SOURCE DATA

MTB - upstream water quality

Summer (Nov – April)						Winter (May – Oct)					
	pH	BOD	NH3-N	DRP	Total N		pH	BOD	NH3-N	DRP	Total N
8/03/2011		0.5	0.005	0.012	0.29	13/07/2010		0.5	0.020	0.021	1.05
22/03/2011	7.67	0.5	0.005	0.006	0.15	10/08/2010		0.5	0.020	0.022	1.01
11/04/2011	8.08	0.5	0.005	0.022	0.36	9/05/2011	7.82	0.5	0.005	0.017	0.41
20/04/2011	8.01	0.5	0.005	0.019	0.34	24/05/2011	7.98	0.5	0.005	0.022	0.76
7/09/2011	7.8	0.5	0.005	0.016	1.14	1/06/2011	8.05	0.5	0.01	0.02	0.66
21/09/2011	8.05	0.5	0.01	0.014	0.55	15/06/2011	8.12	0.5	0.005	0.021	0.63
12/10/2011	8.19	0.5	0.005	0.011	0.48	28/06/2011	7.71	0.5	0.005	0.019	0.64
20/10/2011	7.91	0.5	0.005	0.018	0.48	19/07/2011	7.37	0.5	0.03	0.019	1.14
1/11/2011	7.88	0.5	0.005	0.022	0.64	1/08/2011	7.9	0.5	0.02	0.025	1.04
16/11/2011	8.37	0.5	0.005	0.023	0.54	8/08/2011	7.87	0.5	0.03	0.021	1.08
28/11/2011	8.04	0.5	0.005	0.021	0.35	25/08/2011	7.56	1.5	0.02	0.015	0.8
20/12/2011	8.22	0.5	0.005	0.021	0.37	20/07/2012	8.16	0.5	0.02	0.011	0.74
26/01/2012	8.18	1.5	0.005	0.013	0.31	15/05/2013	8.03	0.50	0.005	0.025	0.440
8/02/2012	8.6	0.5	0.005	0.006	0.22						
22/02/2012	8.73	0.5	0.005	0.005	0.2						
19/03/2012	7.6	0.5	0.005	0.018	0.51						
2/04/2012	8.24	0.5	0.005	0.017	0.49						
17/04/2012	8.41	0.5	0.005	0.016	0.46						
4/10/2012	8.45	0.5	0.005	0.011	0.57						
30/10/2012	7.58	0.5	0.005	0.011	0.52						
15/11/2012	8.29		0.005	0.019	0.470						
18/12/2012	8.38	1.50	0.005	0.006	0.390						
30/01/2013	8.21	0.50	0.030	0.003	0.190						
20/02/2013		0.50	0.005	0.006	0.190						
10/04/2013	8.44	0.50	0.005	0.009	0.300						
	pH	BOD	NH3-N	DRP	Total N		pH	BOD	NH3-N	DRP	Total N
25%ile	7.96	0.5	0.005	0.009	0.300	25%ile	7.765	0.5	0.005	0.019	0.64
Median	8.19	0.5	0.005	0.014	0.390	Median	7.9	0.5	0.02	0.021	0.76
75 %ile	8.375	0.5	0.005	0.019	0.510	75 %ile	8.04	0.5	0.020	0.022	1.04
Count	25					Count	13				

