

EA-SOUTH WEST BOX 16

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ENVIRONMENT  
AGENCY

**WATER QUALITY SECTION  
CORNWALL AREA**

**FINAL DRAFT REPORT**

**GORRAN HAVEN (LITTLE PERHAVER)  
EC BATHING WATERS DIRECTIVE  
FAILURE 1996 - AN INVESTIGATION  
OF THE GORRAN HAVEN STREAM**

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**COR/97/023**

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## 1 INTRODUCTION

### 1.1 Background

The foreshore at Little Perhaver beach, Gorran Haven (SX 0130 4170), is a designated bathing area for the EC Bathing Waters Directive (76/160/EEC).

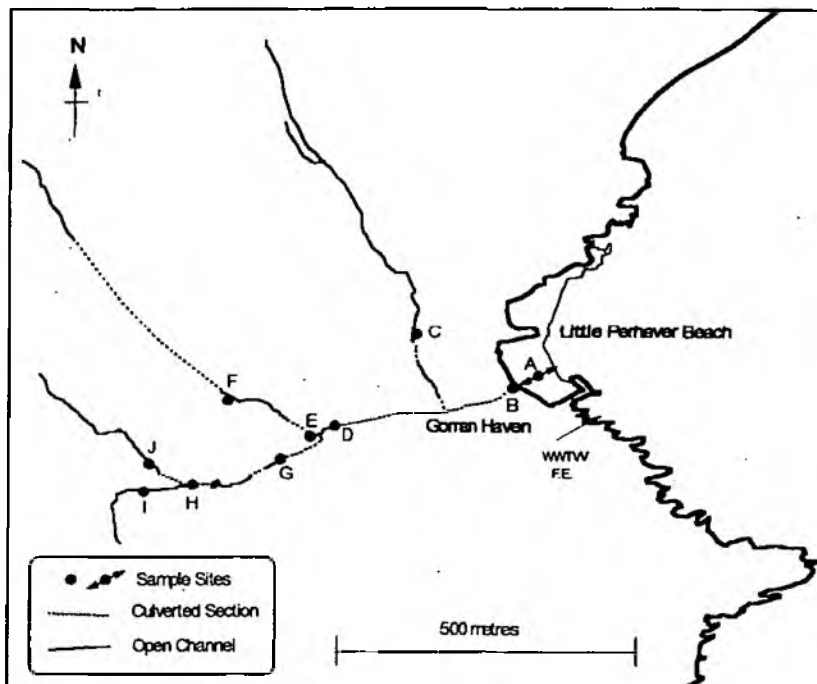
Prior to the current investigation, the beach had not failed its Directive standards since 1990.

In 1994, a new Waste Water Treatment Works (WWTW) was constructed and commissioned by South West Water Services Ltd. to treat foul effluents from the Gorran Haven area.

Water quality data from sampling undertaken in 1995 suggested that the Gorran Haven stream had contributed to the bacterial loading of Little Perhaver beach.

However, on the one occasion when a sample exceeded the EC standards, it was shown not to have been a result of bacterial loading from the stream. Following analysis of the 1995 water quality data, it was decided that additional monitoring would be undertaken should the beach return an exceedance during the 1996 season. On 9th June 1996 the beach recorded 4500 faecal Coliforms, thereby exceeding the mandatory standard of 2000 faecal Coliforms.

**Figure 1. Gorran Haven Sampling Sites**



### 1.2 Objectives

To undertake additional water quality monitoring within the Gorran Haven stream catchment to identify significant sources of bacterial contamination.

## **2 METHODS**

The following methods were adopted in this investigation:

- 2.1 Review of data and previous investigative work.
- 2.2 Bacteriological sampling at key sites within the catchment, Figure 1, carried out in conjunction with routine EC Bathing Waters Directive sampling.
- 2.3 Additional sampling of key sites during wet weather conditions.
- 2.4 Identification of properties not connected to main sewerage network and impact assessment of any septic tanks proximate to a watercourse.

## **3 RESULTS**

- 3.1 Summaries of the survey results are contained in Tables 1-3.
- 3.2 Scatter plots to show the relationship between bacterial contamination of the stream and that of the bathing water are presented in Figures 2 to 13; scatter plots 5-13 illustrate this relationship through different phases of the tide.
- 3.3 A plot of bathing water faecal Coliforms against the estimated stream input for the 1995 and 1996 bathing seasons is given in Figure 14. The input from the stream was calculated from the recorded salinity of the bathing water samples relative to that expected in sea water.

