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DEVON AREA
INTERNAL REPORT

ENVIRONMENT AGENCY

INVESTIGATION TO MONITOR STORM SEWER OVERFLOW EVENTS FROM KENN & KENNFORD STW AND PUMPING STATION

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(CATCHMENT 05A)

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ENVIRONMENT AGENCY

EA - South West/99-12

INVESTIGATION TO MONITOR STORM SEWER OVERFLOW EVENTS FROM KENN & KENNFORD STW AND PUMPING STATION.

1. CATCHMENT DESCRIPTION

The River Kenn rises at Darnaford in the Cotley Wood area (NGR SX 8620 8990) and flows 9 km east south-east where it flows into the River Exe estuary (NGR SX 9748 8318). Of the 9 km of river length, 0.5 km is tidal and 8.5 km fluvial; the predominant land use is agricultural (Ref. 1)

2. TERMS OF REFERENCE

2.1 OBJECTIVES

The Kenn & Kennford pumping station (PS, NGR SX 9277 8540) serves Kenn & Kennford Sewage Treatment Works (STW, WSTW6188FE discharges at NGR SX 9275 8527 SEE Figure 1). Historically there has been concern with regard to the operation of the overflow from the pumping station and the STW itself (Ref. 2).

A previous investigation (Ref. 2) to monitor overflow events from the PS concluded that discharges occurred with apparently little or no associated rainfall in the area. Also concern was raised that a few weeks after the event monitor installation and during times of high rainfall, events from the PS were minimal compared to those recorded previously. This raised the possibility that some time after installation, all flow from the PS may have been continually transferred to the STW where excess flows would be discharged via storm tanks and out of the storm sewer overflow (SSO see Figure 1).

As such, a recommendation from the instigation was to carry out a further study to log all overflow events from the pumping station and the STW's SSO.

2.2 PROJECT TEAM

T. Cronin (Project Leader)
P. Rose (Project Manager, author)

2.3 METHOD

The overflow or 'storm' events from the pumping station and STW SSO were logged by the use of a Prolec Stormlog, a monitoring system ideally suited for a sewage environment.

A transducer is attached to a stainless steel band that in turn is inserted into the overflow pipe. When the water / effluent flows over the sensor, the transducer sends the date and start time of the event to a logger box which is placed away from the pipe. Once the flow stops, the transducer records the date and time to the logger.

The logger is interrogated via a laptop computer and the data file down loaded. Periodic cleaning of the transducer assembly helps prevent build up of plastics, rags etc.

Although events with a duration as low as 1 minute can be record, for the purpose of this investigation only those of 5 minute duration or longer have been reported as events.

The raingauge (a Prolec Rainlog tipping bucket raingauge with integral logger) was situated in the grounds of the STW (for security) in an area with as clear an aspect as possible in order to cause least influence to the readings. The unit was placed on a firm base, levelled as best possible (internal spirit level), checked and down loaded each time the event monitors were visited.

3. RESULTS

Pumping Station Overflow

The Stormlog was successful in recording 25 events (5 minute duration or more) totalling 315 hours 35 minutes between the monitoring period 06 May 1998 to 09 July 1998 inclusive (see Table 1). The first event was recorded as being approximately 40 hours duration; the overflow was actually operating at the time of installation so in reality the length of this event will have been greater. The longest storm event recorded lasted for 104 hours 53 minutes starting 14/05/98 ending 19/05/98.

SSO from the STW

50 events of 5 minute duration or more were recorded between the monitoring period 06 May 1998 to 09 July 1998 inclusive totalling 405 hours 15 minutes (see Table 1). Duration of the longest event was 357 hours and 18 minutes, starting on 21/05/98 and ending 05/06/98. On 05-June-98 during the period when the SSO was overflowing, 100 % sewage fungus cover in the SSO discharge channel was noted.

Rainfall at Kenn & Kennford STW

The rainlog unfortunately was not available for installation until 27/05/98 (see Site Log, APPENDIX I). However rainfall data were recorded between 28/05/98 to 09/07/98 (see Figure 2 and APPENDIX I). During this period a total of 166 mm rain was recorded; during the month of June, 133 mm rain was recorded.

4. DISCUSSION

The overflows from both the PS and STW were found to have operated during both dry and wet weather conditions (see Figure 2). Evidence to support this finding in relation to the PS alone has also been previously reported (Ref. 2). The fact that at the STW the SSO discharge channel just D/S of the event monitor location had time to develop 100 % sewage fungus cover again adds credence to the length of time the overflow had been operating.

There are generally three possible causes as to why the overflows may have operated. Since 1971, June 1998 was the fourth wettest June on record for Devon (Devon area Hydrometric section: wetter Junes in 1971,1980 & 1997, based on general amalgamation of data from 8 raingauge sites all over Devon). An overflow in any STW or PS is designed to overflow during periods of extreme rainfall as an emergency to prevent flooding etc; the discharge events are usually brief and designed to cause minimal impact to an already elevated river level. However, this doesn't account for the duration of events during rainfall or events recorded during periods of little or no rainfall.

Mechanical / electrical failure of components in the PS, e.g. level switches within the wet well, failure of pumps or blockages at the STW's could also result in overflows. However, on contact with SWWL, no failures or problems at the works in general were reported for the period of 06-May-98 to 09-July-98.

The third and more probable cause is one of hydraulic overloading by either insufficient design capacity for the population served and / or by the influent flow being augmented by infiltration of water along the sewerage prior to the PS, thus effectively increasing the population equivalent of the effluent flow-wise.

The STW was designed to serve a population of 638; during September 1987, the population connected to the works was estimated at 588 (see APPENDIX II). Since this date, we are unaware of any work that may have been carried out at the works to increase population capacity.

It was recorded in an internal memorandum (South West Water (SWW), see APPENDIX II) in 1987 that the sewerage system was subject to a large degree of infiltration resulting in premature storm overflow at the PS. Again, since we are unaware of any improvements to the sewerage since this date, one can only assume the problem referred to would have remained the same or if anything become slightly worse.

Taking this knowledge into account, when the National Rivers Authority (NRA) was formed in 1989, a planning embargo was placed on any further development in the area that would be served by Kenn & Kennford STW.

Since 1987 when problems with the works in general were noted by then SWW, apparently the only major work done to increase the quality of the storm effluents has been to place COPA sacks on the discharges to prevent unscreened sewage entering the River Kenn. The evidence from this investigation shows that there is still a problem with the sewerage, PS and STW resulting in the works being frequently hydraulically overloaded. The planning embargo initiated by the then NRA is still supported by the Environment Agency and should continue to be so until any remedial work carried out by SWWL can be demonstrated to have improved the situation.

5. CONCLUSIONS

1. Kenn & Kennford PS overflow and STW SSO will readily operate even during times of low rainfall.

2. During the deployment period (06 May 1998 to 09 July 1998 inclusive) there were 25 storm events totalling 315 hours 35 minutes from the PS overflow and 50 storm events from the STW SSO totalling 405 hours 15 minutes .

3. The problem that the work's design capacity / infiltration have been recognised by the then SWW since at least 1987 and as yet we are unaware of any improvements to rectify this.

4. The Environment Agency is continuing a planning embargo on any further developments served by Kenn & Kennford STW.

6. RECOMMENDATIONS.

1. Continue to enforce the planning embargo on developments served by Kenn & Kennford STW until improvements have been carried out on the sewerage system, PS and STW.

7. REFERENCES.

1. NRA. (1995). River Exe Catchment Management Plan. Consultation Report.

2. Investigation to monitor storm events from the Kenn & Kennford pumping station. E.A. internal report DEV/WQ/13/97 August 1997.

Figure 1. Schematic showing Kenn & Kennford pumping station and STW (Not to scale).

