

EA - South West Box 6

DEVON AREA  
INTERNAL REPORT



ENVIRONMENT  
AGENCY

**INVESTIGATION INTO  
THE CAUSE OF HIGH  
PHENOLS IN BUDLEIGH  
BROOK**

**FEBRUARY 1998  
DEV/EP/04/98  
(CATCHMENT 04A)**

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# INVESTIGATION INTO THE CAUSE OF HIGH PHENOLS IN BUDLEIGH BROOK

## 1. INTRODUCTION AND TERMS OF REFERENCE

A request was received from Devon Area Environment Protection to investigate the cause of high phenols in Budleigh Brook for 1996.

Water is abstracted for potable supply from the Budleigh Brook near East Budleigh at SY 0732 8418. The abstraction point has an A2 category assigned to it, for which the EC Surface Water Abstraction Directive (SWAD) mandatory standard value for phenols is <5000 ng/l. (see Appendix I)

Although below the specified limit, the exceptionally high levels detected warranted investigation by the Devon Area Team.

The two phenols present in high concentrations were 3-Methyl Phenol and 2 4 6-Trichlorophenol.

## 2. CATCHMENT DESCRIPTION AND BACKGROUND

The Budleigh Brook is a tributary of the River Otter, it rises on Woodbury Common at NGR 0375 8620 and flows in an easterly direction for approximately six kilometres through mainly agricultural land.

The abstraction point near East Budleigh is the only monitoring point on the Budleigh Brook and water quality has been routinely monitored here since 1990.

Phenol (C<sub>6</sub>H<sub>5</sub>OH) and its derivatives are aromatic organic compounds derived from a benzene ring structure. They are toxic by ingestion, inhalation and skin absorption. The sources/ uses for the two phenols being investigated are;

- |                                |   |
|--------------------------------|---|
| <b>3-Methyl Phenol -</b>       | Disinfectants, fumigants, synthetic resins, industrial solvents, photographic developing and explosives, but can also be naturally occurring. |
| <b>2 4 6-Trichlorophenol -</b> | Fungicide, herbicide, defoliant and antiseptics.  |

## 3. PROJECT TEAM

T. Cronin (Project Leader)  
J. Bartlett (Project Manager)

## 4. METHOD

- 4.1 Analysis of historical routine water quality data to establish any trends and/or relationships between high phenol levels and other factors such as rainfall and dry weather conditions.
- 4.2 Sampling of sites and investigation of possible upstream influences during periods of wet and dry weather.

## 5. RESULTS

### 5.1 HISTORIC RESULTS

Analysis of routine water quality data taken at East Budleigh between the period 07 March 1995 and 10 September 1997 showed high levels for both phenols for July 1996 (Table 1).

The associated rainfall value, (obtained from Devon Area Hydrometric Section), is the combined rainfall data for the day of sampling and the previous day. Data was gathered from the nearest rainfall gauging station (Kersbrook), situated approximately 1400m from the watercourse.

Table 1. High Phenol Levels in Budleigh Brook

Date	3-Methyl Phenol (ng/l)	2 4 6-Trichlorophenol (ng/l)	Associated Rainfall (mm)
05 July 1996	3930	163	1.4

### 5.2 INVESTIGATION RESULTS

Seven sampling runs were undertaken between 05 September and 28 November 1997 during both wet and dry weather conditions.

Sampling site locations are shown on Figure 1.

Results obtained during the sampling runs are given in Table 2.

The associated rainfall measurements were again provided by Devon Area Hydrometric Section.

Sites 8 and 5 are surface water drains which discharge into the watercourse. Site 8 is located near Hill Farm, site 5 is the outfall pipe from a surface water drain which collects in the area at the top of Middletown Lane near Wynard's Farm (see Figure 1).

A visual inspection of the Wynard's Farm highlighted a channel at the side of the road which drains into a sump. The sump overflows into two pipes, one of which leads in the direction of Budleigh Brook. No further dwellings lie beyond the farm.