## **4 DISCUSSION**

- 4.1 The results of the additional bacteriological sampling conducted during the latter stages of the 1996 bathing period gave little indication of any serious contamination of the Gorran Haven stream from any of its tributaries.
- 4.2 Little correlation was found between high counts in the bathing water and raised counts in the stream (Figures 2-4). Little difference was observed when the collected data were arranged into tidal phases (Figures 5-13).
- 4.3 The calculated estimate of the input of faecal Coliforms to the bathing water from the Gorran Haven stream, (Figure 14), suggested that the stream did not significantly impact the bathing beach in the 1996 season. Comparison of recent data indicated a reduction in the contribution of bacterial loading from the stream from 1995 to 1996.

- 4.4 If the 1996 EC Directive failure at this location was not due to contamination from the Gorran Haven stream, then the most likely source would be the WWTW outfall to the south of the beach. The outfall lies within this small bay and it would not be unreasonable to suggest that discharged material might be driven ashore during certain weather and/or tidal conditions. Due to the close proximity of the outfall to the beach, the conditions which would have been necessary to drive the effluent into these bathing waters would not necessarily have had to have been exceptional.
- 4.5 Wet weather event sampling did not uncover any evidence to support the theory that the bacterial problem was weather related. Additional monitoring for household detergents also proved negative.
- 4.6 Of all the properties in the immediate study area only three were found not to have been connected to the main sewerage network. These were visited and only one of the three was assessed to have been a potential risk. A series of dye and bacterial tracing surveys concluded that the soak-away from this property was not a source of bacterial contamination to the stream.
- 4.7 Although little significant bacterial contamination of the stream was identified, some upstream and downstream variances were observed. The most notable being an increase in faecal Coliform counts between sites F and E (Cook's Level and Rice Farm) on 16 September. On this occasion none of the other sites showed significantly elevated bacterial levels. This event did not cause an exceedance of standards at the bathing beach nor a significant increase in the bacterial count of the stream at the site prior to the beach.
- 4.8 As with many streams flowing onto beaches, the bacteria counts recorded in the Gorran Haven stream were relatively high in relation to the standards imposed upon the bathing waters. However, when compared with other such streams in the region, the bacteria counts from this stream do not appear to be exceptional.
- 4.9 Although the freshwater inputs were not seen to have caused the EC Directive failure, there were some elevated bacteria counts recorded in the catchment. There are currently no bacterial standards for freshwater ecosystems and so gauging water quality from bacteria counts is not practicable.
- 4.10 Bacteria are a naturally occurring part of the aquatic ecosystem and play a major role in the breakdown of organic material in the natural purification processes.

## **5 CONCLUSIONS**

- 5.1 The Gorran Haven stream did not significantly impact the bathing beach at Little Perhaver in the 1996 season.
- 5.2 The failure of the EC Bathing Waters Directive standards was most likely due to contamination from effluent discharging from the nearby WWTW short sea outfall.
- 5.3 Gorran Haven WWTW is now operating Ultra-Violet tertiary treatment. This should eliminate bacterial loading from the works.

## **6 RECOMMENDATIONS**

- 6.1 Continue assessment of bathing beach water quality for compliance with the EC Directive.  
Action - Survey Officer
- 6.2 Continued liaison with South West Water Services Ltd. with respect to the performance of the Ultra-Violet treatment process.  
Action - Water Quality

**Table 1. Total Coliforms**

	A	B	C	D	E	F	G	H	I	J	Tidal Phase:
	Gorran Haven	Stream Prior to beach*	Trib. prior to culvert	Stream prior to culvert	Rice Farm	Cook's Level	Rice Lane	Helyglowarth	Stream by path	Stream at 'The Commons'	Hours from High Tide
01/05/96	30	660									4
10/05/96	270	6400									0.2
18/05/96	10	18000									5.75
30/05/96	144	2600									5
02/06/96	300	24000									5.5
09/06/96	6800	2000									1.5
17/06/96	120	24000									6
22/06/96	60	6800									1
01/07/96	150	37000									1
10/07/96	160	7400									2.5
18/07/96	40	6300									5
27/07/96	50	6000									4
01/08/96	5	13600									5.25
11/08/96	342	30000	6000	30000							5.25
20/08/96	536	30000									3
30/08/96	520	4600	2300	3500							4.5
10/09/96	4100	12000	3400		2900		850		480	800	0.3
16/09/96	840	18000	390		49000	3200	990	660			3
24/09/96	20	7000	3000		3000	500	220	230			3
30/09/96	40	24000	24000		26000	12700	3300	4600			3.5

