NRA South West 184

ENVIRONMENTAL PROTECTION

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National Rivers Authority
South West Region

INVESTIGATION OF THE ENVIRONMENTAL IMPACT OF COOMBE FARM ON THE CLAPTON STREAM JANUARY 1992

INTERNAL REPORT ONLY

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1. INTRODUCTION

A request was received from Sean McKay (Assistant Quality Regulation Officer) to investigate the environmental impact of Coombe Farm on the Clapton Stream (see Figure 1). The Clapton Stream has a River Quality Objective (RQO) of NWC Class 1B.

Coombe Farm consists of a large Dairy Products unit and a Pig unit. Organic waste from the Dairy unit is treated on site (see Figure 2) and the effluent together with Pig waste is pumped to fields in the headwaters of the Hewish Stream and spray irrigated to land. No waste is discharged direct to the Clapton Stream although a consented discharge to the Clapton Stream is held by Coombe Farm (see Figure 2).

In the vicinity of Coombe Farm the Clapton Stream is culverted underground (see Figure 2). Although routine chemical monitoring upstream and downstream of the discharge point has been inconclusive, it is suspected that pollution of the Clapton Stream occurs from Coombe Farm.

Using biological and chemical methods this study sets out to:

1. Investigate the extent of any impact from Coombe farm on the Clapton Stream.

2. Identify any sources of impact.

2. METHODS

A biological and chemical investigation was carried out on the 13 and 14 January 1992.

Aquatic macroinvertebrates were sampled using a 1.0 mm mesh Pond Net for 1 minute duration in a riffle area of the site, using a standard kick technique. Details of substrate type, flow, width, depth, shade and flora were recorded on site. Samples were sorted and identified on site to family level. Sampling sites are shown in Figure 1.

Spot chemical samples were taken at several points in the vicinity of Coombe Farm (see Figure 2). Samples were analysed for standard sanitary determinands. Measurements of pH, dissolved oxygen, conductivity and temperature were taken in situ using WTW meters.

3. RESULTS

3.1 Biology

The macroinvertebrate community at site A upstream of Coombe Farm was dominated by Gammaridae and Baetidae. Immediately downstream of a series of ponds (site B) the macroinvertebrate community was dominated by Sphaeridae, Gammaridae and Asellidae. No sewage fungus cover was recorded at either site.

Downstream of the farm complex (sites C and D) the macroinvertebrate communities were dominated by Oligocheata. A 50% cover of sewage fungus

was recorded on the stream bed at both sites. The macroinvertebrate communities at sites on the Clapton Stream downstream of site D (sites F, H and J) were dominated by Asellidae. Sewage fungus cover decreased gradually downstream.

Three small tributaries were also sampled (sites E, G and I). No evidence of sewage fungus was found in any of these sites. The macroinvertebrate communities at sites E and G were dominated by Gammaridae. The macroinvertebrate community at site I was dominated by Asellidae and Gammaridae.

3.2 Chemistry

Analysis of chemical samples taken upstream of the main farm complex (sites 1, 2, 3, 4 and 5) recorded low concentrations of ammonia, non-ionised ammonia and Biological Oxygen Demand (BOD) (see Table 1). A high conductivity reading was recorded at site 5.

At site 6 on the Clapton Stream concentrations of ammonia, non-ionised ammonia and BOD increased markedly in comparison to upstream sites. Downstream of site 6 (sites 8 and 11) a gradual reduction in the concentration of these determinands was detected.

A ditch draining from the Coombe Farm area into the Clapton Stream (site 7), was found to have high concentrations of ammonia and non-ionised ammonia.

A tributary draining underneath the Pig rearing units (sites 9 and 10), showed a significant increase in ammonia and BOD at the downstream site 10. Sewage fungus was also abundant at this site.

4. DISCUSSION

A significant increase in concentrations of ammonia, non-ionised ammonia and BOD occurred at site 6 downstream of an area of land which is suspected of being used for extensive disposal of animal and silage waste. A ditch draining this area showed high concentrations of ammonia and non-ionised ammonia. A significant increase in ammonia and BOD concentrations was also detected in the stream draining underneath the pig rearing unit at Coombe Farm. The elevated BOD recorded at site 9 was thought to be due to disturbance of the stream bed during sampling.

The biological results reflected the chemical results. The macroinvertebrate community was dominated by organic pollution tolerant taxa downstream of the farm complex (sites C and D). This combined with the dense growths of sewage fungus at these sites indicated severe chronic organic pollution. Upstream of the farm complex no such evidence of organic pollution was found. The extent of the impact of the farm complex was reflected in the dominance of organic pollution tolerant taxa at all downstream sites sampled in the Clapton Stream.

The abundance of Asellidae at site I indicated poor water quality as the habitat at site I was atypical for Asellidae. This family of macroinvertebrates is normally associated with organic pollution. The

macroinvertebrate communities of the other tributies, sites E and G, indicated good water quality.