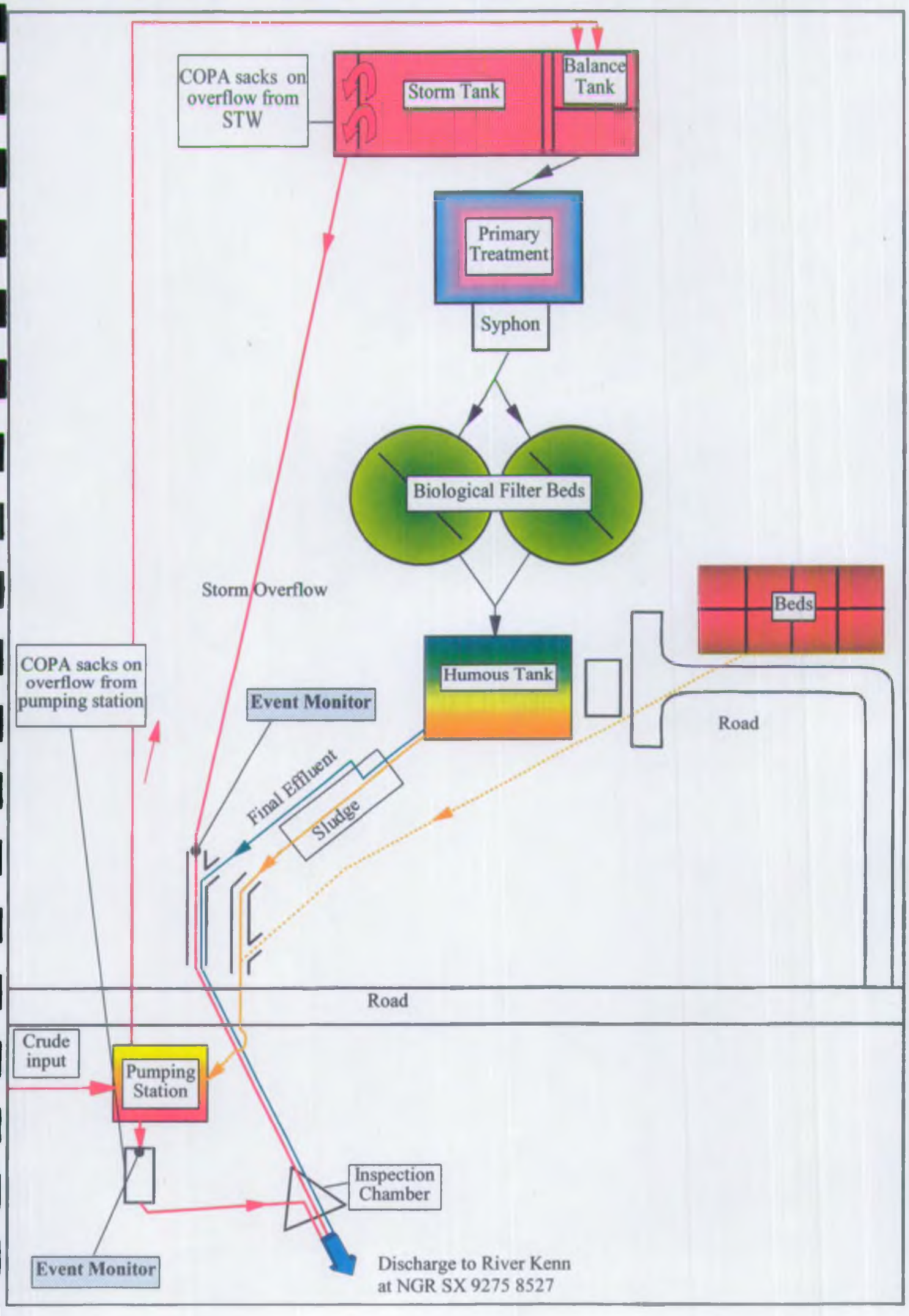

Figure 2. Graphs showing rainfall and logged discharge events.

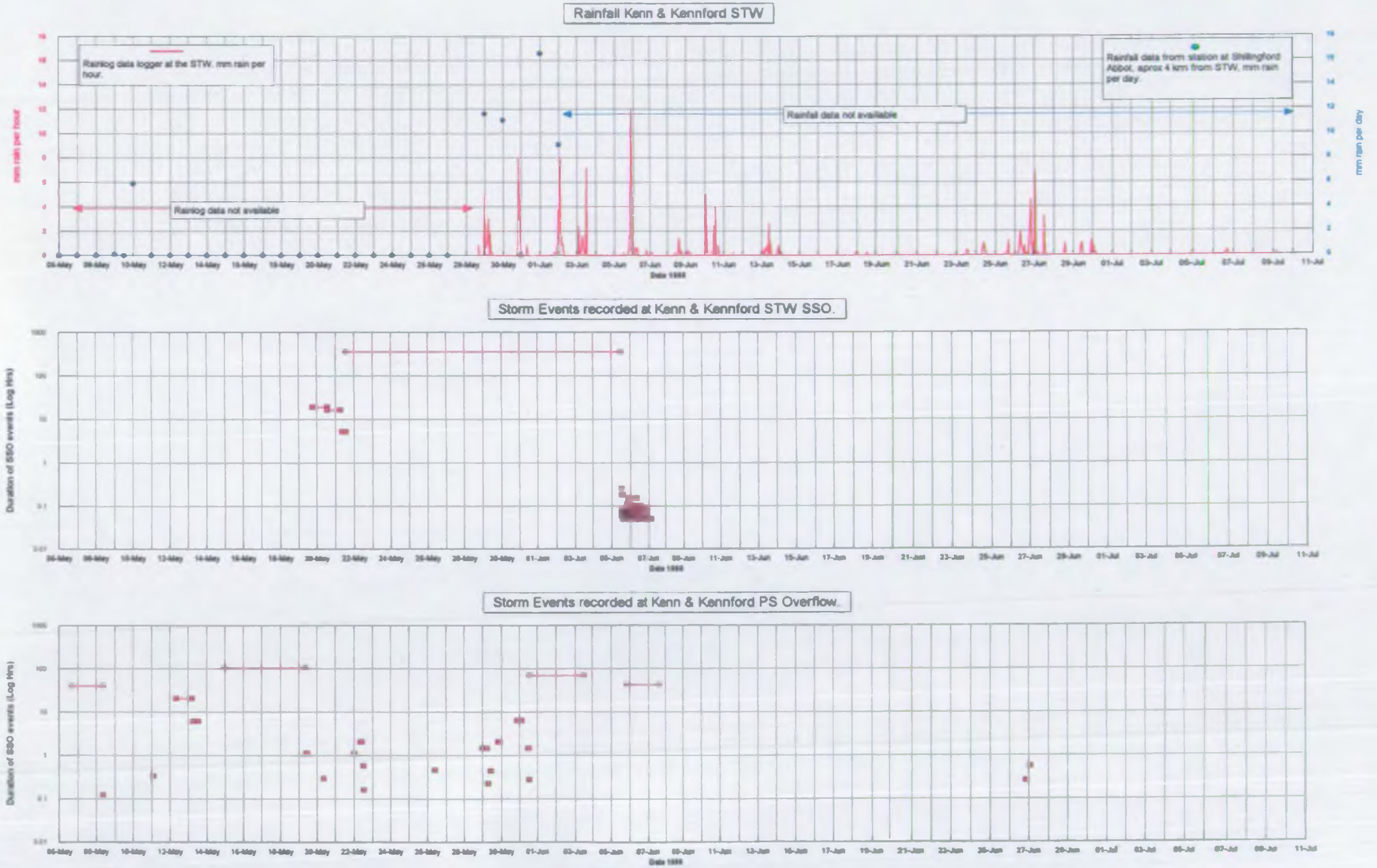

Table 1. Kenn & Kennford Pumping Station and STW overflow events.