MTB - effluent quality

All Year	S.S.	Total Solids	BOD5 Tota	BOD Solubl	NH3-N	TP	DRP	TN	F.C.	E.Coli	pH	Temp	Conductivit	DO	FOG	Outflow
	mg/L								No./100mL					mg/L	mg/L	m3/d
Average	62.1	431.1	40.6	7.8	18.9	6.1	4.8	27.1	844.4	490.8	8.0	14.8	628.9	8.5	3.8	608
25%ile	37.0	335.5	24.4	3.0	11.4	4.3	2.9	18.7	91.0	25.0	7.8	11.0	462.8	7.1	2.5	314
Median	55.0	453.0	35.0	5.0	19.9	6.5	5.0	28.2	225.0	100.0	7.9	15.1	656.0	8.2	2.5	326
75%ile	81.0	519.0	53.6	8.8	25.8	8.0	6.8	33.0	1515.0	955.0	8.1	18.6	750.0	10.0	4.0	841
90%ile	117.8	554.0	68.1	19.5	29.6	8.9	7.5	38.2	2390.0	1510.0	8.5	20.5	864.8	11.0	6.9	1293
Max									3800.0	2900.0						11478
Count	125	71	125	66	123	125	125	121	42	50	92	92	85	90	83	567
Summer (Nov -	S.S.	Total Solids	BOD5 Tota	BOD Solubl	NH3-N	TP	DRP	TN	F.C.	E.Coli	pH	Temp	Conductivit	DO	FOG	Outflow
TRUE	mg/L								No./100mL							m3/d
Average	72.1	493.3	46.5	8.0	16.0	6.7	5.1	25.2	957.5	515.8	8.0	19.0	728.0	7.3	3.5	417
25%ile	42.0	454.5	29.0	4.0	8.7	5.4	3.6	17.3	100.0	29.0	7.8	18.0	654.5	6.3	2.5	306
Median	64.5	498.5	42.5	6.0	17.9	7.1	5.5	26.7	285.0	130.0	7.9	19.0	741.0	7.3	2.5	323
75%ile	95.3	548.0	58.8	8.0	24.0	8.5	6.8	32.4	2000.0	882.5	8.2	20.4	831.5	8.8	4.3	474
90%ile	127.6	577.3	78.9	16.0	26.8	9.3	7.5	35.3	2390.0	1400.0	8.5	21.8	928.6	9.9	6.1	815
Count	62	32	62	29	60	62	62	58	22	26	40	40	39	40	40	323
Winter (May - O	S.S.	Total Solids	BOD5 Tota	BOD Solubl	NH3-N	TP	DRP	TN	F.C.	E.Coli	pH	Temp	Conductivit	DO	FOG	Outflow
FALSE	mg/L								No./100mL							m3/d
Average	52.2	380.0	34.8	7.7	21.7	5.7	4.5	28.8	720.0	463.8	8.0	11.5	544.9	9.4	4.0	861
25%ile	28.5	317.0	22.5	3.0	13.3	3.7	2.5	22.9	78.5	23.0	7.8	9.1	415.9	7.8	2.5	320
Median	44.0	374.0	31.0	5.0	21.8	5.8	4.4	28.6	165.0	95.5	7.9	11.2	523.0	9.5	2.5	759
75%ile	72.5	488.0	45.9	9.0	27.1	7.4	6.6	34.8	1327.5	865.0	8.1	13.9	666.3	10.4	4.0	1282
90%ile	86.2	520.0	59.4	19.4	39.8	8.3	7.5	41.8	1837.0	1540.0	8.5	15.9	736.0	11.5	9.4	1599
Count	63	39	63	37	63	65	63	63	20	24	52	52	46	50	43	244

Statistical Notes:

- Only data from 2009 onwards has been used with exception to pathogens and flow data
- F.C and E.Coli data set from December 2011 - November 2013. UV disinfection unit installed end of November 2011.
- Outflow data from Dec 2011 to June 2013
- Approx. 2.5 years of overlapping quality and flow data (Jul 2010 - Apr 2013)

Ruamahanga River Flows @ Waihenga Bridge	
River Flow	**m3/s**
1 Day MALF Flow	8.712
7 Day MALF Flow	10.274
28 Day MALF Flow	17.824
½ Median Flow	24.93
Median Flow	49.86
2 x Median Flow	99.72
3 × Median Flow	149.58

(based on 2011 river flow statistics & May 2013 low flow statistics)

MWWTP Existing Effluent Flow Rates	m3/s
Average discharge flow rate	0.0092
Maximum discharge flow rate	0.0261

(based on June 2013 - January 2014 UV discharge instantaneous flow data)

MWWTP Proposed Effluent Flow Rates	m3/s
River Flow	**Max Discharge Rate**
<½ Median Flow	0
½ Median Flow - Median Flow	0.011
Median Flow - 2x Median Flow	0.021
2x Median Flow - 3x Median Flow	0.035
>3 × Median Flow	0.05

(based on LEI water and nutrient budget)

