NRA-South West 455

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DEVON AREA INTERNAL REPORT

AN INVESTIGATION INTO POSSIBLE CAUSES OF POOR WATER QUALITY AT BLAKEWELL BRIDGE (R30A001) ON THE BRADIFORD WATER.

DECEMBER 1995

DEV/E/19/95

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AN INVESTIGATION INTO POSSIBLE CAUSES OF POOR WATER QUALITY AT BLAKEWELL BRIDGE (R30A001) ON THE BRADIFORD WATER.

1. INTRODUCTION

The Bradiford Water is a small tributary of the River Taw and rises west of Berry Down in north Devon. The river flows south then south west for approximately 15 km before its confluence with the River Taw estuary.

The single routine chemical monitoring site, Blakewell (R30A001 at NGR SS 5663 358), is designated under the EC Directive for the Protection of Salmonid Fish and has a current River Ecosystem Use (RE) Class target of 2. However, it is being considered that in the future this target will be increased to an RE class of 1.

2. TERMS OF REFERENCE

2.1 OBJECTIVES

A request was received from Regional Quality Planning to briefly investigate the area above Blakewell. Although current classification will meet the River Quality Objective (RQO) of RE class 2, if the class is calculated on the future proposed Environmental Quality Standards (EQS) for a class 1, the site would fail.

In this study, the area concerned has been investigated to identify possible cause of poor water quality of the watercourse.

2.3 PROJECT TEAM

T. Cronin (Project Leader)
P. Rose (Project Manager, author)

3. METHOD

1. Analysis of routine water quality data to establish any trends and / or relationships between water quality and other factors such as rainfall and drought.

2. Talk to Water Quality Officers to ascertain possible problem areas.

3. Carry out a catchment investigation using sewage fungus as a primary indicator to track down problem areas.

4. Inform the Water Quality Officer for the area of any major inputs that are causing impact in the watercourse.

4. RESULTS

4.1 HISTORIC RESULTS

Analysis of routine water quality data taken at Blakewell Bridge between the period of 01 January 1992 and 08 November 1995 (see APPENDIX I) show the following exceedances (using RE class 1 EQS's, see APPENDIX II):

BOD	3	(from 46 samples taken) EQS =2.5 mg/l as 90 %-ile
Dissolved Oxygen	1	(from 45 samples taken) EQS =80 % saturation as 10 %-ile

The exceedances are generally associated with rainfall.

4.2 INVESTIGATION RESULTS

See proformas enclosed.

5. DISCUSSION

Of the areas tracked down one, Collacott Farm, appears most likely to be the probable cause of elevated BOD levels in the Bradiford Water during rainfall events. The sewage fungus present within the farm tributary was thick and had formed large floating colonies.

During the Farm Campaign of early 1995, Collacott Farm was identified as having a problem with cattle slurry overflowing. It may be that either remedial work has not yet been carried out or improvements are insufficient or not managed properly. The Water Quality Officer (WQO) for the area has been informed and will be visiting the farm.

The tributary from Viveham Farms contained a total ammonia concentration above the EQS (0.64 mg/l in the sample). Impact was very localised although it is possible that under very heavy rainfall, run-off may contribute to chemical impact at Blakewell Bridge.

Viveham Farm was also noted in the Farm Campaign though mainly due to poor management practices

6. CONCLUSION

1. Collacott Farm has an illegal discharge that has the potential to impact at the downstream routine monitoring point Blakewell Bridge during heavy rain.

2. The discharge from Collacott Farm is illegal and needs to be controlled.

3. Viveham, Wheaten and Higher Muddiford farms have the potential to cause localised impact due to farm run-off in wet weather

7. RECOMMENDATIONS

1	Collacott Farm to be visited by the WQO.	ACTION:WQO

SITE: Collacott Farm

WATERCOURSE Tributary of Colam Stream

NGR SS 5567 4170 (Tributary locality) SS 5625 4182 (problem locality)

