

Appendix 9-C Water Quality Survey Data and Field Investigation

9-C.1 Water Quality Survey Data

Table 9-C.1 River Ecosystem Classifications

RE Class	Class Description	Water hardness (Mg/l CaCO ₃)	Dissolved Copper EQS Limit (mg/l)	Total Zinc EQS Limit (mg/l)
RE1	Water of very good quality suitable for all fish species	<10	0.005	0.03
		>10 - <50	0.022	0.2
		>50 - <100	0.04	0.3
		>100	0.112	0.5
RE2	Water of good quality and suitable for all fish species	<10	0.005	0.03
		>10 - <50	0.022	0.2
		>50 - <100	0.04	0.3
		>100	0.112	0.5
RE3	Water of fairly good quality suitable for high class coarse fish populations	<10	0.005	0.3
		>10 - <50	0.022	0.7
		>50 - <100	0.04	1
		>100	0.112	2
RE4	Water of fairly good quality suitable for coarse fish populations	<10	0.005	0.3
		>10 - <50	0.022	0.7
		>50 - <100	0.04	1
		>100	0.112	2
RE5	Water of poor quality, which is likely to limit coarse fish populations			

Table 9-C.2 Average Value of Water Quality Parameters Measured by the Environment Agency Between 1999 and 2004 at Different Sampling Points

Sampling Point	PH	Conductivity @20°C	Water Temp	BOD ATU	Ammonia (N)	Nitrate-N	Suspended Solids@105°C	Hardness	Oil & Grease	Pb	Cu	Zn	Dissolved Oxygen
	PH Units	uS/cm	°C	mg/l	mg/l	mg/l	mg/l	mg/l	PRES./AB	ug/l	ug/l	ug/l	%
Pebsham North Ditch Tributary	7.18	887.22	10.95	1.58	2.60	1.36		245.11		3.00	3.60	13.94	51.07
Pebsham South Ditch Tributary	7.23	1203.09	9.82	2.29	2.42	1.96		352.16		1.62	3.51	18.60	66.92
Watermill Stream	7.42	444.08	10.64	1.71	0.06	3.10	11.44	140.43	0.36			12.11	79.91
Powdermill Stream / Adams Farm	7.71	360.88	11.21	1.65	0.06	2.65	11.22	128.98	0.29			7.64	90.96
Pebsham Tip Point 1	7.37	725.73	10.57	2.20	2.36	2.25		251.73		1.69	3.13	18.61	68.03
Gorringe Stream (SWS PS)	7.21	920.47	10.87	2.91	1.07	1.46		258.94		21.14	7.18	38.06	64.93
Pebsham Stream Tip	7.26	730.06	10.66	6.99	1.26	2.43		258.00		49.47	12.75	82.24	68.86
Actons Farm / Combe Haven	7.47	400.21	11.10	1.64	0.08	2.91	10.76	128.93	0.36			8.61	87.91
Combe Haven / Old Water works	7.25	432.13	12.54	1.75	0.09	2.60	9.85	145.19	0.29			15.81	74.40
Combe Haven Footbridge	7.45	397.94	11.79	1.73	0.09	1.95		134.13		1.18	2.71	8.86	76.28
Combe Haven Sheepwash Gates	7.29	488.84	11.29	1.95	0.24	1.84	14.80	153.99	0.00	2.72	3.38	10.54	72.44

