



Buro Happold

**010017 Watchet East Wharf**  
Water Quality Data

February 2007

Revision 01





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author **Joanna Orr**

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signature



date **16.01.07**

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approved **Deana Burn**

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signature



date **16.01.07**

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# 1 Introduction

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The following water quality data supports the water quality baseline conditions as discussed in the Watchet East Wharf Development Proposal prepared by Buro Happold in January 2007.

River and Bathing Water monitoring results have been obtained from the Environment Agency. Groundwater monitoring results have been obtained from the previous Environmental Statement for Watchet East Wharf Development compiled by Royal Haskoning in December 2001.

## 2 River Water Quality

River Stretch	Year	Target	Compliance
Watchet - Sea	2003 - 2005	2	Compliant
Watchet - Sea	2002 - 2004	2	Compliant
Watchet - Sea	2001 - 2003	2	Compliant
Watchet - Sea	2000 - 2002	2	Compliant
Watchet - Sea	1999 - 2001	2	Compliant
Watchet - Sea	1998 - 2000	2	Compliant
Watchet - Sea	1997 - 1999	2	Compliant
Watchet - Sea	1996 - 1998	2	Compliant
Watchet - Sea	1995 - 1997	2	Compliant
Watchet - Sea	1994 - 1996	2	Compliant
Watchet - Sea	1993 - 1995	2	Compliant
Watchet - Sea	1992 - 1994	2	Compliant
Watchet - Sea	1991 - 1993	2	Compliant
Watchet - Sea	1988 - 1990	2	Significant Failure

**Table 1-1 River Quality Target Monitoring Results Summary for Washford River, Watchet - Sea Stretch  
Sampling Period 1998 - 2005**

Upstream Grid Reference: X 307000, Y 143200  
Downstream Grid Reference: X 307200, Y 143400  
Length: 0.4m

River Stretch	Year	Target	Compliance
Torre Fifa - Watchet	2003 - 2005	1	Compliant
Torre Fifa - Watchet	2002 - 2004	1	Compliant
Torre Fifa - Watchet	2001 - 2003	1	Marginal
Torre Fifa - Watchet	2000 - 2002	1	Marginal
Torre Fifa - Watchet	1999 - 2001	1	Marginal
Torre Fifa - Watchet	1998 - 2000	1	Marginal
Torre Fifa - Watchet	1997 - 1999	1	Compliant
Torre Fifa - Watchet	1996 - 1998	1	Significant Failure
Torre Fifa - Watchet	1995 - 1997	1	Significant Failure
Torre Fifa - Watchet	1994 - 1996	1	Significant Failure
Torre Fifa - Watchet	1993 - 1995	1	Compliant
Torre Fifa - Watchet	1992 - 1994	1	Compliant
Torre Fifa - Watchet	1991 - 1993	1	Compliant
Torre Fifa - Watchet	1988 - 1990	1	Significant Failure

**Table 1-2 River Quality Target Monitoring Results Summary for Washford River, Torre Fifa - Watchet  
Stretch**

**Sampling Period 1998 - 2005**  
Upstream Grid Reference: X 304400, Y 140000  
Downstream Grid Reference: X 307000, Y 143200  
Length: 4.8m

	Average	Standard deviation	95%	90%	10%	No of Samples	Compliance
<b>Biochemical oxygen demand (mg/l)</b>	1.46	0.91		2.13		33	Compliant
<b>Ammonia (mgN/l)</b>	0.041	0.051		0.063		33	Compliant
<b>Dissolved oxygen (% saturation)</b>	92.62	7.45			85.60	33	Compliant
<b>Un-ionised ammonia (mgN/l)</b>	0	0.00085	0.00142			33	Compliant
<b>pH acid</b>	7.90	0.335	7.48			33	Compliant
<b>pH alkali</b>	7.90	0.335	8.32			33	Compliant
<b>Hardness (mg/l CaCO3)</b>	148						
<b>Dissolved copper (ug/l)</b>	0.69	1.08	1.38			21	Compliant
<b>Total zinc (ug/l)</b>	31.09	33.50	59.82			21	Compliant

