POLLUTION CONTROL (RBH6)
DO NOT REMOVE

NATIONAL RIVERS AUTHORITY

BIOLOGY EAST

THAMES WATER UTILITIES CATEGORY A AND B

SEWAGE WORKS SURVEY 1991

NRA

Compiled by Judy England,
Biologist.
February, 1992.

NRA Thames 92

ENVIRONMENT AGENCY

NATIONAL LIBRARY &
INFORMATION SERVICE

HEAD OFFICE

Rio House, Waterside Drive,
Aztec West, Almondsbury,
Bristol BS32 4UD

ENVIRONMENT AGENCY
118470

SUMMARY.

Rivers and brooks receiving the effluents from category A and B Thames Water Utilities Sewage Treatment Works in the eastern part of the Thames catchment were surveyed to determine the impact of the effluents on the watercourses concerned.

Standard three season macroinvertebrate sampling was employed. This produced reliable results and ensured sampling through the crucial summer season when the effluent is most concentrated in the river.

Of the large stws surveyed in pollution district 4, Blackbirds stw had no significant effect upon the River Colne. Iver North stw and Gerrards Cross stw had slight effects upon their receiving watercourses. The effects were most evident during the summer.

Chesham stw continues to have an adverse effect on the River Chess but the magnitude of this effect has decreased since 1990.

Of the large stws surveyed in pollution district 5, Deephams stw and East Hyde stw entered waters of poor water quality and had no detectable effects.

Bishops Stortford and Fiddlers Hamlet stws had significant effects upon already restricted faunas.

Harpenden stw had no perceivable effect on the restricted fauna of the River Lee. The impact of Mill Green stw was inconclusive since no upstream site was possible.

Finally, of the large stws surveyed in pollution district 6, Beddington stw had an adverse effect on the River Wandle.

Worcester Park stw continues to restrict the fauna of the Beverley Brook throughout its entire length.

BIOLOGICAL SURVEY RESULTS OF LARGE THAMES WATER UTILITIES SEWAGE TREATMENT WORKS.

Introduction.

An initial survey of category A and B Thames Utilities Sewage Treatment Works was conducted in late 1990/early 1991. As a result of that survey it was decided to continue monitoring these works during 1991.

Three season sampling was employed to provide aggregate scores and more reliable results. In addition it would ensure monitoring throughout the year, including during crucial periods of low flow when effluent is less dilute in the river. The results of these surveys are presented here. A summary of the main results is followed by a more detailed interpretation of each sewage treatment works.

Methodology.

Sampling was conducted using the same methodology as that employed for the 1990/1991 national river surveys. The sampling for macroinvertebrates involved a three minute kick and a one minute active search. Samples were returned to the laboratory where the macroinvertebrates were identified.

Biological Monitoring Working Party (BMWP) scores were calculated for each sample to assess the diversity and pollution tolerance of the macroinvertebrate community at each site. The BMWP score system involves identifying the macroinvertebrates to family level. Each family is allocated a score in the range 1 to 10, based on its tolerance to pollution. The most pollution tolerant group scores 1 (oligochaete worms) and the most pollution sensitive families score 10 (eg. stoneflies, caddis-flies and mayflies). The scores for all the families present at any one site are added together to give a total BMWP score for the site. A high score indicates good water quality.

The BMWP scores were compared to the predicted score for each site. Predicted scores, which represent the potential of a site if unaffected by man, were obtained using the RIVPACS computer programme developed by the Institute of Freshwater Ecology.

Results.

The tables over the page present BMWP scores from the surveys of the category A and B Thames Utilities Sewage Treatment Works. The results are the aggregate scores of taxa lists produced from three season sampling. The figures in brackets give the observed score as a percentage of the RIVPACS predicted score (where sites are suitable for prediction).

In pollution district 4, both Berkhamsted stw and Maple Lodge stw flow into the Grand Union Canal. Since RIVPACS is not yet designed to predict the macroinvertebrate community expected in unpolluted canals, no observed/predicted scores are given. These two sewage works have been studied in greater detail by student projects. The results of these surveys will be summarised in a report later this year.

