NRA

DEVON AREA INTERNAL REPORT

AN INVESTIGATION TO DETERMINE THE WATER QUALITY OF CHURCHSTANTON STREAM.

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South Western Region

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1. INTRODUCTION

The Churchstanton Stream rises south of Churchstanton near Higher Munty (NGR ST 1982 1278). The stream flows north west for approximately 3.5 km before its confluence with the River Culm north of Lillycombe Farm (NGR ST 1690 1422).

Although the water quality of Churchstanton stream is not routinely monitored, the nearest site downstream on the River Culm at Bridge House, Clayhidon (R05C002 NGR ST 1600 1408), has a current River Ecosystem Use (RE) Class target of 2 and a long term target of 1 (see APPENDIX I). These targets will be applied to the Churchstanton Stream.

The Churchstanton Sewage Treatment Works (WSTW7550FE) which has a descriptive consent was added to the routine programme mid 1995; no other discharges to the stream are routinely monitored (see Figure 1).

2. TERMS OF REFERENCE

2.1 OBJECTIVES

A request was received from the Water Quality Officer (WQO) for the area to investigate discharges into the stream and determine the extent of any impact. This report is a documentation of the study.

2.3 PROJECT TEAM

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

3. METHOD

1. Talk to the WQO for the area in order to gain information on known problem areas within the catchment.

2. Appraise the Churchstanton Stream visually, by the use of field test kits and by making biological collections in order to track down and identify inputs to the stream which may be causing an impact.

3. Determine the impact of inputs to the stream both chemically and biologically.

3. Notify the WQO of all findings.

4. RESULTS

4.1 HISTORIC DATA

Analysis of routine samples taken from the final effluent of Churchstanton STW show no excessively high concentrations of basic sanitary detrminands from the start of NRA sampling (11 July 1995) to 16 February 1996 (see APPENDIX II).

River water samples taken for the 'Ups and Downs' programme show the STW effluent was not impacting on the stream. Exceedance of the BOD EQS above and below the final effluent discharge point (samples taken on 28 November 1995, BOD = 5.9 mg/l & 5.8 mg/l upstream and downstream respectively) was associated with rainfall (11.0 mm on the day) and was probably the result of a known upstream illegal discharge from Middle Munty Farm (see the appropriate proforma).

4.2 INVESTIGATION DATA

For results see Figure 1 and proforma.

5. DISCUSSION

Of the inputs identified, one from Osmonds Farm cattle sheds was found to cause an exceedance of EQS's in the road ditch leading to the stream during wet weather. The other 3 inputs found did not result in exceedances in the receiving waters at the time of investigation but have the potential to cause localised impact under certain conditions (see proforma).

Generally the water quality of the Churchstanton Stream was found to be good. The biological collections made contained many taxa indicative of good water quality (4 families or more of stoneflies at each site sampled with the exception of one site which had 3 families).

6. CONCLUSIONS

1. Osmonds Farm has the potential to cause a chemical impact on the Churchstanton Stream during wet weather.

2. Lower Munty Farm has the potential to cause a chemical impact on the Churchstanton Stream during wet weather and is probably responsible for BOD exceedances recorded up and downstream of Churchstanton STW.