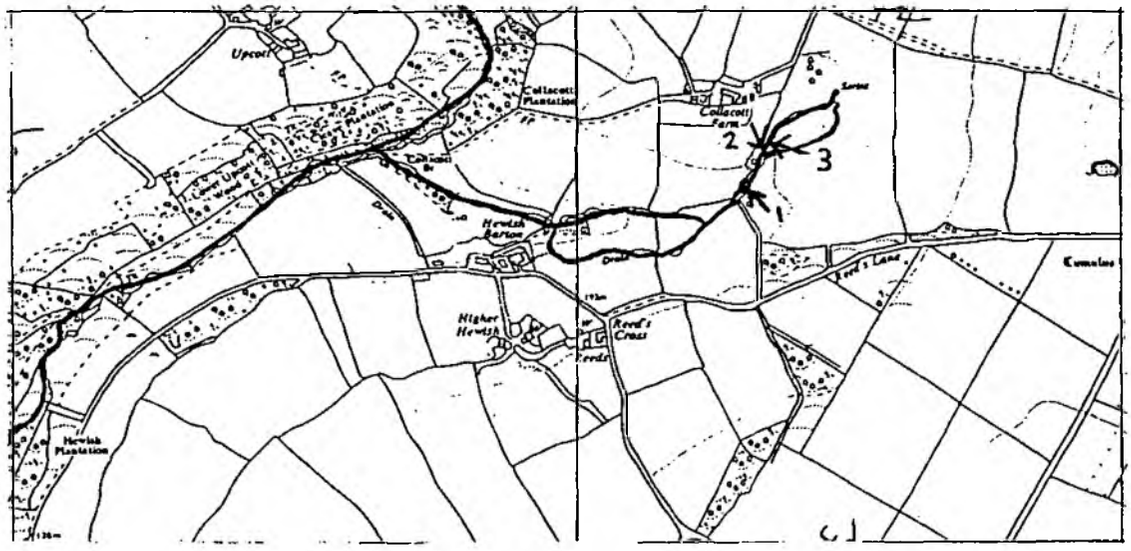
EVIDENCE OF WATER QUALITY PROBLEM

Tributary covered with 100% sewage fungus downstream of the farm. The stream tributary leading down from the Collacott Farm smelt of farm effluent. Sewage fungus apparent to approximately 2 km downstream in the Colam Stream.

Site Description	Site No.	Total Ammonia mg/l	BOD mg/l
Tributary D/S	1	2.0	17.5
Farm ditch	2	50.0	643
Tributary U/S ditch	3	<0.03	<1.0

SOURCE OF PROBLEM:

Farm effluent was directly entering the head waters of the tributary. 'A land drain with clear running water was taken as the upstream site.



IMPLICATIONS:

Collacott Farm has the potential to cause chemical impact of the Bradiford water downstream and possibly at the routine monitoring site at Blakewell during heavy rainfall.

RECOMMENDATIONS:

The Water Quality Officer has been notified and will be visiting the farm.

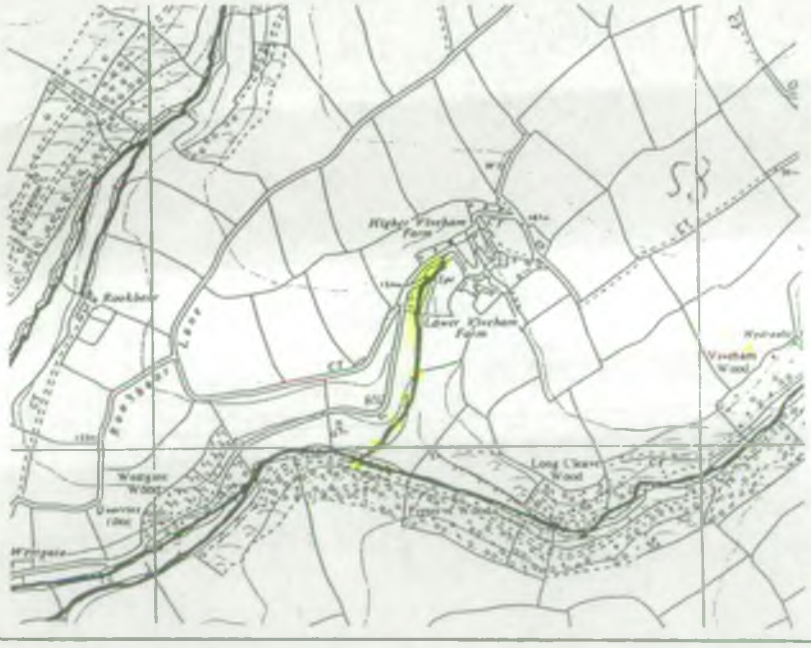
SITE:	Viveham Farms
WATERCOURSE	Tributary of Bradiford water
NGR	SS 5745 3895

EVIDENCE OF WATER QUALITY PROBLEM

Tributary covered with approximately 10% sewage fungus downstream of the farm tributary. Chemical samples indicated no EQS exceedance within the receiving tributary but a total ammonia concentration of 0.64 mg/l (EQS =0.25 mg/l as 95 %-ile) in the farm tributary.

