



**ENVIRONMENT  
AGENCY**

**ENVIRONMENT PROTECTION DEPARTMENT  
CORNWALL AREA**

**FINAL DRAFT REPORT**

**EAST LOOE EC BATHING WATER  
DIRECTIVE FAILURES (1990 TO 1997)**

**November 1998**

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# EAST LOOE EC BATHING WATER DIRECTIVE FAILURES

(1990 - 1997)

## **1 INTRODUCTION**

### **1.1 Background**

The EC designated bathing water at East Looe, South East Cornwall is sampled in accordance with the EC Directive on Bathing Water Quality. The East Looe beach has exceeded the EC Bathing Water Mandatory Environmental Quality Standard (EQS) ten times since 1990. The EC Bathing Water Directive (EC/76/100) dictates that faecal and total coliform concentrations must not exceed 2,000/ 100 millilitres (ml) and 10,000/ 100ml respectively. Should two or more samples exceed the mandatory coliform EQS, the beach fails overall for that year. Since 1990 this has happened on three occasions, 1993, 96 and 97. The directive also gives guideline concentrations for faecal and total coliforms of 100 and 500/ 100 ml respectively. From the 160 samples collected since 1990, 74 have passed the guideline standard, 76 have passed the mandatory standard and 10 have exceeded the mandatory standard. From the 10 EQS exceedances, 8 were sampled 2 hours either side of low water.

The highest concentrations of faecal and total coliforms were found on 3rd August 1997. Faecal coliform concentrations were found to be 24 times higher than the mandatory standard of 2,000/ 100ml and total coliform concentrations were found to be over 5 times the mandatory standard of 10,000/ 100ml.

Earlier investigations have confirmed that bacterial water quality on the East Looe beach is influenced, especially around times of low water by the Looe estuary (see References 1 & 2).

This report does not take into account Salmonella or Entero Virus data.

The official bathing season runs from the beginning of May to the end of September.

### **1.2 Objective**

To identify causes of EC Bathing Water Directive non compliance at East Looe Beach, specifically concentrating on the Looe Estuary.

## **2 METHODS**

- 2.1 Review of the archived bathing water quality data from the East Looe beach since 1990.
- 2.2. Conduct a site visit to identify sources of bacterial contamination which have not previously been investigated.
- 2.3. Compile a program of additional monitoring to be undertaken in conjunction with the mandatory bathing beach samples (weekly) . Initially for the first seven weeks in the bathing season three additional sites were monitored. From 27th June onwards the additional sites were increased to eleven. The extra sites were in the East Looe river and the Looe estuary (see figures 3 & 4).



- 2.4. Conduct a bacterial tracer survey in the East Looe sewerage system to identify leaks. *Bacillus globigii* (*B.globigii*) spores were released into the main sewerage line which runs north, parallel to the harbour wall in East Looe. Samples from seepage in the harbour wall and from the estuary were then analysed for faecal and total coliforms and *B.globigii* concentrations.
- 2.5. All results were tabulated when received and discussed with the Central Environmental Protection Team. Additional monitoring was undertaken if deemed necessary.

### 3 RESULTS

The following table lists the location of the data collected.

Data	Table	Figure
East Looe Bathing Beach Data (1997 Bathing Season)	1	
Looe Estuary Mouth Data (1997 Bathing Season)	2	
East and West Looe Combined Estuaries and East Looe Estuary U/s of Confluence with West Looe Estuary	3	
West Looe Estuary U/s of STW Trib. and Confluence with the East Looe Estuary.	4	
Downstream of Looe STW Data (1997 Bathing Season)	5	
West Looe River at Sowdens Bridge Data (1997 Bathing Season)	6	
East Looe at Railway Halt Data (1997 Bathing Season)	7	
East Looe River Data, Landlooe Bridge - Lamellion Mill	8 & 9	
<i>B.globigii</i> Survey Results (20 August 1997)	10 & 11	
Looe Estuary Mean Coliform Data (1997 Bathing Season)		1 (page 5 )
East Looe River Mean Coliform Data (1997 Bathing Season)		2 (page 6 )
East And West Looe Rivers Sampling Locations		3
Looe Estuary Map and sampling Locations		4
<i>B. globigii</i> Survey Sample Locations (20 August 1997)		5
Rainfall Data	Appendix 1	

### 4 DISCUSSION

The archived data gathered since 1990 shows a correlation between increased coliform concentrations with decreased salinity levels. From the 74 guideline passes since the beginning of the 1990 bathing season the mean salinity level was 34.3 g/kg (the salinity of pure sea water is approximately 35.5 g/kg). From the 76 passes that fall within the statutory EQS the mean salinity level decreases to 32.6 g/kg. Finally the mean salinity level from the 10 EQS exceedances over the same time scale is 27.6 g/kg (78% sea water). This strongly

suggests that freshwater influence from the Looe estuary and its associated pollutant sources transport onto the East Looe beach, especially around times of low water.

#### 4.1 1997 Statutory Bathing Beach Sample Results

From the twenty statutory samples collected from East Looe bathing beach in 1997, 8 passed the EC Bathing Water guideline standard, 10 passed the statutory EQS and 2 exceeded, causing an overall bathing beach failure for 1997 (see table 1), on both occasions the failing samples were collected at low water.

Both 1997 failures are summarised in the table below.

Date	Site	Tide	Salinity (g/kg)	Faecal collforms (no./100ml)	Total coliforms (no./100ml)	Rainfall (mm)
02/07/97	East Looe Beach	LW*	32.1	6600.0	12000.0	5.1
	Looe Estuary Mouth	"	22.8	20000.0	20000.0	
03/08/97	East Looe Beach	LW*	30.7	48000.0	50400.0	36.6
	Looe Estuary Mouth	"	15.0	>30000.0	>30000.0	

\* LW Low water

The above data also strongly suggest that bacterial concentrations from the Looe estuary transport onto the East Looe beach, occasionally causing bathing beach exceedances. This statement is supported by the results from a *B.globigii* tracer survey conducted on 23/07/93 (see reference 1). *B.globigii* spores were dosed into the tributary of the West Looe estuary downstream of the Looe STW discharge at a ratio of 1:1, *B.globigii* spores to faecal coliform concentrations.

*B.globigii* were found in bathing water samples in significant numbers from high water (HW) +5.5 until the end of the survey (HW-4). The maximum (1520/ 100ml) occurred at HW-5. Concentrations never exceeded 2000/ 100ml but the guide value (100/ 100ml) for faecal coliforms in bathing water was exceeded on four occasions.

Bacterial concentrations on the 3rd August were considerably higher due to the high rainfall on the day which would have activated the Railway Car Park Combined Sewer Overflows (CSO) which discharge outside the Looe Health Centre into the Looe estuary. The Monitoring Officer on the day commented on the 'strong smell of sewage' at the beach when the sample was collected.

There does not appear to be an identifiable pattern between guideline passes and mandatory passes.

#### 4.3 1997 Looe Estuary Results

The estuary has five main sources of bacterial contamination, two from the Looe sewerage system, Looe sewage treatment works (STW) and the East and West Looe rivers.

#### 4.3.1 East Looe Sewerage System

Following a number of reports from members of the public a tracing survey was conducted on the East Looe sewerage system to identify leaks. On 20th August *B.globigii*, a harmless tracing bacteria was released into the sewer which runs north parallel to the East Looe harbour wall. The *B.globigii* were released at high water. Water quality samples were then gathered hourly from high water to low water at specific points along the harbour wall. Additional samples were also taken from seepages in the wall at low water.

The survey confirmed that a culvert below Buller Quay contained sewage which the public had previously reported. *B.globigii* concentrations were found downstream of the Buller Quay culvert three hours after high water and for the remainder of the survey. Low concentrations of *B.globigii* were also found at low water on the East Looe beach (see figure 5 and tables 10 & 11).

The survey on 20th August also confirmed that the Railway Car Park CSO's discharge in times of dry weather. CSO's are designed to discharge when the sewerage system is hydraulically overloaded, usually by rainfall events. The Railway Car Park CSO's discharge a mixture of raw sewage and saline water frequently for up to three hours after high water. A combination of saline infiltration and insufficient pump capacity at Bone Mill pumping station cause the Railway Car Park CSO's to discharge. It is considered that these discharges contribute significantly to the bacterial concentrations in the lower part of the estuary system.

The sewer found to be leaking into the Buller Quay culvert was repaired by SWW at the end of January 1998 (see appendix 2). However, further complaints have since been received from members of the public and Looe Harbour Commissioners claiming that sewage is still present in the culvert at Buller Quay. This has not yet been confirmed by the Agency.

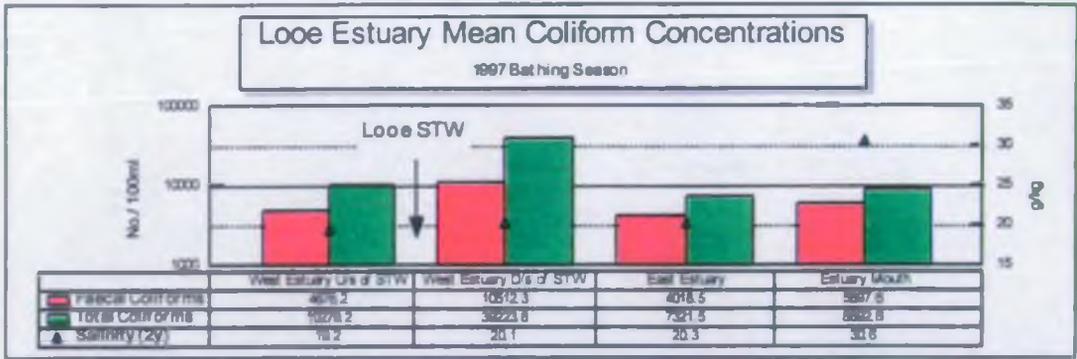
Parts of the East Looe harbour wall are suffering from subsidence, which could create further leaks from the sewerage line in the future.

AMP 2 improvement works scheduled for 1998 will include the upgrading of the Looe sewerage system, Bone Mill pumping station and the Railway Car Park CSO's.

#### 4.3.2 Looe STW

Looe STW is a significant source of bacterial contamination to the Looe estuary. When compared, the up and downstream of the STW's input show mean total coliform concentrations increasing by just under 400% (see figure 1 below). It must be pointed out also that the mean coliform concentrations upstream of the STW input are elevated by sewage effluent being transported upstream on a flood tide.

Figure 1.



The salinity measurements downstream of Looe STW discharge shown in table 5 highlight the degree of saline infiltration in the Looe sewerage system. On one occasion (18/09/97) the freshwater tributary downstream of Looe STW discharge contained 60% sea water.

AMP 2 improvement works are scheduled to begin in the summer of 1998 and be completed and commissioned by the 1999 bathing season. These works are to include the upgrading of Looe STW. The Environment Agency will be consenting the requirement for UV disinfection on the final effluent (see appendix 2).

#### 4.3.3 East Looe River

The East Looe river rises to the North West of Liskeard, approximately 16 km from Looe. The majority of the land use on the banks of the East Looe river is forestry and agriculture. The East Looe river is also the receiving water for Liskeard (Lodge Hill) STW discharge and the Liskeard CSO's.

Initially at the beginning of the 1997 bathing season one sample was taken weekly from the East Looe river at Railway Halt (above the tidal limit) to coincide with the statutory bathing water sample. This was then increased on 27th June to five sites following samples containing elevated coliform concentrations. The sites were from Railway Halt up to Lamellion Mill, upstream of the Liskeard (Lodge Hill) STW (see figure 3).

