, the replacement of five farm access bridges, one ford and the removal of five weirs.

BENEFITS

The principal benefits are the improved field drainage to approximately 250 ha of arable/dairying farmland.

IDENTIFICATION

Problem code number(s):	6-98-810-24
Watercourse:	Thulston Brook (non-main river)
Location:	Thulston Brook (South Derbyshire District Council)
OS Map reference:	SK 410 320

NATURE OF PROBLEM

A house has been flooded in Thulston and others are now built on the same site. Flows from the large scale development that has taken place upstream at Alvaston are balanced to limit flows downstream.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-810-26
Watercourse:	Un-named (non-main river)
Location:	Scropton (South Derbyshire District Council)
OS Map reference:	SK 194 311 to SK 193 301

NATURE OF PROBLEM

The road known as Water Lane which links Scropton to the A50 road regularly suffers from flooding. Several properties bordering the road are also at risk from flooding. The main drain serving this catchment area runs in a southerly direction along the side of the lane and eventually discharges via a flapped outfall into the River Dove at Scropton.

When flooding occurs on the River Dove, high river levels close the flap valve which subsequently causes the Brook to back up and flood the road. The properties bordering the road have been seriously threatened by floodwater on several occasions and any further development or increase in paved areas upstream will certainly worsen the existing situation.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-98-810-27
Watercourse:	Shardlow Parish Dyke (non-main river)
Location:	Shardlow (South Derbyshire District Council)
OS Map reference:	SK 4312 3040 to SK 4475 3055

NATURE OF PROBLEM

A number of flooding problems exist on this watercourse, which is the main watercourse serving the village. The problems are mainly caused by inadequate culverts and channel sections combined with a general lack of maintenance. The situation has been made worse over recent years by increased development upstream of the main problem areas around The Wharf.

As a result of increasing local concern, a considerable amount of discussion and consultation has taken place between the Parish Council, District Council and the former STWA. The outcome has been that a continuous length of the watercourse between SK 4338 3018 and SK 4418 3045 has been accepted and adopted by STW as a public sewer. Pending the result of further enquiries into riparian ownership, a further length upstream may also ultimately be adopted as public sewer.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

South Derbyshire District Council have recently undertaken a drainage investigation of this watercourse and have produced a report identifying what improvements require to be carried out in order to alleviate the problem. No work is currently planned for implementation in the immediate future, but it is envisaged that certain works will be carried out at some stage to financial availability.

IDENTIFICATION

Problem code number(s):	6-98-810-28
Watercourse:	Thulston Brook (non-main river)
Location:	Boulton to Shardlow (Derby City Council and South Derbyshire District Council)
OS Map reference:	SK 390 320 to SK 442 377

NATURE OF PROBLEM

Thulston Village is subject to occasional flooding from the Thulston Brook, the last notable event being in 1977. On this occasion, flooding was caused by a combination of intense local rainfall and the backwater effect of the high floodwater level at the Derwent/Thulston Brook confluence.

In addition to Thulston Village, flooding also affects agricultural land bordering the Brook and improvement works are required to alleviate the existing problems.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

DEVELOPMENT

The policy of the NRA is that no further development draining to this watercourse should be allowed in the future, unless either improvement or balancing works are undertaken.

CONSERVATION

The Brook and adjacent fields support a rich and varied flora and fauna.

IDENTIFICATION

Problem code number(s):	6-98-810-27
Watercourse:	Shardlow Parish Dyke (non-main river)
Location:	Shardlow (South Derbyshire District Council)
OS Map reference:	SK 4312 3040 to SK 4475 3055

NATURE OF PROBLEM

A number of flooding problems exist on this watercourse, which is the main watercourse serving the village. The problems are mainly caused by inadequate culverts and channel sections combined with a general lack of maintenance. The situation has been made worse over recent years by increased development upstream of the main problem areas around The Wharf.

As a result of increasing local concern, a considerable amount of discussion and consultation has taken place between the Parish Council, District Council and the former STWA. The outcome has been that a continuous length of the watercourse between SK 4338 3018 and SK 4418 3045 has been accepted and adopted by STW as a public sewer. Pending the result of further enquiries into riparian ownership, a further length upstream may also ultimately be adopted as public sewer.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

South Derbyshire District Council have recently undertaken a drainage investigation of this watercourse and have produced a report identifying what improvements require to be carried out in order to alleviate the problem. No work is currently planned for implementation in the immediate future, but it is envisaged that certain works will be carried out at some stage to financial availability.

IDENTIFICATION

Problem code number(s):	6-98-810-28
Watercourse:	Thulston Brook (non-main river)
Location:	Boulton to Shardlow (Derby City Council and South Derbyshire District Council)
OS Map reference:	SK 390 320 to SK 442 377

NATURE OF PROBLEM

Thulston Village is subject to occasional flooding from the Thulston Brook, the last notable event being in 1977. On this occasion, flooding was caused by a combination of intense local rainfall and the backwater effect of the high floodwater level at the Derwent/Thulston Brook confluence.

In addition to Thulston Village, flooding also affects agricultural land bordering the Brook and improvement works are required to alleviate the existing problems.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

DEVELOPMENT

The policy of the NRA is that no further development draining to this watercourse should be allowed in the future, unless either improvement or balancing works are undertaken.

CONSERVATION

The Brook and adjacent fields support a rich and varied flora and fauna.

IDENTIFICATION

Problem code number(s):	7-98-810-1
Watercourse:	None
Location:	Burton Road, Newton Solney (South Derbyshire District Council)
OS Map reference:	SK 280 255

NATURE OF PROBLEM

Road flooding is caused by surface water ponding as the road gullies are not able to discharge excess water.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

This is a Highway Authority problem and is outside the scope of this Survey.

IDENTIFICATION

Problem code number(s):	7-98-810-2
Watercourse:	None
Location:	Smisby (South Derbyshire District Council)
OS Map reference:	SK 350 191

NATURE OF PROBLEM

Surface water flows down the road flooding a public house.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

This is a Highway Authority problem and is outside the scope of this Survey.

IDENTIFICATION

Problem code number(s):	7-98-810-3
Watercourse:	Hooborough Brook (non-main river)
Location:	Overseal (South Derbyshire District Council)
OS Map reference:	SK 294 127 to SK 300 161

NATURE OF PROBLEM

65 ha of agricultural land suffer from inadequate arterial drainage and localised flooding.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	3 years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	273,880	
		(ii)	Field drainage	£	20,020	£293,900
(b)	**Present value of benefits**	(i)	Agriculture	£	119,470	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£119,470
(c)	**Benefit/cost ratio**					0.4
(d)	**Priority category**					3C

IMPROVEMENT WORKS

General regrading works are required to provide a channel capacity of 3.1 cumecs and to allow satisfactory freeboard for field drainage under average flow conditions. No major work on structures is required. South Derbyshire District Council have no immediate plans to undertake improvement works.

BENEFITS

With improved drainage some slight improvement in stocking rates may be possible resulting in an increase in gross margin. No further increase in arable cropping is envisaged.

CONSERVATION

The area on either side of the road bridge (B5004) has developed into a good example of a marsh habitat supporting willow warbler and chiff chaff. In a locality where mining and other industrial activities have destroyed much of the natural vegetation, this is of important conservation value.

IDENTIFICATION

Problem code number(s):	7-98-810-7
Watercourse:	Ramsley Brook (non-main river)
Location:	Melbourne (South Derbyshire District Council)
OS Map reference:	SK 393 272

NATURE OF PROBLEM

15 ha of land used for horticulture and 42 ha of semi-waste land (old railway sidings etc) suffer from inadequate arterial drainage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	3 years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£ nil
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£ nil
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The watercourse needs only limited maintenance works to bring it up to the required standard. These are the responsibility of the riparian owners.

BENEFITS

No increase in gross margin is likely following drainage improvements; in fact there may be a reduction as water from this area is extracted for irrigating 15 ha in the benefit area and a further 50 ha beyond. If drainage alters the flow of water it may reduce the amount of water available for irrigation.

It seems unlikely that the 42 ha of waste land has any horticultural potential. Its poor quality is not due to any deficiency of drainage.

IDENTIFICATION

Problem code number(s):	6-99-110-1/12/13
Watercourse:	River Tean and Cecilly Brook (non-main river)
Location:	Lower Tean to Cheadle (Staffordshire Moorlands District Council)
OS Map reference:	SJ 997 429 to SK 020 382, SK 008 443 to SK 006 414, SK 016 443 to SK 014 437

NATURE OF PROBLEM

Flooding occurred in February 1946, July 1957 and the winter of 1974 on the floodplains of the upper reaches of the River Tean and the Cecilly Brook. Thirteen properties were affected near The White Hart Public House in Upper Tean and on Mill Lane in Lower Tean. In addition, drainage is adversely affected on 112 ha of agricultural land.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in 10 years
	(ii)	Structures	1 in 100 years
(b) **Agricultural**	(i)	Channel	1 in 10 years
	(ii)	Structures	1 in 25 years
(c) **Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£_____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£_____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The NRA, Severn-Trent Region has submitted proposals to the Ministry of Agriculture, Fisheries & Food for maining the following lengths of watercourse:
R Tean - SK 062 360 to SK 001 424, 11 km.
Cecilly Brook - SK 006 414 to SK 010 442, 3.5 km
Upon confirmation of these watercourses as main river, the NRA has programmed improvement works for 1992/93 subject to a satisfactory benefit cost assessment.

DEVELOPMENT

Objections are being raised to development in the River Tean catchment because of the detrimental effect of additional surface water on land drainage. In the past, these objections have been overlooked if developers have agreed to provide surface water retention basins which will limit the discharge to the river. Future development could, however, be advised against by STWA to avoid an unacceptable proliferation of retention basins.

FISHERIES

This is a good coarse fishery site and consultation will be necessary before any improvement is commenced.

IDENTIFICATION

Problem code number(s):	6-99-110-3
Watercourse:	River Churnet headwaters (non-main river)
Location:	Meerbrook (Staffordshire Moorlands District Council)
OS Map reference:	SJ 986 626 to SJ 992 609

NATURE OF PROBLEM

Flooding upstream of Tittesworth Reservoir occurs for durations of 2 to 3 hours and affects the drainage of 26 ha of agricultural land.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 2 years
		(ii)	Structures	1 in 50 years
(c)	**Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	236,400	
		(ii)	Field drainage	£	15,010	£251,410
(b)	**Present value of benefits**	(i)	Agriculture	£	130,580	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£130,580
(c)	**Benefit/cost ratio**					0.5
(d)	**Priority category**					3C

IMPROVEMENT WORKS

A regrading scheme of 2.2 km of the river is proposed to improve the drainage of agricultural land by providing 1.5 m of freeboard in the river at normal water levels. A roadbridge, a farm access bridge and 3 footbridges are to be replaced as part of the scheme.

FISHERIES

This is a good trout and coarse fishery site and consultation is essential.

IDENTIFICATION

Problem code number(s):	6-99-110-4/5/15/17
Watercourse:	Ditches draining to Horton Brook (non-main river)
Location:	Endon (Staffordshire Moorlands District Council)
OS Map reference:	SJ 933 548

NATURE OF PROBLEM

Flooding has occurred to a cottage on Dams Lane at Gratton. The flooding results from inadequate farm and highway ditches and work to watercourses will not alleviate this problem. The solution, therefore, is outside the scope of this Survey.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-6
Watercourse:	Dingle Brook and canal feeder (non-main river)
Location:	Rudyard (Staffordshire Moorlands District Council)
OS Map reference:	SJ 955 579

NATURE OF PROBLEM

Flooding for a duration of 1-2 days occurred in February 1977 to a Garage, cellars to 2 houses and 4 ha of land. The flooding originates from Rudyard Reservoir overflow and canal feeder which are British Waterways Board installations. The solution to this problem is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

British Waterways Board have carried out some improvement works to their reservoir overflow arrangements and also cleared and improved their canal feeder channel. The problem has still not been fully alleviated because storm run-off draining to the affected land cannot get away due to inadequate drains beneath the artificially raised highway.

