

**DEVON AREA
INTERNAL REPORT**



**ENVIRONMENT
AGENCY**

**INVESTIGATION INTO THE
IMPACT OF HENSTRIDGE SEWAGE
TREATMENT WORKS ON THE
RIVER UMBER,
N. DEVON**

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(CATCHMENT 31A)**

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INVESTIGATION INTO THE IMPACT OF HENSTRIDGE SEWAGE TREATMENT WORKS ON THE RIVER UMBER, N. DEVON

1. INTRODUCTION AND TERMS OF REFERENCE

A request was received from South West Water Services Limited (SWWSL) through Devon Area Environment Protection to investigate any impact Henstridge Sewage Treatment Works (STW) may be having on the River UMBER:

2. CATCHMENT DESCRIPTION AND BACKGROUND

The hamlet of Henstridge is located in North Devon about 2 km south-east of Combe Martin, (see Figure 1). Henstridge STW is situated at NGR SS 5912 4472, access is along a steep, unsurfaced track with hairpin bends and is not suitable for road vehicles. The works discharges primary treated sewage into the headwaters of the River UMBER which is located approximately 65m away down a densely wooded, steeply sloping hillside.

On entering the works (Figure 2) sewage travels through the inlet pipe to a stone septic tank which is connected via an underground clay pipe to a sludge lagoon soakaway. The overflow pipe connected to the stone tank was blocked several years ago. The works was constructed in 1929 by a local farmer for his own personal use, but was later also used by nearby properties. The current resident population connected to the sewer is 22, the peak holiday season tourist population increases to 30.

In 1995 SWWSL took over the running of the works and the Environment Agency issued it with a descriptive consent. SWWSL recently proposed carrying out improvements on the works and requested an investigation to determine the extent of improvement needed.

The River UMBER rises at NGR SS 5807 4468 south of Combe Martin and flows in a northerly direction through the village where it discharges into the Bristol Channel. The River UMBER is approximately 5.1km long with a theoretical mean daily flow of 0.359 m³/s and a Q95 of 0.036 m³/s (ref 1).

It has a River Ecosystem class of RE 1 and a biological class of A (Good) (ref 1).

The watercourse is routinely monitored prior to the beach at NGR SS 5767 4725 (site R31A005, Figure 1).

3. PROJECT TEAM

T. Cronin (Project Leader)
J. Bartlett (Project Manager)
P. Rose (Technician)

4. METHOD

- 4.1 Analysis of historical routine water quality data to establish any trends and/or relationships between water quality and other factors such as rainfall and dry weather conditions.

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- 4.2 Talk to the Environment Protection Officer (EPO) and interrogate the Pollution Incident Logging System (PILS) for the catchment to identify areas of potential concern.
- 4.3 Carry out an appraisal of the watercourse during both wet and dry weather conditions using;
- i) visual,
 - ii) chemical,
 - iii) bacteriological and
 - iv) biological methods.

5. RESULTS

5.1 HISTORIC DATA

The River UMBER is routinely monitored prior to the beach at site R31A005 (Figure 1). There are no monitoring points further upstream and therefore the quality of the water at this site will be affected by many factors not affecting the upstream section under investigation. A more appropriate indication of water quality in this stretch can be found in a previous study by the Devon Area Investigation Team. This report on the bacterial water quality of the River UMBER (ref 2) showed no gross microbial pollution was generated from the stretch of water running through Henstridge and Indicknowle Woods, and the watercourse up-stream of site A (see Figure 1) was not thought to be a cause for concern.

5.2 POLLUTION INCIDENTS

This watercourse had no pollution incidents recorded on the PILS, and the EPO was not aware of any areas of concern.

5.3 INVESTIGATION RESULTS

A visual appraisal of the watercourse highlighted no obvious signs of pollution, no sewage fungus was present and only old sewage litter was visible scattered around the blocked off overflow pipe in the wood.

Two sampling runs were undertaken over three visits, the results from the sampling runs on 20 August, 12 September and 19 November are presented in Figures 4 and 5. Sampling sites are shown in Figure 3.

Samples were analysed for both total/ faecal coliforms and faecal streptococci. These analyses not only show bacterial input, but can also give an indication as to the origin of the contaminating material.

