ENVIRONMENT AGENCY

WATER QUALITY SECTION
CORNWALL AREA

FINAL DRAFT REPORT

FURTHER MONITORING OF THE IMPACT OF CROWNDALE WASTE WATER TREATMENT WORKS FINAL EFFLUENT ON WATER QUALITY

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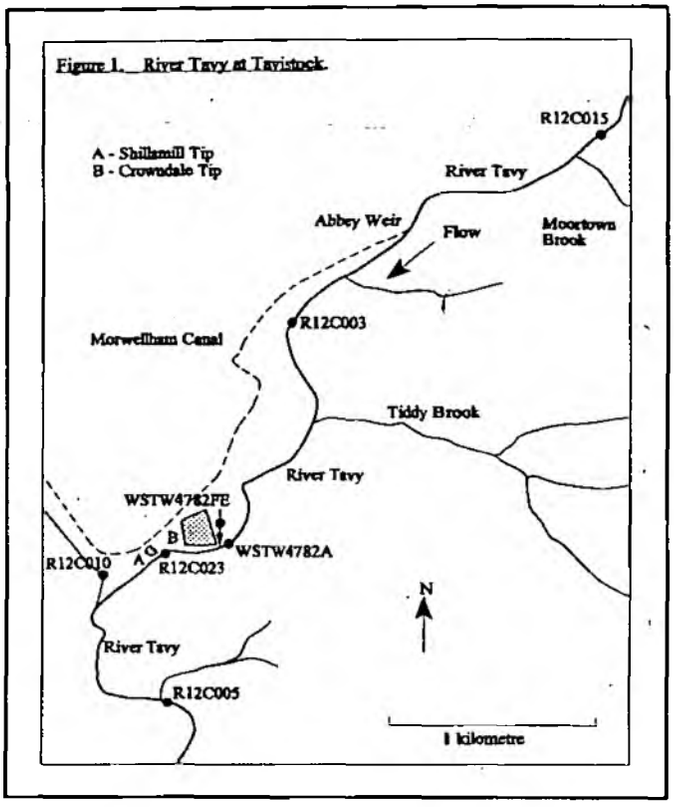
1 INTRODUCTION

1.1 Background

The River Tavy at R12C023, downstream of Crowndale waste water treatment works (WWTW), is a designated salmonid site for the EC Freshwater Fish Directive.
There is a history of water quality problems in this area, with previous work indicating sewage effluent and urban runoff as the major sources.
In 1993 and 1994 the site failed the EC Freshwater Fish Directive for Ammonia.



1.2 Objectives

To monitor the EC Directive site R12C023, downstream of the Crowndale WWTW final effluent, along with the upstream site, WSTW4782A, in order to assess the need to conduct further work in an attempt to identify any link between the works and the periodic reduction in river water quality.

2 METHODS

2.1 Multi parameter water quality monitoring equipment was installed at the two selected sites; where they monitored the river water quality for a period of one month.

2.2 A stormwater event logger was installed at the works storm overflow (SO) to assess its' operation and attempt to link SO operation with downstream water quality.

3 RESULTS

3.1 Summaries of the water quality monitor data, are illustrated in Figures 2-5.

3.2 The SO was recorded as operational on several occasions during the study period but no resulting reduction in downstream water quality was observed.

4 DISCUSSION

4.1 At no point during the period of monitoring was any ammonium recorded at either the upstream or downstream sites (figures 2 and 4). Neither the final nor the storm overflow effluents were seen to have caused a reduction in downstream water quality during the study period.

4.2 Several wet weather events occurred during the study period and theSO was recorded as operating on many occasions without affecting the downstream water quality.

4.3 This brief investigation did not produce any data that would support a more detailed and expansive survey at this time.

4.4 However, prior to this survey sewage fungus was again observed throughout the run immediately downstream of the final effluent discharge point.

4.4.1 The flow dynamics of the River Tavy at the point of final and storm effluent discharges from Crowndale WWTW have been such that during low flow conditions discharged material has been insufficiently mixed. This has often formed a readily identifiable band stretching along the right hand side of the river.
Under such conditions some of the organic material discharged from the works has fallen out of suspension and built up along this 50 metre section of river.

4.4.2 Periodically sewage fungus growth has occurred throughout this section and at times the infestation has reached gross proportions. This has seriously reduced the aesthetic condition of the river.

4.4.3 It is possible that there is a relationship between the build-up of discharged organic material and the occurrence of the sewage fungus.

4.4.4 Improved mixing of the final effluent would reduce the build-up of works derived organic material in this section of the river. This may then in turn reduce the occurrence of gross sewage fungal infestation.