IDENTIFICATION

Problem code number(s):	6-99-110-7
Watercourse:	Horton Brook (non-main river)
Location:	Endon (Staffordshire Moorlands District Council)
OS Map reference:	SJ 936 576 to SJ 934 541

NATURE OF PROBLEM

Flooding of Horton Brook affects the drainage of 80 ha of agricultural land.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 2 years
		(ii)	Structures	1 in 25 years
(c)	**Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	317,120	
		(ii)	Field drainage	£	50,040	£367.160
(b)	**Present value of benefits**	(i)	Agriculture	£	400,080	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£400.080
(c)	**Benefit/cost ratio**					1.1
(d)	**Priority category**					1C

IMPROVEMENT WORKS

A general regrading scheme along 3.8 km of the Horton Brook is recommended to improve the land drainage of the area. Underpinning is required to two road bridges, and a number of farm access bridges need replacing.

BENEFITS

The benefits are attributable to improved output from agricultural land alone.

CONSERVATION

Downstream of the benefit area at SJ 952 576 are wet meadows of nature conservation interest.

FISHERIES

This is a good coarse fishery site and consultation will be necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-99-110-8/16
Watercourse:	Tributary of River Churnet (non-main river)
Location:	Rudyard, Leek (Staffordshire Moorlands District Council)
OS Map reference:	SK 956 587

NATURE OF PROBLEM

Flooding occurred in February 1977 to a barn and a small area of land on each side of Green Lane.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 25 years
		(ii)	Structures	1 in 25 years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	7,210	
		(ii)	Field drainage	£		£7,210
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	5,000	
		(iii)	Roads/Railways	£		£5,000
(c)	**Benefit/cost ratio**					0.7
(d)	**Priority category**					3F

IMPROVEMENT WORKS

The recommended remedial works comprise channel clearance upstream of the Green Lane culvert. In addition, it will be necessary to replace the ford, which provides access to the fields, with a bridge and flood embankment.

BENEFITS

The benefits from alleviation of flooding to agricultural land and the road are negligible and have not been included.

IDENTIFICATION

Problem code number(s):	6-99-110-11
Watercourse:	Tributary of River Tean (non-main river)
Location:	Upper Tean (Staffordshire Moorlands District Council)
OS Map reference:	SK 016 395

NATURE OF PROBLEM

Road flooding at this location has been reported, but investigations have shown no evidence of any arterial drainage problem.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-18
Watercourse:	River Churnet (main river)
Location:	Alton (Staffordshire Moorlands District Council)
OS Map reference:	SK 072 427

NATURE OF PROBLEM

In 1967 and 1969 flooding occurred to two houses, the gardens to two other houses and to the sewage works.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	17,300	
		(ii)	Field drainage	£		£17,300
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	6,010	
		(iii)	Roads/Railways	£		£6,010
(c)	**Benefit/cost ratio**					0.3
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The recommended works require an effective hydraulic seal to be constructed across the disused mill race, to alleviate the flooding which occurs to the two houses behind the mill. The cost of protecting the sewage works and house gardens is high in relation to the benefits achieved and cannot, therefore, be recommended.

DEVELOPMENT

Development at Alton Towers may exacerbate these problems.

FISHERIES

This is a good trout fishery site and consultation is required before any works are commenced.

IDENTIFICATION

Problem code number(s):	6-99-110-19
Watercourse:	Cotton Brook (non-main river)
Location:	Oakamoor (Staffordshire Moorlands District Council)
OS Map reference:	SK 055 450

NATURE OF PROBLEM

In July 1974, flooding occurred to a public house, roads and terraced cottages around the square in Oakamoor. The flooding lasted for approximately 4 hours.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	175,860	
		(ii)	Field drainage	£		£175,860
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	62,550	
		(iii)	Roads/Railways	£		£62,550
(c)	**Benefit/cost ratio**					0.4
(d)	**Priority category**					3C

IMPROVEMENT WORKS

The recommended works consist of 200 m of channel clearance involving regrading, removal of weirs and vegetation and the provision of a concrete lined channel. In addition, it will be necessary to replace two existing footbridges. Floodbanks will be required adjacent to the Brook channel and the River Churnet immediately upstream of the weir.

BENEFITS

The benefit from alleviation of road flooding is negligible and has not been included.

IDENTIFICATION

Problem code number(s):	6-99-110-20
Watercourse:	River Churnet (main river)
Location:	Oakamoor (Staffordshire Moorlands District Council)
OS Map reference:	SK 053 446

NATURE OF PROBLEM

Flooding occurred to 8 terraced cottages at the Island, Oakamoor in 1948 and 1964.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 100 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	54,780	
		(ii)	Field drainage	£		£54,780
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	15,010	
		(iii)	Roads/Railways	£		£15,010
(c)	**Benefit/cost ratio**					0.3
(d)	**Priority category**					3D

IMPROVEMENT WORKS

The recommended flood alleviation works consist of a reinforced concrete wall adjacent to the River Churnet and a floodbank to tie the end of this wall into higher land at Mill Lane.

FISHERIES

This is a good trout and coarse fishery site and consultation is essential.

IDENTIFICATION

Problem code number(s):	6-99-110-21
Watercourse:	River Manifold (non-main river)
Location:	Brund, Near Sheen (Staffordshire Moorlands District Council)
OS Map reference:	SK 098 613

NATURE OF PROBLEM

The flooding problem reported represents the normal inundation of the River Manifold floodplain. As no serious flooding to property, land or roads occurs, no alleviation works have been considered or benefits evaluated.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-22
Watercourse:	River Manifold (non-main river)
Location:	Hulme End (Staffordshire Moorlands District Council)
OS Map reference:	SK 106 593

NATURE OF PROBLEM

The flooding reported represents the normal inundation of the River Manifold floodplain. As no serious flooding occurs to land or roads at this location, no alleviation works have been considered at this stage.

Surface water sewerage problems exist at the Light Railway Inn and also near the Post Office in Hulme End Village, but these problems fall outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-23
Watercourse:	Un-named tributary of River Hamps (non-main river)
Location:	Onecote (Staffordshire Moorlands District Council)
OS Map reference:	SK 051 554

NATURE OF PROBLEM

The problem is considered to be attributable to the brookcourse surcharging and flooding the adjacent road, prior to its discharge to the River Hamps on the downstream side of the B5053 road bridge. The solution considered would be basic channel maintenance consisting of the removal of weeds, debris, etc from the farm access bridge to the River Hamps outfall. As simple maintenance works would alleviate the flooding problem, no costs have been established or benefits evaluated.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-24
Watercourse:	River Manifold (non-main river)
Location:	West Side Mill, Hulme End (Staffordshire Moorlands District Council)
OS Map reference:	SK 101 588

NATURE OF PROBLEM

The infrequent road flooding reported results from abnormal inundation of the River Manifold floodplain and no alleviation works have therefore been considered.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-25
Watercourse:	Tributary of River Dove (non-main river)
Location:	Hollinsclough (Staffordshire Moorlands District Council)
OS Map reference:	SK 071 666

NATURE OF PROBLEM

Flooding occurs to a minor road, but as this is not serious the benefits do not justify an improvement scheme. A solution has, therefore, not been evaluated.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-26
Watercourse:	None
Location:	Milldale (Staffordshire Moorlands District Council)
OS Map reference:	SK 139 547

NATURE OF PROBLEM

In 1964 and 1977 a shop, 2 houses and a woodyard were flooded by run-off from the highway during a flood with an estimated frequency of 1 in 100 years.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

These roadside properties flood due to the inadequacies in the highway surface water drainage system. Works to watercourses will not alleviate the flooding and the solution is, therefore, outside the scope of this Survey.

COMMENT

Owing to the location, a surface water drainage system to prevent the road acting as a watercourse is believed to be impractical and very expensive. Householders protect their properties by sandbags or specially made 'stop boards'.

IDENTIFICATION

Problem code number(s):	6-99-110-30
Watercourse:	Leek Brook (non-main river)
Location:	Leekbrook (Staffordshire Moorlands District Council)
OS Map reference:	SJ 985 539

NATURE OF PROBLEM

Occasional flooding occurs to two detached houses and a domestic garage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 25 years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	23,060	
		(ii)	Field drainage	£		£23,060
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	35,030	
		(iii)	Roads/Railways	£		£35,030
(c)	**Benefit/cost ratio**					1.5
(d)	**Priority category**					2E

IMPROVEMENT WORKS

The recommended remedial works consist of clearance of the Leek Brook channel, both upstream and downstream of the A520 Cheddleton Road, and the construction of floodbanks on both sides of the Leek Brook adjacent to the affected properties. In addition, the A520 road culvert and the Basford Lane culvert will require clearing out.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

COMMENT

Some works to the channel have been carried out as a condition of development of upstream industrial estates, but flooding has since occurred to the same properties. The basic problem appears to be industrial debris thrown into the Brook and heavy river siltation which leads to culvert blockage and flooding. Staffordshire Moorlands District Council carry out some maintenance to the Brook on occasions but no works are programmed.

IDENTIFICATION

Problem code number(s):	6-99-110-31
Watercourse:	River Churnet (main river)
Location:	Leek (Staffordshire Moorlands District Council)
OS Map reference:	SJ 980 572 to SJ 974 571

NATURE OF PROBLEM

The major problem on this reach of the river is the flooding of 3 houses and the road at Abbey Green and also a public house, 7 residential properties, industrial premises and the Macclesfield Road in Leek.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

The National Rivers Authority have an improvement scheme planned for 1991.

FISHERIES

This is a good coarse fishery site and consultation will be necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-99-110-32
Watercourse:	Ball Brook (non-main river)
Location:	Leek (Staffordshire Moorlands District Council)
OS Map reference:	SJ 987 568

NATURE OF PROBLEM

Flooding occurs to 6 terraced houses, a builders yard and the Ball Haye Road. Flooding probably occurred in 1977 following a 1 in 50 year event, but there has been no reported flooding since. The flooding results from surface water sewers, and works to the watercourses will not alleviate the problem. The solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-33
Watercourse:	Ball Brook (non-main river)
Location:	Leek (Staffordshire Moorlands District Council)
OS Map reference:	SJ 992 567

NATURE OF PROBLEM

Flooding occurs to Bodes garage and workshops and the Buxton Road in Leek. The flooding probably occurred in 1977 following a 1 in 50 year event, but no flooding has been reported since. The flooding results from the inadequacy of surface water sewers and works to the watercourse will not alleviate the problem. The solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-34
Watercourse:	River Hamps (non-main river)
Location:	Waterhouses (Staffordshire Moorlands District Council)
OS Map reference:	SK 080 504 to SK 091 501

NATURE OF PROBLEM

The River Hamps has seriously flooded the Village of Waterhouses in 1934, 1947, 1948, 1971 and 1973. In 1971, 29 houses, a restaurant, builders yard, shop, dye works and a chapel were inundated up to depths of 1.5 m. The A523 road was also closed to traffic. This flood was the worst on record and probably had a return period in excess of 100 years.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 15 years
		(ii)	Structures	1 in 100 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	795,680	
		(ii)	Field drainage	£		£795,680
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	78,320	
		(iii)	Roads/Railways	£	750	£79,070
(c)	**Benefit/cost ratio**					0.1
(d)	**Priority category**					3B

IMPROVEMENT WORKS

The bed of the watercourse through Waterhouses is rock and it would be extremely expensive to enlarge the cross-section. The improvements costed consist, therefore, of the construction of flood defences and the replacement of an existing bridge. Because a number of the properties are located immediately adjacent to the watercourse, it would be necessary to construct floodwalls to provide the required protection. The use of earth floodbanks is limited because of the lack of space through the village. The works will provide for a design capacity of 51 cumecs.

BENEFITS

The principal benefit from the scheme is property flood alleviation and the relief of traffic disruption.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

COMMENT

The proposed relocation of a sewer which obstructs flow in the River Hamps will give some slight alleviation.

Waterhouses in a large village which will be a possible location for a new development ;in the Rural Area Local Plan.

IDENTIFICATION

Problem code number(s):	6-99-110-36
Watercourse:	Un-named (non-main river)
Location:	Leek (Staffordshire Moorlands District Council)
OS Map reference:	SJ 979 573 to SJ 989 580

NATURE OF PROBLEM

Flooding occurs to the floodplain of the River Churnet upstream of Leek and causes poor drainage to 56 ha of agricultural land. Riparian rights on the River Churnet means that high water levels have to be maintained and this limits the free outfall of drainage systems.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	2 years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	49,010	
		(ii)	Field drainage	£	32,530	£81,540
(b)	**Present value of benefits**	(i)	Agriculture	£	280,610	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£280,610
(c)	**Benefit/cost ratio**					3.4
(d)	**Priority category**					1E

IMPROVEMENT WORKS

To achieve the necessary freeboard under normal flow conditions to provide for the improvement of agricultural potential, it is proposed to excavate along the line of an existing minor watercourse which runs parallel to the River Churnet. The regraded channel is to intercept the existing watercourse, which rises in Abbey Wood and terminates at South Hills Wood watercourse. The outfall of the new channel is to discharge to the flood alleviation channel proposed as a solution to problem 6-99-110-31. This scheme is wholly dependent on the provision of a satisfactory outfall and can, therefore, only be carried out on completion of the improvement of 6-99-110-31.