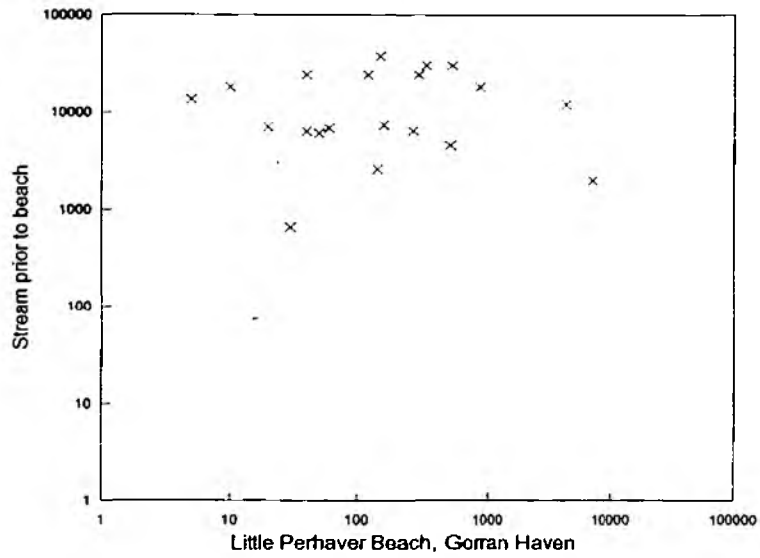
**Table 2. Faecal Coliforms**

	A	B	C	D	E	F	G	H	I	J	Tidal Phase:
	Gorran Haven	Stream Prior to beach	Trib. prior to culvert	Stream prior to culvert	Rice Farm	Cook's Level	Rice Lane	Helygiowarth	Stream by path	Stream at 'The Commons'	Hours from High Tide
01/05/96	40	410									4
10/05/96	150	4600									0.2
18/05/96	10	10800									5.75
30/05/96	160	680									5
02/06/96	110	9000									5.5
09/06/96	4500	1200									1.5
17/06/96	102	14400									6
22/06/96	30	2200									1
01/07/96	110	41000									1
10/07/96	60	3800									2.5
18/07/96	30	3600									5
27/07/96	10	5000									4
01/08/96	5	9400									5.25
11/08/96	261	30000	2600	30000							5.25
20/08/96	232	12000									3
30/08/96	220	3600	1010	3000							4.5
10/09/96	2900	9000	2700		1220		370		290	330	0.3
16/09/96	290	11000	190		44000	210	520	450			3
24/09/96	20	6000	640		950	190	200	170			3
30/09/96	30	15200	8800		10800	9500	2400	4000			3.5