3. Churchstanton STW was not causing an impact at the time of the investigation.

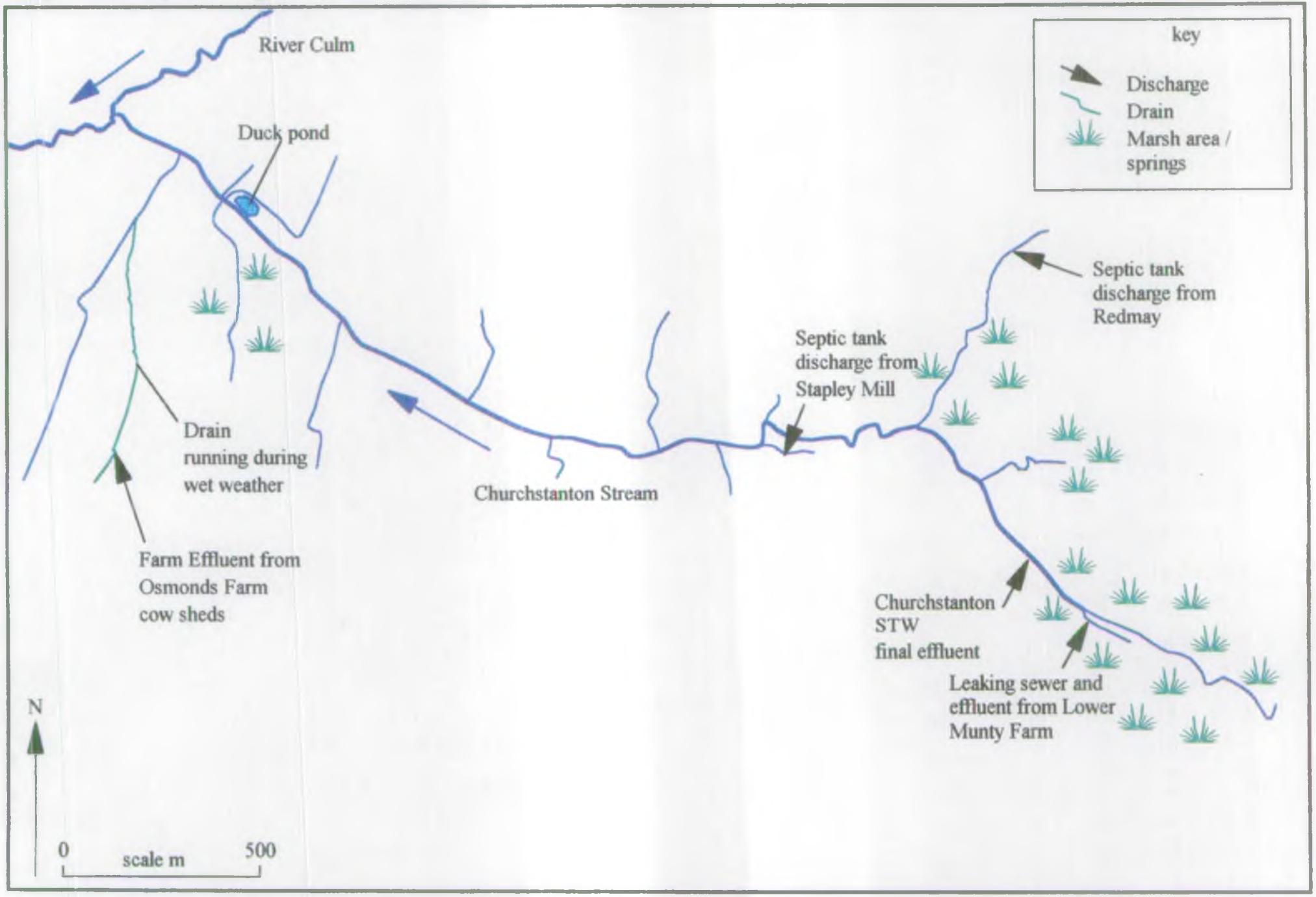
4. The field septic tank at Acombe will probably cause a localised chemical impact during low flow conditions; the barn / cattle shed effluent at Acombe has the potential to cause localised chemical impact during wet weather conditions.

5. The septic tank at Stapley Mill has the potential to cause localised chemical impact during low flow conditions in a tributary of Churchstanton Stream.

7. RECOMMENDATIONS

See proforma.

Figure 1. Map showing the Curchstanton Stream area.



SITE: Osmonds Farm

WATERCOURSE Road drain entering Churchstanton stream

NGR ST 1680 1340 (problem locality)