COMMENT

This is a large area of flat land close to Leek. Therefore, it is likely to be considered for development, but other conditions are known to be against it (poor access and ground conditions).

IDENTIFICATION

Problem code number(s):	6-99-110-42
Watercourse:	River Churnet (main river)
Location:	Nr Leek (Staffordshire Moorlands District Council)
OS Map reference:	SJ 987 503

NATURE OF PROBLEM

Flooding occurs between the canal, railway and Shandoes Wood caused by gravel deposited in the Churnet by the Combes Brook and seepage from the canal. Part of the river bank has collapsed back to the towpath. Possible dredging of the river will cause a greater seepage from the canal.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-110-43
Watercourse:	River Churnet (main river)
Location:	Cheddleton (Staffordshire Moorlands District Council)
OS Map reference:	SJ 981 523 to SJ 995 499

NATURE OF PROBLEM

The closure of Brittains Paper Mill at Cheddleton, and consequent cessation of extensive borehole pumping, has resulted in a rise in the water table, waterlogging of land, collapse of the river banks and overflowing of boreholes. Downstream of Oakmeadow Ford Lock the land between the railway and river/canal is waterlogged.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

A possible solution is to construct culverts to carry excess water from boreholes to the river and carry out remedial works to the river banks.

IDENTIFICATION

Problem code number(s):	6-99-310-2
Watercourse:	Westlands Brook (non-main river)
Location:	Denstone (East Staffordshire District Council)
OS Map reference:	SK 100 407

NATURE OF PROBLEM

Flooding occurs to a shop, public house, garage, two houses and a road on infrequent occasions. The flooding is caused by the inadequate capacity of the existing piecemeal system of culverts and open channels adjacent to College Road.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 25 years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	77,840	
		(ii)	Field drainage	£		£77,840
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	17,510	
		(iii)	Roads/Railways	£	negligible	£17,510
(c)	**Benefit/cost ratio**					0.2
(d)	**Priority category**					3D

IMPROVEMENT WORKS

The recommended solution is to replace the existing system of culverts and open channels with a continuous 600 mm diameter reinforced concrete culvert to provide a design discharge of 1.6 cumecs.

BENEFITS

The benefits from the alleviation of road flooding are negligible and have not, therefore, been assessed.

IDENTIFICATION

Problem code number(s):	6-99-310-3
Watercourse:	None
Location:	Tutbury (East Staffordshire District Council)
OS Map reference:	SK 212 289

NATURE OF PROBLEM

Occasional road flooding (1958 and 1960) occurs to Duke Street in Tutbury and results from the inadequacies of the surface water drainage system. Works to watercourses will not alleviate the problem and the solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-310-5
Watercourse:	None
Location:	Denstone (East Staffordshire District Council)
OS Map reference:	SK 096 407

NATURE OF PROBLEM

Flooding occurs to 5 garages in College Road, Denstone as a result of inadequacies in the surface water drainage system. The problem cannot be alleviated by improvements to watercourses and, therefore, the solution is outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-310-7/9
Watercourse:	River Tean (non-main river)
Location:	Beamhurst to Lower Tean (East Staffordshire District Council)
OS Map reference:	SK 065 359 to SK 019 381

NATURE OF PROBLEM

Inadequate arterial drainage causes flooding and poor drainage of 210 ha of agricultural land.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 2 years
		(ii)	Structures	1 in years
(c)	**Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	677,480	
		(ii)	Field drainage	£	120,100	£797,580
(b)	**Present value of benefits**	(i)	Agriculture	£	1,503,060	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£1,503,060
(c)	**Benefit/cost ratio**					1.9
(d)	**Priority category**					2B

IMPROVEMENT WORKS

The recommended solution is to regrade the watercourse over a length of 6.8 km. The improvements will provide 1.5 m of freeboard within the channel under normal flow conditions.

BENEFITS

This is a grassland area devoted mainly to dairying and it is not anticipated that this pattern will change. The estimated increase in gross margin of £270/ha per annum will result from improved grassland and higher stocking rates.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-99-310-10
Watercourse:	None
Location:	Kiddlestitch, near Bramshall (East Staffordshire District Council)
OS Map reference:	SK 085 335

NATURE OF PROBLEM

Inadequate surface water drainage causes flooding problems in natural low spots both above and below the waterworks reservoirs at Kiddlestitch. This is a surface water problem and falls outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-310-12
Watercourse:	Tributary of Marchington Brook (non-main river)
Location:	Marchington (East Staffordshire District Council)
OS Map reference:	SK 106 309

NATURE OF PROBLEM

Flooding occurred in 1974 and 1977 for durations of 24 hours and affected 3 cottages and the B5017 road at Netherland Green. The flooding is caused by excessive surface water run-off from agricultural land overtopping the stream.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 25 years
		(ii)	Structures	1 in 25 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	34,590	
		(ii)	Field drainage	£		£34,590
(b)	**Present value of benefits**	(i)	Agriculture	£		
		(ii)	Buildings	£	25,020	
		(iii)	Roads/Railways	£		£25,020
(c)	**Benefit/cost ratio**					0.7
(d)	**Priority category**					3E

IMPROVEMENT WORKS

The flood alleviation works proposed comprise floodbanks, a retaining wall, a new culvert and access ramps to provide a capacity of 1 in 25 years.

IDENTIFICATION

Problem code number(s):	6-99-310-14
Watercourse:	Marchington Brook (non-main river)
Location:	Marchington (East Staffordshire District Council)
OS Map reference:	SK 131 302

NATURE OF PROBLEM

The watercourse at this location is poorly maintained and floods the road, preventing satisfactory surface water drainage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in 25 years
		(ii)	Structures	1 in 25 years
(b)	**Agricultural**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(c)	**Land potential category**			

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Channel clearance and removal of silt from under the road bridge will provide the major improvement, and a small floodbank at a localised low spot will prevent further flooding.

The watercourse downstream of the bridge has been improved by the landowner. The work has consisted of widening and regrading the channel. Although the bridge invert and upstream watercourse are in need of maintenance and cleaning, no recent flooding problems have been experienced at this location.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-99-310-15
Watercourse:	River Dove (main river)
Location:	Tutbury (East Staffordshire District Council)
OS Map reference:	SK 221 288

NATURE OF PROBLEM

Flooding occurs to agricultural land and a road in the floodplain of the River Dove. The inundation of this area during times of high flow is essential to prevent flooding of urban areas downstream. No works are proposed.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

FISHERIES

The Dove is a good trout fishery.

IDENTIFICATION

Problem code number(s):	6-99-310-16
Watercourse:	None
Location:	Rolleston (East Staffordshire District Council)
OS Map reference:	SK 240 277

NATURE OF PROBLEM

Surface water from fields near Beacon Hill surcharges culverts at the junction of Craythorne Road and Beacon Road, and caused flooding in 1956, 1960, 1977 and 1979 for durations of 4 to 6 hours. The excess water flows down Beacon Road and floods properties and Chapel Lane, School Lane and Station Road. Works to watercourses will not alleviate the problem and the solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

Some remedial works have been carried out by Staffordshire County Council which has slightly improved the situation.

IDENTIFICATION

Problem code number(s):	6-99-310-17
Watercourse:	None
Location:	Anslow (East Staffordshire District Council)
OS Map reference:	SK 210 251

NATURE OF PROBLEM

The inadequacy of the surface water drainage system causes flooding to minor roads. Works to the watercourses will not alleviate the flooding and the solution is, therefore, outside the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-310-19
Watercourse:	River Dove (main river)
Location:	Sudbury to Draycott Road (East Staffordshire District Council)
OS Map reference:	SK 161 301 to SK 167 319

NATURE OF PROBLEM

The road from Sudbury to Draycott floods where it crosses the River Dove floodplain. This flooding is normal floodplain inundation and any alleviation works will require comprehensive investiation of the whole of the catchment. This is not possible within the scope of this Survey.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-310-20
Watercourse:	River Churnet (main river)
Location:	Denstone (East Staffordshire District Council)
OS Map reference:	SK 110 411

NATURE OF PROBLEM

Calwich Cottage Farm lies within the existing floodplain of the River Churnet and is subject to regular inundation.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Either a flood bank could be constructed to protect the farm or a flood arch could be provided under the road adjacent to Quixhill Bridge.

IDENTIFICATION

Problem code number(s):	6-99-310-30
Watercourse:	River Dove (main river)
Location:	Dove Cliff (East Staffordshire District Council)
OS Map reference:	SK 258 276

NATURE OF PROBLEM

A collapsed weir has been identified on the River Dove.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

Lowering the crest level or total removal of the weir could result in land drainage benefits to some 40 ha of washland. Existing surface water outfall problems in Rolleston may also be improved by weir removal. However, there are also fishing interests involved. No works are currently proposed.

IDENTIFICATION

Problem code number(s):	6-99-310-31
Watercourse:	Croxden/Nothill/Alders Brooks (non-main river)
Location:	Croxden (East Staffordshire District Council)
OS Map reference:	SK 066 395 to SK 100 372

NATURE OF PROBLEM

80 ha of agricultural land suffer from inadequate arterial drainage.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in years
		(ii)	Structures	1 in years
(b)	**Agricultural**	(i)	Channel	1 in 2 years
		(ii)	Structures	1 in 100 years
(c)	**Land potential category**			a

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	504,510	
		(ii)	Field drainage	£	22,520	£527,030
(b)	**Present value of benefits**	(i)	Agriculture	£	608,450	
		(ii)	Buildings	£		
		(iii)	Roads/Railways	£		£608,450
(c)	**Benefit/cost ratio**					1.2
(d)	**Priority category**					2B

IMPROVEMENT WORKS

A general regrading scheme is envisaged along 5.1 km of Croxden Brook from its confluence with the River Dove to Croxden Village.

The scheme is designed to give satisfactory freeboard under normal flow conditions to allow the agricultural improvement of 80 ha of land.

The works include regrading the watercourse, the underpinning of two road bridges at SK 096 373 and SK 076 389 and the replacement of several farm access bridges.

BENEFITS

No change in the existing land use is anticipated, but the existing pattern of drainage will be intensified to provide an increase in gross margins.

FISHERIES

There is fishery interest at this site and consultation is necessary before any improvement work is commenced.

IDENTIFICATION

Problem code number(s):	6-99-310-32
Watercourse:	Mill Fleam (non-main river)
Location:	Lower Ellastone (East Staffordshire District Council)
OS Map reference:	SK 118 427

NATURE OF PROBLEM

The Mill Fleam which used to feed the old mill at Lower Ellastone is in a very poor condition. It is extremely badly silted up along most of its length which causes it to overtop its artifically raised banks in numerous places. This has led to flooding and poor drainage of large areas of agricultural land. Flooding of the yard and outbuildings has also occurred at Dove Farm adjacent to the mill pond.

A further problem is that the flow control apparatus at the mill pond has fallen into disrepair and become unusable. This can no longer be used to provide relief in wet weather and the level is now controlled by the fixed overflow weir.

DESIGN STANDARDS

(a) **Urban**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(b) **Agricultural**	(i)	Channel	1 in	years
	(ii)	Structures	1 in	years
(c) **Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a) **Costs**	(i)	Arterial works	£	
	(ii)	Field drainage	£	£____
(b) **Present value of benefits**	(i)	Agriculture	£	
	(ii)	Buildings	£	
	(iii)	Roads/Railways	£	£____
(c) **Benefit/cost ratio**				
(d) **Priority category**				

IMPROVEMENT WORKS

The Fleam is now solely used to supply water to the mill pond for fishing purposes. The easiest solution to the problem would be to lower the overflow weir and restrict the amount of water entering the Fleam from the River Dove. Since the pond is also fed by the Tit Brook, an alternative would be to seal off the Fleam and abandon it altogether.