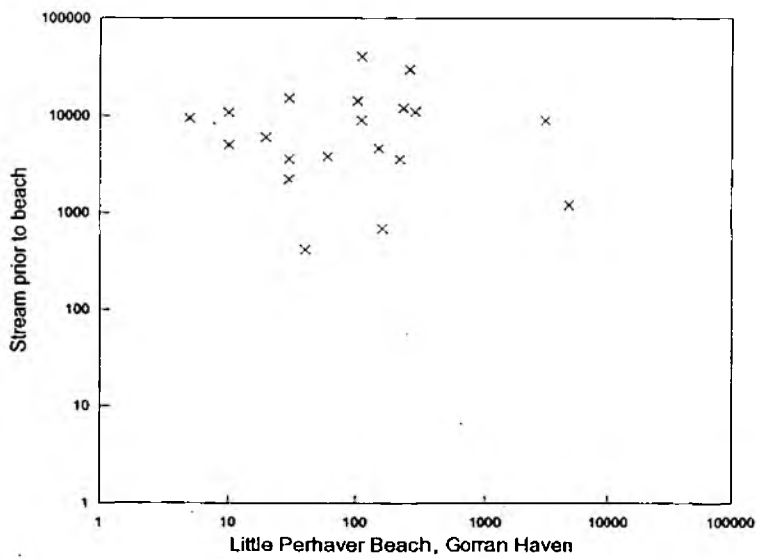
**Table 3. Faecal Streptococci**

	A	B	C	D	E	F	G	H	I	J	Tidal Phase:
	Gorran Haven	Stream Prior to beach	Trib. prior to culvert	Stream prior to culvert	Rice Farm	Cook's Level	Rice Lane	Helyglowarth	Stream by path	Stream at 'The Commons'	Hours from High Tide
01/05/96	30	320									4
10/05/96	10	290									0.2
18/05/96	10	840									5.75
30/05/96	20	450									5
02/06/96	80	3400									5.5
09/06/96	170	340									1.5
17/06/96	180	1000									6
22/06/96	20	600									1
01/07/96	10	6400									1
10/07/96	5	600									2.5
18/07/96	10	900									5
27/07/96	40	300									4
01/08/96	5	640									5.25
11/08/96	80	30000	2400	30000							5.25
20/08/96	100	4900									3
30/08/96	160	3200	960	3300							4.5
10/09/96	1220	2600	1180		400		2000		2600	210	0.3
16/09/96	1840	3700	720		6800	260	6000	1270			3
24/09/96	80	1220	410		310	290	310	220			3
30/09/96	30	9200	3000		6200	20000	13800	1030			3.5