Table 9-C.3 Water Sampling Locations

Sample Location Site	Description	Location
1	Watermill Stream	In Watermill Stream approximately 500m east of Buckholt Farm and 950m upstream of the confluence between Watermill Stream and Combe Haven.
2	Ditch A adjacent to and right of Watermill Stream	In ditch, approximately 20m to the east of Watermill Stream
3	Ditch B adjacent to and left of Watermill Stream	In ditch, approximately 20m to the west of Watermill Stream Ditch B adjacent to and left of Watermill Stream
4	Powdermill Stream	In Powdermill Stream approximately 1.4km upstream of confluence between Powdermill Stream and the Combe Haven / Watermill Streams and approximately 650m upstream of Adam's Farm
5	Ditch C adjacent to and north of Combe Haven / Watermill Streams	In ditch, approximately 125m to the north of Combe Haven / Watermill Streams
6	Ditch D parallel to and south of Combe Haven / Watermill Streams	Approximately 65m to the south of Combe Haven / Watermill Streams
7	Combe Haven	Approximately 35m downstream and to the east of the confluence between the Decoy Stream and the Combe Haven.
8	Ditch E	In ditch, approximately 260m south of the Combe Haven and Russell Stream and 125m along the ditch to the South of Russell Stream.
9	Decoy Pond Stream	In Decoy Pond Stream approximately 350m north of the confluence between Decoy Pond Stream and Combe Haven.
10	Spring Ditch	In Spring Ditch approximately 275m to the north east of the confluence between Spring Ditch and Combe Haven.
11	Ditch F adjacent to and south of the Combe Haven	In ditch, approximately 25m along the ditch to the south east of the Combe Haven.
12	Ditch G within Filsham Reedbed Local Nature Reserve	In the ditch system within the Filsham Reedbed Local Nature Reserve approximately 80m north east of the Combe Haven, (approximate location +/- 50m)
13	Ditch G within Filsham Reedbed Local Nature Reserve	Elsewhere in the ditch system within the Filsham Reedbed Local Nature Reserve (minimum of 300m from Sample Point 12)

Table 9-C.4 Analysis of Water Sampling Results

Site	Description	RQO Class	Dissolved Oxygen (% Saturation)	BOD (ATU) (mg/l)	Ammonium (mg/l)	pH	Hardness (mg/l)	Copper (ug/l)	Zinc (ug/l)	Iron (ug/l)	Chloride (mg/l)	Fats, Oils and Grease (mg/l)	Suspended Solids (mg/l)	Comments
1	Watermill Stream	RE1	45.0%	2.1	0.03	7.3	80	4.7	81	1200	35	<10	80	Generally good but DO is a bit low
2	Ditch A adjacent to and right of Watermill Stream	RE2	50.4%	2.2	0.07	7.0	70	<1	21	1300	34	<10	69	Good quality apart from relatively low DO %
3	Ditch B adjacent to and left of Watermill Stream	RE3/RE4	8.9%	2.8	0.02	6.6	84	<1	7.4	820	38	<10	760	Good BOD and Ammonium but DO is extremely low
4	Powdermill Stream	RE2/RE3	43.7%	1.5	0.06	6.9	67	<1	5.7	1100	30	<10	150	Generally good but DO is too low to be considered RE1
5	Ditch C adjacent to and north of Combe Haven / Watermill Streams	RE3/RE4	9.0%	3.5	0.22	6.3	75	1.5	19	1900	33	<10	60	Good BOD and Ammonium but DO is extremely low
6	Ditch D parallel to and south of Combe Haven / Watermill Streams	RE2/RE3	43.4%	1.2	0.11	7.0	63	<1	7.9	1500	30	<10	80	Generally good but DO is too low to be considered RE1
7	Combe Haven	RE2	46.9%	<1	0.08	6.9	59	1.2	36	1800	27	<10	140	Generally good but DO is too low to be considered RE1
8	Ditch E	RE2/RE3	36.8%	1.8	0.20	6.9	53	<1	38	1400	29	<10	78	Generally good but DO is too low to be considered RE1
9	Decoy Pond Stream	RE2	62.9%	<1	0.07	7.0	81	1.0	11	1400	36	<10	110	Good quality apart from relatively low DO %
10	Spring Ditch	RE2/RE3	43.4%	<1	0.07	6.90	105	<1	22	900	33	<10	110	Generally good but DO is too low to be considered RE1

Table 9-C.4 continued

Site	Description	RQO Class	Dissolved Oxygen (% Saturation)	BOD (ATU) (mg/l)	Ammonium (mg/l)	pH	Hardness (mg/l)	Copper (ug/l)	Zinc (ug/l)	Iron (ug/l)	Chloride (mg/l)	Fats, Oils and Grease (mg/l)	Suspended Solids (mg/l)	Comments
11	Ditch F adjacent to and south of the Combe Haven	RE2/RE3	36.9%	<1	0.11	6.8	59	1.3	38	2300	28	<10	190	Generally good but DO is too low to be considered RE1
12	Ditch G within Filsham Reedbed Local Nature Reserve	RE2	51.3%	2.3	0.11	6.9	135	<1	31	2700	50	<10	16	Good quality apart from relatively low DO %
13	Ditch H within Filsham Reedbed Local Nature Reserve	RE3	30.6%	2.7	0.14	6.8	182	<1	43	1300	63	<10	28	The parameters tend to vary in quality. Therefore categorised as RE3
	Egerton Stream	No data	No data	1.1	0.37	7.49	116	4.4	55	2078	No data	<10	61	All values quoted are mean average from 9 separate sample points.