In pollution district 5 it was not possible to study the impact of Rye Meads stw due to the absence of suitable sites.

Pollution District 4.

STW	River	BMWP SCORES upstream	downstream
Blackbirds	Colne	169 (109)	143 (92)
Chesham	Chess	176 (117)	113 (78)
Gerrards Cross	Misbourne	193 (125)	157 (101)
Iver North	Colne Brook	205 (128)	179 (112)

Pollution District 5.

STW	River	BMWP SCORES upstream	downstream
Bishops Stortford	Great Hallingbury Brook	59 (38)	44 (28)
Deephams	Salmons Brook	35 (23)	39 (21)
East Hyde (Luton)	Lee	44 (26)	52 (30)
Fiddlers Hamlet	Brookhouse Brook	83 (52)	40 (24)
Harpenden	Lee	90 (55)	81 (49)
Mill Green	Lee	NSS	95 (63)
Rye Meads	Lee	NSS	NSS

NSS = No suitable sampling site.

Pollution District 6.

STW	River	BMWP SCORES upstream	downstream
Beddington	Wandle	101 (63)	52 (29)
Worcester Park	Beverley Brook	43 (34)	21 (15)

Appendix 1 presents details of the surveys conducted to assess the impact of each stw on its receiving water. The sewage treatment works are presented in the order in which they appear in the previous tables. The results for each seasons sampling are given together with the observed/predicted scores as a percentage (O/P). This is followed by comments about the impact of each works on the receiving waters and a comparison of the taxa found at each site throughout the year. The abundance categories are those typically found at a site.

Pollution District 4.

Blackbirds stw is not having a significant effect upon the fauna of the River Colne where it remains rich either side of the works. Chesham stw continues to have an adverse effect on the biota in the River Chess, but the magnitude of the effects have decreased since 1990. This improvement below the works is the result of capital improvements at Chesham stw.

Gerrards Cross stw had a slight adverse effect upon the fauna of the River Misbourne. The effects were especially evident during the summer when the effluent was less dilute in the river. The situation is exacerbated by the low flows in the river.

The drop in aggregate score below Iver North stw on the Colne Brook and the loss of sensitive families showed this stw to also have a slight adverse effect on the fauna.

Pollution District 5.

Both Deephams stw and East Hyde stw discharge into rivers where the volume of effluent is much greater than the flow in the river. If the effluents had been of good water quality an increase in score below the stws would have been expected. This was not the case. In both cases there was no detectable change in the biological quality of the recieving waters.

Bishops Stortford stw and Fiddlers Hamlet stw discharge into brooks where the fauna is already restricted. In both cases the effluent had an adverse effect on the fauna reducing the biological quality from moderate to poor. Fiddlers Hamlet stw had a severe effect on the Brookhouse Brook and also upon the fauna of the River Roding into which it flows.

Harpenden and Mill Green stws flow into the River Lee where the fauna is restricted. There was no conclusive change in score or fauna below the input of Harpenden stw. It was not possible to assess Mill Green stw properly due to the absence of an upstream site.

Pollution District 6.

Beddington stw discharges into the River Wandle and had a adverse effect on the fauna. This was shown by a drop in BMWP score below the works and a loss of sensitive families. The resultant fauna below the works comprised of only pollution tolerant families.

Worcester Park stw discharges into the Beverley Brook where it comprises the vast majority of the flow. Below the works the taxa is extremely restricted with only families tolerant of severe organic pollution present in vast numbers. The effects of the works can be seen for the entire length of the brook.

Future sampling.

All category C and D works will be surveyed over the next couple of years to identify those that are having a significant impact on a watercourse. It is not possible to sample all these works in any one year due to the high number of works and limited resources.

APPENDIX 1.

Blackbirds stw. River Colne.