CONSERVATION

Largely as a result of silting, parts of the old Mill Fleam have developed considerable nature conservation interest.

IDENTIFICATION

Problem code number(s):	6-99-310-34
Watercourse:	Un-named (non-main river)
Location:	Wallash (East Staffordshire District Council)
OS Map reference:	SK 154 453

NATURE OF PROBLEM

The inadequacy of both the culverts beneath the B5032 road and a further culvert just downstream has, on several occasions, led to flooding occurring upstream of the road. The degree of flooding has been dependent on storm frequency, but it is known that properties have been flooded on at least 2 occasions during the past 26 years.

In order to prevent an increased risk of flooding to these properties, no further development or increase in impermeable area should be allowed within the catchment area upstream of the road culverts. Prior to further development, and to alleviate the existing problem, a new road culvert would be required together with some downstream watercourse improvements.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IDENTIFICATION

Problem code number(s):	6-99-310-35
Watercourse:	Marchington Brook (non-main river)
Location:	Marchington (East Staffordshire District Council)
OS Map reference:	SK 142 314 to SK 131 301

NATURE OF PROBLEM

Flooding affects roads, gardens, fields and property. Floodwaters from the brook also travel overland and inundate a minor brookcourse at SK 144 310 causing flooding of two properties.

DESIGN STANDARDS

(a)	**Urban**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(b)	**Agricultural**	(i)	Channel	1 in	years
		(ii)	Structures	1 in	years
(c)	**Land potential category**				

ECONOMIC EVALUATION (December 1989 price base)

(a)	**Costs**	(i)	Arterial works	£	
		(ii)	Field drainage	£	£_____
(b)	**Present value of benefits**	(i)	Agriculture	£	
		(ii)	Buildings	£	
		(iii)	Roads/Railways	£	£_____
(c)	**Benefit/cost ratio**				
(d)	**Priority category**				

IMPROVEMENT WORKS

A survey has been carried out and a Flood Studies report to calculate flows and assess improvement options will be prepared in the near future. The County Council have agreed to contribute towards the cost of the works which relate to highway culverts.

APPENDIX A2

SCHEDULE OF MAIN RIVER

SCHEDULE OF MAIN RIVERS IN THE UPPER SEVERN AREA - JANUARY 1990

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
ACRE BROOK	R Severn confluence to upstream face of outfall structure	SJ 316 160	SJ 315 159	0.28	1
ADFORTON BROOK	Wigmore Main Drain confluence to a point upstream of Green Lane Bridge, Adforton	SO 420 706	SO 415 704	0.48	2
ALLCOCKS BROOK	Wigmore Main Drain confluence to Allcocks Bridge	SO 420 706	SO 425 693	1.45	2
BACK BROOK	R Roden confluence to Stang's Plantation	SJ 514 286	SJ 484 291	3.70	1
BAILEY BROOK	R Tern confluence to Hoarstone Lane Bridge	SJ 629 315	SJ 610 337	4.67	1
BELE BROOK	R Severn confluence to Wern Bridge	SJ 283 158	SJ 253 137	4.14	1
BLACK BROOK	Smestow Brook confluence to the A454 road bridge	SO 839 959	SO 836 967	1.00	2
BROMLEY BROOK	R Perry confluence to Bagley-Shade Oak road bridge	SJ 399 252	SJ 410 274	3.70	1
BUCKLEY FARM BROOK	R Severn confluence to upstream face of Buckley Farm outfall	SJ 363 166	SJ 364 167	0.20	1
RIVER CAMLAD	R Severn confluence to Snead Bridge	SJ 209 006	SO 320 918	29.23	1
RIVER CERIST	R Severn confluence to Van road bridge (B4518)	SO 025 915	SN 915 874	9.50	1
RIVER CLYWEDOG	R Severn confluence to Clywedog Dam	SN 954 848	SN 913 869	5.31	1
COMMISSION DRAIN	R Tern confluence to Kynnersley road bridge	SJ 615 149	SJ 650 176	5.25	1
RIVER CORVE	R Teme confluence to Beam Bridge	SO 506 750	SO 532 882	22.85	2
CRIGGION BROOK	R Severn confluence to upstream face of outfall structure	SJ 314 161	SJ 313 161	0.04	1
CRUCKTON BROOK	Rea Brook confluence to upstream of confluence with right bank tributary	SJ 432 098	SJ 428 102	0.70	1
DUNKETT BROOK	R Severn confluence to upstream face of Dunkett outfall	SJ 356 170	SJ 357 174	0.40	1
RIVER EIRTH	R Tanat confluence to 250m upstream of B4391 bridge at Llangynog	SJ 055 260	SJ 051 263	0.56	1
ELMBRIDGE BROOK	R Salwarpe confluence to road bridge near Cooksey Green	SO 885 629	SO 894 696	8.69	2
RIVER GARNO	R Severn confluence to Wig Bridge	SO 027 917	SO 017 926	1.50	1
GUILSFIELD BROOK	Bele Brook confluence to Lower Varchoel Farm	SJ 253 137	SJ 236 126	2.30	1
GWYFER BROOK	R Severn confluence to upstream face of outfall structure	SJ 292 166	SJ 291 166	0.07	1
HADLEY BROOK	R Salwarpe confluence to the B4192 road bridge	SO 869 620	SO 869 713	14.64	2
HEN AFON	R Vyrnwy confluence to outfall structure	SJ 155 127	SJ 153 128	0.26	1
HOO BROOK	R Stour confluence to A448	SO 829 746	SO 847 755	2.25	2
HURLEY BROOK	Commission Drain confluence to overflow structure on Northern Interceptor sewer	SJ 641 159	SJ 653 151	1.17	1
KYRE BROOK	R Tame confluence to confluence with a minor watercourse downstream of Splash Bridge	SO 599 685	SO 602 672	1.88	2
LAUGHERN BROOK	R Teme confluence to the Worcester - Martley road bridge near Kenswick Manor	SO 834 526	SO 796 580	12.71	2
LONCO BROOK	R Meese confluence to Whitleyford Bridge	SJ 737 217	SJ 746 238	4.83	1
RIVER MEESE	R Tern confluence to Aqualate Mere	SJ 638 208	SJ 765 208	22.60	1
RIVER MORDA	R Vyrnwy confluence to Newbridge road bridge	SJ 293 207	SJ 304 254	14.80	1
RIVER ONNY	R Teme confluence to confluence of Quinny Brook	SO 485 766	SO 436 843	12.34	2
OSWESTRY BROOK	R Morda confluence to the major surface water outfalls at Oswestry	SJ 316 238	(SJ 302 290) (SJ 300 284)	7.40	1

SCHEDULE OF MAIN RIVERS IN THE UPPER SEVERN AREA (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
PENTRE BROOK	R Vyrnwy confluence to downstream face of road culvert at Pentre	SJ 166 137	SJ 151 135	1.74	1
RIVER PERRY	R Severn confluence to Hillyards Plantation	SJ 440 166	SJ 315 334	30.09	1
POTFORD BROOK	R Tern confluence to the downstream face of A442 culvert	SJ 638 208	SJ 634 223	2.30	1
REA BROOK	R Severn confluence to Marton Pool	SJ 496 123	SJ 298 028	37.65	1
RIVER REA	R Teme confluence to the A4117 road bridge at Cleobury Mortimer	SO 636 686	SO 680 763	18.02	2
RIVER RED STRINE	R Strine confluence to Humber Brook confluence	SJ 644 174	SJ 685 165	5.31	1
RIVER RODEN	R Tern confluence to Blackhurstford Bridge	SJ 593 124	SJ 462 334	43.44	1
RIVER SALWARPE	R Severn confleunce to Upton Warren Bridge	SO 841 601	SO 933 674	23.01	2
RIVER SEVERN	R Teme confluence to R Clywedog confluence	SO 850 521	SN 954 848	218.00	1 + 2
SLEAP BROOK	R Roden confluence to bridge on minor road from Brandwood to Noneley	SJ 505 281	SJ 471 271	4.30	1
SMESTOW BROOK	R Stour confluence to the upstream face of the canal culvert	SO 863 855	SJ 898 006	25.27	2
SOULTON BROOK	R Roden confluence to Creamery Bridge	SJ 545 294	SJ 541 337	5.15	1
RIVER STOUR	R Severn confluence to the downstream end of Overend Tunnel, Cradley	SO 812 708	SO 949 851	41.79	2
STRINE BROOK	Soulton Brook confluence to road bridge at Steel Heath	SJ 550 308	SJ 554 363	6.35	1
RIVER STRINE	R Tern confluence to downstream face of canal culvert	SJ 629 176	SJ 752 200	15.00	1
RIVER TANAT	R Vyrnwy confluence to 300m downstream of Llangynog bridge	SJ 243 207	SJ 055 260	26.00	1
RIVER TEME	R Severn confluence to sewage works outfall at Knighton	SO 850 521	SO 301 724	107.07	2
RIVER TERN	R Severn confluence to Walkmill Bridge, Market Drayton	SJ 553 091	SJ 672 335	45.21	1
TETCHILL AND NEWNES BROOK	R Perry confluence to upstream face of culvert at Dudleston Heath	SJ 380 296	SJ 365 363	10.70	1
RIVER TRANNON	R Cerist confluence to the B4569 road bridge at Trefeglwys	SO 012 910	SN 969 903	5.52	1
RIVER VYRNWY	R Severn confluence to downstream end of the Vyrnwy dam spillway	SJ 328 159	SJ 019 192	66.06	1
WALL BROOK	R Strine confluence to syphon at junction of Kynnersley Drive and Shropshire Union Canal	SJ 675 181	SJ 687 165	2.14	1
WEIR BROOK	R Severn confluence to upstream face of outfall structure	SJ 345 169	SJ 344 169	0.05	1
WEIR BROOK (new cut)	R Severn confluence to upstream face of outfall structure	SJ 345 171	SJ 344 171	0.04	1
WERN-DDU BROOK	R Vyrnwy confluence to the Melverley IDB outfall on the B4398	SJ 283 202	SJ 282 206	0.56	1
WIGMORE MAIN DRAIN	R Teme confluence to the head of the drain	SO 431 717	SO 415 696	3.22	2
RIVER WORFE	R Severn confluence to Broad Bridge, Stapleford	SO 725 952	SO 762 982	15.14	1
WORTHEN BROOK	Rea brook confluence to the Ford at Worthen	SJ 334 042	SJ 327 045	0.80	1
TOTAL				960.83	