**Table 1-3 River Quality Target Monitoring Results for Washford River, Watchet - Sea Stretch**

**Sampling Year 2003 – 2005**

Upstream Grid Reference: X 307000, Y 143200

Downstream Grid Reference: X 307200, Y 143400

Length: 0.4m

	Average	Standard deviation	95%	90%	10%	No of Samples	Compliance
Biochemical oxygen demand (mg/l)	1.39	0.74		1.94		29	Compliant
Ammonia (mgN/l)	0.047	0.054		0.072		29	Compliant
Dissolved oxygen (% saturation)	90.76	6.25			85.00	29	Compliant
Un-ionised ammonia (mgN/l)	0	0.00094	0.00153			29	Compliant
pH acid	7.77	0.331	7.35			29	Compliant
pH alkali	7.77	0.331	8.18			29	Compliant
Hardness (mg/l CaCO <sub>3</sub> )	168						
Dissolved copper (ug/l)	0.60	1.06	1.30			29	Compliant
Total zinc (ug/l)	25.58	29.77	52.73			29	Compliant

**Table 1-4 River Quality Target Monitoring Results for Washford River, Watchet - Sea Stretch**  
**Sampling Year 2002 – 2004**

Upstream Grid Reference: X 307000, Y 143200

Downstream Grid Reference: X 307200, Y 143400

Length: 0.4m

	Average	Standard deviation	95%	90%	10%	No of Samples	Compliance
Biochemical oxygen demand (mg/l)	1.36	0.70		1.91		33	Compliant
Ammonia (mgN/l)	0.026	0.027		0.041		33	Compliant
Dissolved oxygen (% saturation)	92.01	7.32			85.12	33	Compliant
Un-ionised ammonia (mgN/l)	0	0.00036	0.00073			33	Compliant
pH acid	7.92	0.335	7.49			33	Compliant
pH alkali	7.92	0.335	8.34			33	Compliant
Hardness (mg/l CaCO <sub>3</sub> )	141						
Dissolved copper (ug/l)	0.43	0.83	0.95			33	Compliant
Total zinc (ug/l)	22.31	49.59	49.61			33	Compliant

**Table 1-5 River Quality Target Monitoring Results for Washford River, Torre Fifa – Watchet Stretch  
Sampling Year 2003 – 2005**

Upstream Grid Reference: X 304400, Y 140000

Downstream Grid Reference: X 307000, Y 143200

Length: 4.8m

	Average	Standard deviation	95%	90%	10%	No of Samples	Compliance
Biochemical oxygen demand (mg/l)	1.36	0.58		1.70		30	Compliant
Ammonia (mgN/l)	0.035	0.029		0.052		30	Compliant
Dissolved oxygen (% saturation)	91.01	5.80			85.64	30	Compliant
Un-ionised ammonia (mgN/l)	0	0.00044	0.00086			30	Compliant
pH acid	7.76	0.314	7.37			30	Compliant
pH alkali	7.76	0.314	8.16			30	Compliant
Hardness (mg/l CaCO <sub>3</sub> )	156						
Dissolved copper (ug/l)	0.14	0.61	0.28			30	Compliant
Total zinc (ug/l)	25.59	51.26	55.89			30	Compliant

**Table 1-6 River Quality Target Monitoring Results for Washford River, Torre Fifa – Watchet Stretch  
Sampling Year 2002 – 2004**