U/S stw site
PCNR.0024 400m below Ver.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	142	5.04	24	85	99
Summer	113	5.14	22	82	03
Autumn	121	4.90	29	95	96
Aggregate	169	5.12	33	109	99

D/S stw site
PCNR.0150 Below Blackbirds stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	100	5.00	20	68	99
Summer	73	4.29	17	50	85
Autumn	91	4.55	20	61	89
Aggregate	143	4.77	30	92	92

The site situated above Blackbirds stw produced a high aggregate BMWP score of 169 and achieved its predicted score. The fauna included many pollution sensitive families. This site produced consistently higher BMWP scores, ASPTs and observed over predicted ratios than the downstream site.

The site below the works had an aggregate score of 143, an ASPT of 4.77 and achieved 92 % of its predicted score. The lowest score was in the summer when effluent is more concentrated in the water.

The drop in the aggregate BMWP score, ASPT and prediction achieved suggests that Blackbirds stw is having some effect on the biological quality of the River Colne. However a comparison of families found at the two sites shows little difference. Certain families occurred more sporadically below the stw. These were consistently higher sample scores and ASPT's upstream. The results suggest that any effects that Blackbirds stw is having on the Colne are not significant.

Blackbirds stw. River Colne.

TAXA	SITE Above stw	Below stw
Ephemerellidae	*	*
Leptoceridae	**	**
Goeridae	*	+
Calopterygeidae	*	**
Psychomyiidae	*	
Caenidae	**	**
Rhyacophilidae	*	
Polycentropidae		+
Limnephilidae	+	
Ancylidae	**	+
Hydroptilidae	**	*
Gammaridae	***	**
Coenagridae	*	*
Corixidae		+
Haliplidae	**	*
Dytiscidae	*	+
Elmidae	**	*
Hydropsychidae	**	+
Tipulidae	+	+
Simulidae	+	+
Planariidae	*	+
Dendrocoelidae	+	
Baetidae	**	*
Sialidae	*	+
Valvatidae	+	+
Hydrobiidae	***	**
Lymnaeidae	**	*
Physidae	*	*
Planorbidae	*	*
Sphaeridae	**	**
Glossiphonidae	+	**
Erpobdellidae	*	+
Asellidae	**	**
Chironomidae	***	***
Oligochaeta	***	***

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories
* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Chesham stw. River Chess.

U/S stw site
PCNR.0178 Above Chesham stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	113	4.91	23	82	96
Summer	102	5.10	20	71	100
Autumn	142	5.26	27	105	105
Aggregate	176	5.33	33	117	104

D/S stw sites
PCNR.0179 At Bois Mill

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	83	4.37	19	72	92
Summer	68	3.78	18	52	77
Autumn	62	3.65	17	48	74
Aggregate	118	4.37	27	81	65

PCNR.0179 Below Bois Mill

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	74	4.35	17	53	84
Summer	67	4.19	16	48	84
Autumn	73	4.29	17	51	84
Aggregate	113	4.71	24	78	87

Above Chesham stw the River Chess scored highly (BMWP =176, ASPT =5.33) achieving both its predicted scores. Pollution sensitive families were present including crayfish.

Two downstream sites were monitored to assess the impact of Chesham stw. Bois mill was sampled for the 1990/91 national river survey, because of the designated reach points it was necessary to sample this broad water. Pond net sweeps were taken instead of kick samples. A second site below Bois Mill was sampled because it has both riffles and pools and so has a greater comparability with the upstream site. Both downstream sites produced lower aggregate BMWP scores, No. taxa and ASPTs than the upstream site. Neither downstream site achieves its predicted scores whereas the upstream site does. However there has been a great improvement since last year. The aggregate score at Bois Mill has more than doubled since 1990 when the score was 54.

Chesham stw is continuing to have a considerable effect upon the fauna of the River Chess but the impact has lessened greatly since 1990.

Chesham stw. River Chess.