Table 8: MWWTP (all data - 1994 to 2011)) seasonal treated effluent composition (summer = 6 months from November – April inclusive; winter = May to October inclusive)

Parameter		n	Min	Median	Goemetric Mean	Max	90%ile
pH	Summer	164	6.9	7.7	7.7	8.9	8.2
	Winter	139	6.9	7.7	7.7	8.8	8.1
Suspended solids (mg/L)	Summer	165	5	44	44	346	105
	Winter	126	5	40	37	150	81
BOD_5 (mg/L)	Summer	134	8	29	30	106	64
	Winter	157	16	31	31	83	54
Total P (mg/L)	Summer	164	1.7	7.6	6.4	13.2	10.6
	Winter	149	1.7	7.7	6.7	67.4	10.1
DRP (mg/L)	Summer	163	1.7	6.2	5.3	16.8	9.3
	Winter	145	1.3	6.3	5.4	16.8	9.1
Ammoniacal N (mg/L)	Summer	164	0.11	16.6	11.8	62	33.8
	Winter	154	0.2	20.7	16.2	42	31.8
Nitrate+Nitrite N (mg/L)	Summer	33	0.02	0.74	0.80	9.1	7.1
	Winter	32	0.01	0.31	0.26	8.4	5.5
Total N (mg/L)	Summer	121	5.8	25.6	23.5	50.1	40.3
	Winter	107	9.6	27.6	25.6	50.1	40.7
Oil and Grease (mg/L)	Summer	60	<1	4	4	60	8
	Winter	49	<3	6	5	28	19
Faecal coliforms (cfu's/100 mL)	Summer	163	3	9,300	6,400	296,000	39,200
	Winter	157	720	13,300	13,000	185,000	58,700
E.coli (cfu's/100 mL)	Summer	145	28	6,000	4,600	190,000	26,500
	Winter	121	675	10,500	8,900	190,000	40,900

EAM (2012) data has been replaced by more recent 5 year analysis above.

STAGE 1A (EXISTING) SCENARIO

Notes

Average and Maximum effluent flow rate is taken from plant UV flow rate data provided by SWDC for June 2013 - January 2014
Background summer median river water quality values are taken from in-stream sampling - n= 25
Background winter median river water quality values are taken from in-stream sampling - n= 13
Background DIN river water quality concentration is the annual median taken from Gladstone RSoE (n=60)
Effluent contaminant concentrations are taken from AWT 2014 analysis, except DIN which has been taken from EAM (2012) Table 8

Ammoniacal-N											Compliance after full mixing		
River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	ANZECC trigger value (toxicant trigger value)	GWRC proposed limit	ANZECC (default)	ANZECC (toxicant)	GWRC
m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3	g/m3			
Minimum flow @ Waihenga Bridge													
Summer effluent median + ave flow rate	8.712	0.0092	947	0.005	17.9	**0.0239**	0.0189	378	*0.021*	*0.9*	0.9	×	✓	✓
Summer effluent median + max flow rate	8.712	0.0261	334	0.005	17.9	**0.0586**	0.0536	1073	*0.021*	*0.9*	0.9	×	✓	✓
Mean annual 7 day low flow @ Waihenga Bridge													
Summer effluent median + ave flow rate	10.274	0.0092	1117	0.005	17.9	**0.0210**	0.0160	321	*0.021*	*0.9*	0.9	✓	✓	✓
Summer effluent median + max flow rate	10.274	0.0261	394	0.005	17.9	**0.0505**	0.0455	909	*0.021*	*0.9*	0.9	×	✓	✓
1/2 Median flow @ Waihenga Bridge													
Summer effluent median + ave flow rate	24.93	0.0092	2710	0.005	17.9	**0.0116**	0.0066	132	*0.021*	*0.9*	0.9	✓	✓	✓
Summer effluent median + max flow rate	24.93	0.0261	955	0.005	17.9	**0.0237**	0.0187	375	*0.021*	*0.9*	0.9	×	✓	✓
Winter effluent median + ave flow rate	24.93	0.0092	2710	0.020	21.8	**0.0280**	0.0080	40	*0.021*	*0.9*	0.9	×	✓	✓
Winter effluent median + max flow rate	24.93	0.0261	955	0.020	21.8	**0.0428**	0.0228	114	*0.021*	*0.9*	0.9	×	✓	✓
Median flow @ Waihenga Bridge													
Summer effluent median + ave flow rate	49.86	0.0092	5420	0.005	17.9	**0.0083**	0.0033	66	*0.021*	*0.9*	0.9	✓	✓	✓
Summer effluent median + max flow rate	49.86	0.0261	1910	0.005	17.9	**0.0144**	0.0094	187	*0.021*	*0.9*	0.9	✓	✓	✓
Winter effluent median + ave flow rate	49.86	0.0092	5420	0.020	21.8	**0.0240**	0.0040	20	*0.021*	*0.9*	0.9	×	✓	✓
Winter effluent median + max flow rate	49.86	0.0261	1910	0.020	21.8	**0.0314**	0.0114	57	*0.021*	*0.9*	0.9	×	✓	✓
3 x Median Flow @ Waihenga Bridge													
Summer effluent median + ave flow rate	149.58	0.0092	16259	0.005	17.9	**0.0061**	0.0011	22	*0.021*	*0.9*	0.9	✓	✓	✓
Summer effluent median + max flow rate	149.58	0.0261	5731	0.005	17.9	**0.0081**	0.0031	62	*0.021*	*0.9*	0.9	✓	✓	✓
Winter effluent median + ave flow rate	149.58	0.0092	16259	0.020	21.8	**0.0213**	0.0013	7	*0.021*	*0.9*	0.9	×	✓	✓
Winter effluent median + max flow rate	149.58	0.0261	5731	0.020	21.8	**0.0238**	0.0038	19	*0.021*	*0.9*	0.9	×	✓	✓