Total coliforms is a collective term which includes not only faecal coliforms but also a range of other groups and species, some of which are found on certain types of vegetable matter and in some soils.

Faecal coliforms refers to a subgroup of thermo-tolerant organisms capable of living in warm blooded animals including man.

Faecal Streptococci denotes a group which not only includes enteritic species generally associated with human faecal matter (eg *Streptococcus faecalis*, *S. faecium* and *S. durans*) but also non-human based species (eg *S. bovis*, *S. equinus* and *S. avium*). However it must be stressed that the human based species can be associated with other warm blooded animals and visa versa.

The bacteriological levels of the stream were, (with the exception of one result), all below the EC Bathing Waters Directive principle guidelines standards (total coliforms <500/100ml, faecal coliforms <100/100ml and faecal streptococci <100/100ml).

The biological data collected was analysed using the Biological Monitoring Working Party (BMWP) and Average Score per Taxon (ASPT) scoring systems, (see Figure 5). The BMWP system assigns a numerical value to each invertebrate taxon, based on its tolerance to organic pollution, from one (sensitive) to ten (tolerant). The BMWP score for a site is calculated by summing the values of each taxon found in the sample. The ASPT is derived from dividing the BMWP score by the number of scoring families at each site and is useful in reducing seasonal variation anomalies. Although high values for both systems (over 100 for BMWP and over 6 for ASPT) are indicative of good water quality, there are many other factors to take into consideration when assessing the biological quality of the water.

Associated rainfall data (obtained from Devon Area Hydrometric Section), is the accumulative rainfall data for the day of sampling and the six previous days. It was gathered from the nearest rainfall gauging station at Combe Martin, situated approximately 2km from the STW.

6. DISCUSSION

6.1 HISTORICAL DATA

The results from the previous report on the water quality of the River Umer indicated that the stretch of water running through Henstridge wood was not a cause for concern.

6.2 POLLUTION INCIDENTS

The lack of pollution incidents recorded for this area could be due to no pollution incidents occurring, or the pollution present not being seen and therefore reported, due to the inaccessible nature of the watercourse at this point.

6.3 INVESTIGATION RESULTS

The chemical analysis of the samples taken indicated water of very good quality, ie RE Class 1, (Appendix 1.)

The BMWP and ASPT scores for both the upstream and downstream sites were very similar and indicative of fairly good water quality. Although the diversity in the samples was fairly low (probably due to sampling and sorting technique), the samples contained several pollution sensitive taxa. No sewage fungus was present at either site.

The results indicate the STW is having no effect on the biological quality of the water.

Bacteriological analysis of the samples showed only background levels of the bacteria present.

7. CONCLUSIONS

1. Henstridge STW is producing a minimal, or no chemical, biological or bacteriological impact upon the River Umer.

8. RECOMMENDATIONS

1. Due to the minimal impact of the works on the watercourse, it would seem unwarranted for SWWSL to invest money for improvements.
However due to the age of the works, (built circa 1929), it may be beneficial for SWWSL to carry out any necessary maintenance work to ensure the works continues to perform to an acceptable standard in the future.

9. REFERENCES

1. Local Environment Agency Plan - North Devon Streams Consultation Report, October 1996
2. An Investigation into the Bacterial Water Quality of the River Umer, N. Devon. - December 1996 (DEV/WQ/14/96)