SCHEDULE OF MAIN RIVERS IN THE LOWER SEVERN AREA - JANUARY 1990

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
RIVER ALNE	R Arrow confluence to Botley Mill Farm Bridge	SP 093 573	SP 144 684	22.69	3
RIVER ARROW	R Avon confluence to Coventry Highway Bridge, Redditch	SP 083 507	SO 055 680	25.00	3
RIVER AVON	R Severn confluence to road bridge at Welford	SO 888 331	SP 645 808	180.94	3
BADSEY BROOK	R Avon confluence to A44 road bridge, Wickhamford	SP 050 454	SP 065 413	6.27	3
BIRDINGBURY BROOK	R Leam confluence to upstream face of culvert on Birdingbury-Offchurch Road	SP 418 685	SP 427 677	1.40	3
BOW BROOK	R Avon confluence to Shell Ford, Himbleton	SP 919 426	SO 951 596	25.90	3
BRETFORTON BROOK	Badsey Brook confluence to Stoneford Barn	SP 066 443	SP 097 426	4.32	3
RIVER CAM	Gloucester and Sharpness Canal to Lower Cam	SO 739 051	SO 752 002	7.15	2
CAPEHALL BROOK	Wicksters Brook confluence to upstream face of M5 Motorway culvert	SO 756 048	SO 762 038	1.45	2
CAREYS BROOK	R Severn confluence to upstream face of A4021 road bridge	SO 849 506	SO 834 507	2.50	2
CARRANT BROOK	R Avon confluence to Aston on Carrant road bridge	SO 895 334	(SO 940 349) (SO 940 348)	8.10	3
RIVER CHELT	R Severn confluence to railway bridge, Cheltenham	SO 848 262	SO 936 232	14.81	2
CLAYCOTON BROOK	R Avon confluence to unnamed tributary flowing from Elkington	SP 564 778	SP 607 754	8.20	3
CLIFTON BROOK	R Avon confluence to Clifton road bridge	SP 515 775	SP 521 759	0.90	3
COLLIERS BROOK	R Leadon confluence to upstream face of the A417 road bridge	SO 776 235	SO 799 260	4.00	2
DEAN BROOK	R Swilgate confluence to the A435 road bridge	SO 911 283	SO 955 286	4.83	2
DEERHURST PARISH DRAIN	R Severn confluence to the drain head	SO 846 264	SO 878 271	3.22	2
RIVER DENE	R Avon confluence to Wellesbourne Mill	SP 258 563	SP 284 544	4.83	3
DIMORE BROOK	R Severn confluence to upstream face of the A38 road bridge	SO 794 150	SO 807 131	2.94	2
DOVERTE BROOK	R Little Avon confluence to upstream face of the B4509 road bridge at Berkeley	ST 677 992	ST 684 990	0.84	2
ELL BROOK	R Leadon confluence to upstream face of Ell Bridge, Newent	SO 774 245	SO 721 264	6.80	2
RIVER FROME	R Severn confluence to bridge on Frampton Mansell - Trillis road	SO 751 106	SO 929 030	34.59	2
GLYNCH BROOK	R Leadon confluence to upstream face of Berry Bridge, Staunton	SO 771 275	SO 783 294	4.00	2
HASFIELD DRAIN	R Severn confluence to upstream face of B4213 road culvert	SO 844 270	SO 842 281	1.58	2
HATHERLEY BROOK	R Severn confluence to upstream face of Arle Bridge	SO 826 210	SO 914 218	11.53	2
HORSBERE BROOK	R Severn confluence to upstream face of Brockworth road bridge	SO 828 209	SO 892 169	9.84	2
RIVER ISBOURNE	R Avon confluence to Wormington Bridge	SP 031 431	SP 037 364	9.07	3
RIVER ITCHEN	R Leam confluence to R Stowe confluence	SP 406 690	SP 406 620	12.55	3
RIVER LEADON	R Severn confluence to England's Bridge near Bosbury	SO 817 199	SO 692 440	39.00	2
RIVER LEAM	R Avon confluence to road bridge on Grandborough-Woolscott road	SP 301 657	SP 495 672	39.09	3
LEIGH BROOK	R Chelt confluence to Knight's Bridge	SO 853 259	SO 893 268	5.40	2

SCHEDULE OF MAIN RIVERS IN THE LOWER SEVERN AREA - (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
LEIGH PARISH DRAIN	R Chelt confluence to approx 300m downstream of footbridge on Coombe Hill Canal (disused)	SO 851 261	SO 877 270	3.38	2
RIVER LITTLE AVON	R Severn confluence to upstream face of railway bridge	SO 661 006	ST 728 902	20.04	2
LITTLETON BROOK	Bretforton Brook confluence to tributary upstream of North Littleton	SP 073 443	SP 084 478	4.34	3
LONGDON BROOK	R Severn confluence to confluence with Berry Meadow Brook	SO 868 362	SO 810 335	9.87	2
MARCHFONT BROOK	R Avon confluence to Clifford Chambers - Long Marston road bridge	SP 159 521	SP 169 513	1.61	3
MILL AVON	R Severn confluence to downstream face of Abbey Mill sluice	SO 879 317	SO 892 330	1.80	2
MILLHOLME BROOK	R Leam confluence to downstream side of bridge on road running SW from Grandborough	SP 460 681	SP 483 659	4.02	3
MYTHE BROOK	R Severn confluence to upstream face of Bow Bridge	SO 886 342	SO 879 364	2.69	2
NOLEHAM BROOK	R Avon confluence to access bridge at Pitchell Farm, south of Broad Marston	SP 117 514	SP 145 454	9.81	3
NORMANS BROOK	Hatherley Brook confluence to railway bridge at Churchdown	SO 874 222	SO 895 204	3.38	2
PIDDLE BROOK	R Avon confluence to the A442 at Grafton flyford	SO 954 465	SO 964 555	14.48	3
RED BROOK	R Leadon confluence to upstream face of road bridge at Taynton	SO 776 222	SO 751 231	4.12	2
RIVER SEVERN	Avonmouth (East bank) and Beachley Point (West Bank) to R Teme confluence	(ST 513 798) (ST 550 903)	SO 850 521	130.00	1 + 2
SHELL BROOK	Shell Ford to Brandon Brook confluence	SO 951 596	SO 006 602	6.40	3
RIVER SHERBOURNE	R Sowe confluence to Whitley Bridge	SP 346 757	SP 349 771	2.74	3
SHORN BROOK	Gloucester and Sharpness Canal to minor road at Hardwicke	SO 791 128	SO 794 125	0.40	2
SHOTTERY BROOK	R Avon confluence to upstream face of culvert under the Stratford-on-Avon canal	SP 184 535	SP 187 560	3.00	3
RIVER SOWE	R Avon confluence to Longford Bridge (A444)	SP 324 724	SP 349 832	24.94	3
STOCK GREEN BROOK	Shell Brook confluence to downstream face of road culvert in Stock Green	SO 956 599	SO 981 587	3.15	3
RIVER STOUR	R Avon confluence to Mitford Bridge	SP 183 534	SP 263 371	36.42	3
RIVER STOWE	R Itchen confluence to Daventry road bridge, Southam	SP 406 620	SP 423 619	2.48	3
STROUD WATER	R Frome confluence to Wall Bridge culvert, Stroud	SO 831 047	SO 848 051	1.77	2
RIVER SWIFT	R Avon confluence to Lutterworth water reclamation works outfall	SP 505 768	SP 541 835	11.50	3
RIVER SWILGATE	Mill Avon confluence to Stoke Orchard Bridge	SO 887 323	SO 914 281	7.00	2
TIBBERTON BROOK	Red Brook confluence to upstream face of Wynford Bridge	SO 756 231	SO 752 226	0.68	2
TIRLE BROOK	R Swilgate confluence to Aston Cross Bridge	SO 897 325	SO 942 336	5.95	2
WHADDON BROOK	Gloucester and Sharpness Canal to downstream end of culvert, Lower Tuffley	SO 815 157	SO 824 146	1.40	2
WHITSUN BROOK	Piddle Brook confluence to Bishampton - Abberton road bridge	SO 962 510	SO 991 522	4.40	3

SCHEDULE OF MAIN RIVERS IN THE LOWER SEVERN AREA - (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
WICKSTERS BROOK	R Cam confluence to upstream face of M5 Motorway culvert	SO 742 049	SO 766 049	2.85	2
WITHY BROOK	R Sowe confluence to B4029	SP 385 802	SP 410 827	4.00	3
WOTTON BROOK	Horsbere Brook confluence to Cole Bridge, Gloucester	SO 833 210	SO 847 191	2.57	2
TOTAL				834.93	

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SCHEDULE OF MAIN RIVERS IN THE UPPER TRENT AREA - JANUARY 1990

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
RIVER ANKER	R Tame confluence to Stretton Baskerville Brook confluence	SK 206 038	SP 403 909	38.34	8
BELL BROOK	R Penk confluence to Pillaton Bridge	SJ 923 145	SJ 940 130	2.41	7
BENTLEY (BRADBOURNE) BROOK	R Dove confluence to Woodeaves Mill Bridge	SK 160 462	SK 185 503	6.44	6
RIVER BLITHE	R Trent confluence to north of Blythe Bridge	SK 114 176	SJ 951 416	39.00	7
RIVER BLYTHE	R Tame confluence to Earlswood Reservoir	SP 212 916	SP 114 742	40.47	8
BOURNE BROOK	R Tame confluence to Footherley Brook confluence	(SK 210 017) (SK 209 016)	SK 108 051	18.83	8
RIVER BOURNE	R Tame confluence to Furnace End Bridge	SP 216 916	SP 248 912	4.10	8
BRAMCOTE BROOK	R Anker confluence to downstream face of M42 culverts	SK 264 040	(SK 276 056) (SK 279 061)	3.85	8
CHURCH EATON BROOK	R Penk confluence to Mitton Manor Farm	SJ 916 142	SJ 889 148	3.68	7
RIVER CHURNET	R Dove confluence to Tittesworth Reservoir	SK 102 375	SJ 994 586	40.50	6
RIVER COLE	R Blythe confluence to Cole Ford, near Shard End	SP 212 912	SP 143 885	14.11	8
COLESHILL HALL BROOK	R Cole confluence to the M42 outfall	SP 190 882	SP 195 877	1.00	8
COMBERFORD BROOK	R Tame confluence to field boundary upstream of footbridge north-west of Wigginton	SK 190 075	SK 204 072	1.80	8
CURBOROUGH BROOK	R Trent confluence to Curborough reclamation works outfall	SK 166 155	SK 127 129	5.70	7
DARLASTON BROOK	R Tame confluence to downstream face of Murdoch Road culvert	SO 981 982	SO 961 967	2.85	8
DOLEY BROOK	Church Eaton Brook confluence to Norbury Park, north-west of Gnossall	SJ 892 150	SJ 808 225	13.68	7
RIVER DOVE	R Trent confluence to Okeover Bridge	SK 280 261	SK 164 481	54.86	6
ENDON BROOK	R Churnet confluence to flood wall 40m above railway culvert	SJ 968 534	SJ 928 531	5.82	6
FEATHERSTONE BROOK	R Penk confluence to Cat and Kittens Lane, Featherstone	SJ 905 066	SJ 923 050	2.90	7
FOOTHERLEY BROOK	Bourne Brook confluence to Blake Street Culvert	SK 108 051	SK 105 008	5.95	8
FORS BROOK	R Blithe confleunce to downstream face of the footbridge, Forsbrook	SJ 960 406	SJ 965 417	1.36	7
FOSTON BROOK	R Dove confluence to Boylestone	SK 195 299	SK 179 359	8.45	6
GILWISKAW BROOK	R Meese confluence to near Nook Farm, Ashby-de-la-Zouch	SK 336 101	SK 359 155	6.91	7
GROVELAND BROOK	R Tame confluence to manhole 80m north of Tividale Road	SO 974 916	SO 964 908	1.50	8
HARROW BROOK	R Anker confluence to downstream face of Brodick Road Bridge	SP 389 911	SP 409 938	4.15	8
HATCHFORD BROOK	Kingshurst Brook confluence to the downstream face of Eastern Bridge	SP 167 860	SP 166 860	0.60	8
HENMORE BROOK	R Dove confluence to Carsington Reservoir	SK 160 447	SK 244 504	13.53	6
HILTON BROOK	R Dove confluence to Longford	SK 265 274	SK 219 369	13.52	6
HOLLYWELL BROOK	R Blythe confluence to M42 outfall	SP 214 839	SP 199 836	1.75	8
HORTON BROOK	Endon Brook confluence to A53 road bridge	SJ 936 540	SJ 934 541	0.41	6
KINGSHURST BROOK	R Cole confluence to Hatchford Brook confluence	SP 179 874	SP 167 860	1.50	8
KINGSTON BROOK	R Penk confluence to upstream face of A513 road bridge	SJ 946 229	SJ 939 242	1.45	7
LEASOW BROOK	R Tame confluence to Birmingham & Fazeley Canal	SK 189 082	SK 178 077	1.30	8