Notes:

The categorisation uses ammonium levels measured in the laboratory testing

Table 9-C.5 Discharge Points Within the Study Area

NGR	Description of Site	Discharge Description	Volume Band
TQ 7635 1117	Undefined or other	Septic tank effluent	A
TQ 7360 1072	Undefined or other	Treated sewage effluent	A
TQ 7527 0872	Undefined or other	Surface water	A
TQ 7636 1114	Domestic property (single)	Septic tank effluent	A
TQ 7483 1021	Domestic property (single)	Septic tank effluent	A
TQ 7478 1102	Domestic property (single)	Treated sewage effluent	A
TQ 7702 0878	Sewage disposal works	Surface water	A
TQ 7630 0927	Undefined or other	Surface water	A
TQ 7349 1071	Undefined or other	Septic tank effluent	A
TQ 7378 0802	Sewerage network - sewers	Storm sewage effluent	C
TQ 7611 0922	Domestic property (single)	Treated sewage effluent	A
TQ 7691 0907	Waste disposal sites	Septic tank effluent	A
TQ 7756 0878	Undefined or other	Surface water	A
TQ 7830 1052	Education	Surface water	A
TQ 7803 0986	Sewerage network - sewers	Surface water	A
TQ 7374 0802	(G)transport - undefined	Surface water	A
TQ 7394 0846	Sewerage network - sewers	Storm sewage overflow	C
TQ 7464 1195	Domestic property (single)	Treated sewage effluent	A
TQ 7372 0974	Sewerage network - sewers	Screened storm sewage	C
TQ 7386 0818	Education	Surface water	A
TQ 7690 0905	Waste disposal sites	Surface water	A
TQ 7377 0830	Undefined or other	Surface water	A
TQ 7476 1070	Domestic property (single)	Septic tank effluent	A
TQ 7394 0847	Sewerage network - sewers	Storm sewage effluent	C
TQ 7613 0927	Domestic property (single)	Septic tank effluent	A
TQ 7651 0831	Undefined or other	Surface water	A
TQ 7712 0858	Sewage disposal works	Surface water	A
TQ 7667 1181	Domestic property (single)	Septic tank effluent	A
TQ 7635 0922	Undefined or other	Surface water	A
TQ 7491 0859	Water treatment works	Washout water	B
TQ 7611 1178	Sewerage network - sewers	Screened storm sewage	C
TQ 7600 0917	Undefined or other	Surface water	A
TQ 7802 0879	Sewerage network - sewers	Surface water	A
TQ 7874 0997	Undefined or other	Surface water	A
TQ 7773 0878	Undefined or other	Surface water	A
TQ 7770 0879	Undefined or other	Surface water	A
TQ 7649 0824	Sewerage network - sewers	Storm sewage effluent	C
TQ 7643 1143	Undefined or other	Septic tank effluent	A
TQ 7375 0804	Sewerage network - sewers	Storm sewage overflow	C
TQ 7639 0874	Sewerage network - sewers	Screened storm sewage	A
TQ 7380 0815	Undefined or other	Surface water	A
TQ 7736 1101	Undefined or other	Treated sewage effluent	A
TQ 7691 0907	Undefined or other	Surface water	A

Table 9-C.5 continued

NGR	Description of Site	Discharge Description	Volume Band
TQ 7645 0888	Recreational and cultural	Septic tank effluent	A
TQ 7390 0831	Sewerage network - sewers	Storm sewage effluent	C
TQ 7454 1045	Domestic property (single)	Treated sewage effluent	A
TQ 7707 0861	Sewage disposal works	Surface water	A

Notes:

The Volume of each discharge is given using the following bands:

A= Up to & including 5 cubic metres

B = More than 5 up to & including 20 cubic metres

C = More than 20 up to & including 100 cubic metres

9-C.2 Water Quality Field Investigation

The Combe Haven

9-C.2.1 The Combe Haven is the main river of the valley being fed by waters from the tributaries of Watermill Stream, Powdermill Stream, Decoy Pond Stream, Spring Ditch and the Pebsham and Gorringer Stream system. The Agency maintains 4 permanent monitoring sites on the Combe Haven at Actons Farm, Old Water Works, Combe Haven Footbridge and Sheepwash Gates. An additional monitoring point was established between the Old Water Works and the Footbridge, just downstream of the confluence between Decoy Pond Stream and the Combe Haven.