Figure 2 below shows mean faecal and total coliform concentrations found in the East Looe river. It is clear that coliform concentrations increase considerably below Liskeard (Lodge Hill) STW and then consistently decrease further down the catchment as the East Looe river is diluted from other sources and coliforms die off.

Increases in coliform concentrations were occasionally found at all sites samples in the East Looe river and coincided with rainfall events. The likely causes for these increases are diffuse agricultural inputs and / or Liskeard (Lodge Hill) STW and it's associated CSO's.

Four out of the last five samples taken at Lamellion Mill show high coliform concentrations, these also coincided with a build up of sewage debris and fungus on the river bed. Further investigation work identified a blocked sewage chamber upstream of Lamellion Mill which was discharging untreated sewage into the East Looe river. SWW were notified of the blockage and instructed to act immediately to resolve the problem. Consequently the mean

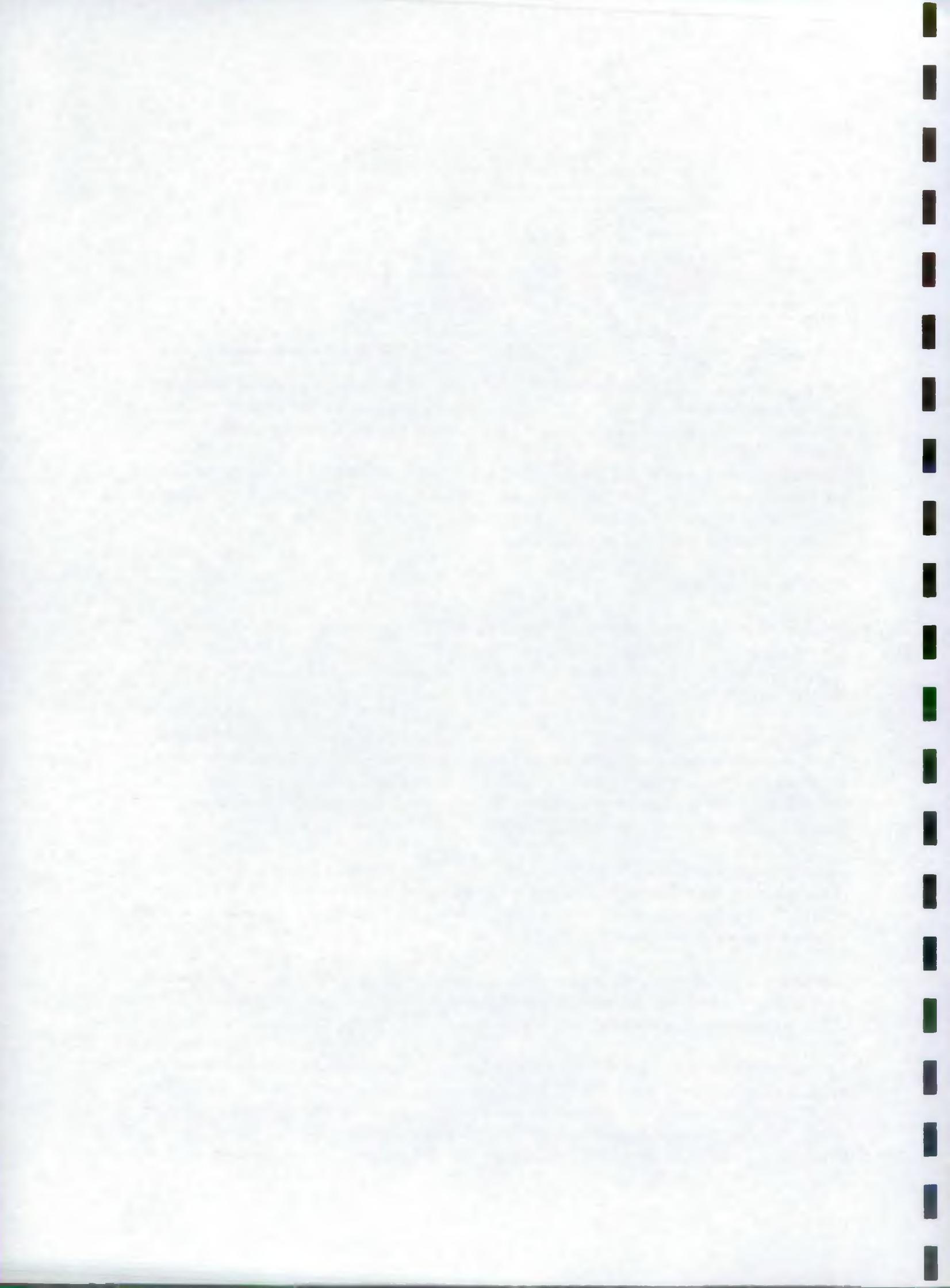
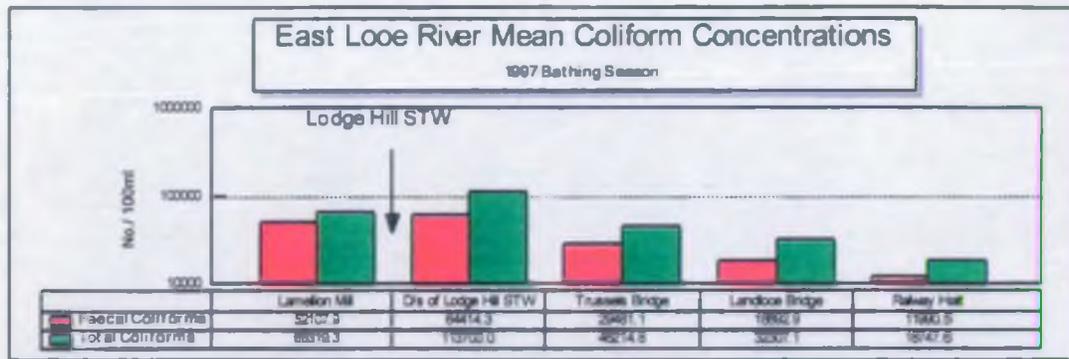


Figure 2.



The East Looe river is, especially at times of rainfall a significant source of bacterial contamination to the Looe estuary.

#### 4.3.4 The West Looe River

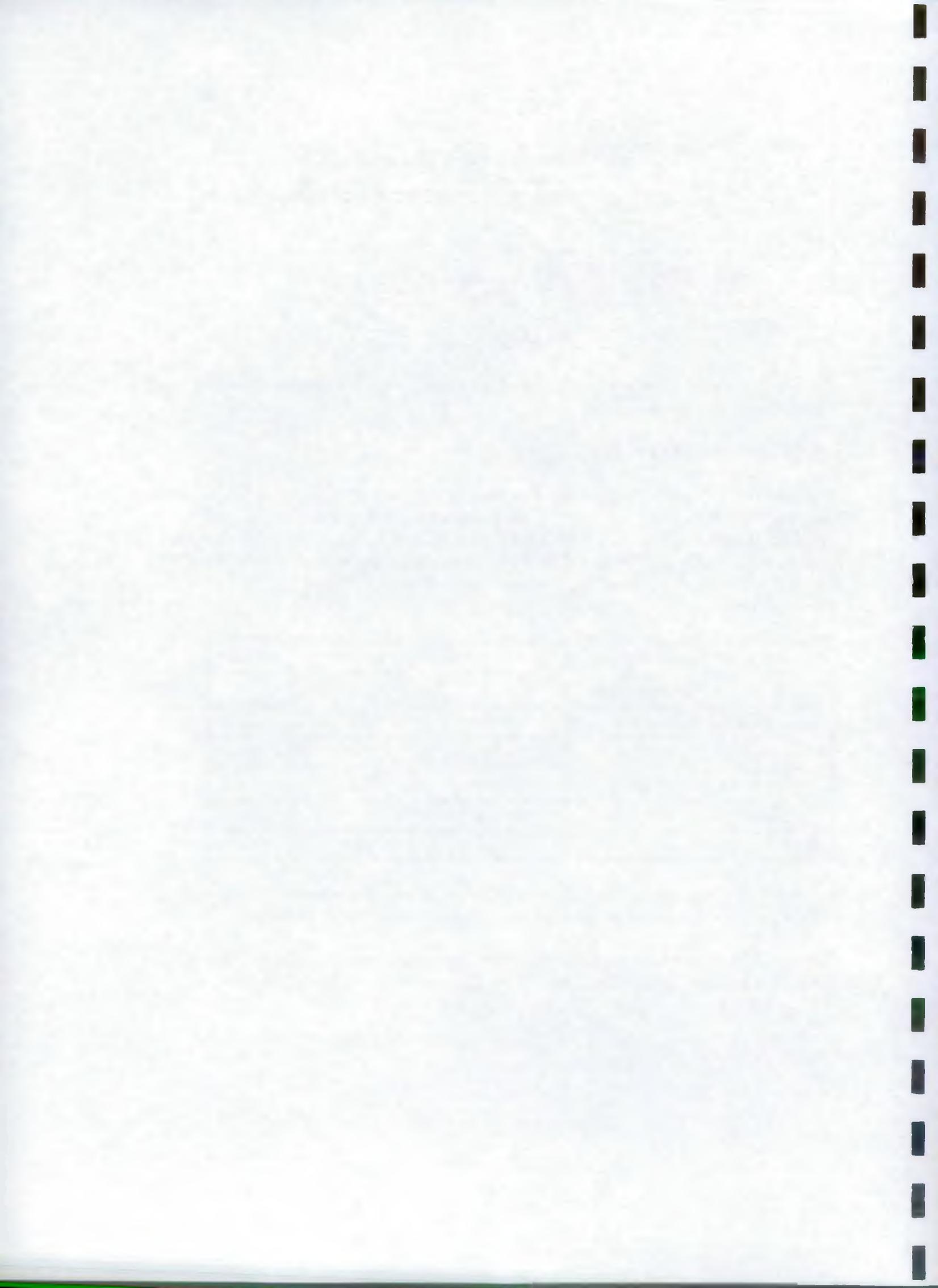
The West Looe rivers rises approximately 11 km to the North West of Looe. The majority of the steep sided West Looe river valley is used for forestry and agriculture.

From the 21 samples collected from the West Looe river at Sowdens Bridge, 3 contained elevated concentrations of faecal and total coliforms, indicating intermittent source (s) of bacterial contamination. Two of the samples coincided with rainfall on the day before and on the day of sampling.

Date	Faecal Coliforms (No./100ml)	Total Coliforms (No./100ml)	Rainfall Previous day (mm)	Rainfall (mm)
Mean (18 samples)	954	1542	n/a	n/a
19/05/97	12,000	20,000	12.5	7.0
20/08/97	35,000	136,000	1.2	0.0
26/08/97	13,400	187,000	1.7	39.3
Mean (21 samples)	3694	17655	n/a	n/a

As can be seen from the above table, the West Looe river without the intermittent events normally contributes relatively low coliform concentrations to the Looe estuary.

Events such as those shown above though could significantly contribute to coliform loadings in the Looe estuary. The sources of bacterial contamination in the West Looe river are likely to be diffuse agricultural inputs.