Upstream Grid Reference: X 304400, Y 140000

Downstream Grid Reference: X 307000, Y 143200

Length: 4.8m

River Stretch	Year	Grade
Watchet - Sea	2003 - 2005	B
Watchet - Sea	2002 - 2004	A
Watchet - Sea	2001 - 2003	A
Watchet - Sea	2000 - 2002	A
Watchet - Sea	1999 - 2001	A
Watchet - Sea	1998 - 2000	B
Watchet - Sea	1997 - 1999	A
Watchet - Sea	1996 - 1998	B
Watchet - Sea	1995 - 1997	B
Watchet - Sea	1994 - 1996	B
Watchet - Sea	1993 - 1995	B
Watchet - Sea	1992 - 1994	A
Watchet - Sea	1991 - 1993	B
Watchet - Sea	1988 - 1990	D

**Table 1-7 Chemical River Quality Results Summary for Washford River, Watchet - Sea Stretch  
Sampling Period 1988 - 2005**

Upstream Grid Reference: X 307000, Y 143200

Downstream Grid Reference: X 307200, Y 143400

Length: 0.4m

	Average	Standard deviation	90%	10%	Number of samples	Grade
<b>Biochemical oxygen demand (mg/l)</b>	1.55	0.77	2.54		33	B
<b>Ammonia (mgN/l)</b>	0.046	0.047	0.095		33	A
<b>Dissolved oxygen (percentage saturation)</b>	92.62	7.45		83.06	33	A

**Table 1-8 Chemical River Quality Monitoring Results for Washford River, Watchet - Sea Stretch  
Sampling Year 2003 - 2005**

Upstream Grid Reference: X 307000, Y 143200

Downstream Grid Reference: X 307200, Y 143400

Length: 0.4m

River Stretch	Year	Grade
Torre Fifa – Watchet	2003 - 2005	A
Torre Fifa – Watchet	2002 - 2004	A
Torre Fifa – Watchet	2001 – 2003	B
Torre Fifa – Watchet	2000 – 2002	B
Torre Fifa – Watchet	1999 – 2001	B
Torre Fifa – Watchet	1998 – 2000	A
Torre Fifa – Watchet	1997 – 1999	A
Torre Fifa – Watchet	1996 – 1998	B
Torre Fifa – Watchet	1995 - 1997	B
Torre Fifa – Watchet	1994 – 1996	B
Torre Fifa – Watchet	1993 – 1995	A
Torre Fifa – Watchet	1992 – 1994	A
Torre Fifa – Watchet	1991 - 1993	A
Torre Fifa – Watchet	1988 - 1990	B

**Table 1-9 Chemical River Quality Results Summary for Washford River, Torre Fifa - Watchet Stretch  
Sampling Period 1988 – 2005**

Upstream Grid Reference: X 304400, Y 140000

Downstream Grid Reference: X 307000, Y 143200

Length: 4.8m

	Average	Standard deviation	90%	10%	Number of samples	Grade
<b>Biochemical oxygen demand (mg/l)</b>	1.41	0.62	2.22		33	A
<b>Ammonia (mgN/l)</b>	0.033	0.020	0.058		33	A
<b>Dissolved oxygen (percentage saturation)</b>	92.01	7.32		82.63	33	A

**Table 1-10 Chemical River Quality Monitoring Results for Washford River, Torre Fifa - Watchet Stretch  
Sampling Year 2003 - 2005**

Upstream Grid Reference: X 304400, Y 140000

Downstream Grid Reference: X 307000, Y 143200

Length: 4.8m



River Stretch	Year	Grade
Watchet - Sea	2004	B
Watchet - Sea	2000	A

**Table 1-11 Biological River Quality Results Summary for Washford River, Watchet - Sea Stretch  
Sampling Period 2000 – 2004**

Upstream Grid Reference: X 307000, Y 143200  
Downstream Grid Reference: X 307200, Y 143400  
Length: 0.4m

	Observed	Expected	Observed/ Expected	Probability grade %	Season code	Grade
<b>NTAXA</b>	32.00	29.00	1.10	100		A
<b>ASPT</b>	5.88	6.06	0.97	74		B
<b>Overall</b>					5	B

**Table 1-12 Biological River Quality Results for Washford River, Watchet - Sea Stretch  
Sampling Year 2004**

Upstream Grid Reference: X 307000, Y 143200  
Downstream Grid Reference: X 307200, Y 143400  
Length: 0.4m