SCHEDULE OF MAIN RIVERS IN THE UPPER TRENT AREA - (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
LONGNOR BROOK	Wheaton Aston Brook confluence to Station Road, Wheaton Aston	SJ 869 141	SJ 855 124	2.05	7
LOW BROOK	Kingshurst Brook confluence to downstream face of railway culvert	SP 172 864	SP 179 846	2.00	8
MARE BROOK	R Tame confluence to upstream face of A38(T) road culvert	SK 174 115	SK 141 096	4.80	8
MARSTON BROOK	Wheaton Aston Brook confluence to Birchmoor Lane	SJ 845 141	SJ 827 143	1.98	7
RIVER MEASE	R Trent confluence to Gilwiskaw Brook confluence	SK 196 147	SK 336 101	25.57	7
MEECE BROOK	R Sow confluence to Swinchurch Brook confluence	SJ 874 282	SJ 823 363	16.94	7
MOAT BROOK	R Penk confluence to 200m above Wood Road, Codsall	SJ 890 037	SJ 859 037	4.30	7
MOTTY MEADOWS BROOK	Wheaton Aston Brook confluence to Wrestlers Wood	SJ 845 141	SJ 825 133	1.60	7
NUNEATON FLOOD RELIEF CHANNEL	R Anker confluence to inlet from the R Anker	SP 365 927	SP 379 917	1.80	8
OTHERTON BROOK	R Penk confluence to railway bridge near Lyne Hill	SJ 922 144	SJ 923 129	1.61	7
RIVER PENK	R Sow confluence to Pendeford Mill Lane bridge	SJ 946 229	SJ 891 036	26.87	7
PICKNALL BROOK	R Dove confluence to confluence 260m downstream of Loxley Lane	SJ 116 319	SK 066 326	6.31	6
RAVENSHAW BROOK	R Blythe confluence to M42 outfall	SP 178 792	SP 173 789	0.80	8
RISING BROOK	R Penk confluence to A449 culvert	SJ 936 212	SJ 920 214	2.60	7
ROLLESTON BROOK	Tutbury Mill Fleam confluence to 200m upstream of Bushton Bridge	SK 242 282	SK 206 262	4.41	6
SAREDON BROOK	R Penk confluence to Golly Brook confluence	SJ 903 075	SJ 972 087	8.35	7
SCOTCH BROOK	R Trent confluence to downstream face of canal culvert	SJ 902 334	SJ 902 337	0.26	7
SENCE BROOK	R Sence confluence to confluence of R Tweed and Stapleton Brook	SP 326 999	SP 409 989	12.47	8
RIVER SENCE	R Anker confluence to B591 at Heather	SP 315 991	SK 394 109	20.33	8
SHADOW BROOK	R Blythe confluence to M42 outfall	SP 216 825	SP 192 809	3.00	8
SKETCHLEY BROOK	Harrow Brook confluence to downstream face of Brookfield Road Bridge	SP 392 916	SP 421 928	3.50	8
RIVER SOW	R Trent confluence to Pershall	SJ 995 226	SJ 818 297	28.83	7
SWAN BROOK	Tipton Brook confluence to downstream face of manhole adjacent Birmingham New Road	SO 963 927	SO 947 918	3.00	8
RIVER TAME	R Trent confluence to Ashes Road, Oldbury and downstream face of James Bridge, Willenhall	SK 192 149	(SO 985 875) (SO 976 987)	87.72	8
TATENHILL BROOK	R Trent confluence to SK 220 203	SK 227 209	SK 220 203	1.00	7
RIVER TEAN	R Dove confluence to footbridge near Noah's Ark Farm	(SK 102 355) (SK 106 344)	SK 062 360	7.80	6
TIPTON BROOK	R Tame confluence to Swan Brook confluence	SO 979 935	SO 963 927	1.90	8
RIVER TRENT	R Dove confluence to footbridge at Stoke-on-Trent	SK 280 261	SJ 901 513	87.00	5 + 7
TUTBURY MILL FLEAM	R Dove confluence to sluice at Dove confluence	SK 249 284	SK 204 294	6.40	6
WHEATON ASTON BROOK	Church Eaton Brook confluence to Motty Meadows Brook confluence	SJ 889 148	SJ 845 141	4.30	7

SCHEDULE OF MAIN RIVERS IN THE UPPER TRENT AREA - (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
WITHERLEY BROOK	R Anker confluence to upstream face of Chapel Lane road bridge	SP 323 981	SP 328 976	0.80	8
WYRLEY BROOK	Golly Brook confluence to Charrington Drive	SJ 972 087	SJ 986 078	1.85	7
TOTAL				744.87	

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SCHEDULE OF MAIN RIVERS IN THE LOWER TRENT AREA (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
RATCLIFFE-ON-SOAR POWER STATION DRAIN	R Soar confluence to upstream face of railway culvert	SK 491 298	SK 497 296	0.70	4
RATCLIFFE-ON-SOAR VILLAGE DRAIN	R Soar confluence to upstream face of railway culvert	SK 493 289	SK 497 285	1.29	4
REPTON BROOK	R Trent confluence to Lawn Bridge	SK 317 285	SK 313 252	4.50	7
ROTHLEY BROOK	R Soar confluence to the A50	SK 592 132	SK 542 070	11.26	4
RIVER RYTON	R Idle confluence to Bracebridge, Worksop	SK 658 921	SK 585 790	28.96	5
SAUNDBY BECK	R Trent confluence to Laneham IDD boundary	SK 807 881	SK 790 879	1.74	5
RIVER SENCE	R Soar confluence to Great Glen	SP 552 985	SP 656 981	19.31	4
SILEBY BROOK	R Soar confluence to Sileby Village	SK 591 148	SK 602 150	1.00	4
SNOW SEWER	R Trent confluence to Snow Sewer pumping station	SK 813 994	SK 731 986	9.01	5
RIVER SOAR	R Trent confluence to footbridge upstream of Sharnford	SK 494 309	SP 463 909	75.73	4
SODBRIDGE DRAIN	Middle Beck confluence to upstream face of railway culvert	SK 805 508	SK 816 528	2.53	5
SOUTH LEVEL ENGINE DRAIN	Keadby pumping station to Bull Hassocks pumping station	SE 835 113	SE 731 017	17.25	5
SOUTH LEVEL ENGINE SOAK DRAIN	South Idle Drain to north of Aucklands Farm	SE 735 040	SE 738 034	2.00	5
SOUTH SOAK DRAIN	Keadby pumping station to Thorne	SE 835 113	SE 681 132	16.57	5
RIVER TORNE	R Trent confluence to the A60 at Styrrup Carr	SE 836 113	SE 588 906	39.42	5
RIVER TORNE SOAK DRAIN (CANDY FARM)	Ring Drain confluence to Blaxton Banks	SE 704 037	SE 673 028	3.94	5
RIVER TORNE SOAK DRAIN (TUNNEL PITS)	Southern side of Syphon under R Torne into Tunnel Pits pumping station to Wroot Common	SE 735 040	SE 717 040	2.20	5
RIVER TRENT	R Humber confluence to R Dove confluence	SE 863 235	SK 280 261	193.00	5 + 7
TUNNEL PITS SUCTION DRAIN	Tunnel Pits pumping station to North Idle Drain at East Ring Drain	SE 735 040	SE 736 044	0.55	5
TWYFORD BROOK	Queniborough Brook confluence to the Dairy Farm	SK 643 131	SK 736 094	15.89	4
WATERTON DRAIN	Woodhouse Sewer confluence to Diggin Dyke confluence	SE 662 066	SE 662 064	0.21	5
WENSLEY BROOK	R Derwent confluence to upstream face of Oldfield Lane Bridge	SK 270 621	SK 269 619	0.13	6
WHETSTONE BROOK	R Soar confluence to Bottom End Bridge, Countesthorpe	SP 548 974	SP 558 969	1.34	4
WILNE DRAIN	R Derwent outfall to 230m north-east of Beech cottage	SK 452 314	SK 440 307	1.59	6
WOODCARR SUCTION DRAIN	Woodcarr pumping station to junction with Woodcarr Small Drain	SE 753 088	SE 754 088	0.06	5
WOODHOUSE SEWER	Hatfield Waste Drain to Green Lane, Waterton Carr	SE 685 082	SE 660 066	3.22	5
RIVER WREAKE	R Soar confluence to Stapleford Park	SK 596 127	SK 815 187	40.42	4
RIVER WYE	R Derwent confluence to the A6 upstream of Ashford-in-the-Water	SK 260 655	SK 179 698	17.29	6
TOTAL				1,032.40	

SCHEDULE OF MAIN RIVERS IN THE LOWER TRENT AREA - JANUARY 1990

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
ALFRETON BROOK	R Amber confluence to Fordbridge Lane	SK 387 564	SK 440 577	6.84	6
RIVER AMBER	R Derwent confluence to Ogston Reservoir	SK 347 515	SK 380 598	16.03	6
BAR BROOK	R Derwent confluence to tributary confluence 60m upstream of Derwent Valley Aqueduct, near Baslow	SK 256 712	SK 262 725	1.77	6
BARROW DRAIN	Main Drain confluence to SK 350 302	SK 368 303	SK 350 302	1.80	6
BENTLEY BROOK	R Derwent confluence to stilling pond south of Lumsdale	SK 300 598	SK 312 605	1.78	6
RIVER BIAM	Downstream confluence with R Soar to upstream confluence with R Soar	SK 579 028	SK 577 024	0.48	4
BLACK BROOK	R Soar confluence to Grace Dieu Brook	SK 521 220	SK 487 209	5.15	4
BOTTESFORD BECK	R Trent confluence to Emanuel Bridge	SE 837 061	SE 925 084	9.98	5
BOTTLE BROOK	R Derwent confluence to Smithy Houses (North) & Bottlebrook Houses (South)	SK 359 407	(SK 386 471) (SK 389 460)	9.00	6
BROUGHTON ASTLEY BROOK	R Soar confluence to surface water outlet from Harborough DC housing development	SP 520 963	SP 528 923	5.00	4
BURTON BROOK	R Sence confluence to Burton Overy	SP 654 974	SP 675 980	2.41	4
CANDY FARM SUCTION DRAIN	Candy Farm pumping station to Hatfield Chase IDB Boundary	SE 698 031	SE 698 037	0.60	5
CASTLE DONINGTON BROOK	R Trent confluence to outfall of surface water sewer	SK 455 300	(SK 449 284) (SK 448 277)	3.33	7
CHADDESDEN BROOK	R Derwent confluence to Lees Brook confluence	SK 375 358	SK 384 372	1.83	6
COSBY BROOK	R Soar confluence to Cambridge Road, Cosby	SP 536 970	SP 547 952	3.22	4
CUTTLE BROOK	R Trent confluence to Sinfin Moor	SK 377 281	SK 370 302	2.41	6
RIVER DERWENT	R Trent confluence to outfall from Ladybower Reservoir	SK 459 308	SK 199 853	88.78	6
RIVER DEVON	R Trent confluence to Knipton reservoir	SK 790 533	SK 818 309	32.94	5
DIGGIN DYKE	Waterton Drain confluence to balancing area	SE 662 064	SE 657 050	2.03	5
DOVER BECK	R Trent confluence to Lowdham Mill (downstream limit of control structures)	SK 695 451	(SK 666 474) (SK 666 473)	5.20	5
RIVER EAU	R Trent confluence to Dunstall Beck	SE 837 033	SK 891 940	16.41	5
RIVER ECCLESBOURNE	R Derwent confluence to weir upstream of Windley Bridge	SK 350 432	SK 319 447	5.28	6
EGGINTON BROOK	R Trent confluence to Radbourne Brook, Etwall	SK 285 269	SK 264 336	9.36	6
EMINSONS DYKE	R Eau confluence to Messingham Catchwater Drain confluence	SE 879 026	SE 884 027	0.50	5
RIVER EREWASH	R Trent confluence to downstream face of B6018 road bridge, Kirkby-in-Ashfield	SK 514 330	SK 485 548	39.66	5
FAIRHAM BROOK	R Trent confluence to surface water outfall from new development on left bank	SK 560 366	SK 556 328	4.60	5
FOSSE DYKE	R Trent confluence to Torksey road bridge	SK 834 781	SK 838 781	0.32	5
GRASSTHORPE BECK	R Trent confluence to downstream end of control structure at Grassthorpe Mill	SK 816 673	SK 792 676	3.12	5
GREAT CATCHWATER DRAIN	Ravensfleet pumping station to the A159 at Wharton	SK 800 960	SK 839 934	6.40	5
RIVER GREET	R Trent confluence to outfall at Lower Kirklington Road, Southwell	SK 743 515	SK 705 547	6.80	5
GREYTHORNE DYKE	R Trent confluence to upstream of Wilford Road	SK 575 375	SK 572 368	0.81	5
HALLOUGHTON DUMBLE DRAIN	Marlock Dyke confluence to Southwell reclamation works	SK 737 523	SK 726 526	1.37	5

SCHEDULE OF MAIN RIVERS IN THE LOWER TRENT AREA - (CONTINUED)