TAXA	SITE Above stw	Below stw
Ephemerellidae	**	+
Phryganeidae	+	
Leptoceridae	**	*
Goeridae	**	
Sericostomatidae	**	
Astacidae	*	
Psychomyiidae	*	
Caenidae	*	+
Rhyacophilidae		+
Limnephilidae	*	
Ancylidae	*	*
Hydroptilidae	+	
Gammaridae	**	*
Coenagridae		+
Gerridae	+	
Corixidae	*	*
Haliplidae	*	*
Dytiscidae	+	
Elmidae	*	+
Tipulidae	*	
Simulidae		*
Planariidae	*	*
Dendrocoelidae	*	+
Baetidae	*	**
Sialidae	+	
Valvatidae	**	+
Hydrobiidae	**	*
Lymnaeidae	*	*
Physidae	*	
Planorbidae	**	**
Sphaeridae	**	*
Glossiphonidae	**	**
Erpobdellidae	**	**
Asellidae	**	***
Chironomidae	**	**
Oligochaeta	**	**

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Gerrards Cross stw. River Misbourne.

U/S stw site
PCNR.0070 Above Gerrards Cross stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	139	5.35	26	102	110
Summer	142	5.46	26	106	113
Autumn	150	5.56	27	103	109
Aggregate	193	5.51	35	125	106

D/S stw site
PCNR.0071 Below Gerrards Cross stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	137	5.27	26	100	110
Summer	85	4.72	18	63	100
Autumn	131	5.04	26	94	101
Aggregate	157	5.23	30	101	95

The site upstream of Gerrards Cross stw had a very high aggregate score of 193 and exceeded both its predicted BMWP score and ASPT. The fauna contained a wide variety of pollution sensitive families which included the cased caddisfly *Odontocerum albicorne*. This is the only river in the Eastern Thames region where this taxa is found.

At the downstream site sample scores did not reach those achieved upstream and the aggregate score was lower, 157. However the site still achieved its predicted. Most pollution sensitive families were still present but a couple of families were absent below the works.

The lowest scores at this site (BMWP =85 and ASPT =4.72) were seen in the summer when the site only achieved 63% of its predicted BMWP score. The lower summer score is likely to be caused by a higher concentration of effluent in the river during the summer months when river flows were low. The River Misbourne suffers from low flow conditions and is the subject of an Alleviation of Low Flows investigation.

The drop in score and absence of some pollution sensitive families below the works suggests that Gerrards Cross stw is having an effect on the River Misbourne. This is more obvious in the summer when the effluent is more concentrated in the river.

Gerrards Cross stw. River Misbourne.

TAXA	SITE Above stw	Below stw
Leptophlebiidae	*	
Ephemerellidae	+	*
Ephemeridae	**	
Odontoceridae	**	*
Leptoceridae	*	*
Sericostomatidae	**	**
Astacidae	+	
Psychomyiidae	+	*
Caenidae	***	**
Rhyacophilidae	**	*
Polycentropidae	+	
Limnephilidae	*	*
Ancylidae		+
Gammaridae	****	***
Coenagridae		+
Hydrometridae	+	
Nepidae	+	
Corixidae		*
Dytiscidae	*	*
Hydrophilidae	+	
Elmidae	*	*
Hydropsychidae	**	**
Tipulidae	**	*
Planariidae	*	*
Dendrocoelidae	*	*
Baetidae	**	**
Sialidae	*	+
Valvatidae	+	
Hydrobiidae	*	**
Lymnaeidae	**	**
Physidae	*	*
Planorbidae	*	**
Sphaeridae	*	**
Glossiphonidae	**	*
Erpobdellidae	*	**
Asellidae	*	**
Chironomidae	**	***
Oligochaeta	***	***

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Iver North stw. Colne Brook.

U/S stw site
PCNR.0131 Above Iver Lane Bridge.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	152	5.43	28	122	109
Summer	120	5.00	24	89	100
Autumn	142	5.26	27	111	107
Aggregate	205	5.69	36	128	112

NB probability of site suitable for classification <0.1%.

D/S stw site
PCNR.0143 Below Railway, Iver.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	133	4.93	27	102	101
Summer	96	4.36	22	76	91
Autumn	127	4.88	26	98	98
Aggregate	179	5.11	35	112	100

The Colne Brook above Iver Lane Bridge produced a very high aggregate score of 205 with a wide range of invertebrates including pollution sensitive families, shown by the high ASPT of 5.69. The site achieved both its predicted BMWP and ASPT scores. A diverse plant community was also present.