4.4.5 In addition, improved mixing might reduce the likelihood of water quality failure at the downstream site.

4.5 A boulder groyne has recently been constructed at the final effluent discharge point; in an attempt to improve the mixing of the effluent and so the general aesthetic condition of this section of river bed.

4.6 A preliminary mixing zone study was conducted to assess the effectiveness of this structure; the results observed being specific to the low flow conditions experienced at the time.

4.6.1 Initial investigation with dye tracing showed that there was some improvement to the effluent mixing. This was confirmed by water sample transects taken downstream.

4.6.2 Further investigation with a larger dye plume indicated substantial infiltration of unmixed effluent through the structure and a back-eddy developing behind the groyne.

5 CONCLUSIONS

5.1 No evidence was found during this brief water quality survey that would support a more detailed and expansive survey to be undertaken at this time.

5.2 Site R12C023 has not failed the Directive standard since 1994. During subsequent monitoring the data have indicated the risk of this site failing under normal conditions to be low.

5.3 It has not been possible to determine either the reason or the source of the 1993 and 1994 Directive failures. Further work at this time would be unlikely to provide any further useful information.

5.4 Recent[1] and planned future work[2] by the water company to the works and improvements to the sewerage/drainage system in the area may have significantly reduced or will further reduce the potential risk of quality standard failure at this site.

5.5 Should the site fail to maintain the relevant standards in the future, the data collected since 1994 will prove valuable for comparative purposes.

5.6 The boulder groyne, by improving the mixing of the final effluent, could result in a significant reduction in discharged organic material accumulation and the resulting sewage fungus infestation. Although the back-eddying and infiltration problems may result in an aesthetic problem in the immediate vicinity of the groyne during certain flow conditions.

6 RECOMMENDATIONS

6.1 Further water quality investigative work should not be considered unless there is a future Directive failure in this area.

6.2 The effectiveness of the boulder groyne should however continue to be assessed under a range of flow conditions. Where necessary, adjustments should made to the structure in order to maximise it's beneficial impact on river.

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1 Motorisation of filters and screening of material to spreader arms.

2 Screening of overflow to storm tank.

Figure 2. Downstream (a)

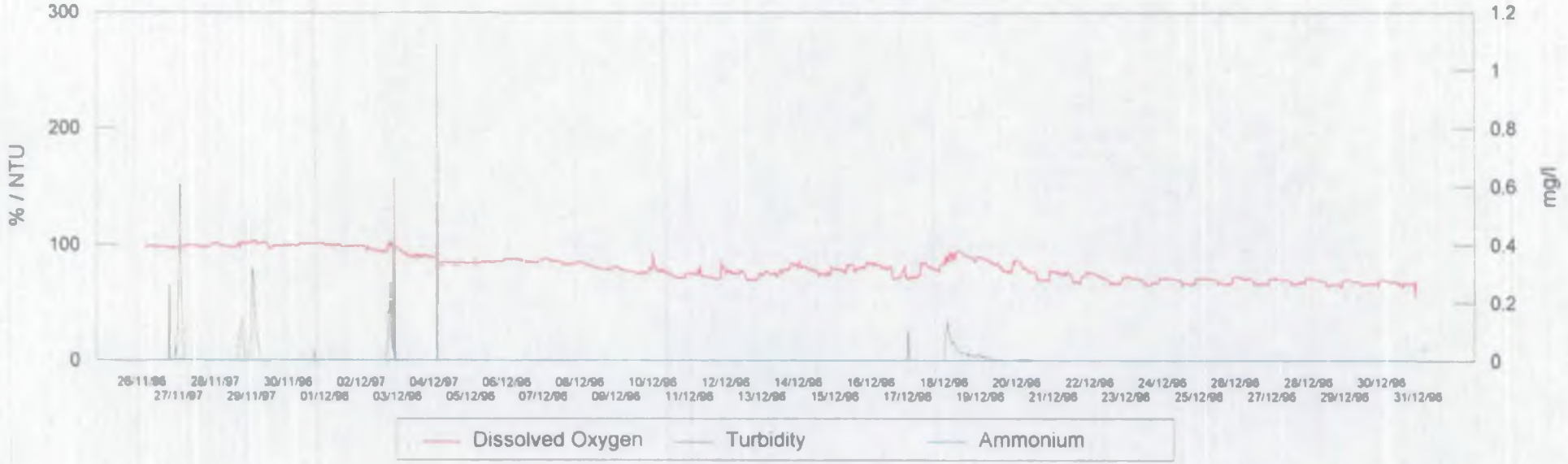

Figure 3. Downstream (b)