During dry weather conditions when the drains were not running no samples were taken for sites 5 and 8.

An Analytical Quality Control (AQC) failure during analysis of the 3-Methyl Phenol samples from the first run on 05 September resulted in the laboratory awarding a "nulled" status to the results, these are represented as "No Result" in Table 2. On discussion with the lab they revealed that the levels of 3-Methyl Phenol had all been <100 ng/l. Despite the clear implications the phenols were at levels below 100 ng/l, the lab were unable to give the actual numerical value due to the AQC failure.

## 6. DISCUSSION

### 6.1 HISTORIC RESULTS

The historic high phenol levels were picked up at the Routine Monitoring Point, (investigation site 1), during weather conditions similar to those present during the dry weather sampling runs.

### 6.2 INVESTIGATION RESULTS

During each sampling run, all sites recorded <100 ng/l of 2,4,6-Trichlorophenol.

One sampling run (on 18 November 1997), resulted in sites 4 and 6 recording levels of 3-Methyl Phenol only marginally above 100 ng/l, at 111 ng/l and 102 ng/l respectively.

During all other sampling runs sites 1-4 and 6-10 recorded <100 ng/l of 3-Methyl Phenol.

The only site to record significant levels of 3-Methyl Phenol (over 1500 ng/l) was site 5. This is the discharge from the surface water drain originating in the vicinity of Wynard's farm. The lab stated that the majority of water samples contain less than 100 ng/l phenols and consequently levels over 1000 ng/l are rare and considered to be significant. The drain appears to originate near the farm, but it is not known what additional inputs there are before it reaches the watercourse.

It can be seen from Table 2 that during the seven sampling runs the pipe was discharging only four times, once during dry weather conditions and three during wet. Two out of the four times the pipe was discharging it was found to have significantly high phenol levels, once during wet weather and once during dry. During the wet weather conditions the level of 3-Methyl Phenol was over 10 times lower than during dry weather conditions, it is possible that this is dilution caused by heavy rainfall.

The historic high phenol levels (3930 ng/l of 3-Methyl Phenol, and 163 ng/l of 2,4,6-Trichlorophenol) were picked up at site 1 during dry weather conditions. Site 1 is approximately 700m downstream from site 5. During the investigation, under similar dry weather conditions, an input of over 16000 ng/l (3-Methyl Phenol) at site 5 was found to have diluted down to <100 ng/l at site 6, a distance of 150m.

This leads to the conclusion that the cause of the original high concentrations was either; a different input, or the input from the pipe was so great the phenols were still detectable at site 1. Discussion with the Organics section in the lab confirmed that if the latter case was true, the levels would have to be extremely high for nearly 4000 ng/l to be present 700m from the source.

## 7. CONCLUSIONS

1. Budleigh Brook has had no further occurrences of high phenol levels since July 1996.
2. During the investigation high levels of 3-Methyl Phenol were detected in the discharge from the surface water drain which serves the area at the top of Middletown Lane.

## **8. RECOMMENDATIONS**

1. A recommendation was made to the Environment Protection Officer for this area (D. Carter), to talk to the owners of Wynard's Farm with respect to disinfection usage. This was carried out in January 1998. The result of this was that no usage of any chemicals which may be associated with the high levels of phenol discovered were said to be used on the farm.  
In light of these findings D. Carter then investigated Drake's School situated opposite the farm. Again nothing substantiating was found. A letter was then distributed to all local residences requesting their cooperation in solving this problem. (Appendix II).
2. Routine Monitoring will continue to sample Budleigh Brook and further high levels of phenol will be flagged by Regional Water Quality.
3. If further investigations are required due to high phenol levels in the future, a causal link between the pipe and the surrounding area should be determined using CCTV cameras or dye tracing studies.

## **9. ADDITIONAL INFORMATION**

Further to the recommendation for a letter to be distributed to local residence (Appendix II), D. Carter (EPO) has since received information from a member of the public. It transpires that the property was not connected to the sewer. The drainage from the property was to an old septic tank which discharged into the surface water drain. The owner of this property has admitted to using disinfectants, which under the circumstances, could have found their way into the watercourse.