The downstream site produced a lower but still high aggregate score of 179. The ASPT was more markedly lower. The downstream site featured a variety of pollution sensitive families and achieved both ASPT and BMWP prediction targets.

The scores at both sites were lowest in the summer. The drop was greater for the downstream site. This may indicate the sewage effluent having an effect during times of lower river flows when it is more concentrated in the river. But this is not conclusive.

Some pollution sensitive families were present above the works but not below. These included saucer bugs (Aphelocheiridae) which are particularly scarce in the eastern area and seem to occur only at sites with the highest biological quality. This suggests that Iver North stw is having a slight effect on the Colne Brook.

Iver North stw. Colne Brook.

TAXA	SITE Above stw	Below stw
Ephemerellidae	*	+
Ephemeridae	**	
Aphelocheiridae	+	
Molannidae	+	*
Leptoceridae	*	*
Goeridae	+	
Calopterygeidae	+	*
Psychomyiidae	+	*
Caenidae	*	*
Rhyacophilidae	**	
Polycentropidae	**	*
Limnephilidae	*	+
Ancylidae	**	*
Hydroptilidae	*	**
Unionidae	+	
Gammaridae	***	***
Coenagridae	+	+
Gerridae		+
Corixidae		+
Haliplidae	+	+
Dytiscidae	*	*
Gyrinidae	+	
Elmidae	*	*
Hydropsychidae	**	**
Tipulidae	+	+
Simulidae	**	*
Planariidae	*	**
Dendrocoelidae		*
Baetidae	*	**
Sialidae		+
Valvatidae	+	**
Hydrobiidae	**	*
Lymnaeidae	*	*
Physidae		*
Planorbidae	**	*
Sphaeridae	**	**
Glossiphonidae	**	**
Erpobdellidae	**	**
Asellidae	**	***
Chironomidae	***	**
Oligochaeta	***	***

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Bishops Stortford stw. Great Hallingbury Brook.

U/S stw site
PLER.0233 Jenkins Farm

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	35	3.50	10	27	69
Summer	54	3.86	14	35	77
Autumn	38	3.45	11	25	65
Aggregate	59	3.93	15	38	74

D/S stw site
PLER.0039 Above River Stort at A1060 Bridge.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	22	3.14	7	15	61
Summer	38	3.45	11	23	65
Autumn	36	4.00	9	23	75
Aggregate	44	3.67	12	28	69

The fauna at the upstream site is restricted with an aggregate BMWP score of 59(achieving 38% of the predicted score) and an ASPT of 3.93.

The downstream site scores less with an aggregate BMWP score of 44 (achieving 28% of the predicted score) and a lower ASPT of 3.67. The taxa is limited to pollution tolerant families only. A couple of more sensitive families are only found above the works, but only in low numbers.

Bishops Stortford stw is having a significant effect upon the water quality of the Great Hallingbury Brook. Sample BMWP scores were always a little lower downstream and the aggregate shows a more marked difference. Given the restricted background fauna this difference is not great.

Bishops Stortford stw. Great Hallingbury Brook.

TAXA	SITE Above stw	Below stw
Hydroptilidae	+	+
Gammaridae	**	**
Gerridae	+	
Dytiscidae	+	
Hydropsychidae	*	+
Tipulidae	*	*
Simulidae	*	
Baetidae	*	*
Lymnaeidae	*	*
Sphaeridae	**	*
Glossiphonidae	*	+
Erpobdellidae	*	*
Asellidae	**	**
Chironomidae	**	**
Oligochaeta	**	**

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Deephams stw. Salmons Brook

U/S stw site
PLER.0129 Above Deephams stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	26	3.25	8	18	70
Summer	27	3.00	9	20	65
Autumn	27	3.00	9	19	60
Aggregate	35	3.18	11	23	61

D/S stw site
PLER.0196 Below Deephams stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	29	3.22	9	16	61
Summer	25	3.13	8	14	59
Autumn	28	3.11	9	18	60
Aggregate	39	3.55	11	21	66

NB. probability of site suitable for classification <0.5%.