	DRP										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
	Minimum flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	8.712	0.0092	947	0.014	5.5	**0.020**	0.0058	41	*0.01*	*0.014*	×	×
Summer effluent median + max flow rate	8.712	0.0261	334	0.014	5.5	**0.030**	0.0164	117	*0.01*	*0.014*	×	×
	Mean annual 7 day low flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	10.274	0.0092	1117	0.014	5.5	**0.019**	0.0049	35	*0.01*	*0.014*	×	×
Summer effluent median + max flow rate	10.274	0.0261	394	0.014	5.5	**0.028**	0.0139	99	*0.01*	*0.014*	×	×
	1/2 Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	24.93	0.0092	2710	0.014	5.5	**0.016**	0.0020	14	*0.01*	*0.014*	×	×
Summer effluent median + max flow rate	24.93	0.0261	955	0.014	5.5	**0.020**	0.0057	41	*0.01*	*0.014*	×	×
Winter effluent median + ave flow rate	24.93	0.0092	2710	0.021	4.4	**0.023**	0.0016	8	*0.01*	*0.014*	×	×
Winter effluent median + max flow rate	24.93	0.0261	955	0.021	4.4	**0.026**	0.0047	22	*0.01*	*0.014*	×	×
	Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	49.86	0.0092	5420	0.014	5.5	**0.015**	0.0010	7	*0.01*	*0.014*	×	×
Summer effluent median + max flow rate	49.86	0.0261	1910	0.014	5.5	**0.017**	0.0029	20	*0.01*	*0.014*	×	×
Winter effluent median + ave flow rate	49.86	0.0092	5420	0.021	4.4	**0.022**	0.0008	4	*0.01*	*0.014*	×	×
Winter effluent median + max flow rate	49.86	0.0261	1910	0.021	4.4	**0.023**	0.0023	11	*0.01*	*0.014*	×	×
	3 x Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	149.58	0.0092	16259	0.014	5.5	**0.014**	0.0003	2	*0.01*	*0.014*	×	✓
Summer effluent median + max flow rate	149.58	0.0261	5731	0.014	5.5	**0.015**	0.0010	7	*0.01*	*0.014*	×	×
Winter effluent median + ave flow rate	149.58	0.0092	16259	0.021	4.4	**0.021**	0.0003	1	*0.01*		×	
Winter effluent median + max flow rate	149.58	0.0261	5731	0.021	4.4	**0.022**	0.0008	4	*0.01*		×	