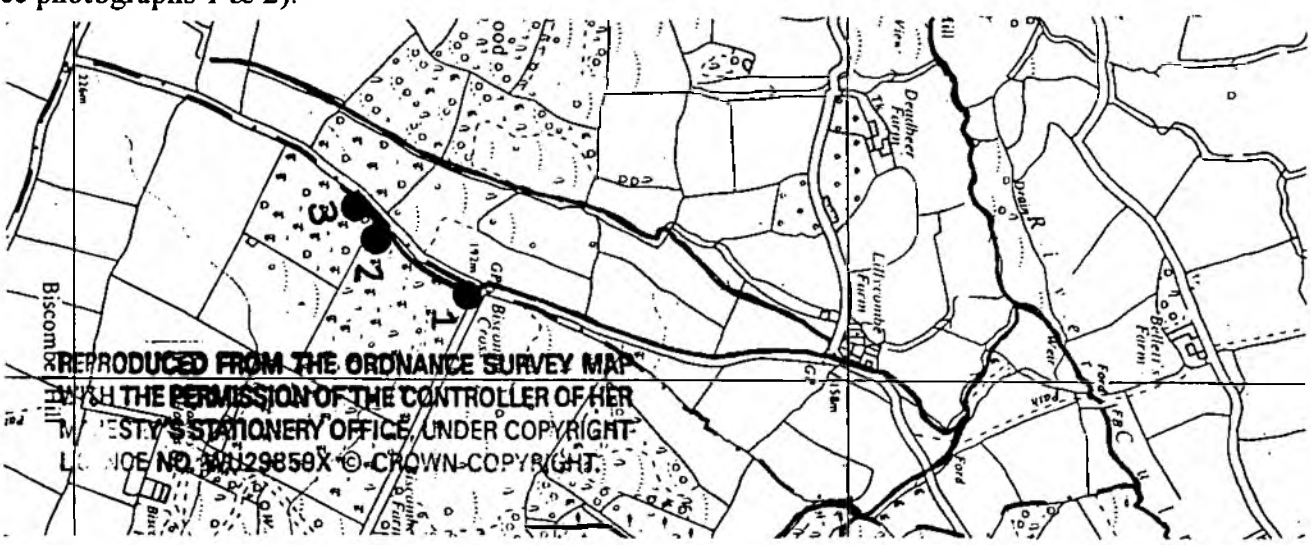
EVIDENCE OF WATER QUALITY PROBLEM

During inspection of the catchment in wet weather a road drain was green and smelt of farm effluent. The drain was fed by a field ditch coming from the direction of a set of cow sheds.

Site Description	Site No.	Total Ammonia mg/l	BOD mg/l
Ditch D/S of cow sheds	1	28.0	457
Farm effluent	2	12.1	614
Surface water U/S of cow sheds	3	0.21	2.2

SOURCE OF PROBLEM:

Surface water and farm waste was running off the open hard-standing of the sheds down to the field ditch (see photographs 1 & 2).



IMPLICATIONS:

The ditch only runs during wet weather. On talking to local people, this problem has happened frequently in the past. Because of the quantity of rain required to result in the ditch running, dilution within the Churchstanton stream will be high and chemical impact will probably be evident but localised. It is unlikely that there would be any chemical impact within the River Culm during these conditions.

RECOMMENDATIONS:

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

Photograph 1: Run off from Osmonds Farm cattle sheds.

Photograph 2: Field ditch with run off from Osmonds Farm cattle sheds.

SITE:	Acombe, Stapley
WATERCOURSE	Tributary of Churchstanton Stream
NGR	ST 1918 1389 (problem locality)