Arrangements have been made to connect the property to the foul sewer by the end of May 1998.

**Table 2. Phenol Levels in Budleigh Brook**

Date	Site 1		Site 2		Site 3		Site 4		Site 5		AR (mm)
	3-M Phn	246-TCP	3-M Phn	246-TCP	3-M Phn	246-TCP	3-M Phn	246-TCP	3-M Phn	246-TCP	
05-Sep-97	NR	<100	NR	<100	NR	<100	NR	<100	16 720	<100	1.1
11-Sep-97	<100	<100	<100	<100	<100	<100	<100	<100	-	-	2.2
18-Sep-97	<100	<100	<100	<100	<100	<100	<100	<100	-	-	1.6
26-Sep-97	<100	<100	<100	<100	<100	<100	<100	<100	-	-	0.0
04-Nov-97	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	9.1
18-Nov-97	<100	<100	<100	<100	<100	<100	111	<100	1 560	<100	26.9
28-Nov-97	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	25.1

Date	Site 6		Site 7		Site 8		Site 9		Site 10		AR (mm)
	3-M Phn	246-TCP	3-M Phn	246-TCP	3-M Phn	246-TCP	3-M Phn	246-TCP	3-M Phn	246-TCP	
05-Sep-97	NR	<100	NR	<100	NR	<100	NR	<100	NR	<100	1.1
11-Sep-97	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	2.2
18-Sep-97	<100	<100	<100	<100	-	-	<100	<100	<100	<100	1.6
26-Sep-97	<100	<100	<100	<100	-	-	<100	<100	<100	<100	0.0
04-Nov-97	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	9.1
18-Nov-97	102	<100	<100	<100	<100	<100	<100	<100	<100	<100	26.9
28-Nov-97	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	25.1

**KEY:**

- NR No Result
- No sample taken
- 3-M Phn 3-Methyl Phenol (ng/l)
- 246-TCP 2,4,6-Trichlorophenol (ng/l)
- AR (mm) Associated Rainfall (mm)
- 16 720 Significant concentration of phenol (over 1 000 ng/l)

**APPENDIX I**



TABLE 10: EC DIRECTIVE CONCERNING THE QUALITY REQUIRED OF SURFACE WATER INTENDED FOR THE ABSTRACTION OF DRINKING WATER IN THE MEMBER STATES (75/440/EEC)

Definition of the Standard Methods of Treatment for Transforming Surface Water of Categories A1, A2 and A3 into Drinking Water

Category A1

Simple physical treatment and disinfection, eg rapid filtration and disinfection.

Category A2

Normal physical treatment, chemical treatment and disinfection, eg pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

Category A3

Intensive physical and chemical treatment, extended treatment and disinfection, eg chlorination to break-point, coagulation, flocculation, decantation, filtration, absorption (activated carbon), disinfection (ozone, final chlorination).

- I = mandatory
- G = guide
- O = exceptional climatic or geographical conditions

**APPENDIX II**

Dear Sir or Madam

**POLLUTION OF THE BUDLEIGH BROOK FROM A SURFACE WATER OUTFALL  
AT MIDDLETOWN LANE, EAST BUDLEIGH -  
WATER RESOURCES ACT 1991, ENVIRONMENT ACT 1995.**

The Environment Agency has a statutory duty to protect and monitor watercourses which are used for public water supply. We check for various substances ensuring the safety of the water used for human consumption.

The Budleigh Brook is one such watercourse, although the abstraction point is 'mothballed' at present.

We, the Agency, have been picking up high levels of phenols in the Budleigh Brook and have been trying to track down the sources of the pollution. A number of samples have been taken and we have traced the phenols to a large surface water outfall at Middletown Lane, East Budleigh.

Phenols are poisonous chemicals associated with disinfectants, such as Dettol, Jeyes Fluid, Domestos and alike. There are many household disinfectants on the market and it could be any of them.