## **5 CONCLUSIONS**

- 5.1** The bacterial water quality in the Looe estuary is the main cause of Bathing Water non compliance at East Looe beach, especially at times of low water. The Looe estuary has five main sources of bacterial contamination which can contribute to bathing beach failures to varying degrees.
- 5.2** The Looe sewerage system was found to leak into a culvert below Buller Quay which discharged a mixture of saline water and untreated sewage for up to three hours after high water. The *B.globigii* tracer survey confirmed the leak and also showed that low concentrations of *B.globigii* transported onto the East Looe beach at low water.
- 5.3** The Railway Car park CSO's discharge a mixture of untreated sewage and saline water at times of dry weather due to a combination of chronic saline infiltration to the Looe sewerage system and insufficient pumping capacity at Bone Mill pumping station. This discharge is a major source of bacterial contamination to the lower estuary system.
- 5.4** Looe STW's consented outfall discharges into a tributary of the West Looe estuary. This tributary is a major source of bacterial contamination to the lower estuary.
- 5.5** The East Looe river, especially at times of rainfall is a significant source of bacterial contamination to the Looe estuary. Diffuse agricultural inputs and / or the Liskeard (Lodge Hill) STW and it's associated CSO's are the likely cause of elevated coliform concentrations in the upper estuary.
- 5.6** The West Looe river occasionally contributes high bacterial concentrations to the upper Looe estuary. Not all these incidents were connected to heavy rainfall events. Diffuse agricultural inputs are thought to be the likely cause.

Note. AMP 2 improvement work on the Looe sewage treatment and sewerage system when completed will reduce the risk of bathing water failures, however it is not possible from the results of this work to completely rule out the risk of future failures from the East and West Looe rivers.

## **6 RECOMMENDATIONS**

- 6.1** Sampling of the East and West Looe rivers prior to the tidal limits should be included with the statutory sampling of the East Looe beach and Looe estuary.

**Action: Monitoring Team Leader**

- 6.2** Investigate reports that sewage is still entering the Buller Quay culvert.

**Action: Environment Protection Team Leader (Central)**

**6.3** Enforce the consents of the Railway Car Park CSO's.

**Action: Environment Protection Team Leader (Central)**

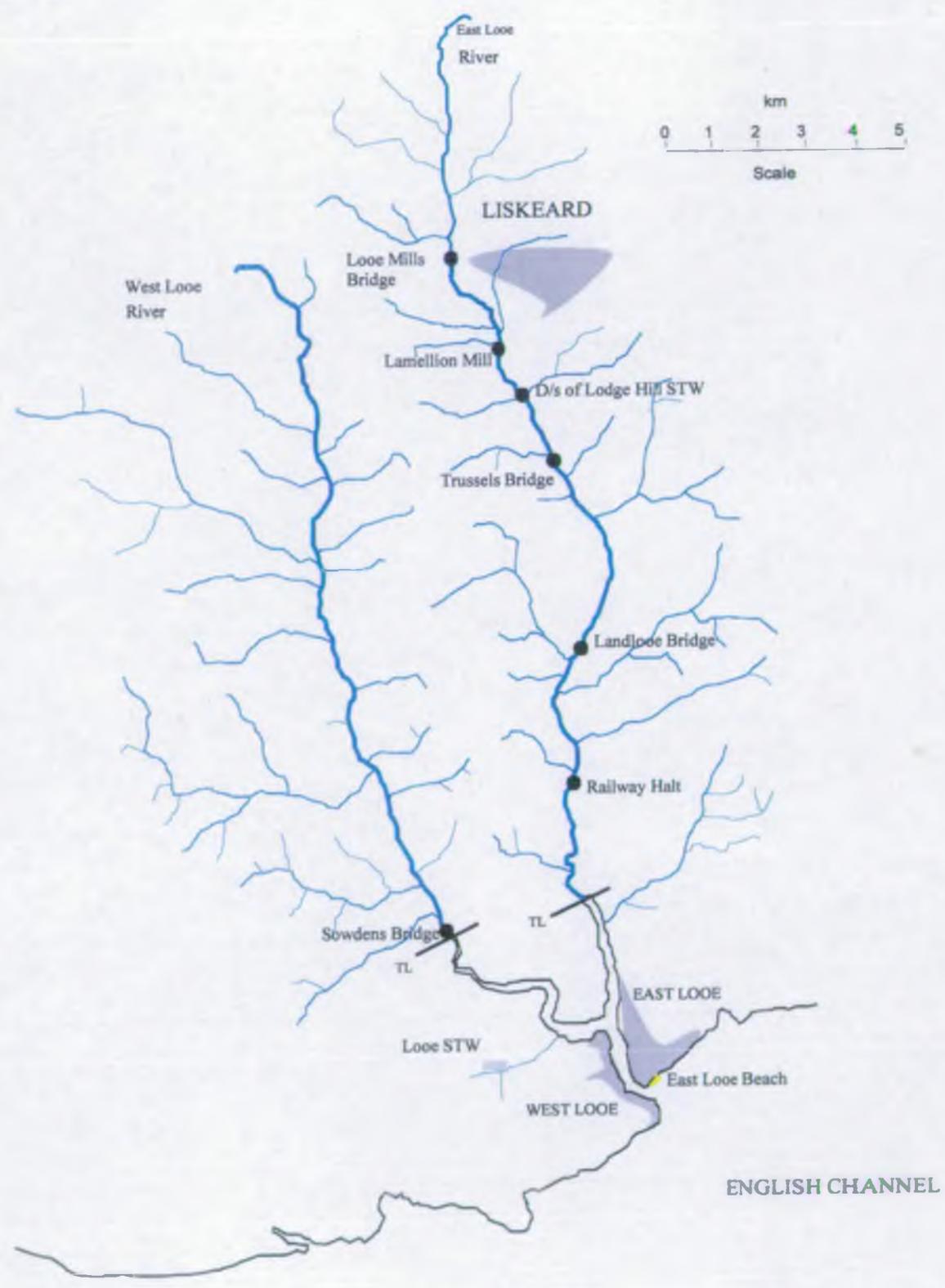
**6.4** Conduct a post scheme appraisal of the 1999 data collected from the East Looe bathing water, Looe estuary and the East and West Looe rivers.

**Action: Investigations Team Leader**

#### **REFERENCES**

1. Harris M. P. December 1993. Bathing Water at East Looe: An Investigations into Non-Compliance with the EC Directive.
2. Hocking R. January 1997. East Looe Bathing Water Risk of EC Bathing Water Failure From East and West Looe Drainage and Sewerage Systems.

**Figure 3**  
**East and West Looe rivers sampling points.**



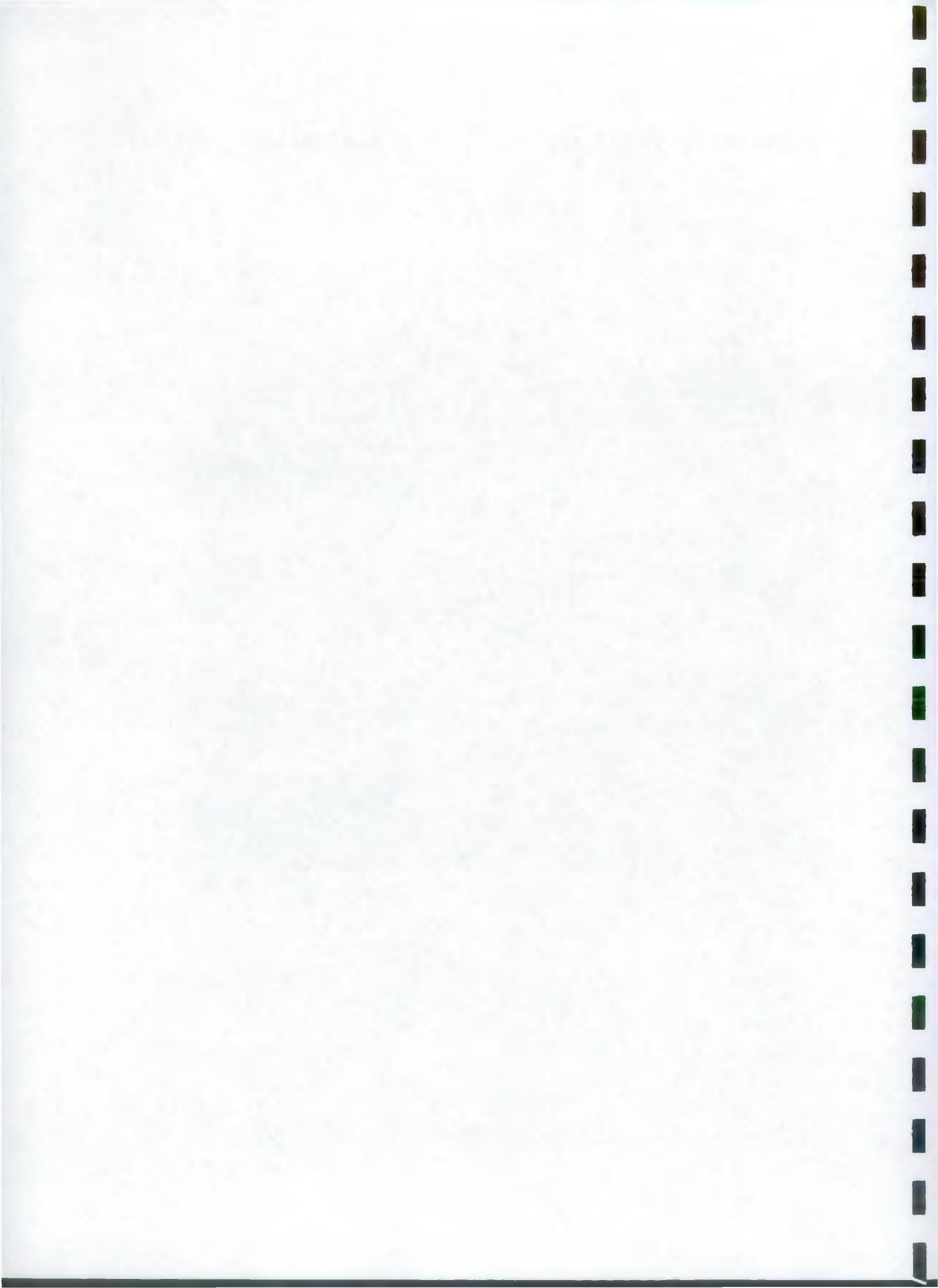
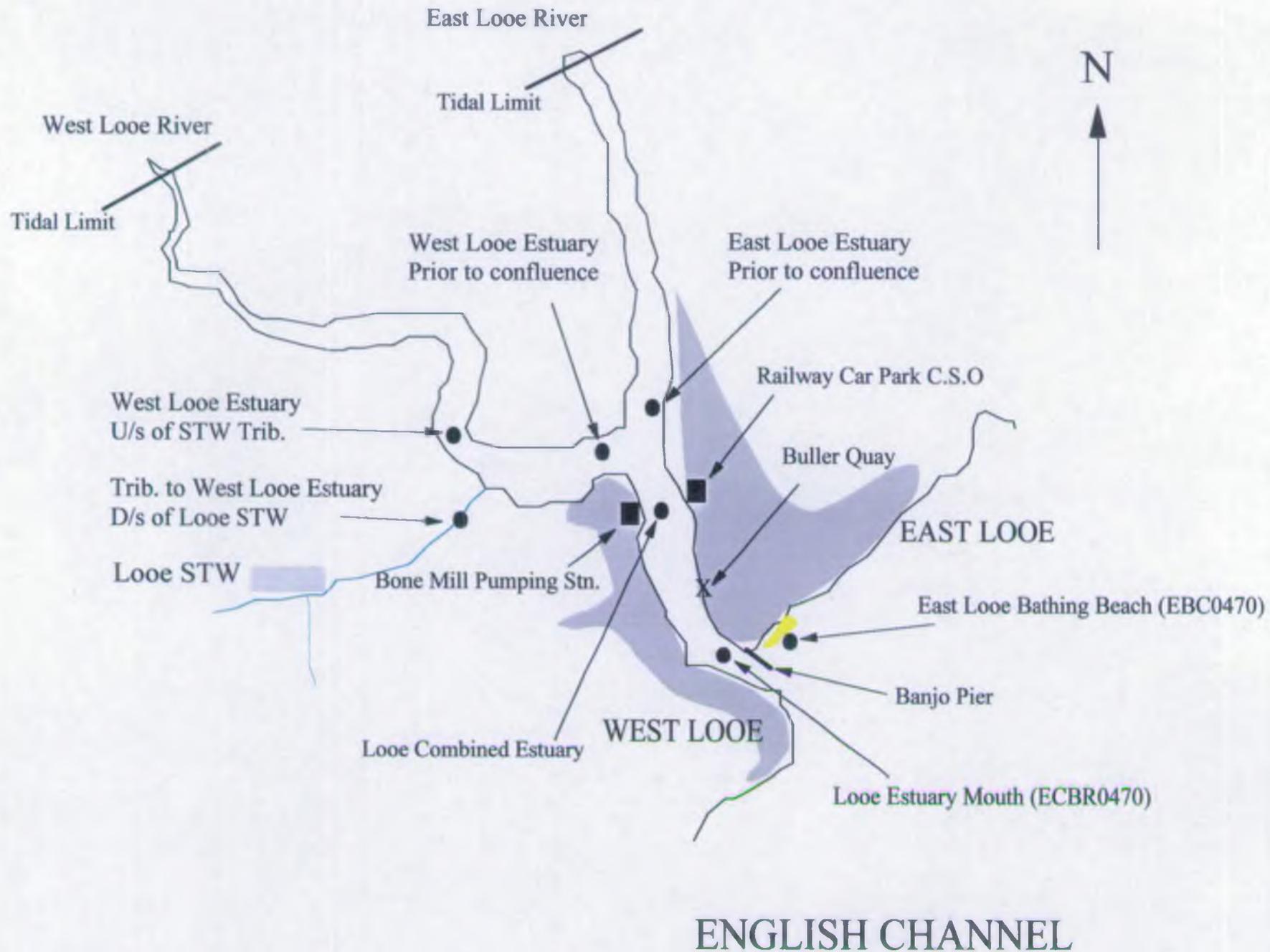