Above Deephams stw the taxa in the Salmons Brook is very restricted with only pollution tolerant families present. The aggregate score is low (35), with a prediction achievement of 23%.

Below the works the taxa is also very restricted and is more typical of a fauna affected by organic enrichment with only pollution tolerant families present. Again the aggregate score is low (39).

The volume of effluent discharged from Deephams stw is greater than the flow in the Salmons Brook. If the effluent was of a better water quality than that in the Salmons Brook then an increase in the aggregate BMWP score would have been expected below the works. Since this was not the case it can be concluded that the effluent from Deephams stw is of poor quality and therefore inhibiting the taxa downstream.

Deephams stw. Salmons Brook

TAXA	SITE Above stw	Below stw
Gammaridae	*	+
Simulidae		+
Planariidae	*	+
Dendrocoelidae		*
Lymnaeidae	**	*
Physidae	**	*
Planorbidae	*	
Sphaeridae	+	
Glossiphonidae	*	*
Erpobdellidae	*	**
Asellidae	**	****
Chironomidae	**	***
Oligochaeta	***	***

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

East Hyde (Luton) stw. River Lee.

U/S stw site
PLER.0050 Above Luton stw

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	31	3.44	9	21	65
Summer	31	3.44	9	21	66
Autumn	32	3.20	10	20	60
Aggregate	44	3.38	13	26	63

D/S stw site
PLER.0061 East Hyde Road Bridge

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	24	3.00	8	17	58
Summer	29	3.22	9	20	60
Autumn	31	3.10	10	20	60
Aggregate	52	3.47	15	30	64

At both sites the taxa is greatly restricted. The site above East Hyde stw achieved a low aggregate BMWP score of 44 and a low ASPT of 3.38. This score was only 26% of the predicted BMWP score. The aggregate BMWP score downstream of the works was a little higher (52), achieving 30% of the predicted score. The ASPT also declined a little downstream. The aggregate BMWP score was similar to that found in 1990 (47). This shows there has been no improvement over the last year. The taxa found downstream are those tolerant of organic pollution.

The volume of effluent discharged from East Hyde stw greatly exceeds the flow in the River Lee at this point. If the effluent was of good water quality then a larger increase in aggregate BMWP would be expected at the downstream site. Since this was not the case it can be concluded that water quality at both sites remains poor.

East Hyde (Luton) stw. River Lee.

TAXA	SITE Above stw	Below stw
Gammaridae	*	+
Corixidae		+
Tipulidae	*	
Simulidae		*
Planaridae	+	+
Baetidae		+
Sialidae	+	
Hydrobiidae	*	*
Lymnaeidae	*	*
Physidae		*
Planorbidae	+	+
Sphaeridae	*	*
Glossiphonidae	*	*
Erpobdellidae	*	**
Asellidae	***	***
Chironomidae	**	****
Oligochaeta	***	****

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Fiddlers Hamlet stw. Brookhouse Brook.

U/S stw site
PRGR.0087 Above Fiddlers Hamlet stw

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	36	3.60	10	23	72
Summer	61	4.07	15	47	81
Autumn	50	3.85	13	38	77
Aggregate	83	4.15	20	52	83

D/S stw site
PRGR.0086 Below Fiddlers Hamlet stw

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	28	3.50	8	17	68
Summer	14	2.80	5	10	54
Autumn	20	3.33	6	14	65
Aggregate	40	3.64	11	24	71

At the upstream site the fauna is moderately restricted and some variety of low-mid scoring families were found. It achieved 52% of the predicted BMWP score. This site produced some notable taxa including Crayfish and water scorpions.

The fauna of the downstream site is more highly restricted, only achieving 24% of the predicted BMWP score. This is half the upstream site. Downstream the fauna comprises only pollution tolerant families.

Fiddlers Hamlet stw is significantly decreasing the water quality of the Brookhouse Brook. This is shown by a significant impact to the fauna of the Brook.