EVIDENCE OF WATER QUALITY PROBLEM

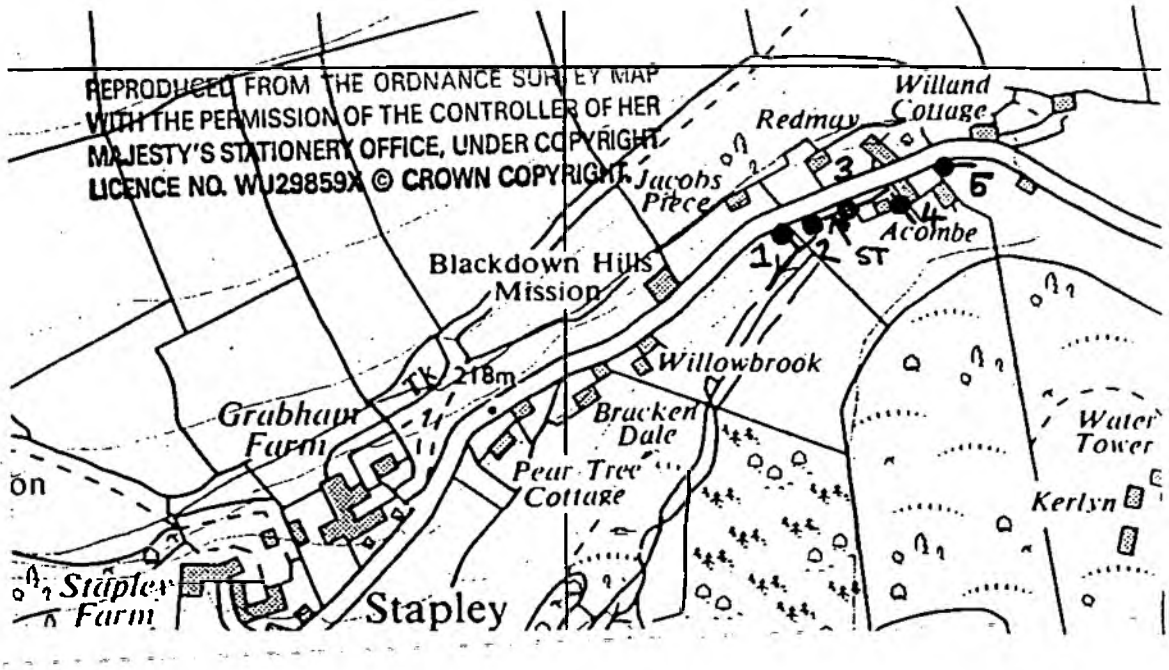
The tributary had a reduced macroinvertebrate taxa list and poorer substrate than other sites on the stream. On following up the watercourse, a septic tank discharge was found seeping up through the soil and entering the tributary.

Site Description	Site No.	Total Ammonia mg/l	BOD mg/l
U/S site	5	0.05	1.2
Small stream	4	0.06	2.1
U/S Septic Tank	3	0.09	1.2
D/S Septic Tank	2	2.1	0.48
Road drain entry	1	<0.03	<1.0

SOURCE OF PROBLEM:

Besides the septic tank in the field, a barn / cattle shed upstream of the discharge had farm effluent oozing out of the wall into the ground near by the watercourse although none of the waste was directly entering the stream at the time of investigation (a small length of the stream is culverted at this point, see photographs 3 & 4).

A road drain had a condom visible through the grating indicating the possibility of a septic tank connection. The entry point of the drain to the stream was not confirmed but a water sample was taken where a further road drain in the same line entered the tributary.



SITE:	Acombe, Stapley	**Continued**

IMPLICATIONS:

None of the inputs were resulting in EQS exceedances for a RE class 2 river at the time of sampling. However, during wet weather the farm waste from the barn may have a localised impact on the stream and during dry weather flows in summer, the septic tank discharge in the field and that to the road drain may impact the tributary chemically.

No biological collection could be made upstream of the whole area due to unsuitable sampling conditions.

RECOMMENDATIONS:

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

Photograph 3: Septic Tank discharge at Acombe.

Photograph 4: Barn / shed seepage at Acombe.

SITE: Stapley Mill

WATERCOURSE Tributary of Churchstanton stream

NGR ST 1680 1340 (problem locality)