Figure 4. Looe Estuary Map and Sample Locations



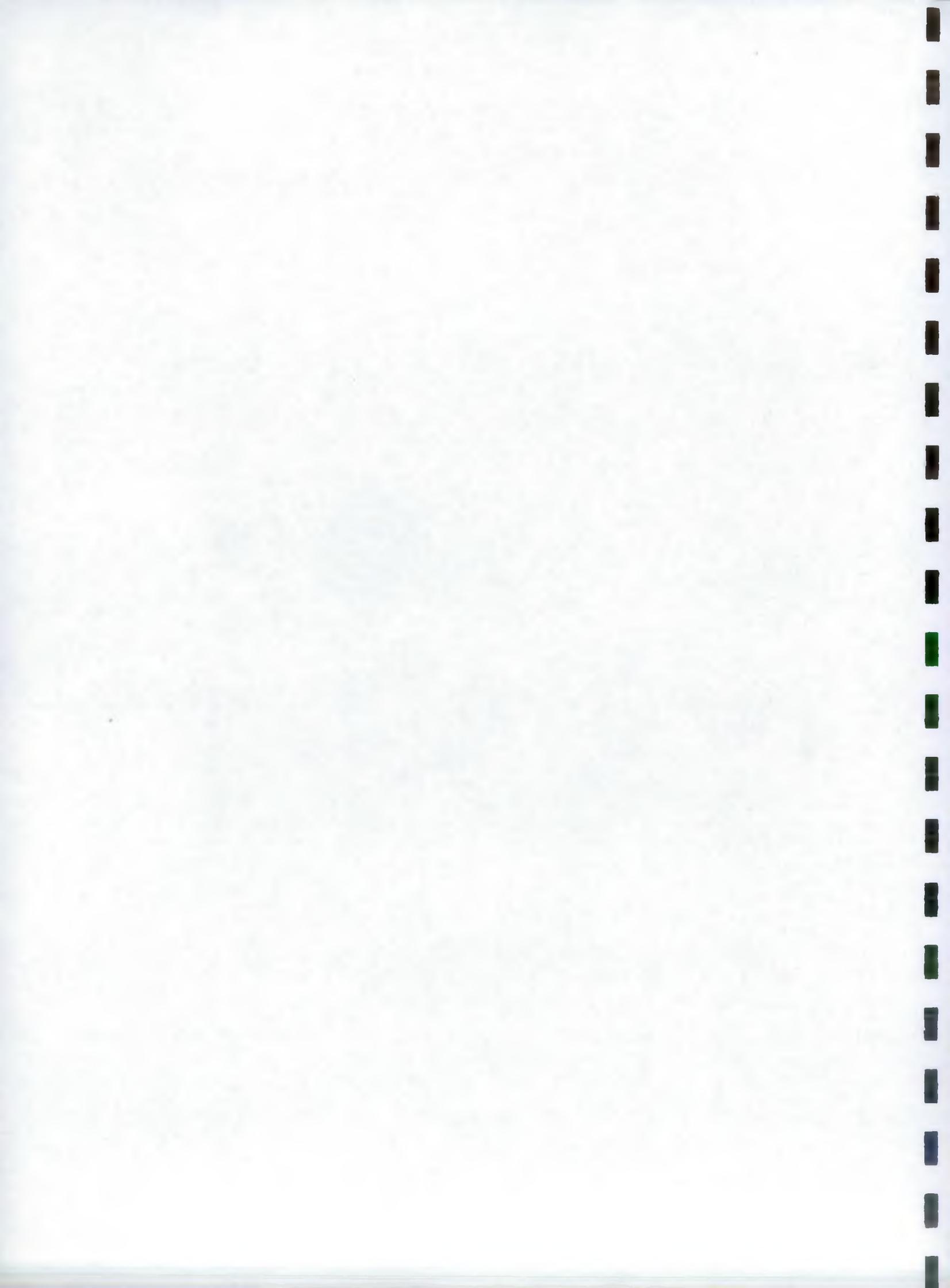
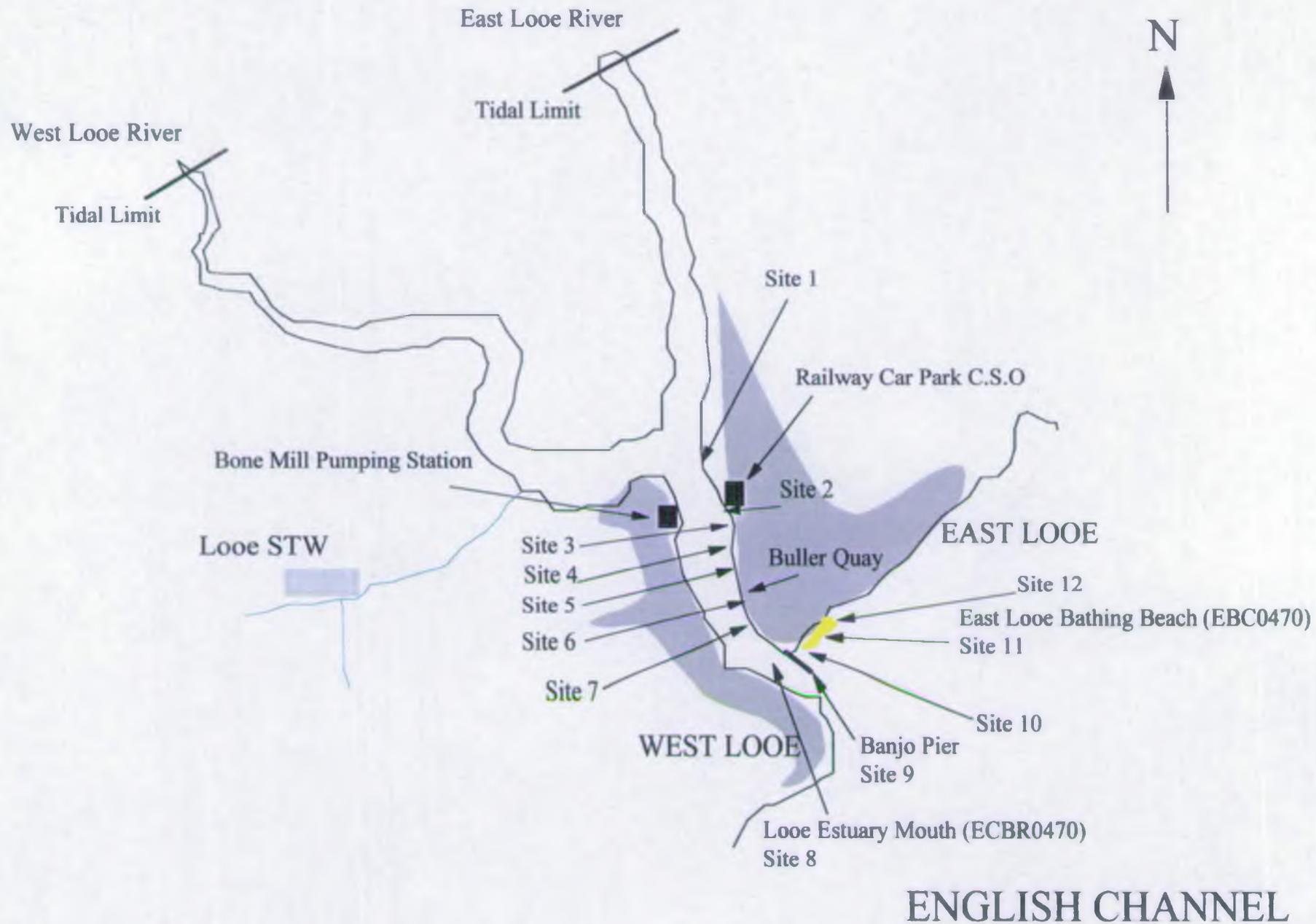
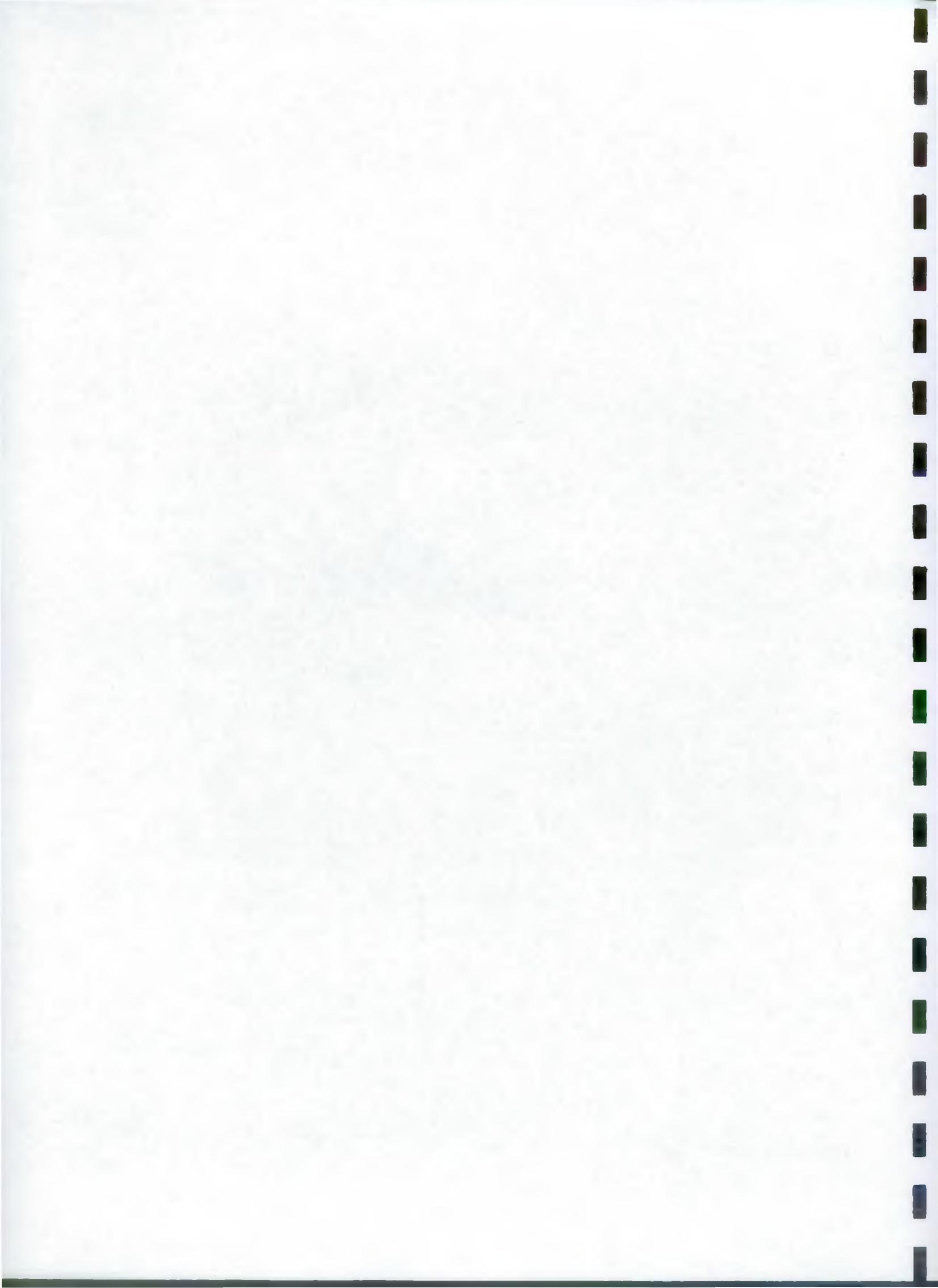