SOURCE OF PROBLEM:

The small tributary leading down from the Viveham Farms was running turbid at the source but almost clear at the confluence downstream. Sewage fungus was detected downstream of the tributary for approximately 1 km (from 10 % cover to trace levels). General run-off was entering the small tributary from the farm area.



IMPLICATIONS:

Although the receiving water samples taken did not exceed EQS's, it is possible that under heavy rain Viveham Farms may pose a problem.

RECOMMENDATIONS:

The Water Quality Officer to be aware of the potential problem that run-off from Viveham Farms may have on the Bradiford Water during wet weather.

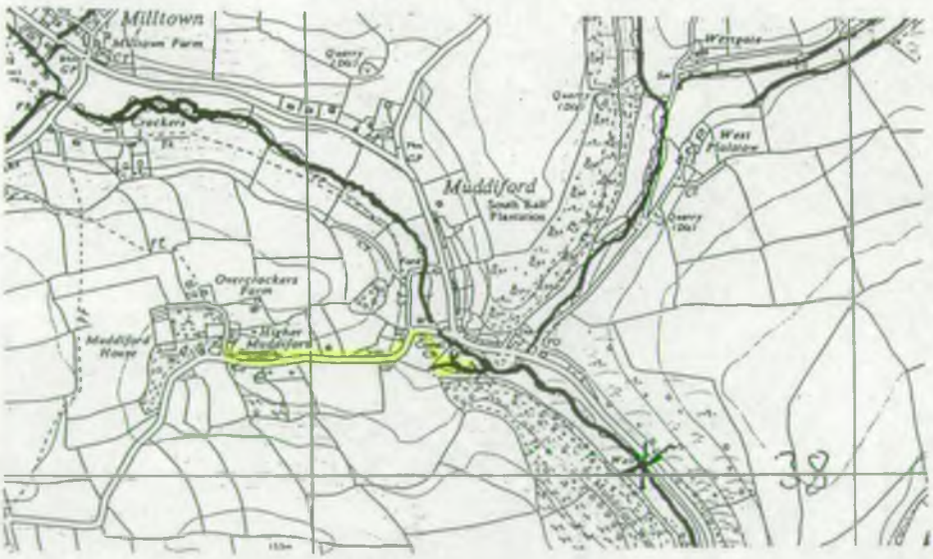
SITE:	Higher Muddiford Farm
WATERCOURSE	Tributary of Bradiford water
NGR	SS 5630 3820

EVIDENCE OF WATER QUALITY PROBLEM

Tributary very turbid, entering clear water stream.
Chemical samples indicated no EQS exceedance of tributary or receiving water.

SOURCE OF PROBLEM:

Higher Muddiford Farm is directly adjacent to road. Road drains empty into near-by ditch and into a muddy tributary area which then enters stream as above. Farm waste evident along road; very likely that farm run-off will enter the watercourses during wet weather.



IMPLICATIONS:

Although the samples taken did not exceed EQS's, it is possible that during wet weather, farm waste run-off may enter the river and cause localised impact.

RECOMMENDATIONS:

The Water Quality Officer to be aware of the potential problem that run-off from Higher Muddiford Farm may have on the Bradiford Water during wet weather.

SITE:	Whiddon Farm
WATERCOURSE	Tributary of Bradiford water
NGR	SS 5555 3873

EVIDENCE OF WATER QUALITY PROBLEM

Tributary covered with approximately 70% sewage fungus .
Chemical samples indicated no EQS exceedance of tributary or receiving water.

SOURCE OF PROBLEM:

A small ditch at Whiddon Farm was contaminated with farm effluent which in turn was entering a small tributary. The sewage fungus cover present suggests this to be a chronic problem, however, from the chemical results (no impact), a minor one.

IMPLICATIONS:

Although the samples taken did not exceed EQS's, it is possible that due to the locality of the water course to the farm, during wet weather, some effluent may enter the river and cause localised impact.

RECOMMENDATIONS:

The Water Quality Officer to be aware of the potential problem that run-off from Whiddon Farm may have on the Bradiford Water during wet weather.