**Figure 2. Total Coliforms**



**Figure 3. Faecal Coliforms**



**Figure 4. Faecal Streptococci**

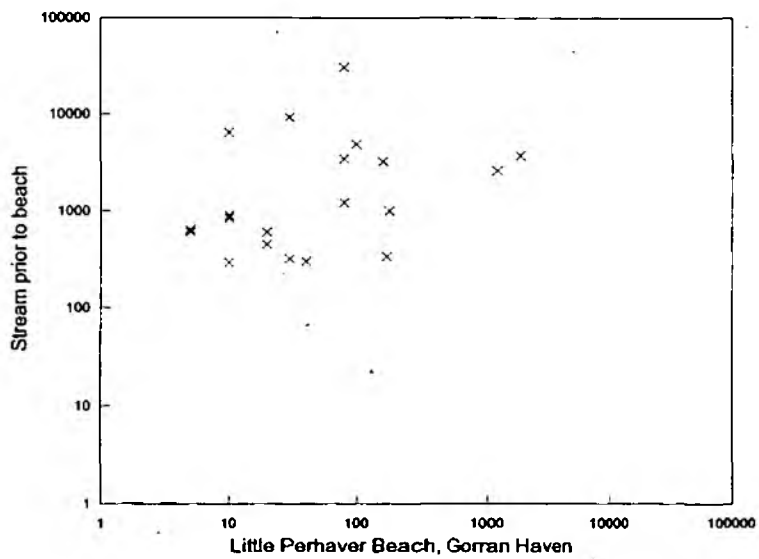


Figure 5. Total Coliforms - High Tide

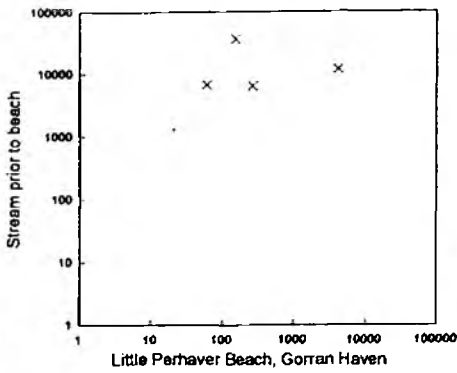


Figure 6. Faecal Coliforms - High Tide

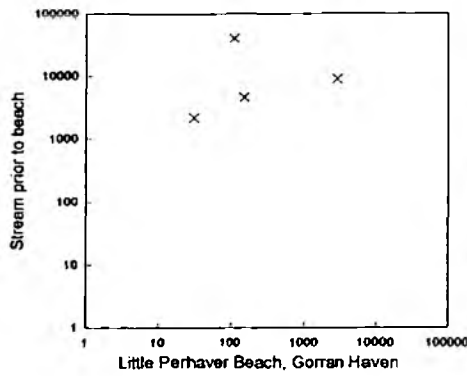


Figure 7. Faecal Streptococci - High Tide

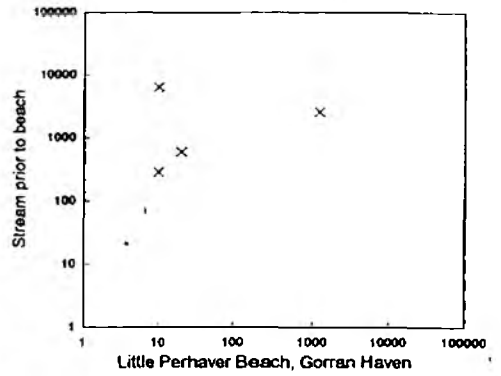


Figure 8. Total Coliforms - Half Tide

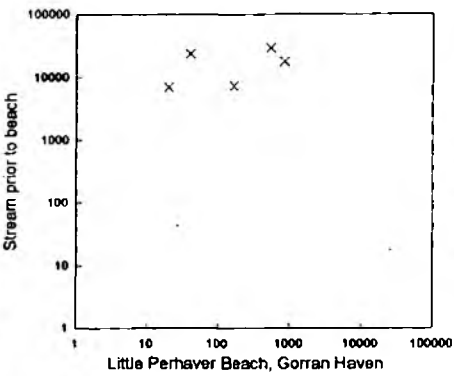


Figure 9. Faecal Coliforms - Half Tide

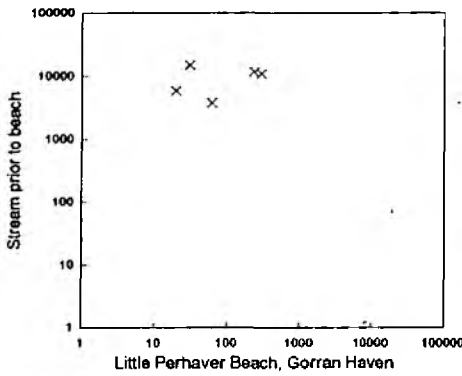


Figure 10. Faecal Streptococci - Half Tide

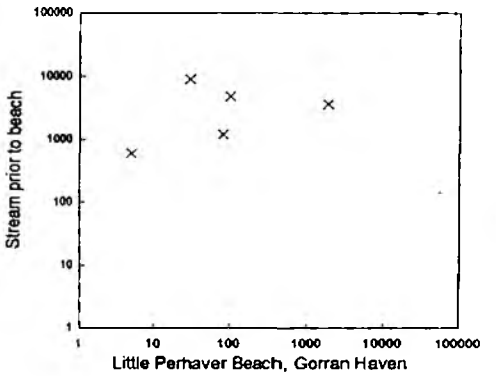


Figure 11. Total Coliforms - Low Tide

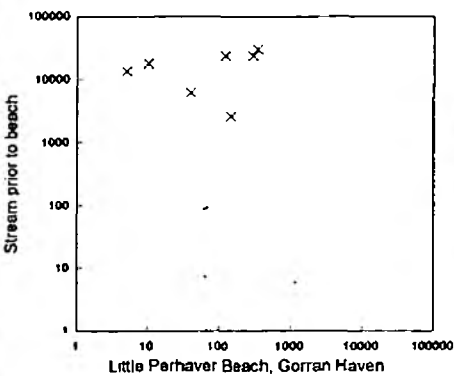


Figure 12. Faecal Coliforms - Low Tide

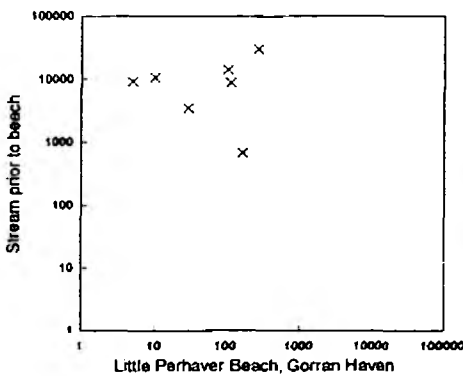
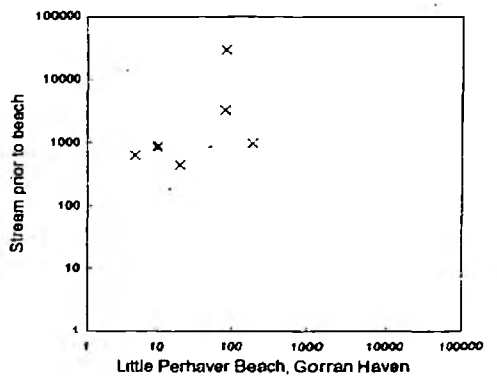


Figure 13. Faecal Streptococci - Low Tide





**Figure 14. Gorran Haven - Little Perhaver Bathing Water monitoring & stream input data, 1995 & 1996.**