WATERCOURSE	LOCATION	FROM NGR	TO NGR	LENGTH (KM)	CATCHMENT NO
HARWORTH DYKE	R Torne confluence to major surface water outfall from Harworth	SK 606 926	SK 614 916	1.50	5
HATFIELD WASTE DRAIN	Keadby pumping station to Woodhouse Sewer, Hatfield Woodhouse	SE 835 113	SE 685 082	17.70	5
HERMITAGE BROOK	R Soar confluence to railway and Moor Lane	SE 544 215	(SK 553 196) (SK 551 194)	3.30	4
RIVER IDLE	R Trent confluence to Twyford Bridge, Gamston	SK 790 947	SK 699 752	48.75	5
KILBY BROOK	R Sence confluence to downstream face of Kilby Road culvert	SP 616 963	SP 618 955	1.00	4
LANEHAM BECK	R Trent confluence to Askham Drain	SK 815 770	SK 774 740	5.60	5
LEAS BROOK	R Meden confluence to surface water outfall at Mansfield Woodhouse	SK 555 672	SK 547 642	3.60	5
RIVER LEEN	R Trent confluence to Linby Mill, Papplewick	SK 566 381	SK 546 510	17.52	5
LEES BROOK	Chaddesden Brook confluence to minor watercourse confluence	SK 384 372	SK 387 373	0.35	6
LOW BANK SUCTION) DRAIN/ANCHOR DRAIN)	Low Bank pumping station to the M180	SE 739 086	SE 729 090	1.06	5
LUBBESTHORPE BROOK	R Soar confluence to downstream face of Meridian Park culvert	SK 564 007	SK 552 008	1.43	4
MAIN DRAIN	Osmaston Drain confluence to outfall from balancing pond, Sinfin Moor	SJ 370 302	SK 348 309	2.30	6
MARLOCK DYKE	R Greet confluence to Halloughton Dumble Drain confluence	SK 741 518	SK 737 523	0.76	5
RIVER MAUN	R Idle confluence to King's Mill reservoir	SK 701 754	SK 519 597	32.61	5
MEADOW DRAIN	Osmaston Drain confluence to southern boundary of golf course, Sinfin	SK 363 312	SK 356 315	0.95	6
RIVER MEDEN	R Maun confluence to Newbound Mill Bridge, Pleasley	SK 703 751	SK 496 633	29.50	5
MESSINGHAM CATCHWATER DRAIN	Bottesford Beck confluence to the Messingham IDD boundary	SE 878 060	SE 884 027	3.50	5
MIDDLE BECK	R Devon confluence to upstream face of railway culvert	SK 785 514	SK 805 508	2.27	5
MILTON BROOK	R Trent confluence to overspill weir at Foremark reservoir	SK 340 273	SK 329 245	4.80	7
NETHERGATE BROOK	Fairham Brook confluence to downstream face of A453 culvert	SK 564 345	SK 548 348	1.70	5
NORTH ENGINE DRAIN	Keadby pumping station to Dirtness pumping station	SE 835 113	SE 747 096	9.01	5
NORTH SOAK DRAIN	Keadby pumping station to Wike Well Bridge, Thorne	SE 835 113	SE 696 121	13.68	5
OCK BROOK	R Derwent confluence to upstream face of Hawthorn Avenue bridge, Borrowash	SK 420 338	SK 422 349	1.44	6
OLDCOATES DYKE	R Ryton confluence to the A60 at Oldcoates	SK 630 872	(SK 588 885) (SK 588 884)	5.79	5
OSMASTON DRAIN	Cuttle brook confluence to culvert under disused railway line	SK 370 302	SK 364 316	1.66	6
OUSE DYKE	R Trent confluence to downstream end of Netherfield railway culvert	SK 648 420	SK 629 411	3.50	5
RIVER POULTER	R Idle confluence to weir upstream of the A614	SK 699 752	SK 646 754	7.24	5
QUENIBOROUGH BROOK	R Wreake confluence to St Mary's Church Bridge	SK 628 133	SK 653 120	3.56	4

SUMMARY OF MAIN RIVER - JANUARY 1990

AREA	LENGTH (KM)
Upper Severn	960.83
Lower Severn	834.93
Upper Trent	744.87
Lower Trent	1,032.40
TOTAL	3,573.03

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APPENDIX A3

CONSERVATION SITES

SSSI - Site of Special Scientific Interest
NNR - National Nature Reserve
LNR - Local Nature Reserve
CTR - County Trust Reserve

CONSERVATION SITES IN THE RIVER DERWENT CATCHMENT AND DERBYSHIRE AT APRIL 1990

SITE NAME	STATUS	NATIONAL GRID REFERENCE	DESCRIPTION
Abney & Bretton Cloughs	SSSI	SK 210 790	Damp gritstone valley important for ferns.
Attenborough Gravel Pits	SSSI/CTR	SK 522 341	Valuable wildfowl refuge.
Bage Mine	SSSI	SK 292 549	Geological interest.
Baileycroft Quarry	SSSI	SK 283 545	Good geological site.
Ball Eye Hill	SSSI	SK 286 574	Community of lead tolerant plants.
Bath Pasture	SSSI	SK 063 459	Large floristically rich unimproved acid grassland.
Bradwell Dale & Bagshaw Cavern	SSSI	SK 170 800	Important geological site.
Breadsall Railway Cutting	SSSI/LNR	SK 395 394	A wide range of ecosystems.
Bretton Clough	SSSI	SK 205 786	Gritstone valley and complex landslipped area.
Brownend Quarry	SSSI	SK 090 503	Important geological site.
Caldon Dales	SSSI	SK 093 489	Unimproved traditionally managed calcareous and neutral grassland.
Caldon Low	SSSI	SK 077 492	Geological interest.
Calton Hill	SSSI	SK 119 715	Good example of igneous intrusion.
Carvers Rocks	SSSI/CTR	SK 330 227	Geological interest.
Castleton	SSSI	SK 129 830	Noted for cave systems.
Cawdor Quarry	SSSI	SK 284 605	Good geological exposures.
Chrome & Parkhouse Hills	SSSI	SK 075 671	Good geological and fossiliferous site.
Clough Wood	SSSI	SK 255 618	Mainly oak and ash with characteristic ground flora including some uncommon species.
Colehill Quarries	SSSI	SK 287 552	A nationally important geological site.
Combes Valley	SSSI/CTR	SK 055 525	RSPB reserve and also of entomological interest.
Coombs Dale	SSSI	SK 224 744	Limestone dale with outstanding flora and some very rare species.
Crabtree Wood	SSSI	SK 490 785	A base-rich flush.
Cressbrook Dale	SSSI/NNR	SK 173 738	Botanically outstanding with exceptionally rare species.
Cromford Canal	SSSI/LNR/CTR	SK 299 569	Supports a variety of plant and animal communities.
Cunning Dale	SSSI	SK 082 728	Uncommon limestone grassland.
Cresswell Crags	SSSI	SK 535 742	Series of caves and exposures of exceptional palaeo-biological & botanical interest.
Dimminsdale	SSSI	SK 377 218	Ancient semi-natural woodland and unimproved acid grassland.
Dove Valley and Biggin Dale	SSSI	SK 157 506	Area of exceptional geological, physiographical, botanical and ornithological interest.
Duchy Quarry	SSSI	SK 093 767	A nationally important geological site.
Eastern Moors	SSSI	SK 270 770	Broad tract of moorland.
Edale	SSSI	SK 100 854	Geological succession.
Eldon Hole, Eldon Hill	SSSI	SK 117 809	Famous pot-hole eroded in carboniferous limestone.

SITE NAME	STATUS	NATIONAL GRID REFERENCE	DESCRIPTION
Foxhole Cave	SSSI	SK 100 663	Extensive cave system containing many fossils.
Gang Mine	SSSI	SK 287 558	Area of hummocky spoil heaps with metallophyte plants.
Ginny Springs	SSSI	SK 520 788	Small flush with some plant species rare in the region.
Green Lane Pits	SSSI	SK 166 626	Geological interest.
Hallam Moors	SSSI	SK 259 835	Characteristic Millstone Grit escarpment.
Hamps and Manifold Valleys	SSSI	SK 100 540	Ecton Hill shows unique mineralisation and is noted for its copper mines.
Hilton Gravel Pits	SSSI/CTR	SK 249 315	An important complex of open water, carr and marshland habitats.
Hipley Hill	SSSI	SK 211 546	Mineralised limestone area with rocky outcrops and natural caves.
Hollinhill & Markland Grips	SSSI	SK 510 750	Deep valleys with vertical cliff-like sides supporting rich flora.
Hulland Moss	SSSI	SK 250 462	Wetland Heath
Ibley and Middleton Woods	SSSI	SK 265 562	Semi-natural ash woodland.
Jumble Coppice	SSSI	SK 268 721	Geological interest.
Kinder & Bleaklow	SSSI	SK 091 942	Important upland vegetation.
Lathkill Dale	SSSI/NNR	SK 187 658	Deep limestone valley.
Lee Farm Meadow	SSSI	SK 131 785	Species rich hay meadow.
Leek Moors	SSSI/LNR/CTR	SK 020 650	Moorland noted for fauna and flora.
Long Dale and Gratton Dale	SSSI/NNR	SK 202 596	Area of considerable phytogeographical importance.
Longstone Moor	SSSI	SK 195 735	Large moorland area.
Masson Hill	SSSI	SK 290 588	Site with cave complex and species rich grasslands.
Matlock Woods	SSSI	SK 296 593	Ash-Elm woodland with interesting ground flora.
Monks Dale	SSSI	SK 135 745	Outstanding limestone dale with extremely rich flora.
Morley Brick Pits	SSSI	SK 389 418	Acidic water pits colonised by rare flora and fauna.
Moss Carr	SSSI	SK 073 659	Well developed willow carr, orchids and ornithological interest.
Ogston Reservoir	SSSI	SK 376 602	Most important wildfowl refuge in district.
Old River Dove	SSSI	SK 238 285	Lowland wetland habitat.
Parwich Moor	SSSI	SK 175 579	Small area of heather moor of pedological interest.
Peak Forest Junction-Great Rocksdale Quarry	SSSI	SK 112 727	Geological site.
Poole's Cavern & Grin Low Wood	SSSI	SK 050 724	Cave system and mixed woodland.
Ridgeway Quarry	SSSI	SK 360 517	Excellent example of sedimentary structures.
Rowlee Bridge	SSSI	SK 147 892	Geological interest.
Rue Hill	SSSI	SK 082 481	Limestone habitat.
Shining Cliff Woods	SSSI	SK 335 530	Good example of oak-birch wood.
Stanton Pastures and Cuckoocliff Valley	SSSI	SK 122 473	Rich flora includes orchids of both calcicote and acidophilous varieties.
Staunton Harold Reservoir	SSSI	SK 377 237	Important site for wintering wildfowl.
Stoney Middleton Dale	SSSI	SK 210 760	Geological and biological interest.
Swineholes Wood & Black Heath	SSSI/CTR	SK 048 504	Woodland and moorland areas notable as breeding sites for birds.
Taddington Wood	SSSI	SK 165 708	Ash wood with typical ground flora.
Ticknall Quarries	SSSI	SK 358 832	Geological, ornithological and entomological interest.

SITE NAME	STATUS	NATIONAL GRID REFERENCE	DESCRIPTION
Topley Pike and Deepdale	SSSI	SK 099 717	Phytogeographical importance.
Upper Lathkill	SSSI	SK 143 677	Geological site with extensive cave system.
Wye Dale	SSSI	SK 099 724	Important for geology, flora and fauna.
Wyns Tor	SSSI	SK 241 603	Fine example of a tor in dolomitised carboniferous limestone.
Yarncliff Wood	SSSI	SK 255 795	Remnant oak-birch woodland.

APPENDIX A4

CODING SYSTEM

CODING SYSTEM

	x	xx	xxx	xx
	CATCHMENT	COUNTY	DISTRICT	NUMBER
eg	6	98	510	23
	Derwent	Derbyshire	High Peak	Problem No.