	DIN										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
	Minimum flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	8.712	0.0092	947	0.47	18	**0.489**	0.0190	4	*0.465*	*0.18*	×	×
Summer effluent median + max flow rate	8.712	0.0261	334	0.47	18	**0.524**	0.0539	11	*0.465*	*0.18*	×	×
	Mean annual 7 day low flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	10.274	0.0092	1117	0.47	18	**0.486**	0.0161	3	*0.465*	*0.18*	×	×
Summer effluent median + max flow rate	10.274	0.0261	394	0.47	18	**0.516**	0.0457	10	*0.465*	*0.18*	×	×
	1/2 Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	24.93	0.0092	2710	0.47	18	**0.477**	0.0066	1	*0.465*	*0.18*	×	×
Summer effluent median + max flow rate	24.93	0.0261	955	0.47	18	**0.489**	0.0188	4	*0.465*	*0.18*	×	×
	Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	49.86	0.0092	5420	0.47	18	**0.473**	0.0033	1	*0.465*	*0.18*	×	×
Summer effluent median + max flow rate	49.86	0.0261	1910	0.47	18	**0.479**	0.0094	2	*0.465*	*0.18*	×	×
	3 x Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	149.58	0.0092	16259	0.47	18	**0.471**	0.0011	0	*0.465*	-	×	-
Summer effluent median + max flow rate	149.58	0.0261	5731	0.47	18	**0.473**	0.0031	1	*0.465*	-	×	-

Total N										Compliance after full mixing	
River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
Minimum flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	8.712	0.0092	947	0.39	26.7	**0.418**	0.0281	7	*0.614*	-	✓	-
Summer effluent median + max flow rate	8.712	0.0261	334	0.39	26.7	**0.470**	0.0798	20	*0.614*	-	✓	-
Mean annual 7 day low flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	10.274	0.0092	1117	0.39	26.7	**0.414**	0.0239	6	*0.614*	-	✓	-
Summer effluent median + max flow rate	10.274	0.0261	394	0.39	26.7	**0.458**	0.0677	17	*0.614*	-	✓	-
1/2 Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	24.93	0.0092	2710	0.39	26.7	**0.400**	0.0098	3	*0.614*	-	✓	-
Summer effluent median + max flow rate	24.93	0.0261	955	0.39	26.7	**0.418**	0.0279	7	*0.614*	-	✓	-
Winter effluent median + ave flow rate	24.93	0.0092	2710	0.76	28.6	**0.771**	0.0105	1	*0.614*	-	×	-
Winter effluent median + max flow rate	24.93	0.0261	955	0.76	28.6	**0.790**	0.0299	4	*0.614*	-	×	-
Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	49.86	0.0092	5420	0.39	26.7	**0.395**	0.0049	1	*0.614*	-	✓	-
Summer effluent median + max flow rate	49.86	0.0261	1910	0.39	26.7	**0.404**	0.0140	4	*0.614*	-	✓	-
Winter effluent median + ave flow rate	49.86	0.0092	5420	0.76	28.6	**0.765**	0.0053	1	*0.614*	-	×	-
Winter effluent median + max flow rate	49.86	0.0261	1910	0.76	28.6	**0.775**	0.0149	2	*0.614*	-	×	-
3 x Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	149.58	0.0092	16259	0.39	26.7	**0.392**	0.0016	0	*0.614*	-	✓	-
Summer effluent median + max flow rate	149.58	0.0261	5731	0.39	26.7	**0.395**	0.0047	1	*0.614*	-	✓	-
Winter effluent median + ave flow rate	149.58	0.0092	16259	0.76	28.6	**0.762**	0.0018	0	*0.614*	-	×	-
Winter effluent median + max flow rate	149.58	0.0261	5731	0.76	28.6	**0.765**	0.0050	1	*0.614*	-	×	-