5. CONCLUSIONS

1. Historic disposal of animal and silage waste to land adjacent to the Clapton Stream is causing polluted runoff or groundwater to enter a ditch which discharges to the Clapton Stream.

2. A small tributary of the Clapton stream which is culverted underneath the pig rearing unit is being polluted by runoff probably draining from the unit.

3. There was biological evidence of organic pollution in the Lower Coombe Stream.

4. The current waste treatment system operated by Coombe Farm did not appear to be causing a pollution effect.

5. There was no evidence of a discharge at the consented discharge point.

6. RECOMMENDATIONS

1. Consideration to be given for the diversion of watercourses away from areas at risk of pollution.

   Action - Pollution Officer (East)

2. Drainage from the contaminated land to be diverted into farm waste treatment process.

   Action - Pollution Officer (East)

3. Pollution from the Pig units to be stopped or diverted into the treatment process.

   Action - Pollution Officer (East)

4. Investigation of the cause of organic pollution in the Lower Coombe Stream.

   Action - Pollution Officer (East)

5. Issues relating to the current consent held by Coombe Farm need to be resolved.

   Action - Quality Regulation Officer.

Figure 1. Macroinvertebrate sampling sites in the Hewish Stream

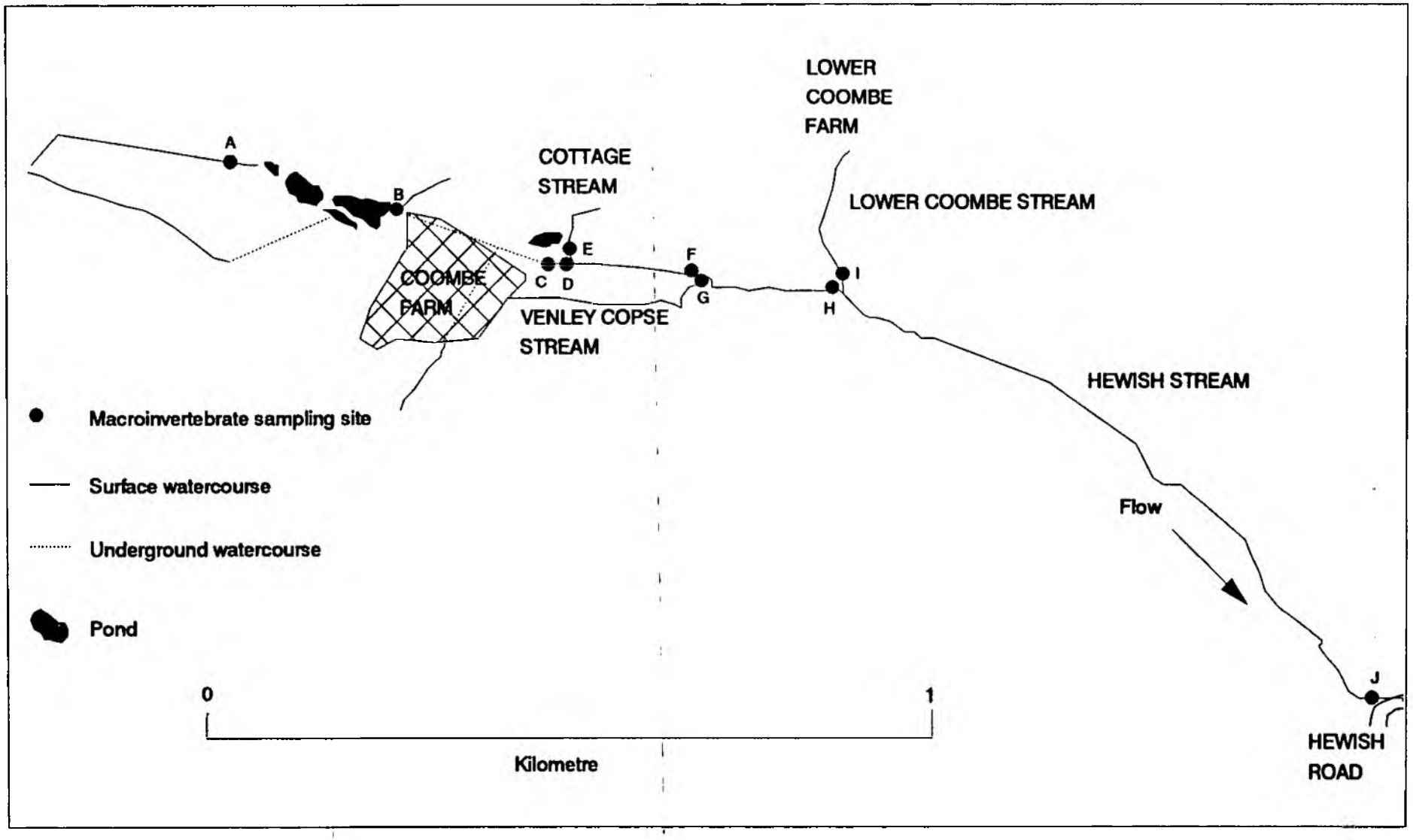

FIGURE 2. CHEMICAL SAMPLING SITES AT COOMBE FARM

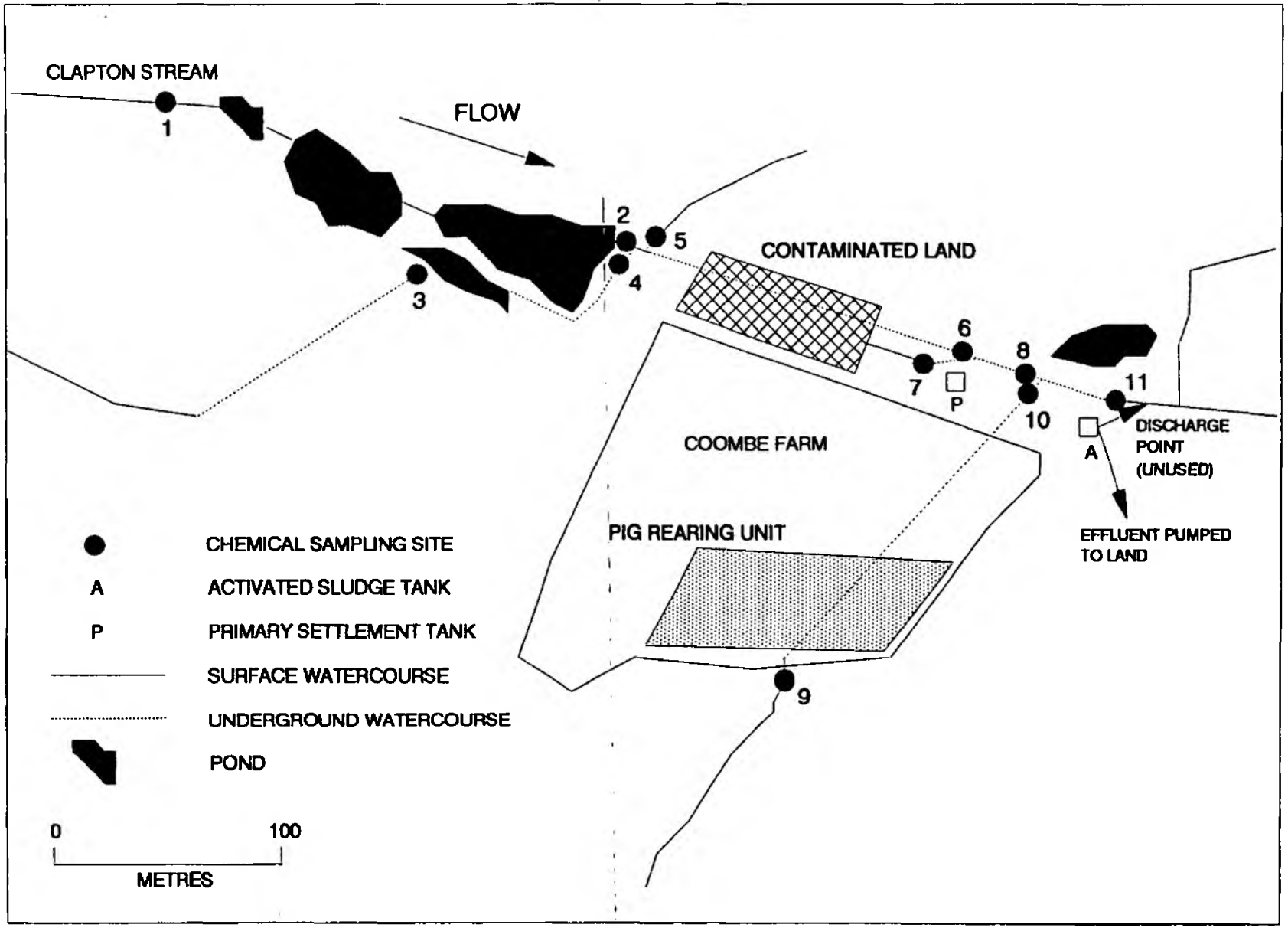

Table 1. Coombe Farm chemical results

	pH	Conductivity	Temperature	DO%	BOD (mg/l)	Ammonia (mg/l)	Non-io ammonia (mg/l)
Site 1	8.1	555	7.7	98	1.0	0.02	0.0004
Site 2	8.0	577	5.1	100	1.6	0.03	0.0004
Site 3	7.8	597	7.7	98	1.0	0.03	0.0002
Site 4	7.9	571	4.9	98	1.3	0.03	0.0003
Site 5	7.9	991	5.4	97	1.0	0.03	0.0003
Site 6	7.9	597	4.7	100	4.2	0.69	0.0066
Site 7	8.1	789	7.0	94	1.3	1.00	0.0181
Site 8	7.9	605	5.0	97	2.2	0.35	0.0034
Site 9	7.8	540			4.0	0.02	0.0100
Site 10	7.9	630	4.9	82	8.4	0.30	0.0029
Site 11	7.9	623	5.4	97	2.2	0.30	0.0030