APPENDIX I

ANALYTICAL SUMMARY OF:-

BRADFORD WATER AT BLAKEWELL

Date	Time	Type Purp	Mat	OXYGEN DISS % SATN	BOD ATU MG/L	AMMON-IA MG/L N	SILICE SUSP MG/L
100192	1152	SOMR	BF		1.9	0.07	13
140292	1230	SOMR	BF	98	1.4	0.07	11
150892	1125	SOMR	BF	99	1.4	0.05	9
270492	1150	SOMR	BF	100	1.2	0.06	6
270592	1400	SOMR	BF	95	1.3	0.06	9
290692	1415	SOMR	BF	94	1.3	0.03	5
010992	1315	SOMR	BF	94	1.1	0.05	5
250912	1355	SOMR	BF	95	1.3	0.05	8
290992	1455	SOMR	BF	94	1.9	0.03	7
291092	1300	SOMR	BF	97	1.4	0.02	42
121192	1120	SOMR	BF	91	1.7	0.05	43

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ANALYTICAL SUMMARY OF:-

BRADFORD WATER AT BLAKEWELL

Date	Time	Type Purp	Mat	OXYGEN DISS % SATN	BOD ATU MG/L	AMMON-IA MG/L N	SILICE SUSP MG/L
041292	1320	SOMR	BF	96	1.6	0.07	52
110193	1305	SOMR	BF	98	1.8	0.06	80
090293	1410	SOMR	BF	99	1.9	0.07	8
040393	1300	SOMR	BF	98	2.2	0.07	9
010493	1120	SOMR	BF	105	1.6	0.05	2
270493	1200	SOMR	BF	97	1.7	0.04	3
050593	1150	SOMR	BF	98	1.8	0.05	2
020793	1400	SOMR	BF	86	1.1	0.10	3
090893	1030	SOMR	BF	97	1.8	0.05	11
100993	1920	SOMR	BF	100	3.8	0.17	10
081093	1425	SOMR	BF	93	1.8	0.04	19

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ANALYTICAL SUMMARY OF -

BRADFORD WATER AT BLAKEWELL

Date	Time	Type Purp	Mat	OXYGEN DISS % SATN	BOD ATU MG/L D	AMMONIA MG/L N	TURBIDITY JTU
021198	1505	SOMR	2F	98	1.1	0.05	3
171198	1040	SOMR	2F	90	1.1	0.05	1
100194	1305	SOMR	2F	99	1.1	0.06	12
040294	1340	SOMR	2F	100	1.8	0.08	16
180294	1410	SOMR	2F	97	2.5	1.24	87
250294	1500	SOMR	2F	96	1.4	0.05	13
120394	1155	SOMR	2F		1.5	0.03	3
140394	1620	SOMR	2F	94	1.4	0.07	1
250794	1035	SOMR	2F	94	2.7	0.02<	2
140994	1510	SOMR	2F	90	1.9	0.11	13
061094	1025	SOMR	2F	104	1.7	0.04	3

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ANALYTICAL SUMMARY OF:

BRADFORD WATER AT BLAKEWELL

Date	Time	Type Purp	Mat	OXYGEN DISS % SATN	BOD ATU MG/L	O	AMMONIA MG/L	N	COLIFORM DUST MG/L
271094	1430	SOMR	SF	98	2.2		0.13		7
151194	1405	SOMR	SF	97	1.8		0.04		19
131294	1425	SOMR	SF	98	1.4		0.02		1
030195	0901	SOMR	SF	101	1.2		0.05		
090195	0955	SOMR	SF	98	1.4		0.09		
220196	1300	SOMR	SF	98	1.6		0.06		
200496	0920	SOMR	SF	102	1.7		0.11		
220596	1215	SOMR	SF	100	2.3		0.12		
260695	1105	SOMR	SF	92	1.2		0.05		
310795	1130	SOMR	SF	78	1.1		0.20		
280896	1445	SOMR	SF	97	1.0		0.01		

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ANALYTICAL SUMMARY OF:-

BRADIFORD WATER AT BLAENGELL

Date	Time	Type Pump	Mat	OXYGEN SOL DISS % SATN	OXYGEN SOL ATU MG/L	AMMON IA MG/L N	ALLIC SUSP MG/L
251083	1013	SOMR	2F	91	9.8	0.00	
021195	1200	SOMR	2F	98	1.04	0.06	

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APPENDIX II

TABLE 1 : STANDARDS FOR THE FIVE RIVER ECOSYSTEM USE CLASSES

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 95%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness mg/l $CaCO_3$	Dissolved Copper µg/l 95%ile	Total Zinc µg/l 95%ile	Class Description
1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of very good quality suitable for all fish species
2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of good quality suitable for all fish species
3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for high class coarse fish populations
4	50	8.0	2.5	-	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for coarse fish populations
5	20	15.0	9.0	-	-	-	-	-	Water of poor quality which is likely to limit coarse fish populations