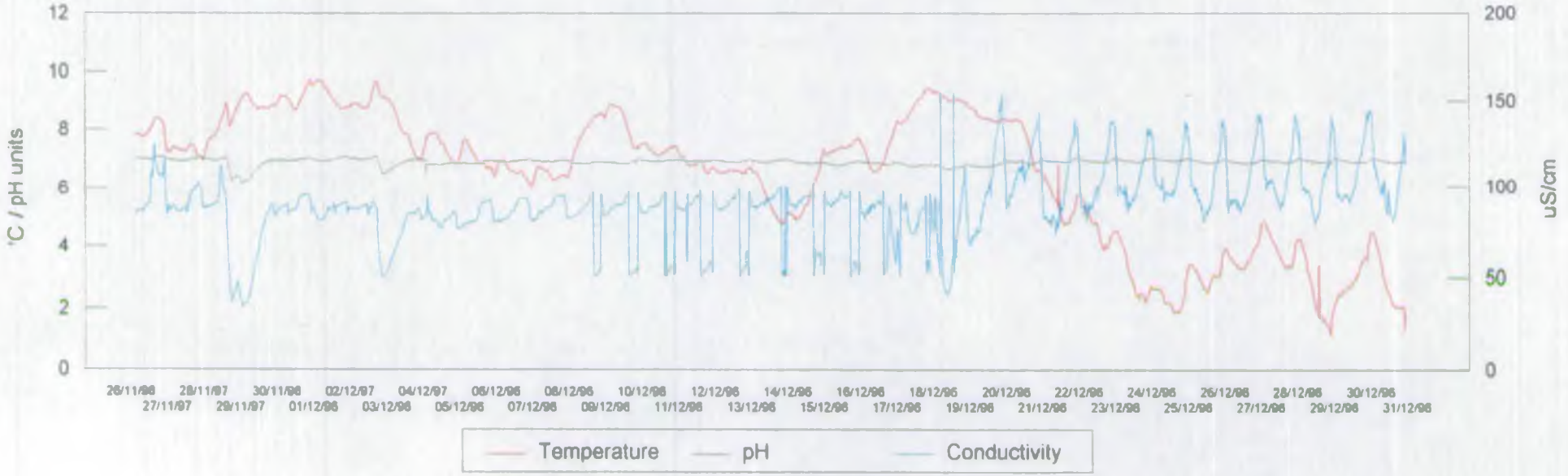

Figure 4. Upstream (a)

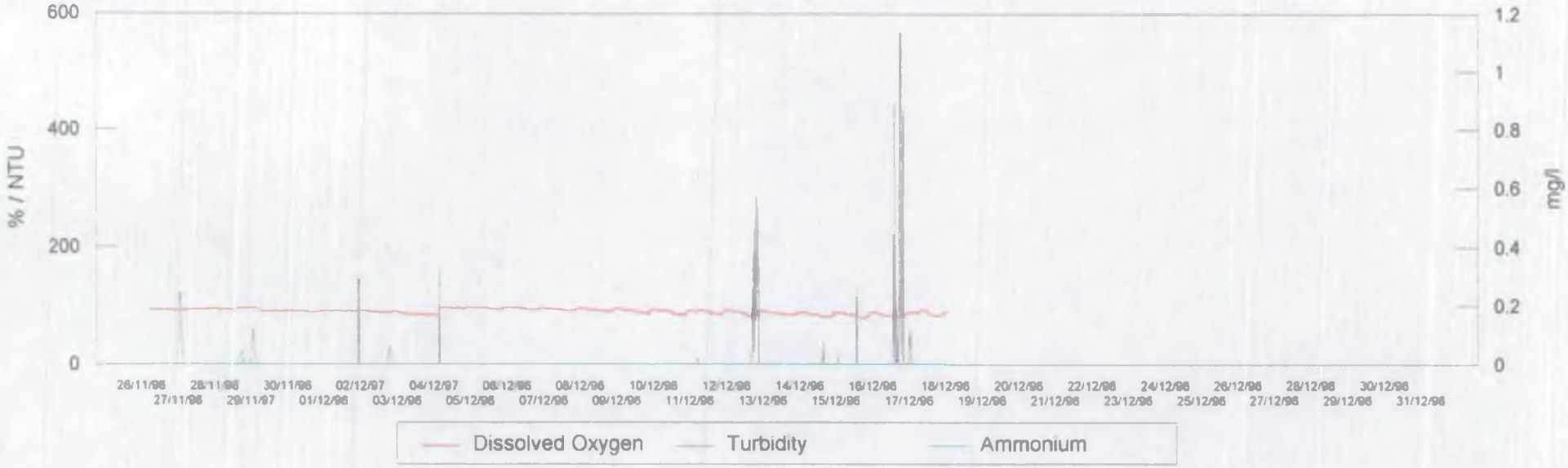

Figure 5. Upstream (b)