Figure 5. *B. Globigii* Survey Sample Locations 20 August 1997





# TABLE 1

## East Looe Beach (ECB0470)

Date	Time	Time of high water	Tidal height (metres)	Temp (°C)	Salinity (g/kg)	Faecal Strep (no/100ml)
<b>EEC BATHING WATER STANDARDS</b>						
01/05/97	12:00	13:18	5.6	13.0	34.8	5.0
10/05/97	11:50	08:34	6.6	13.5	33.8	20.0
19/05/97	15:30	16:43	6.2	14.0	34.8	180.0
27/05/97	12:08	09:44	6.4	15.0	35.1	5.0
05/06/97	10:35	06:13	6.7	14.5	35.1	80.0
14/06/97	12:10	13:02	5.2	15.5	35.3	5.0
22/06/97	12:00	07:14	6.9	15.0	35.3	10.0
27/06/97	11:40	11:25	6.2	13.5	35.1	40.0
02/07/97	10:30	04:19	6.2	14.0	32.1	8400.0
11/07/97	11:55	10:19	5.8	15.5	34.9	5.0
20/07/97	12:35	16:15	6.9	18.0	28.0	180.0
29/07/97	12:00	14:43	5.7	18.0	34.4	40.0
03/08/97	12:20	06:24	6.4	15.0	30.7	6600.0
09/08/97	11:55	09:43	6.1	16.0	34.9	20.0
20/08/97	10:30	07:30	7.5	20.0	34.5	850.0
26/08/97	15:50	12:33	5.6	17.5	34.6	10.0
01/09/97	12:10	06:04	6.4	18.0	20.1	560.0
10/09/97	12:00	11:22	5.5	17.0	34.7	5.0
18/09/97	10:30	07:09	7.6	16.5	35.0	360.0
29/09/97	11:50	05:03	6.2	16.5	32.7	80.0
				Min	20.1	5.0
				Max	35.3	8400.0
				Mean	33.3	872.8

Faecal Coliforms (no/100ml) (2000)	Total Coliforms (no/100ml) (10000)	Wind Direction	Rainfall (mm) Previous day	Rainfall (mm)
5.0	60.0	SE	0.0	0.0
5.0	40.0	SW	2.5	2.4
1000.0	1200.0	SW	12.5	7.0
10.0	10.0	SE	0.0	0.0
220.0	200.0	E	2.7	7.5
5.0	20.0	E	1.1	2.7
50.0	51.0	NW	1.5	1.3
360.0	340.0	N	1.4	0.1
6660.0	12000.0	S	0.4	5.1
5.0	30.0	SE	0.0	0.0
980.0	2100.0	S	0.0	0.0
68.0	130.0	W	0.0	2.7
48000.0	50400.0	S	3.8	36.6
120.0	140.0	NW	0.0	0.0
1143.0	1900.0	S	1.2	0.0
20.0	60.0	S	1.7	39.3
1155.0	2870.0	W	0.5	0.4
150.0	70.0	SE	0.0	0.0
500.0	513.0	SE	0.0	3.1
243.0	477.0	SW	0.0	0.1
5.0	10.0			
48000.0	50400.0			
3035.0	3630.6			

**TABLE 2****East Looe River - Mouth of Estuary**

Date	Time	Time of high water	Tidal height (metres)	Temp (°C)	Salinity (g/kg)	Faecal Strep (no/100ml)
01/05/97	12:05	13:18	5.6	11.5	35.0	5.0
10/05/97	11:55	08:34	6.6	13.0	34.9	2100.0
19/05/97	15:35	16:43	6.2	14.0	34.9	10.0
27/05/97	12:03	09:44	6.4	14.5	35.1	20.0
05/06/97	10:40	06:13	6.7	14.5	31.3	30.0
14/06/97	12:15	13:02	5.2	14.5	35.3	20.0
22/06/97	12:05	07:14	6.9	13.5	27.3	280.0
27/06/97	11:45	11:25	6.2	13.5	35.1	5.0
02/07/97	10:35	04:19	6.2	13.5	22.8	900.0
11/07/97	12:00	10:19	5.8	14.5	35.0	5.0
20/07/97	12:45	16:15	6.9	18.0	23.3	500.0
29/07/97	12:05	14:43	5.7	16.5	34.9	5.0
03/08/97	12:25	06:24	6.4	15.0	23.1	>30000.0
05/08/97	13:15	19:48	6.5	16.1	30.8	1310.0
09/08/97	12:00	09:43	6.1	15.5	34.7	20.0
20/08/97	10:35	07:30	7.5	19.0	34.5	930.0
26/08/97	15:55	12:33	5.6	18.0	34.1	2600.0
01/09/97	12:15	06:04	6.4	18.5	10.8	730.0
10/09/97	12:05	11:22	5.5	16.5	34.8	10.0
18/09/97	10:35	07:09	7.6	16.0	34.8	1050.0
29/09/97	11:55	05:03	6.2	16.0	19.1	460.0
				Min	10.8	5.0
				Max	35.3	>30000.0
				Mean	30.6	1951.9

Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Rainfall (mm) Previous day	Rainfall (mm)	Comments
5.0	5.0	0.0	0.0	
11200.0	14800.0	2.5	2.4	
20.0	20.0	12.5	7.0	
60.0	220.0	0.0	0.0	
230.0	180.0	2.7	7.5	
20.0	70.0	1.1	2.7	
1300.0	3000.0	1.5	1.3	
5.0	5.0	1.4	0.1	
20000.0	20000.0	0.4	5.1	
30.0	340.0	0.0	0.0	
6500.0	8000.0	0.0	0.0	
10.0	5.0	0.0	2.7	
>30000.0	>30000.0	3.8	36.6	
10200.0	36000.0	0.0	0.0	Non Statutory Sample
360.0	580.0	1.2	0.0	
10600.0	14700.0	1.7	39.3	
4000.0	9600.0	0.5	0.4	
7400.0	10400.0	0.0	0.0	
10.0	20.0	0.0	3.1	
17700.0	29000.0	0.0	0.1	
4200.0	5600.0	0.0	0.1	
5.0	5.0			
>30000.0	36000.0			
5897.6	8692.6			

**TABLE 3**

**East Looe Estuary U/s of Confluence**

Date	Time	Time of high water	Tidal height (metres)	Temp (°C)	Salinity (g/kg)	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Comments
02/07/97	10:00	16:47	6.2	13.4	6.4	440.0	5400.0	9700.0	
11/07/97	12:00	10:19	5.8	16.5	35.2	20.0	50.0	150.0	
20/07/97	12:15	16:15	6.9	17.9	11.5	260.0	2900.0	6400.0	
29/07/97	11:35	14:43	5.7	17.7	32.4	200.0	1040.0	1170.0	
03/08/97	11:40	06:24	6.4	13.1	16.0	300.0	2900.0	4700.0	
05/08/97	12:20	07:33	6.5	16.0	14.1	2100.0	23000.0	34000.0	U/s of the telephone exchange pipe. Pipe not discharging.
09/08/97	11:30	09:43	6.1	17.3	35.1	20.0	90.0	150.0	
20/08/97	12:35	07:30	7.3	20.9	4.0	310.0	6000.0	6100.0	
26/08/97	15:10	12:33	5.6	17.9	33.8	2800.0	960.0	2800.0	
01/09/97	12:45	06:04	6.4	17.0	1.7	410.0	4000.0	6700.0	Large flock of gulls cleaning in estuary upstream.
10/09/97	10:15	11:22	5.5	16.5	35.0	30.0	120.0	220.0	
18/09/97	10:35	07:09	7.6	15.0	34.7	20.0	80.0	90.0	
29/09/97	11:50	05:03	6.2	16.1	4.2	660.0	5700.0	23000.0	Slightly turbid.
				Min	1.7	20.0	50.0	90.0	
				Max	35.2	2800.0	23000.0	34000.0	
				Mean	20.3	582.3	4018.5	7321.5	

**Looe Combined Estuary**

Date	Time	Time of high water	Tidal height (metres)	Temp (°C)	Salinity (g/kg)	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Comments
02/07/97	10:20	16:47	6.2	13.5	12.7	220.0	2440.0	2500.0	
11/07/97	12:05	10:19	5.8	16.5	35.2	20.0	10.0	50.0	
20/07/97	12:10	16:15	6.9	17.9	20.5	3100.0	37000.0	48000.0	
29/07/97	11:40	14:43	5.7	16.0	35.1	140.0	260.0	380.0	
03/08/97	11:55	06:24	6.4	15.6	19.8	3500.0	20000.0	40000.0	
05/08/97	12:35	07:33	6.5	16.1	17.0	1600.0	24000.0	36000.0	Slightly turbid.
09/08/97	11:35	09:43	6.1	17.1	35.0	20.0	390.0	400.0	
20/08/97	12:15	07:30	7.5	20.2	27.5	490.0	5300.0	23000.0	
26/08/97	15:15	12:33	5.6	17.8	34.5	2300.0	4400.0	20000.0	
01/09/97	12:35	06:04	6.4	17.3	3.0	480.0	3300.0	22000.0	Fairly turbid.
10/09/97	10:25	11:22	5.5	16.5	35.1	20.0	40.0	110.0	
18/09/97	10:25	07:09	7.6	15.9	34.5	12200.0	210000.0	240000.0	Taken off the east bank. SSO in operation upstream.
29/09/97	12:00	05:03	6.2	16.4	10.4	370.0	4800.0	7800.0	Taken from middle of estuary
				Min		20.0	10.0	50.0	
				Max		12200.0	210000.0	240000.0	
				Mean		1881.5	23995.4	33864.6	

TABLE 4

West Looe Estuary 100m u/s of STW Trib.

