Appendix B.

Table A1. Chessie BIBI score comparisons.

MS4	Comparison	Z	P.unadj	P.adj
Acton/Hamilton	Control - Reference	-6.22	0	0
Acton/Hamilton	Control - Treatment	-0.26	0.792	0.792
Acton/Hamilton	Reference - Treatment	3.44	0.001	0.001
Airpark Business Center	Control - Reference	-4.99	0	0
Airpark Business Center	Control - Treatment	0.81	0.415	0.415
Airpark Business Center	Reference - Treatment	6.09	0	0
Bear Branch	Control - Reference	-7.22	0	0
Bear Branch	Control - Treatment	-2.96	0.003	0.003
Bear Branch	Reference - Treatment	4.24	0	0
Breewood	Control - Reference	-3.53	0	0.001
Breewood	Control - Treatment	0.31	0.753	0.753
Breewood	Reference - Treatment	8.92	0	0
Moores Run	Control - Reference	-4.07	0	0
Moores Run	Control - Treatment	1.34	0.179	0.179
Moores Run	Reference - Treatment	9.27	0	0
Parole Town Center	Control - Reference	-4.55	0	0
Parole Town Center	Control - Treatment	-0.94	0.346	0.346
Parole Town Center	Reference - Treatment	5.11	0	0
Peter Pan Run	Control - Reference	-5.75	0	0
Peter Pan Run	Control - Treatment	1.92	0.055	0.055
Peter Pan Run	Reference - Treatment	11.8	0	0
Red Hill Branch	Control - Reference	-8.22	0	0
Red Hill Branch	Control - Treatment	2.4	0.016	0.016
Red Hill Branch	Reference - Treatment	9.37	0	0
Scotts Level Branch	Control - Reference	-5.38	0	0
Scotts Level Branch	Control - Treatment	5.77	0	0
Scotts Level Branch	Reference - Treatment	15.9	0	0
Stewart-April Lane	Control - Reference	-2.32	0.02	0.041
Stewart-April Lane	Control - Treatment	0.79	0.429	0.429
Stewart-April Lane	Reference - Treatment	14.65	0	0

Table A2. Biological metrics comparisons.

MS4	Metric	Comparison	Z	P.unadj	P.adj
Acton/Hamilton	ASPT_MOD	Control - Reference	-6.92	0	0
Acton/Hamilton	ASPT_MOD	Control - Treatment	0.16	0.877	0.877
Acton/Hamilton	ASPT_MOD	Reference - Treatment	4.29	0	0
Acton/Hamilton	MARGALEFS	Control - Reference	-6.8	0	0
Acton/Hamilton	MARGALEFS	Control - Treatment	-0.7	0.485	0.485
Acton/Hamilton	MARGALEFS	Reference - Treatment	3.42	0.001	0.001
Acton/Hamilton	PCT_BURROW	Control - Reference	5.29	0	0
Acton/Hamilton	PCT_BURROW	Control - Treatment	-1.99	0.047	0.047
Acton/Hamilton	PCT_BURROW	Reference - Treatment	-5.12	0	0
Acton/Hamilton	PCT_INTOL_0_4	Control - Reference	-6.04	0	0
Acton/Hamilton	PCT_INTOL_0_4	Control - Treatment	1.16	0.248	0.248
Acton/Hamilton	PCT_INTOL_0_4	Reference - Treatment	4.8	0	0
Acton/Hamilton	PCT_NON_HYDROP_TRICHOPTERA	Control - Reference	-3.31	0.001	0.003
Acton/Hamilton	PCT_NON_HYDROP_TRICHOPTERA	Control - Treatment	0.46	0.645	0.645
Acton/Hamilton	PCT_NON_HYDROP_TRICHOPTERA	Reference - Treatment	2.55	0.011	0.022
Acton/Hamilton	PCT_SHRED	Control - Reference	-5.97	0	0
Acton/Hamilton	PCT_SHRED	Control - Treatment	1.01	0.311	0.311
Acton/Hamilton	PCT_SHRED	Reference - Treatment	4.62	0	0
Acton/Hamilton	RICH_MODTOL	Control - Reference	-5.1	0	0
Acton/Hamilton	RICH_MODTOL	Control - Treatment	-0.59	0.554	1
Acton/Hamilton	RICH_MODTOL	Reference - Treatment	0.36	0.717	0.717
Acton/Hamilton	RICH_SHRED	Control - Reference	-5.78	0	0
Acton/Hamilton	RICH_SHRED	Control - Treatment	-0.37	0.713	0.713
Acton/Hamilton	RICH_SHRED	Reference - Treatment	0.73	0.466	0.932
Airpark Business Center	PCT_EPHEMEROPTERA	Control - Reference	-5.24	0	0
Airpark Business Center	PCT_EPHEMEROPTERA	Control - Treatment	0.1	0.919	0.919
Airpark Business Center	PCT_EPHEMEROPTERA	Reference - Treatment	5.38	0	0
Airpark Business Center	PCT_EPHEMEROPTERA_NO_BAETID	Control - Reference	-4.8	0	0
Airpark Business Center	PCT_EPHEMEROPTERA_NO_BAETID	Control - Treatment	0.8	0.422	0.422
Airpark Business Center	PCT_EPHEMEROPTERA_NO_BAETID	Reference - Treatment	5.88	0	0
Airpark Business Center	PCT_EPT	Control - Reference	-5.01	0	0
Airpark Business Center	PCT_EPT	Control - Treatment	0.5	0.619	0.619
Airpark Business Center	PCT_EPT	Reference - Treatment	5.68	0	0
Airpark Business Center	PCT_INTOL_0_3	Control - Reference	-4.38	0	0
Airpark Business Center	PCT_INTOL_0_3	Control - Treatment	1.33	0.182	0.182
Airpark Business Center	PCT_INTOL_0_3	Reference - Treatment	6.18	0	0
Airpark Business Center	PCT_PLECOPTERA	Control - Reference	-0.31	0.759	0.759
Airpark Business Center	PCT_PLECOPTERA	Control - Treatment	4.12	0	0
Airpark Business Center	PCT_PLECOPTERA	Reference - Treatment	5.86	0	0
Airpark Business Center	RICH_CLING	Control - Reference	-2.38	0.018	0.035
Airpark Business Center	RICH_CLING	Control - Treatment	2.13	0.033	0.033
Airpark Business Center	RICH_CLING	Reference - Treatment	5.25	0	0
Airpark Business Center	RICH_EPHEMEROPTERA	Control - Reference	-2.99	0.003	0.006
Airpark Business Center	RICH_EPHEMEROPTERA	Control - Treatment	0.53	0.596	0.596
Airpark Business Center	RICH_EPHEMEROPTERA	Reference - Treatment	3.71	0	0.001