Suspended solids										Compliance after full mixing	
River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
Minimum flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	8.712	0.0092	947	2.5	64.5	**2.57**	0.0681	3	-	-	-	-
Summer effluent median + max flow rate	8.712	0.0261	334	2.5	64.5	**2.69**	0.1932	8	-	-	-	-
Mean annual 7 day low flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	10.274	0.0092	1117	2.5	64.5	**2.56**	0.0578	2	-	-	-	-
Summer effluent median + max flow rate	10.274	0.0261	394	2.5	64.5	**2.66**	0.1639	7	-	-	-	-
1/2 Median flow @ Waihenga Bridge											
Summer effluent median + ave flow rate	24.93	0.0092	2710	2.5	64.5	**2.52**	0.0238	1	-	-	-	-
Summer effluent median + max flow rate	24.93	0.0261	955	2.5	64.5	**2.57**	0.0675	3	-	-	-	-

BOD										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit ($ScBOD_5$ @ <FRE3)	ANZECC trigger value (default trigger value)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
Minimum flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	8.712	0.0092	947	0.5	42.5	**0.5449**	0.0449	9	-	*2*	-	✓
Summer effluent median + max flow rate	8.712	0.0261	334	0.5	42.5	**0.6273**	0.1273	25	-	*2*	-	✓
Mean annual 7 day low flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	10.274	0.0092	1117	0.5	42.5	**0.5381**	0.0381	8	-	*2*	-	✓
Summer effluent median + max flow rate	10.274	0.0261	394	0.5	42.5	**0.6080**	0.1080	22	-	*2*	-	✓
1/2 Median flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	24.93	0.0092	2710	0.5	42.5	**0.5157**	0.0157	3	-	*2*	-	✓
Summer effluent median + max flow rate	24.93	0.0261	955	0.5	42.5	**0.5445**	0.0445	9	-	*2*	-	✓
Median flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	49.86	0.0092	5420	0.5	42.5	**0.5078**	0.0078	2	-	*2*	-	✓
Summer effluent median + max flow rate	49.86	0.0261	1910	0.5	42.5	**0.5222**	0.0222	4	-	*2*	-	✓
3 x Median flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	149.58	0.0092	16259	0.5	42.5	**0.5026**	0.0026	1	-	*2*	-	✓
Summer effluent median + max flow rate	149.58	0.0261	5731	0.5	42.5	**0.5074**	0.0074	1	-	*2*	-	✓

E.coli										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	MfE 'acceptable' for contact recreation	GWRC proposed limit	MfE acceptable for contact recreation	GWRC
	m3/sec	m3/sec		cfu/100ml	cfu/100ml	cfu/100ml	cfu/100ml	%	cfu/100ml	cfu/100ml		
Minimum flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	8.712	0.0092	947	46	100	**46.11**	0.1056	0	*<260cfu/100ml*	*<260cfu/100ml*	✓	✓
Summer effluent median + max flow rate	8.712	0.0261	334	46	100	**46.30**	0.2996	1	*<260cfu/100ml*	*<260cfu/100ml*	✓	✓
Mean annual 7 day low flow @ Waihenga Bridge												
Summer effluent median + ave flow rate	10.274	0.0092	1117	46	100	**46.09**	0.0895	0	*<260cfu/100ml*	*<260cfu/100ml*	✓	✓
Summer effluent median + max flow rate	10.274	0.0261	394	46	100	**46.25**	0.2540	1	*<260cfu/100ml*	*<260cfu/100ml*	✓	✓

STAGE 1B & 2A SCENARIO

Notes

Maximum effluent flow rates have been determined by LEI (2014) as part of their water and nutrient budget.
Background summer median river water quality values are taken from in-stream sampling - n= 25
Background winter median river water quality values are taken from in-stream sampling - n= 13
Background DIN river water quality concentration is the annual median taken from Gladstone RSoE (n=60)
Effluent contaminant concentrations have been taken from AWT 2014 analysis, except for DIN which is taken from EAM (2012) Table 8.