STW Overflow					Pumping Station Overflow				
Start Date	Start Time	End Date	End Time	Duration (Hrs/mins)	Start Date	Start Time	End Date	End Time	Duration (Hrs/mins)
19/05/98	18:10:00	20/05/98	13:29:00	19.19	06/05/98	16:30:00	08/05/98	08:21:00	39.51
20/05/98	13:48:00	21/05/98	06:09:00	16.21	08/05/98	08:26:00	08/05/98	08:38:00	0.12
21/05/98	08:00:00	21/05/98	13:26:00	5.26	11/05/98	02:20:00	11/05/98	02:53:00	0.33
21/05/98	13:44:00	05/06/98	11:22:00	357.18	12/05/98	08:07:00	13/05/98	04:33:00	20.26
05/06/98	11:31:00	05/06/98	11:57:00	0.26	13/05/98	06:38:00	13/05/98	12:50:00	6.12
05/06/98	12:17:00	05/06/98	12:23:00	0.06	14/05/98	23:22:00	19/05/98	08:15:00	104.53
05/06/98	12:33:00	05/06/98	12:41:00	0.08	19/05/98	09:47:00	19/05/98	10:59:00	1.12
05/06/98	12:52:00	05/06/98	13:10:00	0.18	20/05/98	08:39:00	20/05/98	09:08:00	0.29
05/06/98	13:31:00	05/06/98	13:38:00	0.07	21/05/98	23:23:00	22/05/98	00:33:00	1.10
05/06/98	14:29:00	05/06/98	14:34:00	0.05	22/05/98	08:03:00	22/05/98	10:07:00	2.04
05/06/98	15:03:00	06/06/98	15:08:00	0.05	22/05/98	11:24:00	22/05/98	12:21:00	0.57
05/06/98	15:40:00	05/06/98	15:48:00	0.08	22/05/98	12:33:00	22/05/98	12:49:00	0.16
05/06/98	15:52:00	05/06/98	15:57:00	0.05	26/05/98	09:02:00	26/05/98	09:47:00	0.45
05/06/98	16:25:00	05/06/98	16:31:00	0.06	28/05/98	23:44:00	29/05/98	01:28:00	1.44
05/06/98	16:55:00	05/06/98	17:02:00	0.07	29/05/98	04:04:00	29/05/98	05:48:00	1.44
05/06/98	17:13:00	05/06/98	17:18:00	0.05	29/05/98	07:22:00	29/05/98	07:44:00	0.22
05/06/98	17:40:00	05/06/98	17:45:00	0.05	29/05/98	10:18:00	29/05/98	11:01:00	0.43
05/06/98	18:18:00	05/06/98	18:24:00	0.06	29/05/98	19:44:00	29/05/98	21:47:00	2.03
05/06/98	18:30:00	05/06/98	18:37:00	0.07	30/05/98	20:37:00	31/05/98	03:13:00	6.36
05/06/98	18:57:00	05/06/98	19:03:00	0.06	31/05/98	10:59:00	31/05/98	12:43:00	1.44
05/06/98	20:23:00	05/06/98	20:34:00	0.11	31/05/98	12:45:00	31/05/98	13:12:00	0.27
05/06/98	21:03:00	05/06/98	21:11:00	0.08	31/05/98	13:15:00	03/06/98	11:35:00	70.20
05/06/98	21:14:00	05/06/98	21:21:00	0.07	05/06/98	20:35:00	07/06/98	15:05:00	42.30
05/06/98	21:33:00	05/06/98	21:44:00	0.11	26/06/98	20:18:00	26/06/98	20:44:00	0.26
05/06/98	22:05:00	05/06/98	22:20:00	0.15	27/06/98	00:46:00	27/06/98	01:42:00	0.56
05/06/98	22:25:00	05/06/98	22:31:00	0.06					
05/06/98	22:34:00	05/06/98	22:39:00	0.05					
05/06/98	22:43:00	05/06/98	22:48:00	0.05					
05/06/98	22:58:00	05/06/98	23:06:00	0.08					
05/06/98	23:11:00	05/06/98	23:18:00	0.07					
05/06/98	23:22:00	05/06/98	23:27:00	0.05					
05/06/98	23:32:00	05/06/98	23:39:00	0.07					
06/06/98	00:30:00	06/06/98	00:35:00	0.05					
06/06/98	03:41:00	06/06/98	03:49:00	0.08					
06/06/98	04:06:00	06/06/98	04:12:00	0.06					
06/06/98	04:41:00	06/06/98	04:51:00	0.10					
06/06/98	04:53:00	06/06/98	04:58:00	0.05					
06/06/98	05:19:00	06/06/98	05:24:00	0.05					
06/06/98	05:29:00	06/06/98	05:34:00	0.05					
06/06/98	05:58:00	06/06/98	06:04:00	0.06					
06/06/98	07:02:00	06/06/98	07:07:00	0.05					
06/06/98	07:16:00	06/06/98	07:31:00	0.15					
06/06/98	07:48:00	06/06/98	07:57:00	0.09					
06/06/98	08:07:00	06/06/98	08:12:00	0.05					
06/06/98	08:36:00	06/06/98	08:41:00	0.05					
06/06/98	08:56:00	06/06/98	09:03:00	0.07					
06/06/98	09:11:00	06/06/98	09:18:00	0.07					
06/06/98	09:26:00	06/06/98	09:32:00	0.06					
06/06/98	10:42:00	06/06/98	10:47:00	0.05					
06/06/98	12:16:00	06/06/98	12:26:00	0.10					
06/06/98	12:47:00	06/06/98	12:54:00	0.07					
06/06/98	15:47:00	06/06/98	15:52:00	0.05					
06/06/98	18:50:00	06/06/98	18:55:00	0.05					
06/06/98	19:09:00	06/06/98	19:18:00	0.09					
06/06/98	19:44:00	06/06/98	19:49:00	0.05					
06/06/98	20:44:00	06/06/98	20:50:00	0.06					
06/06/98	21:07:00	06/06/98	21:13:00	0.06					
06/06/98	21:27:00	06/06/98	21:35:00	0.08					
06/06/98	21:37:00	06/06/98	21:43:00	0.06					
07/06/98	03:40:00	07/06/98	03:45:00	0.05					

ata filtered to show events 5 minutes duration and over.

APPENDIX I

Kenn & Kennford 1998

Site log

Unit	Site	Start date	Start Time	Stop Date
Stormlog 5	Pump Station overflow	06/05/98	16:30	01/08/98
Stormlog 6	STW overflow	06/05/98	16:30	01/08/98
Rainlog	STW grounds	28/05/98	15:00	31/08/98

Log:

06-May-98 Both units installed at 14:00 to 15:00 aprox; pumping station overflow operating.

27-May-98 Both units downloaded, examined & cleaned. Storm tanks at STW full & over flowing, no flow from PS overflow. Rainlog installed.

03-Jun-98 Both units downloaded, examined & cleaned. Storm tanks at STW full & overflowing. Pumping station also overflowing.

05-Jun-98 Both units downloaded, examined & cleaned. Storm tanks at STW full & overflowing. Storm tanks overflow channel 100 % covered with sewage fungus. PS not overflowing;
Disregard previous 2 days data for pumping station as unreliable due to fat / rag stuck to sensor head.

15-Jun-98 Both units downloaded, examined & cleaned. Neither overflowing, COPA sacks containing debris. Circuit box in PS open.

09-Jul-98 Both units downloaded and removed. STW storm tanks containg some effluent.

Rainfall data collected at Kenn & Kennford STW via Rainlog.

RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm
				34	30/05/98	00:00	0.0	82	01/06/98	00:00	0.0	130	03/06/98	00:00	0.0
				35	30/05/98	01:00	0.0	83	01/06/98	01:00	0.0	131	03/06/98	01:00	0.0
				36	30/05/98	02:00	0.0	84	01/06/98	02:00	0.0	132	03/06/98	02:00	2.4
				37	30/05/98	03:00	0.0	85	01/06/98	03:00	0.0	133	03/06/98	03:00	0.0
				38	30/05/98	04:00	0.0	86	01/06/98	04:00	0.0	134	03/06/98	04:00	0.0
				39	30/05/98	05:00	0.0	87	01/06/98	05:00	0.0	135	03/06/98	05:00	0.2
				40	30/05/98	06:00	0.0	88	01/06/98	06:00	0.0	136	03/06/98	06:00	1.0
				41	30/05/98	07:00	0.0	89	01/06/98	07:00	0.0	137	03/06/98	07:00	1.6
				42	30/05/98	08:00	0.0	90	01/06/98	08:00	0.0	138	03/06/98	08:00	0.8
				43	30/05/98	09:00	0.0	91	01/06/98	09:00	0.0	139	03/06/98	09:00	0.4
				44	30/05/98	10:00	0.0	92	01/06/98	10:00	0.0	140	03/06/98	10:00	0.0
				45	30/05/98	11:00	0.0	93	01/06/98	11:00	0.0	141	03/06/98	11:00	0.0
				46	30/05/98	12:00	0.0	94	01/06/98	12:00	0.0	142	03/06/98	12:00	7.2
				47	30/05/98	13:00	0.0	95	01/06/98	13:00	0.0	143	03/06/98	13:00	0.0
				48	30/05/98	14:00	0.0	96	01/06/98	14:00	0.0	144	03/06/98	14:00	0.0
1	28/05/98	15:00	0.8	49	30/05/98	15:00	0.0	97	01/06/98	15:00	0.0	145	03/06/98	15:00	0.0
2	28/05/98	16:00	0.0	50	30/05/98	16:00	0.0	98	01/06/98	16:00	0.0	146	03/06/98	16:00	0.0
3	28/05/98	17:00	0.0	51	30/05/98	17:00	0.0	99	01/06/98	17:00	0.2	147	03/06/98	17:00	0.0
4	28/05/98	18:00	0.0	52	30/05/98	18:00	0.0	100	01/06/98	18:00	0.2	148	03/06/98	18:00	0.0
5	28/05/98	19:00	0.0	53	30/05/98	19:00	1.2	101	01/06/98	19:00	0.0	149	03/06/98	19:00	0.0
6	28/05/98	20:00	0.0	54	30/05/98	20:00	8.0	102	01/06/98	20:00	0.0	150	03/06/98	20:00	0.0
7	28/05/98	21:00	0.0	55	30/05/98	21:00	4.0	103	01/06/98	21:00	1.0	151	03/06/98	21:00	0.0
8	28/05/98	22:00	0.4	56	30/05/98	22:00	1.8	104	01/06/98	22:00	3.8	152	03/06/98	22:00	0.0
9	28/05/98	23:00	5.0	57	30/05/98	23:00	0.8	105	01/06/98	23:00	1.4	153	03/06/98	23:00	0.0
10	29/05/98	00:00	1.0	58	31/05/98	00:00	0.0	106	02/06/98	00:00	5.0	154	04/06/98	00:00	0.0
11	29/05/98	01:00	0.6	59	31/05/98	01:00	0.0	107	02/06/98	01:00	8.0	155	04/06/98	01:00	0.0
12	29/05/98	02:00	1.0	60	31/05/98	02:00	0.0	108	02/06/98	02:00	2.0	156	04/06/98	02:00	0.0
13	29/05/98	03:00	1.4	61	31/05/98	03:00	0.0	109	02/06/98	03:00	0.8	157	04/06/98	03:00	0.0
14	29/05/98	04:00	3.0	62	31/05/98	04:00	0.0	110	02/06/98	04:00	1.0	158	04/06/98	04:00	0.0
15	29/05/98	05:00	0.0	63	31/05/98	05:00	0.0	111	02/06/98	05:00	0.2	159	04/06/98	05:00	0.0
16	29/05/98	06:00	1.8	64	31/05/98	06:00	0.0	112	02/06/98	06:00	0.0	160	04/06/98	06:00	0.0
17	29/05/98	07:00	0.0	65	31/05/98	07:00	0.8	113	02/06/98	07:00	0.0	161	04/06/98	07:00	0.0
18	29/05/98	08:00	0.0	66	31/05/98	08:00	0.0	114	02/06/98	08:00	0.0	162	04/06/98	08:00	0.0
19	29/05/98	09:00	0.2	67	31/05/98	09:00	0.0	115	02/06/98	09:00	0.0	163	04/06/98	09:00	0.0
20	29/05/98	10:00	0.0	68	31/05/98	10:00	0.0	116	02/06/98	10:00	0.0	164	04/06/98	10:00	0.0
21	29/05/98	11:00	0.0	69	31/05/98	11:00	0.0	117	02/06/98	11:00	0.0	165	04/06/98	11:00	0.0
22	29/05/98	12:00	0.0	70	31/05/98	12:00	0.0	118	02/06/98	12:00	0.0	166	04/06/98	12:00	0.0
23	29/05/98	13:00	0.0	71	31/05/98	13:00	0.0	119	02/06/98	13:00	0.0	167	04/06/98	13:00	0.0
24	29/05/98	14:00	0.0	72	31/05/98	14:00	0.0	120	02/06/98	14:00	0.0	168	04/06/98	14:00	0.0
25	29/05/98	15:00	0.0	73	31/05/98	15:00	0.0	121	02/06/98	15:00	0.0	169	04/06/98	15:00	0.0
26	29/05/98	16:00	0.0	74	31/05/98	16:00	0.0	122	02/06/98	16:00	0.0	170	04/06/98	16:00	0.0
27	29/05/98	17:00	0.0	75	31/05/98	17:00	0.0	123	02/06/98	17:00	0.0	171	04/06/98	17:00	0.0
28	29/05/98	18:00	0.0	76	31/05/98	18:00	0.0	124	02/06/98	18:00	0.0	172	04/06/98	18:00	0.0
29	29/05/98	19:00	0.0	77	31/05/98	19:00	0.0	125	02/06/98	19:00	0.0	173	04/06/98	19:00	0.0
30	29/05/98	20:00	0.0	78	31/05/98	20:00	0.0	126	02/06/98	20:00	0.0	174	04/06/98	20:00	0.0
31	29/05/98	21:00	0.0	79	31/05/98	21:00	0.0	127	02/06/98	21:00	0.0	175	04/06/98	21:00	0.0
32	29/05/98	22:00	0.0	80	31/05/98	22:00	0.0	128	02/06/98	22:00	0.0	176	04/06/98	22:00	0.0
33	29/05/98	23:00	0.0	81	31/05/98	23:00	0.0	129	02/06/98	23:00	0.0	177	04/06/98	23:00	0.0

RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm
178	05/06/98	00:00	0.0	226	07/06/98	00:00	0.0	274	09/06/98	00:00	0.2	322	11/06/98	00:00	0.0
179	05/06/98	01:00	0.0	227	07/06/98	01:00	0.0	275	09/06/98	01:00	0.2	323	11/06/98	01:00	0.0
180	05/06/98	02:00	0.0	228	07/06/98	02:00	0.2	276	09/06/98	02:00	0.4	324	11/06/98	02:00	0.0
181	05/06/98	03:00	0.0	229	07/06/98	03:00	0.0	277	09/06/98	03:00	0.0	325	11/06/98	03:00	0.0
182	05/06/98	04:00	0.0	230	07/06/98	04:00	0.0	278	09/06/98	04:00	0.2	326	11/06/98	04:00	0.0
183	05/06/98	05:00	0.0	231	07/06/98	05:00	0.0	279	09/06/98	05:00	0.2	327	11/06/98	05:00	0.0
184	05/06/98	06:00	0.0	232	07/06/98	06:00	0.0	280	09/06/98	06:00	0.0	328	11/06/98	06:00	0.0
185	05/06/98	07:00	0.0	233	07/06/98	07:00	0.0	281	09/06/98	07:00	0.0	329	11/06/98	07:00	0.0
186	05/06/98	08:00	0.0	234	07/06/98	08:00	0.0	282	09/06/98	08:00	0.0	330	11/06/98	08:00	0.0
187	05/06/98	09:00	0.0	235	07/06/98	09:00	0.0	283	09/06/98	09:00	0.0	331	11/06/98	09:00	0.0
188	05/06/98	10:00	0.0	236	07/06/98	10:00	0.0	284	09/06/98	10:00	0.0	332	11/06/98	10:00	0.0
189	05/06/98	11:00	0.2	237	07/06/98	11:00	0.0	285	09/06/98	11:00	0.0	333	11/06/98	11:00	0.2
190	05/06/98	12:00	0.0	238	07/06/98	12:00	0.0	286	09/06/98	12:00	0.0	334	11/06/98	12:00	0.0
191	05/06/98	13:00	0.0	239	07/06/98	13:00	0.0	287	09/06/98	13:00	0.0	335	11/06/98	13:00	0.0
192	05/06/98	14:00	0.0	240	07/06/98	14:00	0.0	288	09/06/98	14:00	0.0	336	11/06/98	14:00	0.0
193	05/06/98	15:00	0.0	241	07/06/98	15:00	0.0	289	09/06/98	15:00	0.0	337	11/06/98	15:00	0.0
194	05/06/98	16:00	0.0	242	07/06/98	16:00	0.0	290	09/06/98	16:00	0.0	338	11/06/98	16:00	0.0
195	05/06/98	17:00	0.2	243	07/06/98	17:00	0.0	291	09/06/98	17:00	0.0	339	11/06/98	17:00	0.0
196	05/06/98	18:00	0.4	244	07/06/98	18:00	0.0	292	09/06/98	18:00	0.0	340	11/06/98	18:00	0.0
197	05/06/98	19:00	2.0	245	07/06/98	19:00	0.0	293	09/06/98	19:00	0.0	341	11/06/98	19:00	0.0
198	05/06/98	20:00	10.0	246	07/06/98	20:00	0.0	294	09/06/98	20:00	0.0	342	11/06/98	20:00	0.0
199	05/06/98	21:00	12.0	247	07/06/98	21:00	0.0	295	09/06/98	21:00	0.0	343	11/06/98	21:00	0.0
200	05/06/98	22:00	0.2	248	07/06/98	22:00	0.0	296	09/06/98	22:00	0.0	344	11/06/98	22:00	0.0
201	05/06/98	23:00	0.0	249	07/06/98	23:00	0.0	297	09/06/98	23:00	0.0	345	11/06/98	23:00	0.0
202	06/06/98	00:00	0.0	250	08/06/98	00:00	0.0	298	10/06/98	00:00	0.6	346	12/06/98	00:00	0.0
203	06/06/98	01:00	0.0	251	08/06/98	01:00	0.0	299	10/06/98	01:00	5.0	347	12/06/98	01:00	0.0
204	06/06/98	02:00	0.0	252	08/06/98	02:00	0.0	300	10/06/98	02:00	1:6	348	12/06/98	02:00	0.0
205	06/06/98	03:00	0.6	253	08/06/98	03:00	0.0	301	10/06/98	03:00	0.0	349	12/06/98	03:00	0.0
206	06/06/98	04:00	0.4	254	08/06/98	04:00	0.0	302	10/06/98	04:00	0.0	350	12/06/98	04:00	0.0
207	06/06/98	05:00	0.6	255	08/06/98	05:00	0.0	303	10/06/98	05:00	0.0	351	12/06/98	05:00	0.0
208	06/06/98	06:00	0.0	256	08/06/98	06:00	0.0	304	10/06/98	06:00	0.0	352	12/06/98	06:00	0.0
209	06/06/98	07:00	0.0	257	08/06/98	07:00	0.0	305	10/06/98	07:00	0.0	353	12/06/98	07:00	0.0
210	06/06/98	08:00	0.0	258	08/06/98	08:00	0.0	306	10/06/98	08:00	0.0	354	12/06/98	08:00	0.0
211	06/06/98	09:00	0.0	259	08/06/98	09:00	0.2	307	10/06/98	09:00	0.4	355	12/06/98	09:00	0.0
212	06/06/98	10:00	0.0	260	08/06/98	10:00	0.0	308	10/06/98	10:00	0.0	356	12/06/98	10:00	0.0
213	06/06/98	11:00	0.0	261	08/06/98	11:00	0.0	309	10/06/98	11:00	2.4	357	12/06/98	11:00	0.0
214	06/06/98	12:00	0.0	262	08/06/98	12:00	0.0	310	10/06/98	12:00	0.0	358	12/06/98	12:00	0.0
215	06/06/98	13:00	0.0	263	08/06/98	13:00	0.2	311	10/06/98	13:00	4.0	359	12/06/98	13:00	0.0
216	06/06/98	14:00	0.0	264	08/06/98	14:00	1.4	312	10/06/98	14:00	0.0	360	12/06/98	14:00	0.0
217	06/06/98	15:00	0.0	265	08/06/98	15:00	0.2	313	10/06/98	15:00	0.0	361	12/06/98	15:00	0.0
218	06/06/98	16:00	0.0	266	08/06/98	16:00	0.2	314	10/06/98	16:00	0.0	362	12/06/98	16:00	0.0
219	06/06/98	17:00	0.0	267	08/06/98	17:00	0.4	315	10/06/98	17:00	0.8	363	12/06/98	17:00	0.0
220	06/06/98	18:00	0.4	268	08/06/98	18:00	0.2	316	10/06/98	18:00	0.0	364	12/06/98	18:00	0.0
221	06/06/98	19:00	0.2	269	08/06/98	19:00	0.0	317	10/06/98	19:00	0.0	365	12/06/98	19:00	0.0
222	06/06/98	20:00	0.0	270	08/06/98	20:00	0.0	318	10/06/98	20:00	0.0	366	12/06/98	20:00	0.0
223	06/06/98	21:00	0.0	271	08/06/98	21:00	0.0	319	10/06/98	21:00	0.0	367	12/06/98	21:00	0.0
224	06/06/98	22:00	0.0	272	08/06/98	22:00	0.0	320	10/06/98	22:00	0.0	368	12/06/98	22:00	0.0
225	06/06/98	23:00	0.0	273	08/06/98	23:00	0.0	321	10/06/98	23:00	0.0	369	12/06/98	23:00	0.0

RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm
370	13/06/98	00:00	0.0	418	15/06/98	00:00	0.0	466	17/06/98	00:00	0.0	514	19/06/98	00:00	0.0
371	13/06/98	01:00	0.0	419	15/06/98	01:00	0.0	467	17/06/98	01:00	0.0	515	19/06/98	01:00	0.0
372	13/06/98	02:00	0.4	420	15/06/98	02:00	0.0	468	17/06/98	02:00	0.0	516	19/06/98	02:00	0.0
373	13/06/98	03:00	0.0	421	15/06/98	03:00	0.0	469	17/06/98	03:00	0.0	517	19/06/98	03:00	0.0
374	13/06/98	04:00	0.6	422	15/06/98	04:00	0.0	470	17/06/98	04:00	0.0	518	19/06/98	04:00	0.0
375	13/06/98	05:00	0.4	423	15/06/98	05:00	0.0	471	17/06/98	05:00	0.0	519	19/06/98	05:00	0.0
376	13/06/98	06:00	0.4	424	15/06/98	06:00	0.0	472	17/06/98	06:00	0.0	520	19/06/98	06:00	0.0
377	13/06/98	07:00	0.8	425	15/06/98	07:00	0.0	473	17/06/98	07:00	0.0	521	19/06/98	07:00	0.0
378	13/06/98	08:00	0.0	426	15/06/98	08:00	0.0	474	17/06/98	08:00	0.0	522	19/06/98	08:00	0.0
379	13/06/98	09:00	2.6	427	15/06/98	09:00	0.0	475	17/06/98	09:00	0.0	523	19/06/98	09:00	0.0
380	13/06/98	10:00	0.0	428	15/06/98	10:00	0.0	476	17/06/98	10:00	0.0	524	19/06/98	10:00	0.0
381	13/06/98	11:00	1.0	429	15/06/98	11:00	0.0	477	17/06/98	11:00	0.0	525	19/06/98	11:00	0.0
382	13/06/98	12:00	0.0	430	15/06/98	12:00	0.0	478	17/06/98	12:00	0.0	526	19/06/98	12:00	0.0
383	13/06/98	13:00	0.0	431	15/06/98	13:00	0.0	479	17/06/98	13:00	0.0	527	19/06/98	13:00	0.0
384	13/06/98	14:00	0.0	432	15/06/98	14:00	0.0	480	17/06/98	14:00	0.0	528	19/06/98	14:00	0.0
385	13/06/98	15:00	0.0	433	15/06/98	15:00	0.0	481	17/06/98	15:00	0.0	529	19/06/98	15:00	0.0
386	13/06/98	16:00	0.0	434	15/06/98	16:00	0.0	482	17/06/98	16:00	0.0	530	19/06/98	16:00	0.0
387	13/06/98	17:00	0.0	435	15/06/98	17:00	0.0	483	17/06/98	17:00	0.0	531	19/06/98	17:00	0.0
388	13/06/98	18:00	0.0	436	15/06/98	18:00	0.0	484	17/06/98	18:00	0.0	532	19/06/98	18:00	0.0
389	13/06/98	19:00	0.0	437	15/06/98	19:00	0.0	485	17/06/98	19:00	0.0	533	19/06/98	19:00	0.0
390	13/06/98	20:00	0.4	438	15/06/98	20:00	0.0	486	17/06/98	20:00	0.0	534	19/06/98	20:00	0.0
391	13/06/98	21:00	0.8	439	15/06/98	21:00	0.0	487	17/06/98	21:00	0.0	535	19/06/98	21:00	0.0
392	13/06/98	22:00	0.2	440	15/06/98	22:00	0.0	488	17/06/98	22:00	0.2	536	19/06/98	22:00	0.0
393	13/06/98	23:00	0.0	441	15/06/98	23:00	0.0	489	17/06/98	23:00	0.0	537	19/06/98	23:00	0.0
394	14/06/98	00:00	0.0	442	16/06/98	00:00	0.0	490	18/06/98	00:00	0.2	538	20/06/98	00:00	0.0
395	14/06/98	01:00	0.2	443	16/06/98	01:00	0.0	491	18/06/98	01:00	0.0	539	20/06/98	01:00	0.0
396	14/06/98	02:00	0.0	444	16/06/98	02:00	0.0	492	18/06/98	02:00	0.0	540	20/06/98	02:00	0.0
397	14/06/98	03:00	0.0	445	16/06/98	03:00	0.0	493	18/06/98	03:00	0.0	541	20/06/98	03:00	0.0
398	14/06/98	04:00	0.0	446	16/06/98	04:00	0.0	494	18/06/98	04:00	0.0	542	20/06/98	04:00	0.0
399	14/06/98	05:00	0.0	447	16/06/98	05:00	0.0	495	18/06/98	05:00	0.0	543	20/06/98	05:00	0.0
400	14/06/98	06:00	0.0	448	16/06/98	06:00	0.0	496	18/06/98	06:00	0.0	544	20/06/98	06:00	0.0
401	14/06/98	07:00	0.0	449	16/06/98	07:00	0.0	497	18/06/98	07:00	0.0	545	20/06/98	07:00	0.0
402	14/06/98	08:00	0.0	450	16/06/98	08:00	0.0	498	18/06/98	08:00	0.0	546	20/06/98	08:00	0.0
403	14/06/98	09:00	0.0	451	16/06/98	09:00	0.0	499	18/06/98	09:00	0.0	547	20/06/98	09:00	0.0
404	14/06/98	10:00	0.0	452	16/06/98	10:00	0.0	500	18/06/98	10:00	0.0	548	20/06/98	10:00	0.0
405	14/06/98	11:00	0.0	453	16/06/98	11:00	0.0	501	18/06/98	11:00	0.0	549	20/06/98	11:00	0.0
406	14/06/98	12:00	0.0	454	16/06/98	12:00	0.0	502	18/06/98	12:00	0.2	550	20/06/98	12:00	0.0
407	14/06/98	13:00	0.0	455	16/06/98	13:00	0.0	503	18/06/98	13:00	0.2	551	20/06/98	13:00	0.0
408	14/06/98	14:00	0.0	456	16/06/98	14:00	0.0	504	18/06/98	14:00	0.0	552	20/06/98	14:00	0.0
409	14/06/98	15:00	0.0	457	16/06/98	15:00	0.0	505	18/06/98	15:00	0.0	553	20/06/98	15:00	0.0
410	14/06/98	16:00	0.0	458	16/06/98	16:00	0.0	506	18/06/98	16:00	0.0	554	20/06/98	16:00	0.0
411	14/06/98	17:00	0.0	459	16/06/98	17:00	0.0	507	18/06/98	17:00	0.0	555	20/06/98	17:00	0.0
412	14/06/98	18:00	0.0	460	16/06/98	18:00	0.0	508	18/06/98	18:00	0.0	556	20/06/98	18:00	0.0
413	14/06/98	19:00	0.0	461	16/06/98	19:00	0.0	509	18/06/98	19:00	0.0	557	20/06/98	19:00	0.0
414	14/06/98	20:00	0.0	462	16/06/98	20:00	0.0	510	18/06/98	20:00	0.0	558	20/06/98	20:00	0.0
415	14/06/98	21:00	0.0	463	16/06/98	21:00	0.0	511	18/06/98	21:00	0.0	559	20/06/98	21:00	0.0
416	14/06/98	22:00	0.0	464	16/06/98	22:00	0.0	512	18/06/98	22:00	0.0	560	20/06/98	22:00	0.0
417	14/06/98	23:00	0.0	465	16/06/98	23:00	0.0	513	18/06/98	23:00	0.0	561	20/06/98	23:00	0.0

RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm
562	21/06/98	00:00	0.0	610	23/06/98	00:00	0.0	658	25/06/98	00:00	0.0	706	27/06/98	00:00	6.8
563	21/06/98	01:00	0.0	611	23/06/98	01:00	0.0	659	25/06/98	01:00	0.0	707	27/06/98	01:00	0.0
564	21/06/98	02:00	0.0	612	23/06/98	02:00	0.0	660	25/06/98	02:00	0.0	708	27/06/98	02:00	0.0
565	21/06/98	03:00	0.0	613	23/06/98	03:00	0.0	661	25/06/98	03:00	0.0	709	27/06/98	03:00	0.2
566	21/06/98	04:00	0.0	614	23/06/98	04:00	0.0	662	25/06/98	04:00	0.0	710	27/06/98	04:00	0.0
567	21/06/98	05:00	0.0	615	23/06/98	05:00	0.0	663	25/06/98	05:00	0.0	711	27/06/98	05:00	0.0
568	21/06/98	06:00	0.0	616	23/06/98	06:00	0.0	664	25/06/98	06:00	0.0	712	27/06/98	06:00	0.0
569	21/06/98	07:00	0.0	617	23/06/98	07:00	0.0	665	25/06/98	07:00	0.0	713	27/06/98	07:00	0.0
570	21/06/98	08:00	0.0	618	23/06/98	08:00	0.0	666	25/06/98	08:00	0.0	714	27/06/98	08:00	0.0
571	21/06/98	09:00	0.0	619	23/06/98	09:00	0.0	667	25/06/98	09:00	0.0	715	27/06/98	09:00	0.0
572	21/06/98	10:00	0.0	620	23/06/98	10:00	0.0	668	25/06/98	10:00	0.0	716	27/06/98	10:00	0.4
573	21/06/98	11:00	0.0	621	23/06/98	11:00	0.0	669	25/06/98	11:00	0.0	717	27/06/98	11:00	3.2
574	21/06/98	12:00	0.0	622	23/06/98	12:00	0.4	670	25/06/98	12:00	0.2	718	27/06/98	12:00	0.2
575	21/06/98	13:00	0.0	623	23/06/98	13:00	0.4	671	25/06/98	13:00	0.0	719	27/06/98	13:00	0.0
576	21/06/98	14:00	0.0	624	23/06/98	14:00	0.0	672	25/06/98	14:00	0.0	720	27/06/98	14:00	0.0
577	21/06/98	15:00	0.0	625	23/06/98	15:00	0.0	673	25/06/98	15:00	1.2	721	27/06/98	15:00	0.0
578	21/06/98	16:00	0.0	626	23/06/98	16:00	0.0	674	25/06/98	16:00	0.2	722	27/06/98	16:00	0.0
579	21/06/98	17:00	0.0	627	23/06/98	17:00	0.0	675	25/06/98	17:00	0.0	723	27/06/98	17:00	0.0
580	21/06/98	18:00	0.0	628	23/06/98	18:00	0.0	676	25/06/98	18:00	0.0	724	27/06/98	18:00	0.0
581	21/06/98	19:00	0.0	629	23/06/98	19:00	0.0	677	25/06/98	19:00	0.0	725	27/06/98	19:00	0.0
582	21/06/98	20:00	0.0	630	23/06/98	20:00	0.0	678	25/06/98	20:00	0.0	726	27/06/98	20:00	0.0
583	21/06/98	21:00	0.0	631	23/06/98	21:00	0.0	679	25/06/98	21:00	0.0	727	27/06/98	21:00	0.0
584	21/06/98	22:00	0.0	632	23/06/98	22:00	0.0	680	25/06/98	22:00	0.0	728	27/06/98	22:00	0.0
585	21/06/98	23:00	0.0	633	23/06/98	23:00	0.0	681	25/06/98	23:00	0.0	729	27/06/98	23:00	0.0
586	22/06/98	00:00	0.0	634	24/06/98	00:00	0.0	682	26/06/98	00:00	0.0	730	28/06/98	00:00	0.0
587	22/06/98	01:00	0.0	635	24/06/98	01:00	0.0	683	26/06/98	01:00	0.0	731	28/06/98	01:00	0.0
588	22/06/98	02:00	0.0	636	24/06/98	02:00	0.0	684	26/06/98	02:00	0.0	732	28/06/98	02:00	0.0
589	22/06/98	03:00	0.0	637	24/06/98	03:00	0.0	685	26/06/98	03:00	0.2	733	28/06/98	03:00	0.0
590	22/06/98	04:00	0.0	638	24/06/98	04:00	0.0	686	26/06/98	04:00	0.2	734	28/06/98	04:00	0.0
591	22/06/98	05:00	0.0	639	24/06/98	05:00	0.0	687	26/06/98	05:00	1.0	735	28/06/98	05:00	0.0
592	22/06/98	06:00	0.0	640	24/06/98	06:00	0.0	688	26/06/98	06:00	2.0	736	28/06/98	06:00	0.0
593	22/06/98	07:00	0.0	641	24/06/98	07:00	0.6	689	26/06/98	07:00	0.6	737	28/06/98	07:00	0.0
594	22/06/98	08:00	0.0	642	24/06/98	08:00	0.8	690	26/06/98	08:00	0.6	738	28/06/98	08:00	0.0
595	22/06/98	09:00	0.0	643	24/06/98	09:00	1.0	691	26/06/98	09:00	0.4	739	28/06/98	09:00	0.0
596	22/06/98	10:00	0.0	644	24/06/98	10:00	0.4	692	26/06/98	10:00	0.0	740	28/06/98	10:00	0.0
597	22/06/98	11:00	0.0	645	24/06/98	11:00	0.0	693	26/06/98	11:00	0.8	741	28/06/98	11:00	0.2
598	22/06/98	12:00	0.0	646	24/06/98	12:00	0.2	694	26/06/98	12:00	0.2	742	28/06/98	12:00	0.0
599	22/06/98	13:00	0.0	647	24/06/98	13:00	0.0	695	26/06/98	13:00	0.0	743	28/06/98	13:00	1.0
600	22/06/98	14:00	0.0	648	24/06/98	14:00	0.0	696	26/06/98	14:00	0.2	744	28/06/98	14:00	0.0
601	22/06/98	15:00	0.0	649	24/06/98	15:00	0.0	697	26/06/98	15:00	0.0	745	28/06/98	15:00	0.0
602	22/06/98	16:00	0.0	650	24/06/98	16:00	0.0	698	26/06/98	16:00	0.2	746	28/06/98	16:00	0.0
603	22/06/98	17:00	0.0	651	24/06/98	17:00	0.0	699	26/06/98	17:00	1.2	747	28/06/98	17:00	0.0
604	22/06/98	18:00	0.0	652	24/06/98	18:00	0.0	700	26/06/98	18:00	3.2	748	28/06/98	18:00	0.0
605	22/06/98	19:00	0.0	653	24/06/98	19:00	0.0	701	26/06/98	19:00	4.6	749	28/06/98	19:00	0.0
606	22/06/98	20:00	0.0	654	24/06/98	20:00	0.0	702	26/06/98	20:00	1.0	750	28/06/98	20:00	0.0
607	22/06/98	21:00	0.0	655	24/06/98	21:00	0.0	703	26/06/98	21:00	0.0	751	28/06/98	21:00	0.0
608	22/06/98	22:00	0.0	656	24/06/98	22:00	0.0	704	26/06/98	22:00	1.0	752	28/06/98	22:00	0.0
609	22/06/98	23:00	0.0	657	24/06/98	23:00	0.0	705	26/06/98	23:00	1.0	753	28/06/98	23:00	0.0

RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm
754	29/06/98	00:00	0.0	802	01/07/98	00:00	0.0	850	03/07/98	00:00	0.0	898	05/07/98	00:00	0.0
755	29/06/98	01:00	0.0	803	01/07/98	01:00	0.0	851	03/07/98	01:00	0.0	899	05/07/98	01:00	0.0
756	29/06/98	02:00	0.0	804	01/07/98	02:00	0.0	852	03/07/98	02:00	0.0	900	05/07/98	02:00	0.0
757	29/06/98	03:00	0.0	805	01/07/98	03:00	0.0	853	03/07/98	03:00	0.0	901	05/07/98	03:00	0.0
758	29/06/98	04:00	0.0	806	01/07/98	04:00	0.0	854	03/07/98	04:00	0.0	902	05/07/98	04:00	0.0
759	29/06/98	05:00	0.0	807	01/07/98	05:00	0.0	855	03/07/98	05:00	0.0	903	05/07/98	05:00	0.0
760	29/06/98	06:00	0.0	808	01/07/98	06:00	0.0	856	03/07/98	06:00	0.0	904	05/07/98	06:00	0.0
761	29/06/98	07:00	0.0	809	01/07/98	07:00	0.0	857	03/07/98	07:00	0.0	905	05/07/98	07:00	0.0
762	29/06/98	08:00	0.0	810	01/07/98	08:00	0.0	858	03/07/98	08:00	0.0	906	05/07/98	08:00	0.0
763	29/06/98	09:00	0.8	811	01/07/98	09:00	0.0	859	03/07/98	09:00	0.0	907	05/07/98	09:00	0.0
764	29/06/98	10:00	1.0	812	01/07/98	10:00	0.0	860	03/07/98	10:00	0.0	908	05/07/98	10:00	0.0
765	29/06/98	11:00	0.2	813	01/07/98	11:00	0.0	861	03/07/98	11:00	0.0	909	05/07/98	11:00	0.0
766	29/06/98	12:00	0.0	814	01/07/98	12:00	0.0	862	03/07/98	12:00	0.0	910	05/07/98	12:00	0.0
767	29/06/98	13:00	0.0	815	01/07/98	13:00	0.0	863	03/07/98	13:00	0.0	911	05/07/98	13:00	0.0
768	29/06/98	14:00	0.0	816	01/07/98	14:00	0.0	864	03/07/98	14:00	0.0	912	05/07/98	14:00	0.0
769	29/06/98	15:00	0.0	817	01/07/98	15:00	0.0	865	03/07/98	15:00	0.0	913	05/07/98	15:00	0.0
770	29/06/98	16:00	0.0	818	01/07/98	16:00	0.0	866	03/07/98	16:00	0.0	914	05/07/98	16:00	0.0
771	29/06/98	17:00	0.0	819	01/07/98	17:00	0.0	867	03/07/98	17:00	0.0	915	05/07/98	17:00	0.0
772	29/06/98	18:00	0.0	820	01/07/98	18:00	0.0	868	03/07/98	18:00	0.0	916	05/07/98	18:00	0.0
773	29/06/98	19:00	0.0	821	01/07/98	19:00	0.0	869	03/07/98	19:00	0.0	917	05/07/98	19:00	0.0
774	29/06/98	20:00	0.0	822	01/07/98	20:00	0.0	870	03/07/98	20:00	0.0	918	05/07/98	20:00	0.0
775	29/06/98	21:00	0.0	823	01/07/98	21:00	0.0	871	03/07/98	21:00	0.0	919	05/07/98	21:00	0.0
776	29/06/98	22:00	1.2	824	01/07/98	22:00	0.0	872	03/07/98	22:00	0.0	920	05/07/98	22:00	0.0
777	29/06/98	23:00	1.2	825	01/07/98	23:00	0.0	873	03/07/98	23:00	0.0	921	05/07/98	23:00	0.0
778	30/06/98	00:00	0.0	826	02/07/98	00:00	0.0	874	04/07/98	00:00	0.0	922	06/07/98	00:00	0.0
779	30/06/98	01:00	0.8	827	02/07/98	01:00	0.0	875	04/07/98	01:00	0.0	923	06/07/98	01:00	0.0
780	30/06/98	02:00	0.0	828	02/07/98	02:00	0.0	876	04/07/98	02:00	0.0	924	06/07/98	02:00	0.0
781	30/06/98	03:00	0.2	829	02/07/98	03:00	0.0	877	04/07/98	03:00	0.0	925	06/07/98	03:00	0.0
782	30/06/98	04:00	0.0	830	02/07/98	04:00	0.0	878	04/07/98	04:00	0.0	926	06/07/98	04:00	0.0
783	30/06/98	05:00	0.0	831	02/07/98	05:00	0.0	879	04/07/98	05:00	0.0	927	06/07/98	05:00	0.0
784	30/06/98	06:00	0.0	832	02/07/98	06:00	0.0	880	04/07/98	06:00	0.0	928	06/07/98	06:00	0.0
785	30/06/98	07:00	0.0	833	02/07/98	07:00	0.0	881	04/07/98	07:00	0.0	929	06/07/98	07:00	0.0
786	30/06/98	08:00	0.0	834	02/07/98	08:00	0.0	882	04/07/98	08:00	0.0	930	06/07/98	08:00	0.0
787	30/06/98	09:00	0.0	835	02/07/98	09:00	0.0	883	04/07/98	09:00	0.0	931	06/07/98	09:00	0.0
788	30/06/98	10:00	0.0	836	02/07/98	10:00	0.0	884	04/07/98	10:00	0.0	932	06/07/98	10:00	0.0
789	30/06/98	11:00	0.0	837	02/07/98	11:00	0.0	885	04/07/98	11:00	0.0	933	06/07/98	11:00	0.0
790	30/06/98	12:00	0.0	838	02/07/98	12:00	0.0	886	04/07/98	12:00	0.0	934	06/07/98	12:00	0.0
791	30/06/98	13:00	0.0	839	02/07/98	13:00	0.0	887	04/07/98	13:00	0.0	935	06/07/98	13:00	0.2
792	30/06/98	14:00	0.0	840	02/07/98	14:00	0.0	888	04/07/98	14:00	0.0	936	06/07/98	14:00	0.0
793	30/06/98	15:00	0.0	841	02/07/98	15:00	0.0	889	04/07/98	15:00	0.0	937	06/07/98	15:00	0.0
794	30/06/98	16:00	0.0	842	02/07/98	16:00	0.0	890	04/07/98	16:00	0.0	938	06/07/98	16:00	0.4
795	30/06/98	17:00	0.0	843	02/07/98	17:00	0.0	891	04/07/98	17:00	0.0	939	06/07/98	17:00	0.0
796	30/06/98	18:00	0.0	844	02/07/98	18:00	0.0	892	04/07/98	18:00	0.0	940	06/07/98	18:00	0.0
797	30/06/98	19:00	0.0	845	02/07/98	19:00	0.0	893	04/07/98	19:00	0.0	941	06/07/98	19:00	0.0
798	30/06/98	20:00	0.0	846	02/07/98	20:00	0.0	894	04/07/98	20:00	0.0	942	06/07/98	20:00	0.0
799	30/06/98	21:00	0.0	847	02/07/98	21:00	0.0	895	04/07/98	21:00	0.0	943	06/07/98	21:00	0.0
800	30/06/98	22:00	0.0	848	02/07/98	22:00	0.0	896	04/07/98	22:00	0.0	944	06/07/98	22:00	0.0
801	30/06/98	23:00	0.0	849	02/07/98	23:00	0.0	897	04/07/98	23:00	0.0	945	06/07/98	23:00	0.0

RECORD	DATE	TIME	D(mm) mm	RECORD	DATE	TIME	D(mm) mm
946	07/07/98	00:00	0.0	994	09/07/98	00:00	0.0
947	07/07/98	01:00	0.0	995	09/07/98	01:00	0.0
948	07/07/98	02:00	0.0	996	09/07/98	02:00	0.0
949	07/07/98	03:00	0.0	997	09/07/98	03:00	0.2
950	07/07/98	04:00	0.0	998	09/07/98	04:00	0.0
951	07/07/98	05:00	0.0				
952	07/07/98	06:00	0.0				
953	07/07/98	07:00	0.0				
954	07/07/98	08:00	0.0				
955	07/07/98	09:00	0.0				
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967	07/07/98	21:00	0.0				
968	07/07/98	22:00	0.0				
969	07/07/98	23:00	0.0				
970	08/07/98	00:00	0.0				
971	08/07/98	01:00	0.0				
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973	08/07/98	03:00	0.0				
974	08/07/98	04:00	0.0				
975	08/07/98	05:00	0.0				
976	08/07/98	06:00	0.0				
977	08/07/98	07:00	0.0				
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979	08/07/98	09:00	0.0				
980	08/07/98	10:00	0.0				
981	08/07/98	11:00	0.0				
982	08/07/98	12:00	0.0				
983	08/07/98	13:00	0.0				
984	08/07/98	14:00	0.0				
985	08/07/98	15:00	0.0				
986	08/07/98	16:00	0.0				
987	08/07/98	17:00	0.0				
988	08/07/98	18:00	0.0				
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992	08/07/98	22:00	0.0				
993	08/07/98	23:00	0.0				

APPENDIX II

MEMORANDUM

OFFICER (EAST)

05A/28

cc PI(E)

From Planning Liaison Officer (South)

To Group Planning and Investment Officer

Your Ref. 5850/09/MMR/DMD

My Ref. BDN/ACS/DartKenn/Kennford/MJD/2476/86

Date 23rd September 1987

Kenn and Kennford Settlement Study

I refer to your memorandum dated 17th September 1987 regarding the above.

Planning Considerations

There is no current Local Plan for either of the two villages, and as such no formal land allocation for residential use. However, they were considered in a rural settlement study (February 1986) where Kennford was considered suitable for priority in provision of services and facilities. The village of Kenn was regarded as suitable for limited development of say 6 dwellings only in the foreseeable future.

Whilst there is sufficient land at Kennford for approximately 150 dwellings (see plan enclosed), the Council would regard an en masse development as excessive, and would seek a phased building programme over say 15 years.

Infrastructure Constraints

Water Supply To adequately supply any significant development in Kenn/ Kennford without adversely affecting existing consumers the following improvements would be necessary.

Installation of a larger outlet main from the Kennford service reservoir. A length of approximately 900 metres of main would be required, costs are anticipated at £75,000.00

Sewage Treatment The works serving Kenn/kennford were designed for a population of 638, population connected is estimated at 588. The sewerage system is subject to a large degree of infiltration resulting in premature storm overflow at the pumping station. Foul flows to the works are totally pumped.

The Treatment Works Controller has identified three options for dealing with further development at Kenn and Kennford.

1. A new works on the site possibly avoiding the necessity of pumping at a cost of approximately £600,000.00.

cont/d ....

2. Diverting flows to the Kenton/Starcross sewage treatment works at a cost of approximately £400,00.00 (this scheme not favoured by T.W.C. as significant development already taking place at Starcross).

3. Diverting flows to Exminster and hence to Countess Wear at a cost of approximately £300,000.00. This option would need to be carefully considered in light of the proposed development at Exminster Hospital and the capacity of the pumping station which is administered by Exe District.

These options are all subject to Environmental approval.

Sewerage Study by DTS Teignbridge has been commissioned.

Land Drainage Surface water from the development site in Kennford would need to be discharged to the River Kenn which is a "main" river.

The village of Kenn is downstream of the site, and is currently subject to flooding. The discharge of surface water upstream of Kenn would not be permissible until such time as a flood alleviation scheme for the area at risk had been agreed and carried out. Government Circular 17/82 refers.

M. J. Dunn.

PLANNING LIAISON OFFICER (SOUTH)