Date	Time	Time of high water	Tidal height (metres)	Temp (°C)	Salinity (g/kg)	Faecal Strept (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Comments
02/07/97	11:05	16:47	6.2	13.1	3.1	30.0	460.0	290.0	
11/07/97	11:45	10:19	5.8	16.4	31.9	1210.0	22000.0	47000.0	
20/07/97	11:40	16:15	6.9	17.4	15.0	50.0	640.0	590.0	
29/07/97	12:00	14:43	5.7	18.2	31.6	620.0	20000.0	27000.0	
03/08/97	11:20	06:24	6.4	15.6	16.1	220.0	700.0	1450.0	
05/08/97	14:50	07:33	6.5	16.4	3.4	800.0	5600.0	13000.0	Flow still going down.
09/08/97	11:55	09:43	6.1	17.5	26.9	120.0	1180.0	5200.0	
20/08/97	11:50	07:30	7.5	19.8	37.8	190.0	1140.0	2000.0	
26/08/97	15:45	12:33	5.6	18.6	16.5	2000.0	6600.0	31000.0	
01/09/97	12:25	06:04	6.4	15.1	0.8	140.0	690.0	3800.0	Fairly turbid.
10/09/97	10:50	11:22	5.5	16.5	34.1	30.0	370.0	390.0	
18/09/97	09:55	07:09	7.6	15.3	30.0	100.0	950.0	1450.0	Greyish tinge to the water.
29/09/97	12:20	05:03	6.2	15.9	2.7	60.0	460.0	460.0	Very low water.
				Min	0.8	30.0	370.0	290.0	
				Max	37.0	2000.0	22000.0	47000.0	
				Mean	19.2	428.5	4676.2	10279.2	

West Looe Estuary U/s of Confluence

Date	Time	Time of high water	Tidal height (metres)	Temp (°C)	Salinity (g/kg)	Faecal Strept (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Comments
02/07/97	10:10	16:47	6.2	13.1	10.6	240.0	4100.0	2100.0	
11/07/97	11:55	10:19	5.8	16.5	35.1	50.0	11700.0	22000.0	
20/07/97	11:50	16:15	6.9	17.4	20.6	2000.0	20000.0	241000.0	
29/07/97	11:50	14:43	5.7	17.4	33.7	40.0	230.0	240.0	
03/08/97	11:30	06:24	6.4	15.8	19.7	4000.0	7200.0	35000.0	
05/08/97	14:45	07:33	6.5	16.4	5.8	2000.0	10800.0	23200.0	Flow still going out.
09/08/97	12:05	09:43	6.1	18.1	11.6	210.0	4000.0	5000.0	
20/08/97	12:10	07:30	7.5	20.2	28.2	1340.0	12800.0	52000.0	
26/08/97	15:35	12:33	5.6	18.4	22.6	6100.0	51000.0	81000.0	
01/09/97	12:10	06:04	6.4	15.4	2.0	430.0	9600.0	24000.0	Very turbid. Low water.
10/09/97	10:40	11:22	5.5	16.5	34.9	10.0	30.0	170.0	
18/09/97	10:05	07:09	7.6	15.2	30.1	210.0	2300.0	3400.0	
29/09/97	12:10	05:03	6.2	16.2	6.1	220.0	2900.0	20800.0	Slightly turbid.
				Min		10.0	30.0	170.0	
				Max		6100.0	51000.0	241000.0	
				Mean		1296.2	10512.3	39223.8	

**TABLE 5**

**Tributary of the West Looe River D/s of Looe STW**

Date	Time	Temp (°C)	Salinity (g/kg)	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Rainfall (mm) Previous day	Rainfall (mm)	Comments
01/05/97	12:00	14.3	11.6	23000.0	176000.0	208000.0	0.0	0.0	
10/05/97	12:10	11.1	20.5	20000.0	160000.0	300000.0	2.5	2.4	
19/05/97	15:45	15.1	12.2	26000.0	120000.0	240000.0	12.5	7.0	
27/05/97	14:05	No Result	18.6	35000.0	200000.0	300000.0	0.0	0.0	
05/06/97	10:15	15.6	20.1	30000.0	70000.0	100000.0	2.7	7.5	Rain in night and during the morning
14/06/97	12:35	16.4	13.3	50000.0	120000.0	300000.0	1.1	2.7	
22/06/97	12:15	15.5	20.3	12000.0	53000.0	240000.0	1.5	1.3	
27/06/97	11:15	14.0	14.3	3200.0	40000.0	112000.0	1.4	0.1	
02/07/97	10:55	12.0	17.6	12000.0	86000.0	240000.0	0.4	5.1	
11/07/97	11:35	16.6	16.4	7600.0	63000.0	240000.0	0.0	0.0	
20/07/97	11:35	No Result	No Result	10200.0	148000.0	186000.0	0.0	0.0	
29/07/97	12:07	18.1	13.9	51000.0	1280000.0	1720000.0	0.0	2.7	
03/08/97	11:10	17.8	13.6	9700.0	150000.0	300000.0	3.8	36.6	
05/08/97	14:55	17.6	13.3	4500.0	51000.0	160000.0	0.0	0.0	
09/08/97	12:10	18.9	19.4	56000.0	830000.0	1080000.0	1.2	0.0	High Flow. Fairly turbid.
20/08/97	11:45	20.0	No Result	9000.0	210000.0	540000.0	1.7	39.3	
26/08/97	15:50	19.2	12.0	91000.0	650000.0	2530000.0	0.5	0.4	Flow lower than expected
01/09/97	12:15	17.2	20.4	7900.0	203000.0	286000.0	0.0	0.0	Foam downstream. Average flow.
10/09/97	11:00	16.3	No Result	35000.0	300000.0	300000.0	0.0	3.1	
18/09/97	09:50	16.2	21.3	1360.0	380000.0	320000.0	0.0	0.1	Fairly high flow.
29/09/97	12:25	16.7	17.2	10800.0	110000.0	125000.0	0.0	0.1	Normal flow.
		Min	11.6	1360.0	40000.0	100000.0			
		Max	21.3	91000.0	1280000.0	2530000.0			
		Mean	16.4	24060.0	257142.9	467952.4			

**TABLE 6****West Looe River at Sowdens Bridge**

Date	Time	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)
01/05/97	11:45	5.0	370.0	260.0
10/05/97	11:55	170.0	440.0	700.0
19/05/97	15:15	3400.0	12000.0	20000.0
27/05/97	13:25	30.0	400.0	560.0
05/06/97	09:45	120.0	390.0	710.0
14/06/97	12:00	490.0	640.0	1200.0
22/06/97	12:50	320.0	1200.0	1600.0
27/06/97	10:50	210.0	720.0	1030.0
02/07/97	11:25	220.0	480.0	650.0
11/07/97	11:10	120.0	1240.0	1230.0
20/07/97	11:20	180.0	780.0	1730.0
29/07/97	12:35	90.0	1300.0	1370.0
03/08/97	10:50	600.0	2200.0	5000.0
05/08/97	15:15	680.0	3200.0	4100.0
09/08/97	11:30	100.0	480.0	660.0
20/08/97	13:00	230.0	35000.0	136000.0
26/08/97	16:10	13200.0	13400.0	187000.0
01/09/97	11:55	280.0	940.0	2300.0
10/09/97	11:25	50.0	280.0	420.0
18/09/97	09:30	70.0	480.0	1350.0
29/09/97	12:40	90.0	1640.0	2900.0
	Min	5.0	280.0	260.0
	Max	13200.0	35000.0	187000.0
	Mean	983.6	3694.3	17655.7

Rainfall (mm) Previous day	Rainfall (mm)	Comments
0.0	0.0	
2.5	2.4	
12.5	7.0	
0.0	0.0	
2.7	7.5	Rain in night and during the morning
1.1	2.7	Showers yesterday
1.5	1.3	
1.4	0.1	
0.4	5.1	
0.0	0.0	
0.0	0.0	
0.0	2.7	
3.8	36.6	
0.0	0.0	
1.2	0.0	
1.7	39.3	
0.5	0.4	River discoloured. Heavy showers in am.
0.0	0.0	Increased flow. River more discoloured than East Looe River.
0.0	3.1	
0.0	0.1	Clear water. Normal flow.
0.0	0.1	

**TABLE 7****East Looe River at Railway Halt**

Date	Time	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)
01/05/97	11:35	1300.0	2600.0	4000.0
10/05/97	11:45	1200.0	2800.0	4800.0
19/05/97	14:55	23500.0	100000.0	120000.0
27/05/97	13:40	500.0	2800.0	5600.0
05/06/97	09:55	640.0	3800.0	6500.0
14/06/97	12:12	510.0	1200.0	5400.0
22/06/97	12:35	1200.0	4800.0	12000.0
27/06/97	11:00	480.0	4800.0	6600.0
02/07/97	09:45	770.0	4400.0	6800.0
11/07/97	10:55	560.0	11900.0	12400.0
20/07/97	11:05	800.0	9600.0	20000.0
29/07/97	10:40	390.0	7600.0	22000.0
03/08/97	10:35	1150.0	5000.0	12500.0
05/08/97	12:05	2900.0	36000.0	48000.0
09/08/97	11:20	760.0	3400.0	6800.0
20/08/97	11:20	4000.0	2100.0	3400.0
26/08/97	15:00	7300.0	25000.0	31000.0
01/09/97	11:45	400.0	5400.0	13400.0
10/09/97	10:15	560.0	4800.0	5200.0
18/09/97	10:45	440.0	7500.0	38000.0
29/09/97	11:40	480.0	6300.0	9300.0
	Min	390.0	1200.0	3400.0
	Max	23500.0	100000.0	120000.0
	Mean	2373.3	11990.5	18747.6

Rainfall (mm) Previous day	Rainfall (mm)	Comments
0.0	0.0	
2.5	2.4	
12.5	7.0	
0.0	0.0	
2.7	7.5	Rain in night and during the morning
1.1	2.7	Showers yesterday
1.5	1.3	
1.4	0.1	
0.4	5.1	
0.0	0.0	
0.0	0.0	
0.0	2.7	
3.8	36.6	
0.0	0.0	Drizzly rain. Slightly turbid.
1.2	0.0	Warm, Dry day.
1.7	39.3	
0.5	0.4	Less turbid than Landlooe Bridge
0.0	0.0	Rain over past few days. Increased river flow. Slight discolouration.
0.0	3.1	
0.0	0.1	Dry over past few days. Normal flow. Misty day.
0.0	0.1	Dry weather for past 10 days or so.