Ammoniacal-N											Compliance after full mixing		
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	ANZECC trigger value (toxicant trigger value)	GWRC proposed limit	ANZECC (default)	ANZECC (toxicant)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3	g/m3			
<1/2 Median flow @ Waihenga Bridge														
No discharge to River	24.93	0	0	0.005	0	**0.0050**	0.0000	0	*0.021*	*0.9*	0.9	✓	✓	✓
<Median flow @ Waihenga Bridge														
Median Summer	24.93	0.011	2266	0.005	17.9	**0.0129**	0.0079	158	*0.021*	*0.9*	0.9	✓	✓	✓
Median Winter	24.93	0.011	2266	0.02	21.8	**0.0296**	0.0096	48	*0.021*	*0.9*	0.9	×	✓	✓
<2 x Median flow @ Waihenga Bridge														
Median Summer	49.86	0.021	2374	0.005	17.9	**0.0125**	0.0075	151	*0.021*	*0.9*	0.9	✓	✓	✓
Median Winter	49.86	0.021	2374	0.02	21.8	**0.0292**	0.0092	46	*0.021*	*0.9*	0.9	×	✓	✓
<3 x Median flow @ Waihenga Bridge														
Median Summer	99.72	0.035	2849	0.005	17.9	**0.0113**	0.0063	126	*0.021*	*0.9*	0.9	✓	✓	✓
Median Winter	99.72	0.035	2849	0.02	21.8	**0.0277**	0.0077	38	*0.021*	*0.9*	0.9	×	✓	✓
>3 x Median flow @ Waihenga Bridge														
Median Summer	149.58	0.05	2992	0.005	17.9	**0.0110**	0.0060	120	*0.021*	*0.9*	0.9	✓	✓	✓
Median Winter	149.58	0.05	2992	0.02	21.8	**0.0273**	0.0073	36	*0.021*	*0.9*	0.9	×	✓	✓

DRP										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
<1/2 Median flow @ Waihenga Bridge												
No discharge to River	24.93	0	0	0.014	0	**0.0140**	0.0000	0	*0.01*	*0.014*	×	×
<Median flow @ Waihenga Bridge												
Median Summer	24.93	0.011	2266	0.014	5.5	**0.0164**	0.0024	17	*0.01*	*0.014*	×	×
Median Winter	24.93	0.011	2266	0.021	4.4	**0.0229**	0.0019	9	*0.01*	*0.014*	×	×
< 2x Median flow @ Waihenga Bridge												
Median Summer	49.86	0.021	2374	0.014	5.5	**0.0163**	0.0023	16	*0.01*	*0.014*	×	×
Median Winter	49.86	0.021	2374	0.021	4.4	**0.0229**	0.0019	9	*0.01*	*0.014*	×	×
<3 x Median flow @ Waihenga Bridge												
Median Summer	99.72	0.035	2849	0.014	5.5	**0.0159**	0.0019	14	*0.01*	*0.014*	×	×
Median Winter	99.72	0.035	2849	0.021	4.4	**0.0225**	0.0015	7	*0.01*	*0.014*	×	×
>3 x Median flow @ Waihenga Bridge												
Median Summer	149.58	0.05	2992	0.014	5.5	**0.0158**	0.0018	13	*0.01*	*0.014*	×	×
Median Winter	149.58	0.05	2992	0.021	4.4	**0.0225**	0.0015	7	*0.01*	*0.014*	×	×

	DIN										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
	1/2 Median flow @ Waihenga Bridge											
No discharge to River	24.93	0	0	0.47	0	**0.4700**	0.0000	0	*0.465*	*0.18*	×	×
	< Median flow @ Waihenga Bridge											
Median Summer	24.93	0.011	2266	0.47	17.3	**0.4776**	0.0076	2	*0.465*	*0.18*	×	×
Median Winter	24.93	0.011	2266	0.47	21	**0.4793**	0.0093	2	*0.465*	*0.18*	×	×
	<2 x Median flow @ Waihenga Bridge											
Median Summer	49.86	0.021	2374	0.47	17.3	**0.4773**	0.0073	2	*0.465*	-	×	-
Median Winter	49.86	0.021	2374	0.47	21	**0.4788**	0.0088	2	*0.465*	-	×	-
	<3 x Median flow @ Waihenga Bridge											
Median Summer	99.72	0.035	2849	0.47	17.3	**0.4761**	0.0061	1	*0.465*	-	×	-
Median Winter	99.72	0.035	2849	0.47	21	**0.4774**	0.0074	2	*0.465*	-	×	-
	>3 x Median flow @ Waihenga Bridge											
Median Summer	149.58	0.05	2992	0.47	17.3	**0.4758**	0.0058	1	*0.465*	-	×	-
Median Winter	149.58	0.05	2992	0.47	21	**0.4770**	0.0070	1	*0.465*	-	×	-