River Stretch	Year	Grade
Torre Fifa – Watchet	2005	A
Torre Fifa – Watchet	2002	A
Torre Fifa – Watchet	2000	A

**Table 1-13 Biological River Quality Results for Washford River, Torre Fifa - Watchet Stretch  
Sampling Period 2000 – 2005**

Upstream Grid Reference: X 304400, Y 140000  
Downstream Grid Reference: X 307000, Y 143200  
Length: 4.8m

	Observed	Expected	Observed/ Expected	Probability grade %	Season code	Grade
<b>NTAXA</b>	37.00	31.50	1.17	100		A
<b>ASPT</b>	6.43	5.98	1.08	99		A
<b>Overall</b>					5	A

**Table 1-14 Biological River Quality Monitoring Results for Washford River, Torre Fifa - Watchet Stretch  
Sampling Year 2005**

Upstream Grid Reference: X 304400, Y 140000  
Downstream Grid Reference: X 307000, Y 143200  
Length: 4.8m

River Stretch	Year	Nitrate Level	Phosphate Level
Watchet - Sea	2003 - 2005	4	2
Watchet - Sea	2002 - 2004	4	2
Watchet - Sea	2001 - 2003	4	2
Watchet - Sea	2000 - 2002	3	2
Watchet - Sea	1999 - 2001	3	2
Watchet - Sea	1998 - 2000	4	2
Watchet - Sea	1993 - 1995	4	2

**Table 1-15 Nutrient River Quality Results Summary for Washford River, Watchet - Sea Stretch  
Sampling Period 1993 - 2005**

Upstream Grid Reference: X 307000, Y 143200

Downstream Grid Reference: X 307200, Y 143400

Length: 0.4m

	Mean	Standard deviation	Number of samples	Grade
<b>Nitrates (mg/l)</b>	20.44	20.46	33	4
<b>Phosphates (mg/l)</b>	0.04	0.99	33	2

**Table 1-16 Nutrient River Quality Monitoring Results for Washford River, Watchet - Sea Stretch  
Sampling Year 2003 - 2005**

Upstream Grid Reference: X 307000, Y 143200

Downstream Grid Reference: X 307200, Y 143400

Length: 0.4m

River Stretch	Year	Nitrate Level	Phosphate Level
Torre Fifa - Watchet	2003 - 2005	4	2
Torre Fifa - Watchet	2002 - 2004	4	2
Torre Fifa - Watchet	2001 - 2003	4	2
Torre Fifa - Watchet	2000 - 2002	3	2
Torre Fifa - Watchet	1999 - 2001	3	2
Torre Fifa - Watchet	1998 - 2000	4	2
Torre Fifa - Watchet	1993 - 1995	4	2

**Table 1-17 Nutrient River Quality Results Summary for Washford River, Torre Fifa - Watchet Stretch  
Sampling Period 1993 - 2005**

Upstream Grid Reference: X 304400, Y 140000

Downstream Grid Reference: X 307000, Y 143200

Length: 4.8m

	Mean	Standard deviation	Number of samples	Grade
<b>Nitrates (mg/l)</b>	20.41	20.43	33	4
<b>Phosphates (mg/l)</b>	0.05	0.99	33	2

**Table 1-18 Nutrient River Quality Results for Washford River, Torre Fifa - Watchet Stretch  
Sampling Year 2003 - 2005**