This stw also effects the River Roding. The fauna in the Roding at Abridge (below the confluence with the Brookhouse Brook) is restricted in comparison with the fauna at the site above the Brookhouse Brook, Passingford Mill.

Fiddlers Hamlet stw. Brookhouse Brook.

TAXA	SITE Above stw	Below stw
Astacidae	+	
Gammaridae	**	*
Gerridae	+	
Nepidae	+	
Notonectidae	+	
Corixidae	+	
Haliplidae	+	
Dytiscidae	*	
Hydrophilidae	+	
Tipulidae	*	+
Simulidae	*	+
Hydrobidae	*	+
Lymnaeidae	*	**
Planorbidae	+	
Sphaeridae	+	+
Glossiphonidae	*	
Erpobdellidae	+	+
Asellidae	**	**
Chironomidae	***	****
Oligochaeta	***	****

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Harpenden stw. River Lee.

U/S stw site
PLER.0286 Below Batford Ford.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	58	4.14	14	41	80
Summer	69	3.83	17	48	72
Autumn	42	3.50	12	26	66
Aggregate	90	4.28	21	55	80

D/S stw site
PLER.0285 Leasey Bridge.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	57	4.07	14	40	78
Summer	73	4.56	16	51	88
Autumn	55	4.23	13	35	80
Aggregate	81	4.50	18	49	85

The fauna of the River Lee is of intermediate quality at both sites. There was only a slight difference in the scores between the sites. The upstream aggregate score was 90 compared with a downstream score of 81. The percentage achievements were 55 and 49 respectively. A comparison of the families between the sites shows no consistent differences between the sites.

Overall there was little difference in the aggregate scores achieved at the two sites.

There is no indication that Harpenden stw is having an effect on the River Lee. However it is difficult to assess the impact of the sewage effluent due to the moderately restricted nature of the fauna in the River Lee.

Harpenden stw. River Lee.

TAXA	SITE Above stw	Below stw
Leptoceridae	+	*
Caenidae	*	*
Limnephilidae		*
Ancylidae	+	*
Gammaridae	**	**
Haliplidae		*
Dytiscidae	+	
Elmidae	+	
Hydropsychidae	*	**
Tipulidae	+	
Simulidae	*	*
Planariidae	+	+
Baetidae	*	+
Valvatidae	*	
Hydrobiidae	*	*
Lymnaeidae	*	*
Planorbidae	*	
Sphaeridae	*	*
Glossiphonidae	*	*
Erpobdellidae	**	**
Asellidae	***	***
Chironomidae	**	***
Oligochaeta	**	**

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Mill Green (Hatfield) stw. River Lee.

U/S stw site
No site suitable

D/S stw site
PLER.0058 Below Cecil Mill

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	69	4.31	16	47	83
Summer	65	4.06	15	44	78
Autumn	79	4.16	19	52	82
Aggregate	95	4.32	22	63	83

No upstream sample was possible due to the deep slow-flowing nature of the River Lee.

At the downstream site the taxa was of moderate quality producing an aggregate score of 95, (63% of the prediction). The fauna comprised mostly low and mid scoring families, although several relatively intolerant families were found, notably Caenidae, Rhyacophilidae and Polycentropididae. The lack of higher scoring families (and moderate ASPT of 4.32) suggests a limited water quality.

A clearer indication of impact would be possible if an upstream site was available.

Mill Green (Hatfield) stw. River Lee.

TAXA	SITE Above stw	Below stw
Caenidae	no site	*
Rhyacophilidae		+
Polycentropodidae		*
Ancylidae		*
Gammaridae		**
Coenagridae		*
Dytiscidae		+
Hydropsychidae		*
Simulidae		**
Planariidae		**
Dendrocoelidae		*
Baetidae		*
Hydrobiidae		*
Lymnaeidae		+
Physidae		+
Planorbidae		*
Sphaeridae		**
Glossiphonidae		**
Erpobdellidae		**
Asellidae		**
Chironomidae		**
Oligochaeta		**

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Beddington stw. River Wandle.