EVIDENCE OF WATER QUALITY PROBLEM

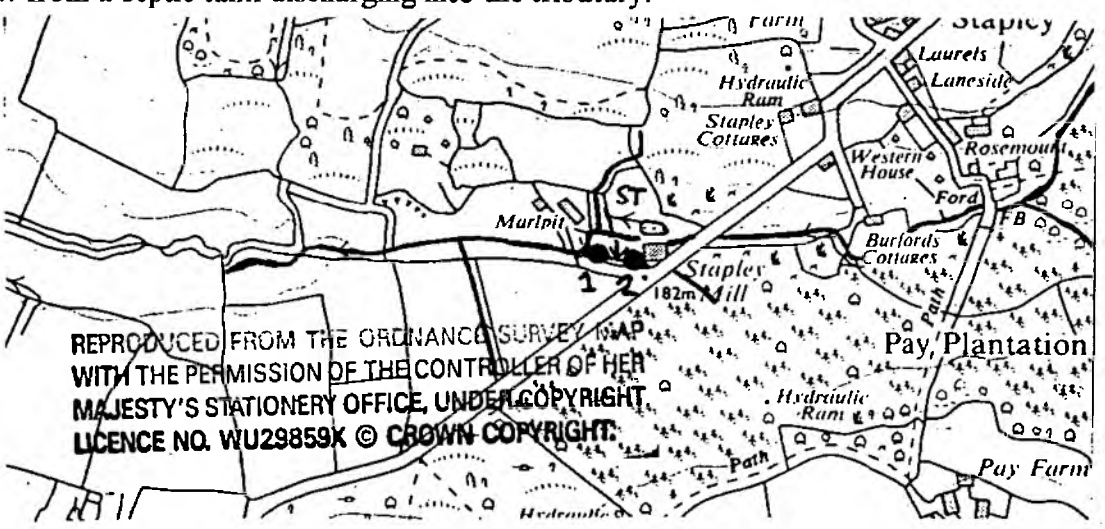
During the appraisal there was a septic tank effluent smell around Stapley Mill. On closer examination a septic tank discharge was located in a small tributary of the stream. Sewage fungus D/S of the effluent was approximately 11.5% compared to 1% cover U/S.

Water samples taken did not exceed EQS for a RE class 2 river.

Site Description	Site No.	Total Ammonia mg/l	BOD mg/l
D/S of discharge	1	<0.03	1.6
U/S of discharge	2	0.05	1.4

SOURCE OF PROBLEM:

An outflow from a septic tank discharging into the tributary.



IMPLICATIONS:

The biological community D/S of the discharge was poorer than that U/S but was by no means indicative of bad water quality. The input did not result in exceedance of the EQS's for a class 2 river. However, during the summer months with low dilution, there may be a localised chemical impact in the tributary.

RECOMMENDATIONS:

The Water Quality Officer has been notified.

Photograph 5: Septic Tank discharge Stapley Mill.

SITE:	Lower Munty Farm
WATERCOURSE	Churchstanton Stream
NGR	ST 1938 1300 (problem locality)