9-C.2.2 At Acton Farm the Agency has 14 samples analysed over the last 4 years. All the samples show low Biochemical Oxygen Demand (BOD) and low levels of ammonia. The dissolved oxygen percentage is also generally high indicating good water quality with little organic pollution. Zinc levels are consistently low, between 5 µg/l and 19 µg/l. Lead and copper levels are not monitored by the Agency at this location.

9-C.2.3 At the Old Water Works the 16 samples indicate low BOD and low levels of ammonia. The dissolved oxygen content is more erratic than further upstream, varying between 47% and 93%. Zinc levels are also more erratic, between 5 µg/l and 47 µg/l, although this is still a relatively low level of heavy metals. Lead and copper levels are not monitored by the Agency at this location

9-C.2.4 The additional sampling site (Point 7) is approximately midway between the Old Water Works site and Combe Haven Footbridge. The data is consistent with both the Agency monitoring sites, indicating good water quality generally equivalent to RE2. This suggests that there are no significant inputs of pollution along this reach of the river. This agrees with the analyses of the samples from Powdermill Stream and Decoy Pond Stream.

9-C.2.5 The final EA sampling along the Combe Haven is situated at Sheepwash Gates, approximately 1000m downstream of the Footbridge and immediately downstream of the confluence between the Gorringer Stream and Combe Haven. The site has 62 sets of data over the 5 year period 1999 to 2003. The BOD and ammonia levels are generally low but with occasional higher values. The

dissolved oxygen levels however are very erratic varying from 16% to 99%. Copper, zinc and lead levels are consistently low.

Watermill Stream

9-C.2.6 The Agency has one monitoring point on the Watermill Stream, with 12 samples analysed over the last 4 years. All the samples show low BOD and low levels of ammonia indicating good water quality with little organic pollution. The dissolved oxygen percentage is low in a few samples, indicating poor flushing.

9-C.2.7 Additional sampling was taken approximately 600m upstream of the Agency monitoring point. The sampling (Point 1) indicates that the Watermill Stream at this location has low BOD (2.1 mg/l) and ammonia (0.03 mg/l) in line with the Agency long term data.

Powdermill Stream

9-C.2.8 The Agency has one monitoring point on the Powdermill Stream near Adams Farm, with 16 samples analysed over the last 4 years. All the samples show low BOD, low levels of ammonia and high dissolved oxygen levels indicating good water quality with little organic pollution.

9-C.2.9 Additional sampling was taken approximately 700m upstream of the Agency monitoring point. The sampling indicates that the Powdermill Stream (Site 4) shows a low BOD level of 2.2 mg/l, and a low ammonium level of 0.07 mg/l indicating an unpolluted source.

Decoy Pond Stream

9-C.2.10 No data for this stream was found in the EAs database. An additional sampling point (Point 9) was established approximately 300m upstream of its confluence with the Combe Haven. The sampling indicates that the Decoy Pond Stream has a low BOD level (<1.0 mg/l), a low ammonium level of 0.07 mg/l and the highest recorded dissolved oxygen level of any of the sites sampled. The copper and zinc levels are low. The iron level is similar to the average of the sampled locations.

Spring Ditch

9-C.2.11 No data for this stream was found in the EAs database. An additional sampling point (Point 10) was established approximately 250m upstream of its confluence with the Combe Haven. The sampling indicates that the Spring Ditch shows a low BOD level (<1.0 mg/l), a low ammonium level of 0.07 mg/l and a satisfactory dissolved oxygen level compared to the other sites sampled. These indicate an unpolluted source equivalent to a River Eco-system Class of RE2. The copper and zinc levels are low. The iron level is slightly less than the average of the sampled locations.