**TABLE 8**

**East Looe River at Lamellion Mill**

Date	Time	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Rainfall (mm) Previous day	Rainfall (mm)	Comments
27/06/97	12:25	460.0	2300.0	3500.0	1.4	0.1	
02/07/97	12:05	5800.0	12000.0	4800.0	0.4	5.1	
11/07/97	10:00	200.0	3800.0	24000.0	0.0	0.0	
20/07/97	10:05	220.0	1350.0	2100.0	0.0	0.0	
29/07/97	10:13	360.0	1060.0	1070.0	0.0	2.7	
03/08/97	10:00	2600.0	7800.0	20000.0	3.8	36.6	
05/08/97	11:25	4200.0	5900.0	9300.0	0.0	0.0	
09/08/97	10:45	1060.0	4900.0	6400.0	1.2	0.0	
20/08/97	10:10	440.0	3800.0	6900.0	1.7	39.3	
26/08/97	14:25	6800.0	12600.0	52000.0	0.5	0.4	River discoloured. Heavy showers.
01/09/97	11:00	7200.0	161000.0	270000.0	0.0	0.0	Increased flow. Slightly discoloured. Faint smell of sewage.
10/09/97	09:20	11200.0	300000.0	300000.0	0.0	3.1	Grey tinge to the water.
18/09/97	11:35	49000.0	205000.0	220000.0	0.0	0.1	Smell of sewage. River grey in colour. River bed silted and covered in fungus.
29/09/97	11:10	600.0	8000.0	8400.0	0.0	0.1	
	Min	200.0	1060.0	1070.0			
	Max	49000.0	300000.0	300000.0			
	Mean	6438.6	52107.9	66319.3			

**East Looe River D/s Of Lodge Hill STW**

Date	Time	Faecal Strep (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Rainfall (mm) Previous day	Rainfall (mm)	Comments
27/06/97	12:15	1410.0	8000.0	12100.0	1.4	0.1	
02/07/97	12:00	910.0	12600.0	10700.0	0.4	5.1	
11/07/97	10:15	1080.0	26000.0	37000.0	0.0	0.0	
20/07/97	10:15	560.0	6000.0	39000.0	0.0	0.0	
29/07/97	10:20	580.0	23000.0	44000.0	0.0	2.7	
03/08/97	10:05	3500.0	9600.0	26000.0	3.8	36.6	
05/08/97	11:35	4500.0	43000.0	138000.0	0.0	0.0	Slightly turbid.
09/08/97	10:55	1430.0	6000.0	22000.0	1.2	0.0	
20/08/97	10:20	3900.0	59000.0	112000.0	1.7	39.3	
26/08/97	14:35	15300.0	73000.0	241000.0	0.5	0.4	Slightly discoloured, heavy showers.
01/09/97	11:10	10800.0	86000.0	296000.0	0.0	0.0	Increases flow. Slightly discoloured.
10/09/97	09:30	23000.0	260000.0	282000.0	0.0	3.1	
18/09/97	11:25	25000.0	276000.0	300000.0	0.0	0.1	Slightly turbid. Sewage fungus present.
29/09/97	11:20	800.0	13600.0	32000.0	0.0	0.1	
	Min	560.0	6000.0	10700.0			
	Max	25000.0	276000.0	300000.0			
	Mean	6626.4	64414.3	113700.0			

TABLE 9

East Looe River at Trussels Bridge

Date	Time	Faecal Strept (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Rainfall (mm) Previous day	Rainfall (mm)	Comments
27/06/97	12:10	640.0	7200.0	8000.0	1.4	0.1	
02/07/97	11:50	670.0	16000.0	9100.0	0.4	5.1	
11/07/97	10:25	2200.0	31000.0	62000.0	0.0	0.0	
20/07/97	10:25	520.0	4900.0	9000.0	0.0	0.0	
29/07/97	10:30	610.0	16800.0	27000.0	0.0	2.7	
03/08/97	10:10	790.0	6000.0	20000.0	3.8	36.6	
05/08/97	11:40	5400.0	40000.0	92000.0	0.0	0.0	Slightly turbid.
09/08/97	11:00	1360.0	8600.0	20000.0	1.2	0.0	
20/08/97	10:30	4000.0	51000.0	93000.0	1.7	39.3	
26/08/97	14:40	38000.0	102000.0	294000.0	0.5	0.4	River more discoloured than the above site
01/09/97	11:15	17500.0	54000.0	238000.0	0.0	0.0	Slightly discoloured. Increased flow.
10/09/97	09:40	14500.0	103000.0	122000.0	0.0	3.1	
18/09/97	11:13	21000.0	118000.0	130000.0	0.0	0.1	Slightly turbid. Greyish colour. Faint smell of sewage.
29/09/97	11:25	760.0	9800.0	23000.0	0.0	0.1	Slightly turbid.
	Min	520.0	4900.0	8000.0			
	Max	38000.0	118000.0	294000.0			
	Mean	7710.7	40592.9	81935.7			

East Looe River at Landloe Bridge

Date	Time	Faecal Strept (no/100ml)	Faecal Coliforms (no/100ml)	Total Coliforms (no/100ml)	Rainfall (mm) Previous day	Rainfall (mm)	Comments
27/06/97	11:55	1200.0	30000.0	56000.0	1.4	0.1	Probably contaminated by septic tank discharge.
02/07/97	09:35	340.0	8000.0	5300.0	0.4	5.1	
11/07/97	10:40	440.0	21000.0	23000.0	0.0	0.0	
20/07/97	10:40	360.0	13500.0	12900.0	0.0	0.0	
29/07/97	10:45	370.0	36000.0	54000.0	0.0	2.7	Faint smell of sewage. Septic tank?
03/08/97	10:20	940.0	5500.0	11600.0	3.8	36.6	
05/08/97	11:55	2800.0	37000.0	50000.0	0.0	0.0	
09/08/97	11:12	820.0	6000.0	7000.0	1.2	0.0	
20/08/97	10:50	2400.0	26000.0	54000.0	1.7	39.3	
26/08/97	14:50	8300.0	38000.0	79000.0	0.5	0.4	Slightly more turbid than Trussels bridge.
01/09/97	11:25	2000.0	21000.0	39000.0	0.0	0.0	Slightly discoloured. Increased flow.
10/09/97	09:55	490.0	6500.0	15200.0	0.0	3.1	
18/09/97	10:55	520.0	7800.0	23000.0	0.0	0.1	Normal flow.
29/09/97	11:35	330.0	8200.0	22300.0	0.0	0.1	
	Min	330.0	5500.0	5300.0			
	Max	8300.0	38000.0	79000.0			
	Mean	1522.1	18892.9	32307.1			

TABLE 10

*B. Globigii* Upper Harbour Survey results 20 August 1997

## 1. Steps by short saty car park upstream of Health Centre

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
07:59	18.4	34.9	<10.00	50.00	160.00	120.00	
09:25	18.5	34.9	<10.00	20.00	120.00	100.00	
10:22	18.7	34.6	<10.00	100.00	5900.00	5300.00	
11:42	19.3	34.1	<10.00	110.00	5800.00	4800.00	
12:49	21.3	25.3	<10.00	440.00	6300.00	4500.00	

## 2. East Bank by Health Centre downstream of SSO

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
08:05	18.3	35.0	<10.00	30.00	210.00	80.00	
09:27	18.5	34.6	<10.00	28300.00	103000.00	74000.00	Storm sewage overflow in operation
10:29	19.1	34.0	<10.00	31000.00	276000.00	241000.00	SSO in operation
11:46	19.0	33.9	18.00	310.00	8300.00	6400.00	SSO no longer in operation
12:50	21.2	25.3	<10.00	370.00	4100.00	3400.00	

## 3. East Bank by steps downstream of Looe Bridge

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
08:08	18.3	35.0	<10.00	80.00	170.00	150.00	
09:37	18.4	34.7	<10.00	2000.00	9600.00	4700.00	
10:34	18.7	34.7	<10.00	10400.00	43000.00	41000.00	SSO in operation upstream
11:51	19.6	33.2	<10.00	270.00	4400.00	3100.00	
13:02	21.0	26.0	<10.00	450.00	4600.00	4200.00	

## 4. East Bank by crane at the end of the car park

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
08:10	18.3	35.0	<10.00	50.00	100.00	60.00	
09:39	18.5	34.9	<10.00	70.00	2100.00	1420.00	
10:36	18.8	34.7	<10.00	3700.00	60000.00	36000.00	SSO in operation upstream
11:54	19.6	32.6	<10.00	170.00	2200.00	1080.00	
13:07	21.2	23.9	<10.00	270.00	6900.00	3300.00	

## 5. East Bank by M.A.F.F office

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
08:12	18.3	35.0	<10.00	30.00	90.00	70.00	
09:42	18.4	34.9	<10.00	70.00	800.00	350.00	
10:39	18.8	34.7	9.00	3200.00	39000.00	42000.00	SSO in operation upstream
11:58	19.6	32.5	<10.00	180.00	3000.00	1400.00	
13:15	20.7	24.4	<10.00	530.00	6100.00	4600.00	

## 6. East Bank downstream of known discharge

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
08:16	18.3	35.0	<10.00	70.00	240.00	150.00	
09:51	18.5	34.9	<10.00	1150.00	8000.00	5000.00	
10:48	18.8	34.7	18000.00	7400.00	72000.00	56000.00	Pipe submerged, but thought to be discharging upstream
12:00	19.5	32.2	2000.00	420.00	5300.00	4100.00	
13:23	21.1	23.1	153.00	390.00	8800.00	4700.00	

## 7. East Bank 25m downstream of Amusement Building

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	Faecal/ Strep (no./100 ml)	Total Coliforms (no./100 ml)	Faecal/ Coli (no./100 ml)	Comments
08:18	18.4	35.0	<10.00	40.00	160.00	110.00	
09:46	18.4	34.9	45.00	120.00	3300.00	2200.00	
10:50	18.9	34.7	3400.00	4300.00	51000.00	29000.00	Pipe submerged, but thought to be discharging upstream
12:03	20.0	31.6	680.00	480.00	3500.00	2100.00	
13:30	21.1	23.6	45.00	310.00	6200.00	4300.00	

**TABLE 11**

***B. Globigii* Lower Estuary and Beach Survey results 20 August 1997**

**8. Looe River (ECBR0470)**

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	F/ Strep (no./100 ml)	F/ Coli (no./100 ml)	Total Coli (no./100 ml)	Comments
08:00	18.2	34.9	5.00	50.00	90.00	50.00	
09:31	18.0	No result	5.00	150.00	340.00	410.00	Sewage litter present
10:30	18.7	No result	2000.00	2200.00	6800.00	12400.00	Sewage litter and weed present
11:30	18.6	No result	1532.00	740.00	80000.00	84000.00	SSO had been discharging upstream
12:40	18.3	No result	45.00	370.00	2500.00	4200.00	
13:33	21.0	25.3	36.00	290.00	2800.00	4300.00	

**9. End of Banjo Pier**

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	F/ Strep (no./100 ml)	F/ Coli (no./100 ml)	Total Coli (no./100 ml)	Comments
08:35	18.2	35.0	5.00	40.00	200.00	580.00	Sewage litter present
09:35	18.4	No result	5.00	30.00	270.00	460.00	Sewage litter and weed present
10:35	18.4	No result	1455.00	1320.00	10200.00	24000.00	
11:35	19.0	No result	1207.00	570.00	2700.00	5000.00	
12:45	18.2	No result	54.00	240.00	1170.00	2100.00	
13:40	21.0	25.0	18.00	370.00	2600.00	4900.00	

**10. West of East Looe Beach**

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	F/ Strep (no./100 ml)	F/ Coli (no./100 ml)	Total Coli (no./100 ml)	Comments
08:07	18.6	34.4	5.00	230.00	620.00	680.00	
09:40	18.6	No result	5.00	40.00	220.00	600.00	
10:43	19.3	No result	5.00	120.00	340.00	490.00	
11:45	19.4	No result	5.00	90.00	110.00	8500.00	
12:48	19.0	No result	27.00	160.00	450.00	550.00	
13:44	20.0	25.7	18.00	330.00	3000.00	4600.00	

**11. East Looe Beach (ECB0470)**

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	F/ Strep (no./100 ml)	F/ Coli (no./100 ml)	Total Coli (no./100 ml)	Comments
08:12	18.6	34.8	5.00	350.00	940.00	2400.00	
09:45	18.9	No result	5.00	1190.00	1100.00	1630.00	Sewage litter and weed present.
10:45	19.4	No result	5.00	410.00	300.00	490.00	Sewage litter and weed present.
11:48	19.6	No result	5.00	150.00	220.00	410.00	Sewage litter and weed present.
12:55	18.3	No result	5.00	150.00	50.00	240.00	Sewage litter and weed present.
13:50	21.3	32.8	5.00	160.00	370.00	680.00	Sewage litter and weed present.