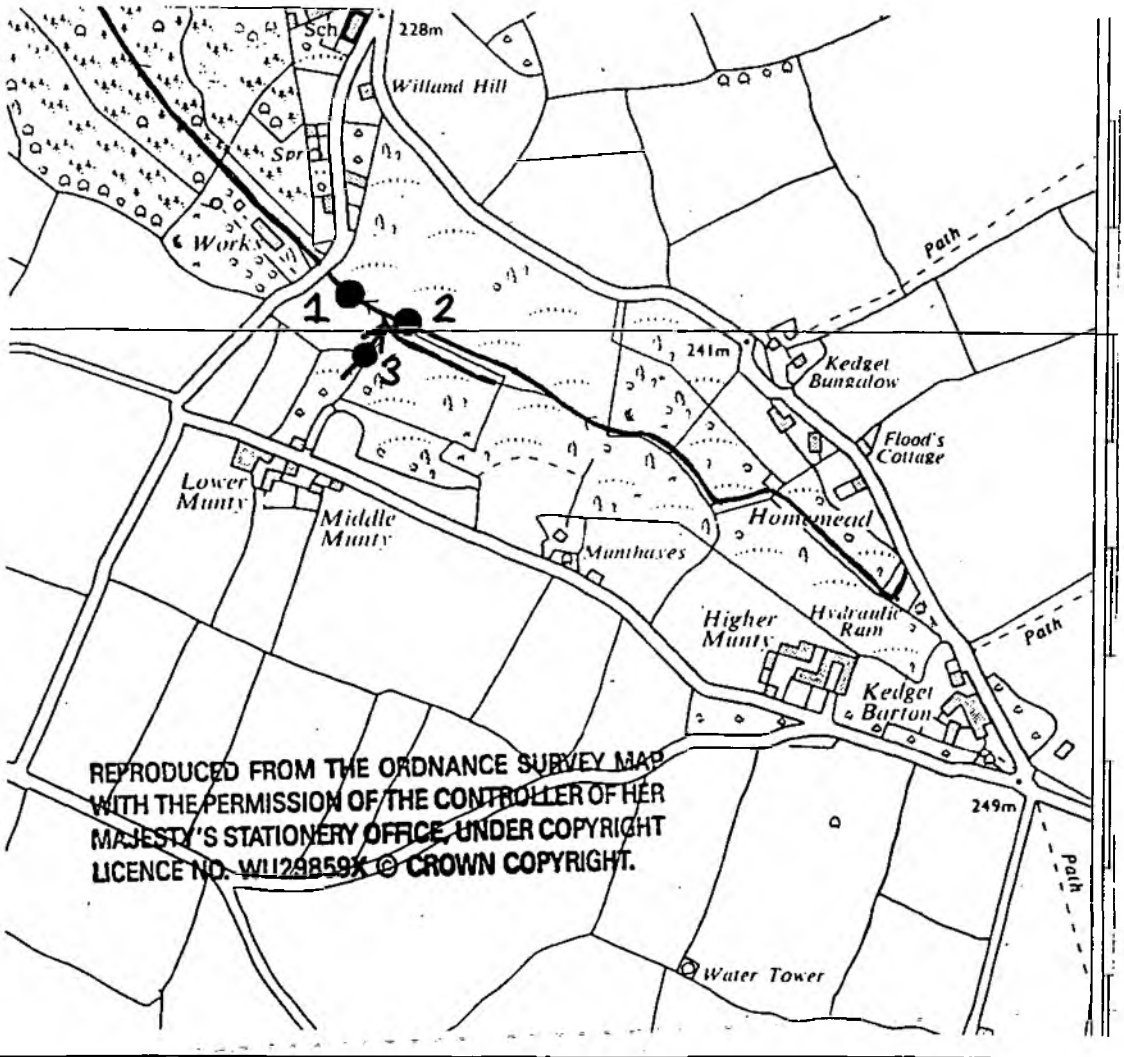
EVIDENCE OF WATER QUALITY PROBLEM

The WQO was aware of a pollution problem at Lower Munty Farm and requested a biological impact assessment to be carried out up and downstream of the area.

Site Description	Site No.	Total Ammonia mg/l	BOD mg/l
D/S site	1	<0.03	<1.0
Farm waste effluent	2	4.4	0.0
U/S site	3	<0.03	<1.0

SOURCE OF PROBLEM:

The problem was a combination of farm waste entering the stream and a cracked sewage pipe coming from the farm towards the stream.



IMPLICATIONS:

No chemical or biological impact was detected in the stream: indeed the biological collections made both up and downstream of the input were indicative of good water quality.

However, during wet weather, there is likely that run off from the farm could cause a chemical impact in the stream. The 'Ups and Downs' programme sampling of Churchstanton STW downstream of the farm show a BOD exceedance during wet weather (26 November 1995 BOD = 5.9 mg/l U/S works, 11.0 mm rain on the day, 11.0 mm total for previous 2 days) which is probably attributable to the farm effluent.

RECOMMENDATIONS:

The Water Quality Officer is in discussion with the farmer.

APPENDIX I

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

APPENDIX II

ANALYTICAL SUMMARY OF:-

TRIBUTARY OF RIVER CULM UPSTREAM OF CHURCHSTANTON S T W
DIS FEATURE NOT AVAILABLE

Date	Time	Type Purp	Mat	AMMON-IA MG/L N	SOLIDS SUSP MG/L	OXYGEN DISS % SATN	BOD ATU MG/L O	PH
110795	1405	SAUD	2F	0.03<	3	95	1.0<	
250795	1310	SAUD	2F	0.03<	3	99	1.1	
300895	1230	SAUD	2F	0.03<	3<	100	1.0<	
051095	1555	SAUD	2F	0.03<	3<	95	1.0<	
131095	1215	SAUD	2F	0.03<	3<	94	1.1	
161095	1240	SAUD	2F	0.03<	3<	96	1.0<	
221195	1500	SAUD	2F	0.03<	3<	94	1.0<	
281195	1325	SAUD	2F	0.42	75	95	5.9	
121295	1315	SAUD	2F	0.03<	3<	104	1.1	
110196	1220	SAUD	2F	0.34	46	96	3.9	
260196	1050	SAUD	2F	0.03	3	101	1.1	