	Total N										Compliance after full mixing	
	River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
	m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
	<1/2 Median flow @ Waihenga Bridge											
No discharge to River	24.93	0	0	0.39	0.0	**0.3900**	0.0000	0	*0.614*	-	✓	-
	<Median flow @ Waihenga Bridge											
Median Summer	24.93	0.011	2266	0.39	26.7	**0.4018**	0.0118	3	*0.614*	-	✓	-
Median Winter	24.93	0.011	2266	0.76	28.6	**0.7726**	0.0126	2	*0.614*	-	×	-
	<2x Median flow @ Waihenga Bridge											
Median Summer	49.86	0.021	2374	0.39	26.7	**0.4012**	0.0112	3	*0.614*	-	✓	-
Median Winter	49.86	0.021	2374	0.76	28.6	**0.7720**	0.0120	2	*0.614*	-	×	
	<3 x Median flow @ Waihenga Bridge											
Median Summer	99.72	0.035	2849	0.39	26.7	**0.3994**	0.0094	2	*0.614*	-	✓	-
Median Winter	99.72	0.035	2849	0.76	28.6	**0.7700**	0.0100	1	*0.614*	-	×	
	>3 x Median flow @ Waihenga Bridge											
Median Summer	149.58	0.05	2992	0.39	26.7	**0.3989**	0.0089	2	*0.614*	-	✓	-
Median Winter	149.58	0.05	2992	0.76	28.6	**0.7695**	0.0095	1	*0.614*	-	×	

STAGE 2B SCENARIO

Notes

No discharges during flows <FRE3 flow, hence discharge scenarios for rivers flows <FRE3 not shown as all discharges to go to land or held in storage.

Background summer river median value from in-stream sampling - n= 25

Background witner median river water quality values taken from in-stream sampling - n= 13

Background DIN river water quality concentration is the annual median taken from Gladstone RSoE (n=60)

Effluent contaminant concentrations are taken from AWT 2014 analysis, except DIN which has been taken from EAM (2012) Table 8

Ammoniacal-N											Compliance after full mixing		
River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	ANZECC trigger value (toxicant trigger value)	GWRC proposed limit	ANZECC (default)	ANZECC (toxicant)	GWRC
m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3	g/m3			
3 x median river flow													
149.58	0.035	4274	0.005	19.9	**0.0097**	0.0047	93	*0.021*	*0.9*	0.9	✓	✓	✓
149.58	0.035	4274	0.02	19.9	**0.0247**	0.0047	23	*0.021*	*0.9*	0.9	×	✓	✓
> 3 x median river flow													
226	0.05	4520	0.005	19.9	**0.0094**	0.0044	88	*0.021*	*0.9*	0.9	✓	✓	✓
226	0.05	4520	0.02	19.9	**0.0244**	0.0044	22	*0.021*	*0.9*	0.9	×	✓	✓

DRP										Compliance after full mixing	
River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
3 x median river flow											
149.58	0.035	4274	0.014	5.0	**0.0152**	0.0012	8	*0.01*	*0.014*	×	×
149.58	0.035	4274	0.021	5.0	**0.0222**	0.0012	6	*0.01*	*0.014*	×	×
> 3 x median river flow											
226	0.05	4520	0.014	5.0	**0.0151**	0.0011	8	*0.01*	*0.014*	×	×
226	0.05	4520	0.021	5.0	**0.0221**	0.0011	5	*0.01*	*0.014*	×	×

DIN										Compliance after full mixing	
River flow	Effluent flow rate	Dilution ratio	Background	Effluent	Fully mixed concentration	Addition to downstream concentration	% increase to downstream concentration	ANZECC trigger value (default trigger value)	GWRC proposed limit	ANZECC trigger value (default trigger value)	GWRC
m3/sec	m3/sec		g/m3	g/m3	g/m3	g/m3	%	g/m3	g/m3		
3 x median river flow											
149.58	0.035	4274	0.47	21	**0.4749**	0.0049	1	*0.465*	-	×	-
> 3 x median river flow											
226	0.05	4520	0.47	21	**0.4746**	0.0046	1	*0.465*	-	×	-