U/S stw site.
PWAR.0053 Goat Bridge.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	65	4.06	16	47	87
Summer	76	4.22	18	50	83
Autumn	80	4.21	19	53	83
Aggregate	101	4.59	22	63	88

D/S stw site.
PWAR.9998 Below Beddington stw.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	44	3.38	13	25	68
Summer	38	3.45	11	26	68
Autumn	35	3.18	11	23	62
Aggregate	52	3.47	15	29	68

The fauna of the upstream site at Goat Bridge is of intermediate quality. The site does not achieve its predicted score. However there has been an improvement since last year (1990 aggregate = 84, 1991 aggregate = 101).

In comparison to Goat Bridge the downstream site has both a lower aggregate score and a lower observed to predicted ratio. Those sensitive families found upstream were absent downstream. The downstream site featured pollution tolerant families such as flatworms, chironomids and snails in very high numbers, clearly attributable to the effluent.

Beddington stw effluent is having a significant detrimental effect in water quality downstream of the stw. The whole length of this river below Beddington stw is of a consistently poor biological quality which contrasts sharply with the intermediate and relatively good macroinvertebrate assemblages above.

Beddington stw. River Wandle.

TAXA	SITE Above stw	Below stw
Leptoceridae	*	
Goeridae	+	
Limnephilidae	*	
Ancylidae	*	+
Gammaridae	***	*
Coenagriidae	+	
Haliplidae	*	
Dytiscidae	+	
Tipulidae	*	
Planariidae	**	****
Dendrocoelidae	*	+
Baetidae	+	
Valvatidae	*	+
Hydrobiidae	*	*
Lymnaeidae	**	***
Physidae		+
Planorbidae	**	*
Sphaeridae	**	****
Glossiphonidae	**	*
Erpobdellidae	**	**
Asellidae	**	***
Chironomidae	*	*
Oligochaeta	**	**

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+

Worcester Park stw. Beverley Brook.

U/S stw site.
PBVR.0005 Pembury Ave.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	31	3.44	9	25	79
Summer	24	3.00	8	19	63
Autumn	38	3.45	11	30	77
Aggregate	43	3.58	12	34	85

D/S stw site.
PBVR.0004 Motspur Park.

Season	BMWP	ASPT	No. fams	O/P BMWP %	O/P ASPT %
Spring	15	2.50	6	11	53
Summer	15	2.50	6	11	50
Autumn	15	2.50	6	10	49
Aggregate	21	2.65	8	15	52

The invertebrate community of the Beverley Brook is of poor biological quality. The invertebrate fauna is slightly more varied above the works than below. Downstream of the works the flow in the river comprises almost entirely sewage effluent. Any polluting influences entering the river upstream will have negligible impact below the works due to the large dilution effects of the stw effluent. So in this case it is not appropriate to compare the upstream and downstream scores.

The fauna downstream of the works is extremely restricted and characteristic of severe organic pollution. Only a few very tolerant families are present. The score below the works has declined since last year, (1990 aggregate = 40, 1991 aggregate = 21). This shows that the water quality is deteriorating.

This is an important works since the water quality of the rest of the brook downstream is directly dependant on the quality of the stw effluent. The influence of the organic pollution can be seen in the invertebrate community along the entire length of the brook. It will not be possible to identify other polluting influences clearly until the background water quality improves.

Worcester Park stw. Beverley Brook.

TAXA	SITE Above stw	Below stw
Ancylidae	+	
Gammaridae	*	
Tipulidae	+	
Planariidae	*	
Hydrobiidae	****	
Lymnaeidae	**	*
Physidae	**	*
Sphaeridae	***	***
Glossiphonidae	+	*
Erpobdellidae		+
Asellidae	**	**
Chironomidae	***	*****
Oligochaeta	**	**

The invertebrates are listed in order of increasing tolerance to pollution.

Abundance categories

* = 1-9 (+ = found in one season only)
** = 10-99
*** = 100-999
**** = 1000-9999
***** = 10000+