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ANALYTICAL SUMMARY OF:-

TRIBUTARY OF RIVER CULM UPSTREAM OF CHURCHSTANTON S T W
DIS FEATURE NOT AVAILABLE

Date	Time	Type Purp	Mat	AMMON-IA MG/L N	SOLIDS SUSP MG/L	OXYGEN DISS % SATN	BOD ATU MG/L O	PH
160296	1140	SAUD	2R	0.03<	3<	99	1.2	

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ANALYTICAL SUMMARY OF:-

CHURCHSTANTON S T W - EFFLUENT
10/09/85:- BOD MG/L, SS MG/L, AMM MG/L N, FLOW M3/

Date	Time	Type Purp	Mat	AMMON-IA MG/L N	SOLIDS SUSP MG/L	OXYGEN DISS % SATN	BOD ATU MG/L O	PH
110795	1410	SAUD	4S	0.50<	14			7.4
250795	1305	SAUD	4S	0.50<	3<			7.0
300895	1235	SAUD	4S	0.50<	3<			7.5
051095	1600	SQMS	4S	0.60	22			7.6
131095	1220	SQMS	4S	0.70	4			7.4
161095	1235	SQMS	4S	0.50<	3<			6.7
221195	1505	SQMS	4S	0.50<	11			7.5
281195	1320	SQMS	4S	0.50<	56			7.0
121295	1325	SQMS	4S	0.50<	3<			7.2
110196	1215	SQMS	4S	0.50<	15		3.0<	
260196	1040	SQMS	4S	0.50<	3		3.0<	

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ANALYTICAL SUMMARY OF:-

CHURCHSTANTON S T W - EFFLUENT
10/09/85:- BOD MG/L, SS MG/L, AMM MG/L N, FLOW M3

Date	Time	Type Purp	Mat	AMMON-IA MG/L N	SOLIDS SUSP MG/L	OXYGEN DISS % SATN	BOD ATU MG/L O	PH
160296	1130	SQMS	4S	0.50<	31		4.0<	

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ANALYTICAL SUMMARY OF:-

TRIBUTARY OF RIVER CULM DOWNSTREAM OF CHURCHSTANTON S T W
DIS FEATURE NOT AVAILABLE

Date	Time	Type Purp	Mat	AMMON-IA MG/L N	SOLIDS SUSP MG/L	OXYGEN DISS % SATN	BOD ATU MG/L O	PH	CONDUCTIVITY US/CM
110795	1400	SAUD	2F	0.03(	3(	94	1.0(		
250795	1200	SAUD	2F	0.03(	3	96	1.6		
300895	1225	SAUD	2F	0.03(	3(	100	1.0(		
051095	1550	SAUD	2F	0.03(	3(	95	1.0(		
191095	1210	SAUD	2F	0.03(	3(	92	1.0(		
161095	1250	SAUD	2F	0.03(	3(	95	1.0(		
221195	1455	SAUD	2F	0.03(	3(	95	1.0(		
231195	1315	SAUD	2F	0.40	88	98	5.8		
121295	1320	SAUD	2F	0.03(	5	104	1.4		
110196	1210	SAUD	2F	0.33	49	95	3.3		
260196	1045	SAUD	2F	0.03	3	99	1.2		

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TYPE ONLINE READY

ANALYTICAL SUMMARY OF:-

TRIBUTARY OF RIVER CULM DOWNSTREAM OF CHURCHSTANTON S T W
DIS FEATURE NOT AVAILABLE

Date	Time	Type Purp	Mat	AMMON-IA MG/L N	SOLIDS SUSP MG/L	OXYGEN DISS % SATN	BOD ATU MG/L O	PH	CONDUCTIVITY US/CM
160296	1135	SAUD	2R	0.03(	3(	99	1.2		
080396	1105	SAUD	2R	0.03	9	101	1.5		

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