14,000

15,000

16,000

17,000

18,000 Metres

Figure 1. Location Map

57

58

59

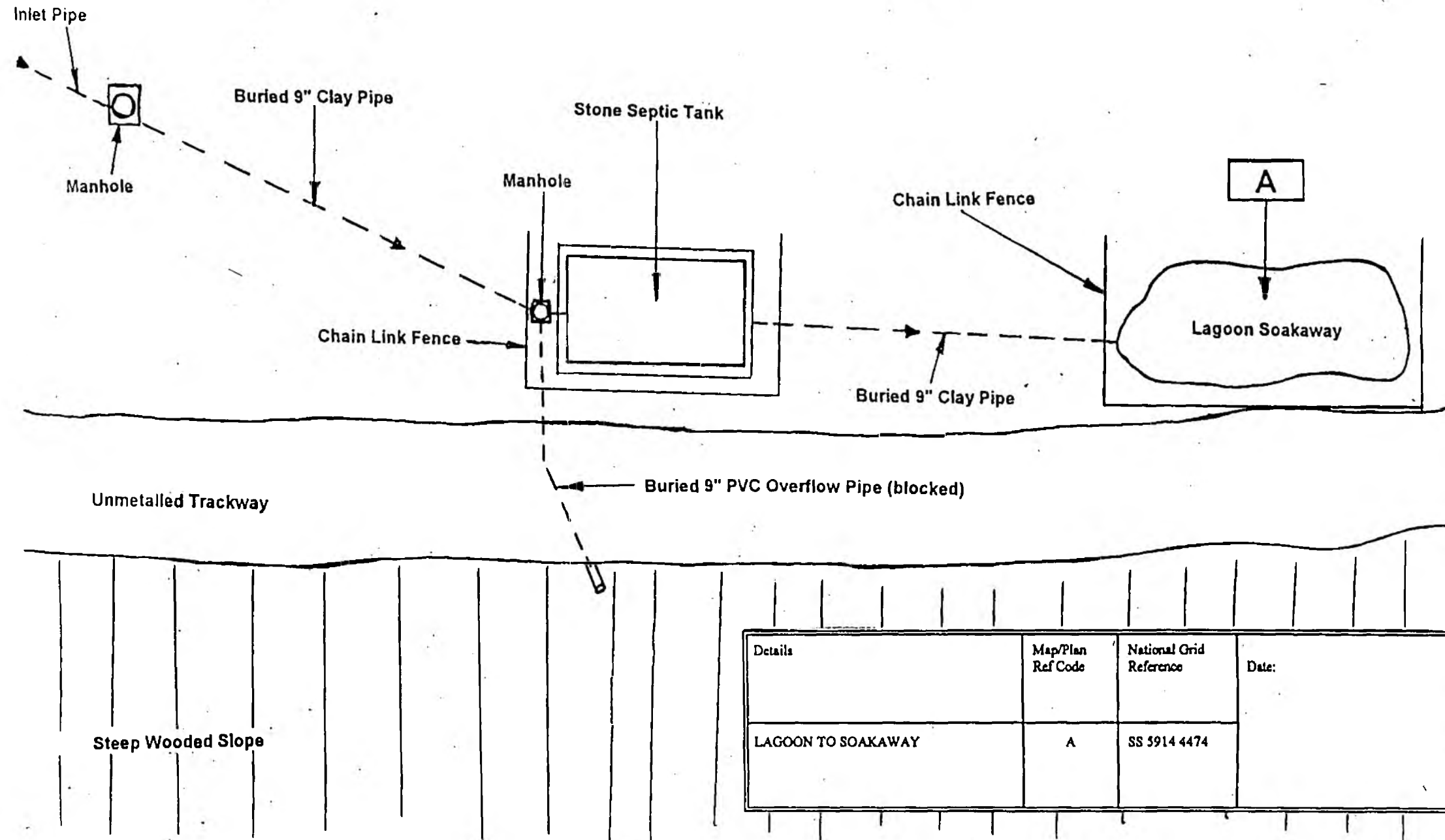
LONG
4° 01' W

Scale: Grid lines are at 1km intervals



Figure 2.