CATCHMENT	Code
UPPER SEVERN	1
LOWER SEVERN	2
AVON	3
SOAR	4
LOWER TRENT	5
DERWENT	6
UPPER TRENT	7
TAME	8

County/District Councils	County Code	District Code
AVON COUNTY COUNCIL		
Bristol	82	310
Northavon	82	410
SHROPSHIRE COUNTY COUNCIL		
Bridgnorth	83	110
North Shropshire	83	210
Oswestry	83	310
South Shropshire	83	410
Shrewsbury and Atcham	83	510
Telford Development Corporation	83	610
Wrekin	83	710
CLWYD COUNTY COUNCIL		
Glyndwr	84	110
Wrexham Maelor	84	210
GWYNEDD COUNTY COUNCIL		
Meirionnydd	85	110
POWYS COUNTY COUNCIL		
Mid Wales Development Corporation	86	110
Montgomery	86	210
Radnor	86	310

HEREFORD AND WORCESTER COUNTY COUNCIL		
Leominster	87	110
Bromsgrove	87	210
Malvern Hills	87	310
Redditch	87	410
Redditch Development Corporation	87	510
South Herefordshire	87	610
Worcester	87	710
Wychavon	87	810
Wyre Forest	87	910
GLOUCESTERSHIRE COUNTY COUNCIL		
Cheltenham	88	110
Forest of Dean	88	210
Gloucester	88	310
Stroud	88	410
Tewkesbury	88	510
Cotswold	88	610
OXFORDSHIRE COUNTY COUNCIL		
Cherwell	89	110
NORTHAMPTONSHIRE COUNTY COUNCIL		
Daventry	90	110
WARWICKSHIRE COUNTY COUNCIL		
Nuneaton & Bedworth	91	110
Rugby	91	210
Stratford-upon-Avon	91	310
Warwick	91	410
North Warwickshire	91	510
WEST MIDLANDS		
Coventry	92	110
Birmingham	92	210
Dudley	92	310
Sandwell	92	410
Solihull	92	510
Walsall	92	610
Wolverhampton	92	710
LEICESTERSHIRE COUNTY COUNCIL		
Blaby	93	110
Hinckley and Bosworth	93	210
Charnwood	93	310
Harborough	93	410
Leicester	93	510
Melton	93	610
North West Leicestershire	93	710
Oadby and Wigston	93	810
Rutland	93	910

NOTTINGHAMSHIRE COUNTY COUNCIL		
Ashfield	94	110
Bassetlaw	94	210
Broxtowe	94	310
Gedling	94	410
Mansfield	94	510
Newark and Sherwood	94	610
Nottingham	94	710
Rushcliffe	94	810
LINCOLNSHIRE COUNTY COUNCIL		
North Kesteven	95	110
South Kesteven	95	210
West Lindsey	95	310
HUMBERSIDE COUNTY COUNCIL		
Boothferry	96	110
Glanford	96	210
Scunthorpe	96	310
SOUTH YORKSHIRE		
Doncaster	97	110
Rotherham	97	210
Sheffield	97	310
DERBYSHIRE COUNTY COUNCIL		
Bolsover	98	110
Erewash	98	210
Amber Valley	98	310
Derby	98	410
High Peak	98	510
North East Derbyshire	98	610
Derbyshire Dales	98	710
South Derbyshire	98	810
Chesterfield	98	910
STAFFORDSHIRE COUNTY COUNCIL		
Staffordshire Moorlands	99	110
Cannock Chase	99	210
East Staffordshire	99	310
Lichfield	99	410
Newcastle under Lyme	99	510
South Staffordshire	99	610
Stafford	99	710
Stoke on Trent	99	810
Tamworth	99	910

APPENDIX A5

SOURCES OF FINANCE

1 **Levy on County Councils, Metropolitan District Councils and Internal Drainage Boards**

The Authority's flood defence and land drainage revenue income derives in the main from contributions from County Councils, Metropolitan District Councils and Internal Drainage Boards collected by a regional levy. The total amount required to be collected is apportioned between the Councils on the basis of relevant population (for Community Charge purposes) after taking into account the amounts to be raised from Internal Drainage Boards. The amount paid by Councils for flood defence levies is reimbursed in full by the Department of the Environment the following year through the revenue support grant for local authorities. Internal Drainage Boards' contributions to the National Rivers Authority expenditure are assessed on the basis of the benefit which the Boards derive as a result of the Authority's operations.

2 **Loans**

The Authority's flood defence capital expenditure is self-financed and loans will be sought in exceptional circumstances only, to deal with unforeseen emergencies.

3 **General and Special Drainage Charges**

General drainage charges are a means by which revenue, to meet land drainage expenditure, can be raised on agricultural land which lies outside Internal Drainage Districts. The Land Drainage Act (as amended by the Water Act 1989) prescribes a procedure designed to secure that the amount of the charge shall be as near as practicable equivalent to what would be paid in respect of the chargeable land if the land were rated.

Special drainage charges can be levied on specified areas outside Internal Drainage Districts where it appears to the Authority that drainage works on any watercourses in that area should be carried out in the interests of agriculture.

Because of the limits which are statutorily imposed, General and Special charges would provide only a small addition to current income. The Authority has, therefore, decided that, in view of the high adminstrative costs, such charges would not be justified at present.

4 **Grant Aid to the National Rivers Authority**

(a) Section 90 of the Land Drainage Act 1976 (as amended by the Water Act 1989) enables grants to be paid by the Ministry of Agriculture, Fisheries and Food in respect of approved land drainage schemes for the improvement of existing works or the construction of new works. In the Severn-Trent Region grant is currently paid at 15% of qualifying expenditure. A supplement of 20% may also be payable for tidal defence schemes.

(b) Grants are available under Section 92 of the Land Drainage Act 1976 (as amended by the Water Act 1989) for providing apparatus for carrying out engineering operations for the installation of flood warning systems.

5 **Grant Aid to Local Authorities and Internal Drainage Boards**

By virtue of Section 91, Land Drainage Act 1976 (as amended by the Water Act 1989) grants are payable by the Ministry of Agriculture, Fisheries and Food to Internal Drainage Boards and County, Metropolitan and District Councils in respect of expenditure incurred on drainage schemes carried out under Sections 17, 22, 98, 99

and 100 of the Land Drainage Act 1976 (as amended by the Water Act 1989). Such grants are available in respect of expenditure on approved land drainage schemes for the improvement of existing works and for the construction of new works, and, in the case of Internal Drainage Boards, on works (other than routine maintenance) on the rebuilding or repair of any bridge maintained by a Board.

The Authority must be consulted, as required by Section 98(8) of the Land Drainage Act 1976 (as amended by the Water Act 1989), before such schemes are submitted to the Ministry.

Grant aid is currently payable up to a maximum of 26% of the cost of the scheme for Internal Drainage Boards and Local Authorities. A supplement of 20% may also be payable for tidal defence schemes.

6 European Regional Development Fund

Certain areas within the region, principally the West Midlands, have been designated as intermediate areas and schemes which are designed to serve those areas by the provision of infrastructure for industry/commerce may be eligible for grant aid from the European Regional Development Fund.

APPENDIX A6

CONSERVATION

CONSERVATION DUTIES UNDER THE WATER ACT 1989

The following excerpts from the Water Act 1989 define the NRA's statutory conservation duties, as relating to flood defence/land drainage operations.

8. (1) It shall be the duty of each of the following, that is to say, the Secretary of State, the Minister, the Director and every relevant body, in formulating or considering any proposals relating to the functions of any relevant body or, as the case may be, that body:-

a) so far as may be consistent with the purposes of any enactment relating to the functions of that body and, in the case of the Secretary of State and the Director, with their duties under section 7 above, so to exercise any power conferred on him or it with respect to the proposals as to further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological and physiographical features of special interest;

b) to have regard to the desirability of protecting and conserving buildings, sites and objects of archaeological, architectural or historic interest; and

c) to take into account any effect which the proposals would have on the beauty or amenity of any rural or urban area or on any such flora, fauna, features, buildings, sites or objects.

(2) Subject to subsection (1) above, it shall be the duty of each of the following, that is to say, the Secretary of State, the Minister, the Director and every relevant body, in formulating or considering any proposals relating to the functions of a relevant body or, as the case may be, that body:-

a) to have regard to the desirability of preserving for the public any freedom of access to areas of woodland, mountains, moor, heath, down, cliff or foreshore and other places of natural beauty;

b) to have regard to the desirability of maintaining the availability to the public of any facility for visiting or inspecting any building, site or object of archaeological, architectural or historic interest; and

c) to take into account any effect which the proposals would have on any such freedom of access or on the availability of any such facility.

9. (1) Where the Nature Conservancy Council are of the opinion that any area of land:-

a) is of special interest by reason of its flora, fauna or geological or physiographical features; and

b) may at any time be affected by schemes, works, operations or activities of a relevant body or by an authorisation given by the Authority,

the Council shall notify the fact that the land is of special interest for that reason to every relevant body whose works, operations or activities may affect the land or, as the case may be, to the Authority.

(2) Where a National Park authority or the Broads Authority is of the opinion that any area of land in a National Park or in the Broads:-

a) is land in relation to which the matters for the purposes of which section 8 above has effect are of particular importance; and

b) may at any time be affected by schemes, works, operations or activities of a relevant body or by an authorisation given by the Authority, the National Park authority or Broads Authority shall notify the fact that land is such land, and the reasons why those matters are of particular importance in relation to the land, to every relevant body whose works, operations or activities may affect the land or, as the case may be, to the Authority.

(3) Where a relevant body has received a notification under subsection (1) or (2) above with respect to any land, that body shall consult the notifying body before carrying out, or (in the case of the Authority) carrying out or authorising, any works, operations or activities which appear to that relevant body to be likely:-

a) to destroy or damage any of the flora, fauna, or geological or physiographical features by reason of which the land is of special interest; or

b) significantly to prejudice anything the importance of which is one of the reasons why the matters mentioned in subsection (2) above are of particular importance in relation to that land.

(4) Subsection (3) above shall not apply in relation to anything done in an emergency where particulars of what is done and of the emergency are notified to the Nature Conservancy Council, the National Park authority in question or, as the case may be, the Broads Authority as soon as practicable after that thing is done.

2 RELEVANT FUNCTIONS OF THE NATURE CONSERVANCY COUNCIL

1 The Nature Conservancy Council was established by the Nature Conservancy Council Act 1973 for the purposes of nature conservation and fostering the understanding thereof. The major functions prescribed by the Act are:-

i) the establishment, maintenance and management of nature reserves in Great Britain;

ii) the provision of advice to Ministers on the development and implementation of policies for or affecting nature conservation in Great Britain;

iii) the provision of advice and dissemination of knowledge about nature conservation;

iv) the commissioning or support of relevant research.

2 The NCC also inherited a number of powers and duties formerly exercised by the Nature Conservancy among which are:-

i) a duty to notify land of special interest (SSSIs) to local planning authorities (Section 23 of the National Park and Access to the Countryside Act 1949 now superseded by Section 28 of the Wildlife and Countryside Act 1981 - see below);

ii) power to enter into agreements to conserve SSSIs (Section 15 of the Countryside Act 1968);

iii) powers of entry for survey in connection with acquisition of land (Section 108 of the 1949 Act).

3 The Town and Country Planning General Development Order 1977 obliges local planning authorities to consult the NCC before granting planning permission for development in an SSSI.

4 The Wildlife and Countryside Act 1981 placed a number of additional duties on the NCC, some of which replace similar duties in earlier legislation, including:

i) duty to notify internal drainage boards and the NRA of land of special interest and to advise those bodies when consulted on their proposals affecting such sites. (Section 48);

ii) duty to notify land of special interest (SSSIs) not only to local planning authorities but also to every owner or occupier and to the Secretary of State, specifying the nature of the scientific interest and any operations likely to damage the interest (Section 28);

iii) duty to offer a management agreement where the NCC has objected to a farm capital grant and it is subsequently refused by agriculture ministers on nature conservation grounds (Section 32).

3 RELEVANT FUNCTIONS OF COUNTRYSIDE COMMISSION

1 Under Section 2 of the Countryside Act 1968, the Countryside Commission has the statutory duty of keeping under review all matters relating to the provision and improvement of facilities for the enjoyment of the countryside, the conservation and enhancement of the natural beauty and amenity of the countryside, and the need to secure public access to the countryside for the purposes of open-air recreation. It is required to consult with such local planning authorities and other bodies as appear to the Commission to have an interest in those matters, and to encourage, assist, concert or promote the implementation of any proposals with respect to those matters made by any person or body, being proposals which the Commission consider to be suitable. The Commission is also required to advise any Minister having functions under the Countryside Act 1968, or any other Minister or any public body, on such matters relating to the countryside as he or they may refer to the Commission, or as the Commission may think fit.

2 Under Section 9 of the Local Government Act, 1974, the Commission, in accordance with arrangements approved by the Secretary of State and the Treasury, may give financial assistance by way of grant or loan, to any person in respect of expenditure incurred by him in doing anything which, in the opinion of the Commission, is conducive to the attainment of any of the purposes of the Countryside Act 1968 or the National Parks and Access to the Countryside Act 1949.

NRA

National Rivers Authority
Severn-Trent Region