These poisonous discharges are intermittent and it is difficult to track down the exact source but it is likely someone is, on occasions, pouring disinfectants down a surface water drain, roof drain or has a drain with an odour problem and tries to improve the smell with the disinfectant, not knowing the drains are linked to the Budleigh Brook.

Obviously the Agency is anxious for the polluting discharge to stop not only to protect the abstraction point but to protect our aquatic life in the Brook and other stock and wildlife using the Brook, River Otter and estuary. Can you help to stop this pollution?

If you have any queries, do not hesitate to contact the Environment Agency or Mr Derek Carter, Environment Protection Officer on 01392 444000 Ext 2007.

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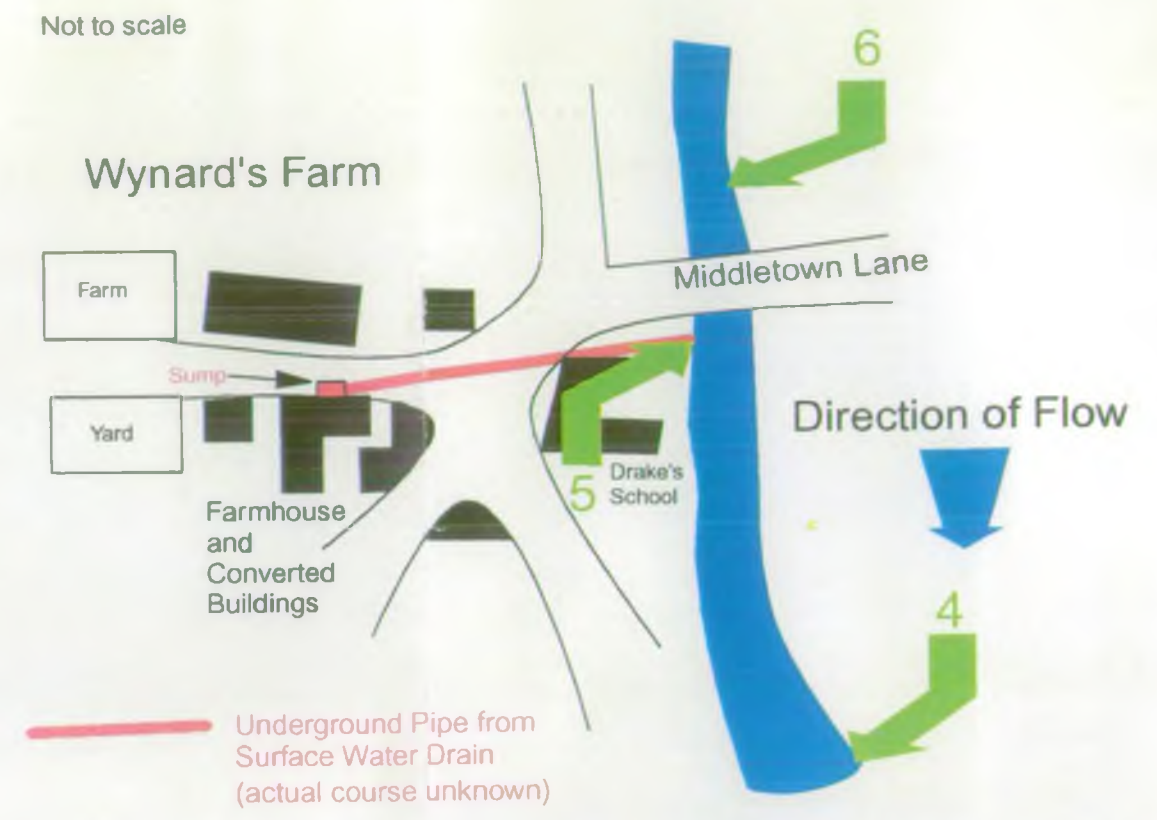
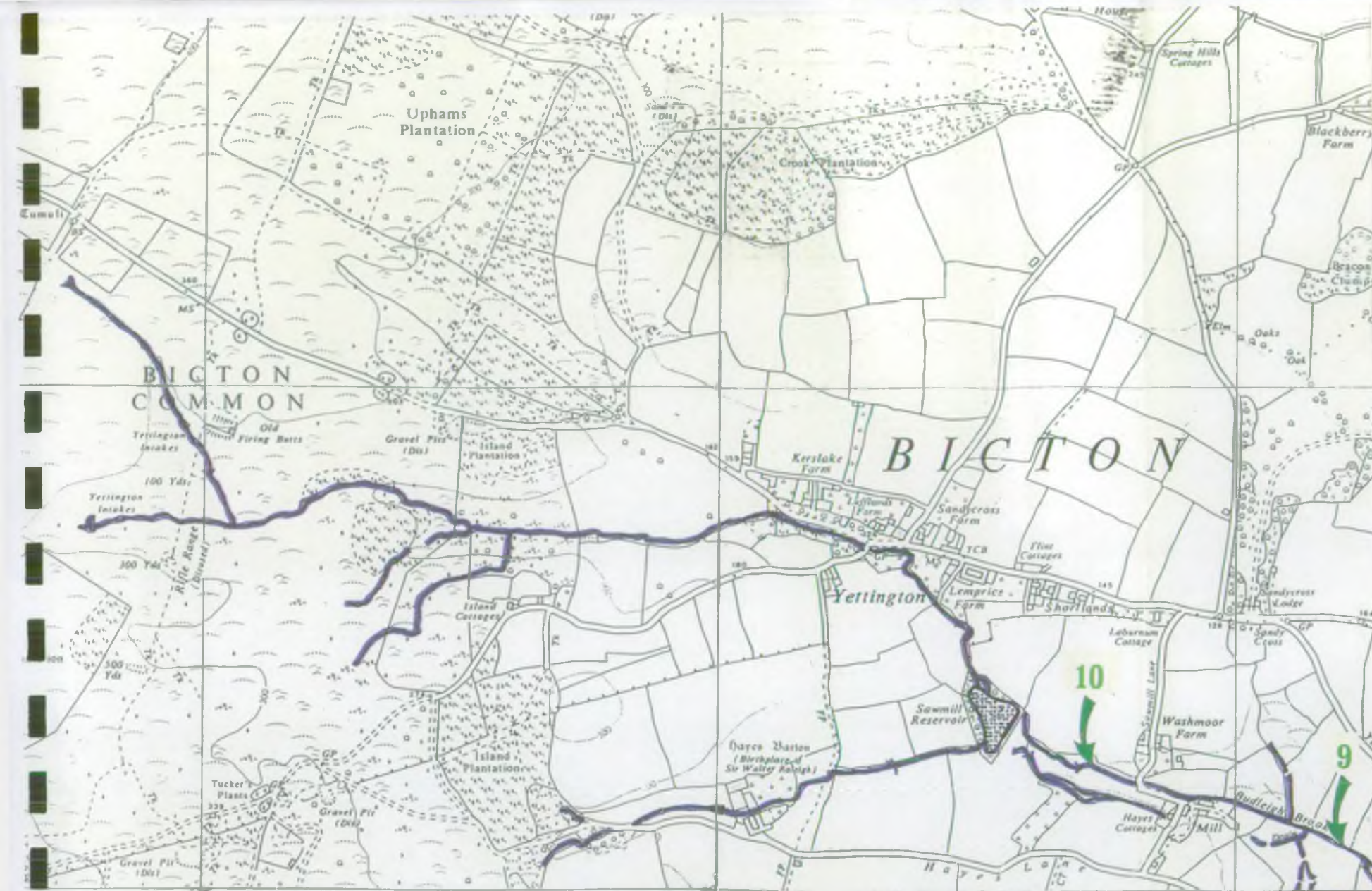
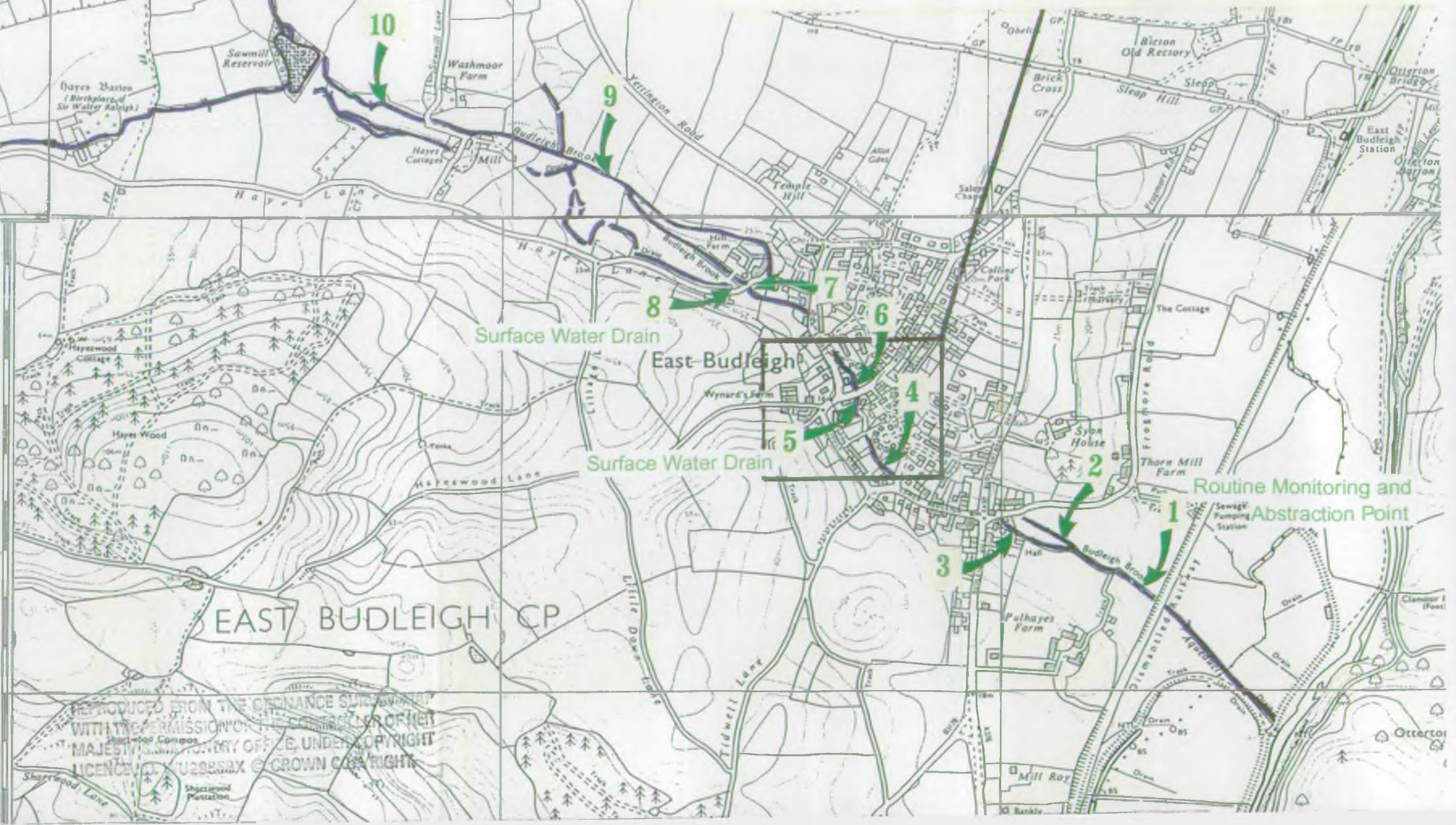


Figure 1. Sampling Point Locations on Budleigh Brook



3 → Sampling Point

Scale: Grid lines are at 1km intervals

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