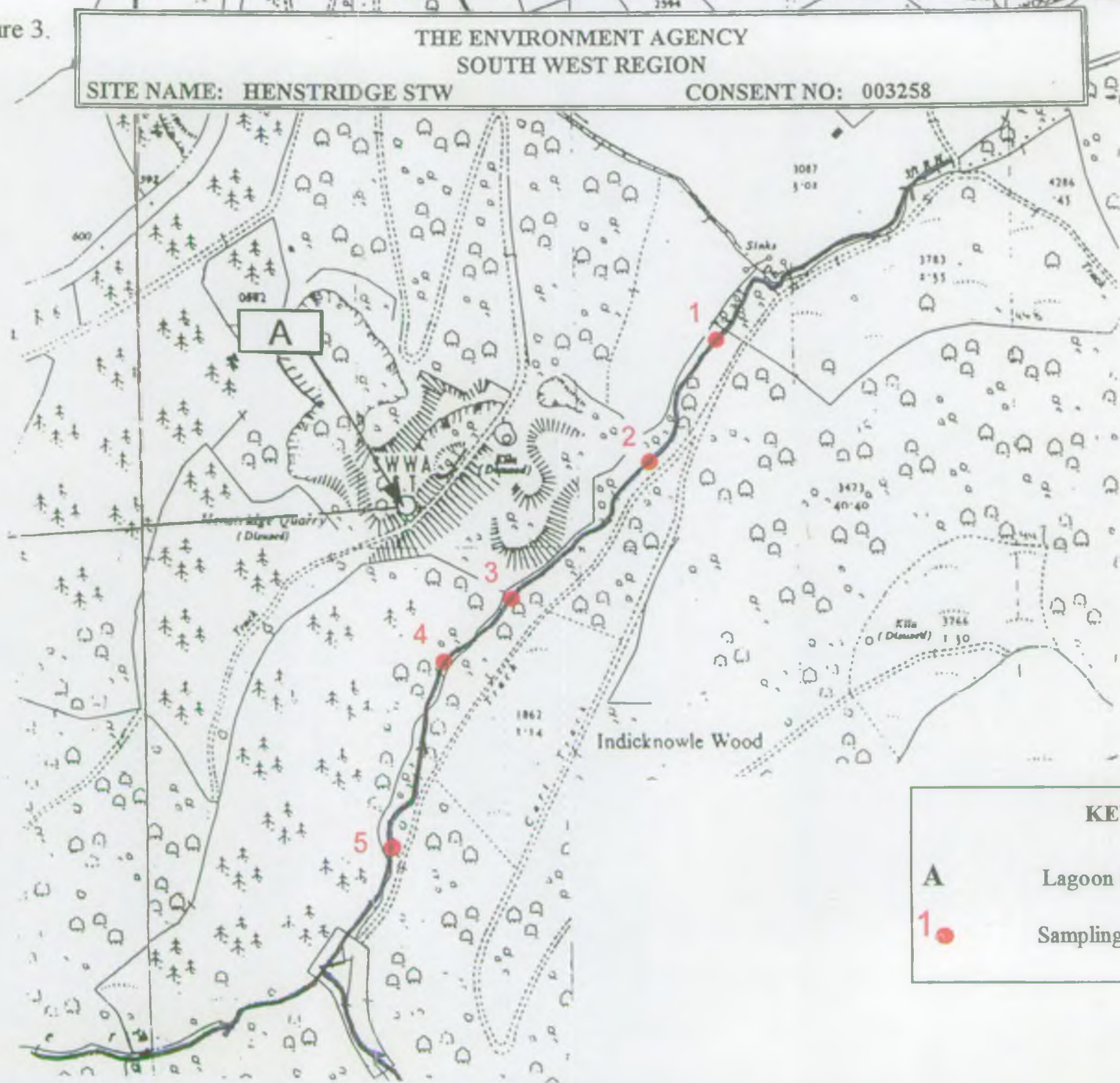
THE ENVIRONMENT AGENCY
SOUTH WEST REGION
SITE NAME: HENSTRIDGE STW **CONSENT NO: 003258**



Details	Map/Plan Ref Code	National Grid Reference	Date:
LAGOON TO SOAKAWAY	A	SS 5914 4474	

NOT TO SCALE

Figure 3.



KEY	
A	Lagoon Soakaway
1 ●	Sampling Locations

Figure 4. Henstridge STW Chemical and Bacteriological Survey Results

Dry Weather Survey: 20 August 1997

AR = 5.0 mm

Site	pH	DO (% sat)	BOD	T. NH3	NH3 non	SS 105
1	8.05	103	<1	<0.03	0.0009	5.0
2	8.00	106	<1	<0.03	0.0008	4.1
3	8.05	106	<1	<0.03	0.0009	3.3
4	8.00	106	<1	<0.03	0.0008	9.6
5	8.05	105	<1	<0.03	0.0009	3.7