**12. Eastern End of East Looe Beach**

Time (BST)	Temp (° C)	Salinity (g/kg)	<i>B. Globigii</i> (no./100 ml)	F/ Strep (no./100 ml)	F/ Coli (no./100 ml)	Total Coli (no./100 ml)	Comments
08:16	18.8	34.4	9.00	2400.00	910.00	2000.00	Sewage litter on beach
09:50	18.9	No result	5.00	180.00	220.00	240.00	Sewage litter and weed present.
10:53	19.3	No result	5.00	100.00	30.00	130.00	Sewage litter and weed present.
11:53	18.0	No result	5.00	60.00	130.00	210.00	Sewage litter and weed present.
13:00	18.3	No result	5.00	70.00	200.00	650.00	Sewage litter and weed present.
13:57	21.1	30.2	9.00	200.00	400.00	1700.00	Sewage litter and weed present.

APPENDIX 1

Output from RAINARK data logging & processing system, (c)1989-98 Hydro-Logic Ltd  
 STATION RAINFALL REPORT Printed on 31/03/1998 at 12:16 hrs

N.R.A. South Western Region, Cornwall Area

GAUGE REFERENCE : 375927  
 M.O. REFERENCE : 375927  
 GAUGE TYPE : Storage  
 RAIN DAY START : 09:00 GMT

STATION NAME : 3 BEACON PARK  
 LOCATION : PELYNT LOOE  
 GRID REF : SX 206 549  
 ALTITUDE : 0.0 m

Annual Summary : 1997

Record Type : Archive file  
 Quality Level: Mixed Quality

Daily Rainfall totals recorded in mm, including LTA details(1941-1970)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	-	1.4	2.4	-	-	-	0.4	0.4 e	0.4	T	-	4.3 Q	1
2	-	T	4.5	-	-	26.0	5.1	1.8 e	20.5	-	-	4.0 Q	2
3	-	3.5	23.3	-	11.2	T	7.6	16.6 e	6.5	T	3.6	-	3
4	-	12.0	0.8	-	1.1	2.7	T	10.5	T	-	8.2	-	4
5	-	0.3	1.8	-	2.7 e	7.5	-	0.6	1.4	-	8.6	0.1 Q	5
6	-	4.2	0.4	-	3.3 e	5.9	-	3.9	-	7.1	13.4	1.2 Q	6
7	-	-	0.5	-	1.9	0.2	-	0.1	-	26.0	17.0	2.4 Q	7
8	-	T	0.5	-	4.7	T	-	-	-	8.3	7.9	3.3 Q	8
9	-	12.9	0.1	-	2.5	T	-	-	-	12.7	2.7	17.1 Q	9
10	8.7	1.1	-	-	2.4	16.0	-	-	-	8.2	2.2	3.0 Q	10
11	1.4	20.5	0.1	-	3.4	0.5	-	2.9	1.8	4.6	T	4.4 Q	11
12	1.9	12.6	T	-	1.1	0.6	1.9	20.3	1.2	0.4	0.1	0.2 Q	12
13	T	4.7	0.3	-	T	T	0.5	T	T	0.2	2.2	T Q	13
14	0.2	3.2	T	-	0.1	-	0.7	-	-	3.6	9.5	-	14
15	T	2.1	0.4	-	-	-	0.2	-	-	0.5	4.3	-	15
16	4.7	T	0.1	-	-	-	0.8	-	-	2.5	0.9	A Q	16
17	T	21.7	1.0	-	6.3	0.1	T	0.2	T	T	21.0	17.6 Q	17
18	6.1	1.5	T	-	12.5	7.4	-	1.0	3.1	T	11.4	0.1 Q	18
19	1.2	4.0	-	-	7.0	4.3 e	-	1.2	16.2	8.5	8.2	T Q	19
20	-	0.8	-	-	8.1	18.2 e	-	T	-	3.2	3.8	-	20
21	3.6	0.2	-	-	T	1.5	-	3.0	-	0.1	7.8	0.7 Q	21
22	1.4	T	-	-	-	1.3	-	2.2	-	-	1.3	30.1 Q	22
23	0.1	10.1	0.8	-	-	T	1.5	4.1	-	-	12.5	21.5 Q	23
24	T	6.8	0.1	8.9	-	22.9	4.2	1.0	-	-	15.7	10.3 Q	24
25	0.5	2.1	1.3	6.3	-	2.8	3.9	1.7	-	-	4.1	10.9 Q	25
26	T	0.1	0.7	18.9	-	1.4	0.3	39.3	-	-	29.8	5.6 Q	26
27	-	0.2	0.2	3.3	-	0.1	T	0.6	-	-	40.9	0.7 Q	27
28	-	0.4	T	T	-	-	-	10.2	-	-	5.5	0.4 Q	28
29	-	-	-	-	-	0.6	2.7	20.1	0.1	-	9.7	11.4 Q	29
30	-	-	-	-	-	0.8	-	16.7	T	-	4.0	12.4 Q	30
31	0.4	-	-	-	-	-	-	0.5	-	-	-	2.5 Q	31
Totals:	10.2	126.4	39.3	37.4	70.3 e	120.8 e	29.8	180.9 e	51.2	85.9	256.3	164.2 Q	
LTA :	-	-	-	-	-	-	-	-	-	-	-	-	
% LTA :	-	-	-	-	-	-	-	-	-	-	-	-	
Max.Day:	8.7	21.7	23.3	18.9	12.5	26.0	7.6	39.3 e	20.5	26.0	40.9	30.1 Q	

Annual Total : 1192.7 mm e  
 Total LTA (mm) : 4.4 mm  
 Total (%LTA) : - %

Quality Original Records : E=Edited S=Snow ?=Suspect M=Incomplete T=Trace  
 Quality M.O. Quality cont : e=Edited s=Snow !=Suspect m=Incomplete t=Trace  
 Quality Code : Q = Original Record

## APPENDIX 2

### LOOE SCHEME MEETING

29 JANUARY 1998  
PENINSULA HOUSE

Environment Agency: David Marshall  
Norman Babbedge  
Rob Torr  
Andy Rogers

SWW: John Bennett  
Colin Rogers  
Paul Hutchings

#### 1 Programme

SWW described their approach to the scheme.

David Mason will be Project Manager. A Catchment Approach will be taken to the development of the scheme. The scheme comprises three aspects: 7 CSOs, Bone Mill PS and associated rising main and the refurbishment and upgrading of Looe STW.

The CSO work will start during June 1998, dependant on Highway Authority and Town Council Summer works embargoes (it is thought the embargo runs from Easter to October). The planned completion date for the CSO work is March 1999.

The Company plan to start work at the STW in mid-July. Completion date for the STW works is 31 December 1998, giving time for operational commissioning prior to the 1999 Bathing Season. The work on Bone Mill PS and the rising main is programmed to be completed in the same timescale as the STW improvements. The resulting increase in flows being passed to the STW will reduce spills from the sewerage catchment, in particular from Doctors Surgery CSO.

SWW stated the whole scheme is under appraisal and it is intended to supply Consent Applications for the CSOs and STW by the end of March 1998. **Action:SWW**

It was made clear to the Company that the Agency were concerned over the tight timescales involved with producing consents before the proposed start of work on both the STW and the CSOs.

#### 2 Intermittent Discharges

It was agreed that the outfall at Doctors Surgery is also known as, and is consented as, Railway Car Park (South) and Railway Car Park (North) with both weirs sharing a common outfall to the estuary.

It was agreed that the Hannafore PS CSO is satisfactory and requires no further improvements. RT stated that he was unaware of any complaints or problems associated with the discharge.

RT described the situation at Plaidy CSO. In view of the G value failures at Millendreath ECBW (since the installation of secondary treatment at Millendreath STW) and the I value failures at Plaidy Beach (non-designated; measured during the rolling programme) it was agreed that this CSO will be included as part of the Bathing Water scheme and will be priority High 1.

JB agreed to forward to the Agency details of the sewerage work already undertaken by Division in the Looe catchment to the Agency. **Action: JB**

AR stated that the Agency expected Formula A improvements to be funded from AMP2 CSO Budget and improvements to Bathing Water standards to be funded from Looe scheme. JB was unsure of this arrangement and will check with Martin Ross. **Action: JB**

SWW stated that they will be not be undertaking any sewerage modelling and were unaware of any DAS that exist for the catchments. JB stated that he did not wish to spend money on modelling or surveys and was not impressed with the overall approach of sewerage modelling.

The Agency expressed concern over this approach and stated that the CSOs would probably have to be consented on a spill frequency basis with monitoring of all discharges. CR stated that the Company would accept this approach.

CR stated that he was anticipating a 3 spills/BS standard for those CSOs impacting on the Bathing Water and Formula A elsewhere. The Agency position was stated as all CSOs in the Looe catchment impact on the Bathing Water and a catchment frequency of 3 spills/BS with monitoring of all discharges was the most likely standard.

### **3 Looe STW**

The Agency confirmed they would be consenting the requirement for UV disinfection at Looe STW. As the Company will not be providing a fully supported consent application, the required dose will be based on a precautionary approach. NB stated that the Agency has data available to enable a first order calculation of the required dose. CR stated that the company would not have a problem with that approach.

The Company requested the Agency provide written justification for the UV requirement. This would be forwarded to OFWAT.

### **4 Consenting Issues**

CR requested that the consents for the STW and CSOs could be dealt with on a review basis and would not need advertising. The Agency stated that due to the level of Public interest this would not be possible and that applications would be required and the applications would be advertised.

### **5 Other Issues**

PH stated that further sewer rehabilitation work at Buller Quay had been completed in the previous week.

CR stated that, due to the level of saline infiltration in the catchment, saline balancing tanks would be provided at the STW. NB stated concern over this in view of the problems associated with the tanks installed at Salcombe STW.

**David Marshall**  
**Scientific Officer (Scheme Development)**  
**Environment Agency**