Upstream Grid Reference: X 304400, Y 140000

Downstream Grid Reference: X 307000, Y 143200

Length: 4.8m

### 3 Bathing Water Quality

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<b>Sampling Point</b>	<b>Year</b>	<b>Grade</b>
Blue Anchor West	2006	Good
Blue Anchor West	2005	Excellent
Blue Anchor West	2004	Good
Blue Anchor West	2003	Poor
Blue Anchor West	2002	Good
Blue Anchor West	2001	Good
Blue Anchor West	2000	Good
Blue Anchor West	1999	Poor
Blue Anchor West	1998	Poor
Blue Anchor West	1997	Good
Blue Anchor West	1996	Good
Blue Anchor West	1995	Good
Blue Anchor West	1994	Good
Blue Anchor West	1993	Good
Blue Anchor West	1992	Good
Blue Anchor West	1991	Poor
Blue Anchor West	1990	Good
Blue Anchor West	1989	Good
Blue Anchor West	1988	Good

**Table 2-1 Bathing Water Quality Results Summary for Blue Anchor Bay**

**Sampling Period 1988 – 2006**

Grid Reference: X 306780, Y 143340

Sampling Point	Date	Time	Total coliforms (colonies / 100ml)	Faecal coliforms (colonies / 100ml)	Faecal streptococci (colonies / 100ml)	Water Quality
Blue Anchor West	11/09/06	09:38	252	308	140	Good
Blue Anchor West	25/08/06	08:20	63	130	100	Good
Blue Anchor West	13/08/06	09:30	342	327	11	Good
Blue Anchor West	11/08/06	08:10	210	150	192	Good
Blue Anchor West	31/07/06	11:05	273	64	1008	Good
Blue Anchor West	29/07/06	10:10	76	160	34	Good
Blue Anchor West	14/07/06	09:02	3400	34	50	Good
Blue Anchor West	12/07/06	08:25	400	462	462	Good
Blue Anchor West	14/06/06	08:40	350	192	78	Good
Blue Anchor West	29/08/06	09:05	76	29	2	Excellent
Blue Anchor West	15/08/06	10:55	101	<6	4	Excellent
Blue Anchor West	27/07/06	08:45	32	8	<2	Excellent
Blue Anchor West	17/07/06	10:45	36	17	2	Excellent
Blue Anchor West	29/06/06	10:00	27	8	8	Excellent
Blue Anchor West	27/06/06	08:20	76	54	13	Excellent
Blue Anchor West	16/06/06	09:56	<10	<2	2	Excellent
Blue Anchor West	30/05/06	09:20	89	10	8	Excellent
Blue Anchor West	17/05/06	09:35	81	3	6	Excellent
Blue Anchor West	15/05/06	07:50	138	42	8	Excellent
Blue Anchor West	02/05/06	10:09	65	16	2	Excellent

**Table 2-2 Bathing Water Quality Monitoring Results for Blue Anchor Bay**

**Sampling Year 2006**

Grid Reference: X 306780, Y 143340

## 4 Groundwater Quality

Chemical Parameter	Units	East Wharf Groundwater Borehole 2	East Wharf Groundwater Borehole 4
pH	-	7.53	7.33
Total phenols	mg/l	<0.05	<0.05
Total polycyclic aromatic hydrocarbons	µg/l	<20	<20
Total cyanide	mg/l	<0.1	<0.1
Water soluble sulphate	g/l	0.15	0.92
Sulphide	mg/l	<0.5	<0.5
Arsenic	µg/l	<10	<10
Boron	mg/l	0.15	0.14
Cadmium	µg/l	<5	<5
Chromium	µg/l	<10	<10
Lead	µg/l	<10	<10
Mercury	µg/l	<1	<1
Copper	µg/l	18	46
Nickel	µg/l	<10	<10
Zinc	µg/l	56	<10

**Table 3-1 Range of Chemical Conditions of Groundwater at the East Wharf (Parkman 1997)**  
Results from Watchet east Wharf Development Environmental Statement compiled by Royal Haskoning, December 2001



Joanna Orr  
Buro Happold Limited  
Camden Mill  
Lower Bristol Road  
Bath  
BA2 3DQ  
UK

Telephone: +44 (0)1225 320600  
Facsimile: +44 (0)870 787 4148

Email: [joanna.orr@burohappold.com](mailto:joanna.orr@burohappold.com)