Wet Weather Survey: 19 November 1997

AR = 37.9 mm

Site	pH	DO (% sat)	BOD	T. NH3	NH3 non	SS 105
1	7.95	99	<1	<0.03	0.0005	34.7
2	8.00	99	<1	<0.03	0.0006	12.4
3	8.05	99	<1	<0.03	0.0007	19.6
4	8.05	100	<1	<0.03	0.0008	10.9
5	8.05	100	<1	<0.03	0.0008	12.8

Dry Weather Survey: 12 September 1997

AR = 21.9 mm

Site	F Strep	F Colif	T. Colif
1	162	350	530
2	72	280	420
3	126	290	310
4	81	270	360
5	108	260	320

Wet Weather Survey: 19 November 1997

AR = 37.9 mm

Site	F Strep	F Colif	T. Colif
1	126	90	171
2	72	63	180
3	18	54	126
4	18	27	171
5	45	9	144

DO (% sat) Dissolved Oxygen % saturation

BOD: Biochemical Oxygen Demand

T. NH3: Total ammonia mg/l

NH3 non: Non-ionised ammonia

SS105: Suspended solids at 105C

F Strep: Faecal streptococci presumptive No/100ml

F Colif: Faecal Coliforms presumptive No/100ml

T Colif: Total Coliforms presumptive No/100ml

AR: Associated Rainfall

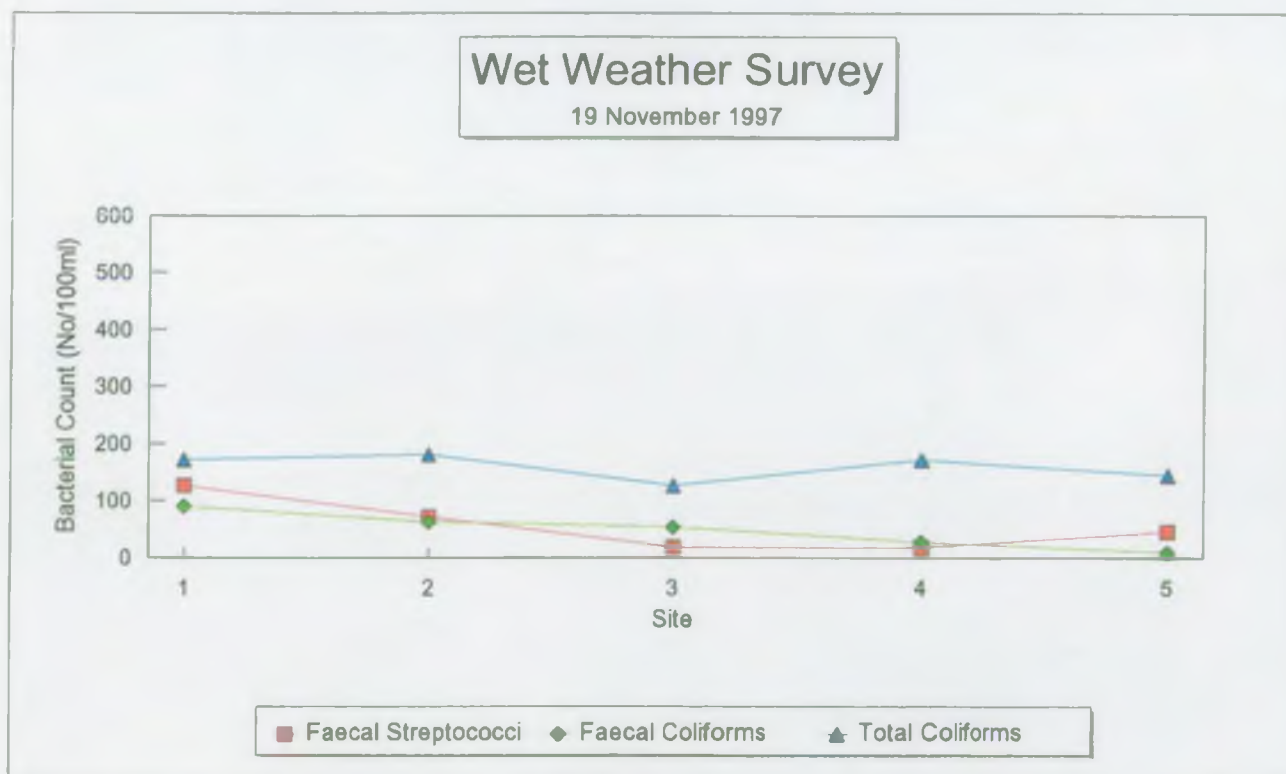
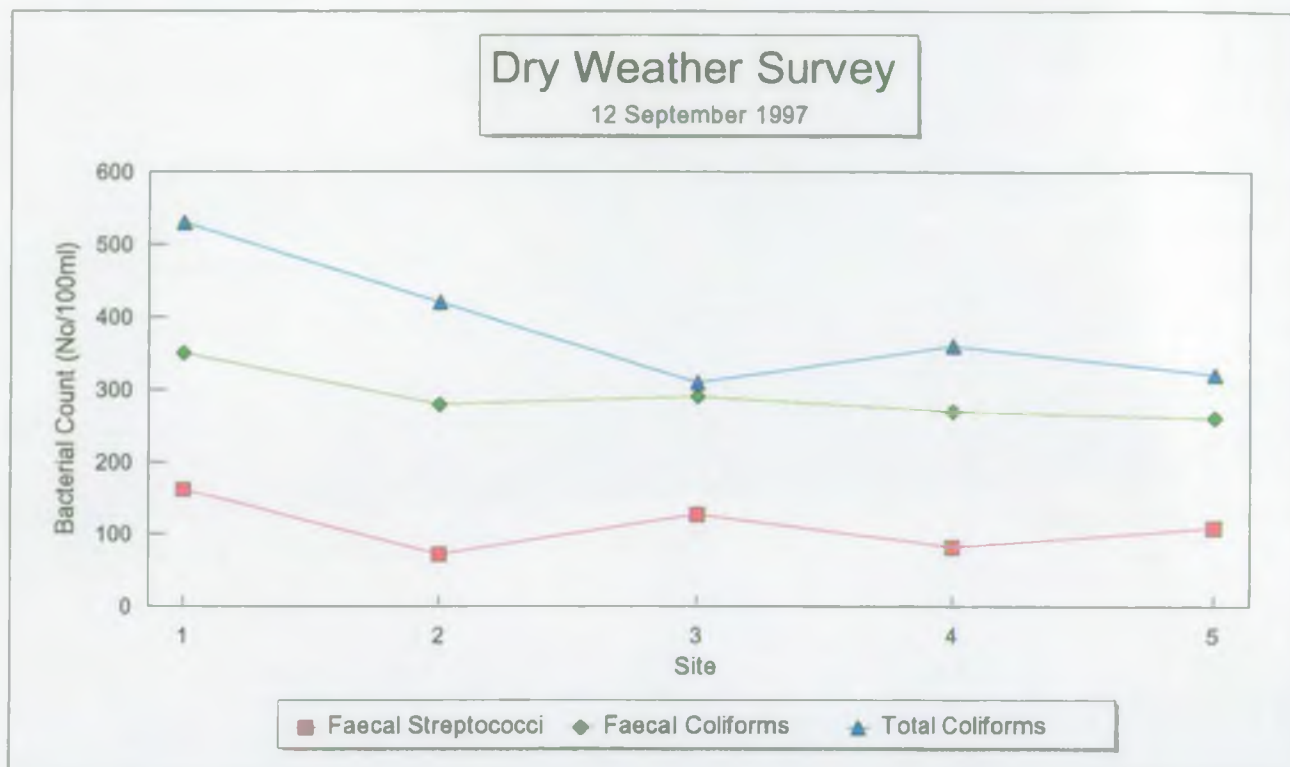
Figure 5. Henstridge STW Biological Survey Results - 19 November 1997

Site	BMWP	ASPT
1	95	6.33
5	91	6.5

BMWP: Biological Monitoring Working Party

ASPT: Average Score Per Taxon

Figure 6 Bacterial Concentrations in the River UMBER



APPENDIX I

Standards for the Five River Ecosystem Use Classes

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mg N/l 90%ile	Un-ionised Ammonia mg N/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