Airpark Business Center	RICH_PLECOPTERA	Control - Reference	-0.74	0.461	0.461
Airpark Business Center	RICH_PLECOPTERA	Control - Treatment	3.76	0	0
Airpark Business Center	RICH_PLECOPTERA	Reference - Treatment	5.93	0	0
Bear Branch	ASPT_MOD	Control - Reference	-7.42	0	0
Bear Branch	ASPT_MOD	Control - Treatment	-0.29	0.771	0.771
Bear Branch	ASPT_MOD	Reference - Treatment	6.04	0	0
Bear Branch	MARGALEFS	Control - Reference	-6.66	0	0
Bear Branch	MARGALEFS	Control - Treatment	-0.12	0.902	0.902
Bear Branch	MARGALEFS	Reference - Treatment	6.36	0	0
Bear Branch	PCT_BURROW	Control - Reference	4.8	0	0
Bear Branch	PCT_BURROW	Control - Treatment	-2.79	0.005	0.005
Bear Branch	PCT_BURROW	Reference - Treatment	-6.9	0	0
Bear Branch	PCT_INTOL_0_4	Control - Reference	-6.59	0	0
Bear Branch	PCT_INTOL_0_4	Control - Treatment	0.29	0.774	0.774
Bear Branch	PCT_INTOL_0_4	Reference - Treatment	5.98	0	0
Bear Branch	PCT_NON_HYDROP_TRICHOPTERA	Control - Reference	-3.79	0	0
Bear Branch	PCT_NON_HYDROP_TRICHOPTERA	Control - Treatment	1.39	0.164	0.164
Bear Branch	PCT_NON_HYDROP_TRICHOPTERA	Reference - Treatment	4.76	0	0
Bear Branch	PCT_SHRED	Control - Reference	-6	0	0
Bear Branch	PCT_SHRED	Control - Treatment	1.47	0.14	0.14
Bear Branch	PCT_SHRED	Reference - Treatment	6.63	0	0
Bear Branch	RICH_MODTOL	Control - Reference	-5.15	0	0
Bear Branch	RICH_MODTOL	Control - Treatment	-2.74	0.006	0.012
Bear Branch	RICH_MODTOL	Reference - Treatment	1.5	0.134	0.134
Bear Branch	RICH_SHRED	Control - Reference	-5.65	0	0
Bear Branch	RICH_SHRED	Control - Treatment	1.08	0.282	0.282
Bear Branch	RICH_SHRED	Reference - Treatment	5.73	0	0
Breewood	PCT_EPHEMEROPTERA	Control - Reference	-3.29	0.001	0.002
Breewood	PCT_EPHEMEROPTERA	Control - Treatment	0.49	0.623	0.623
Breewood	PCT_EPHEMEROPTERA	Reference - Treatment	7.71	0	0
Breewood	PCT_EPHEMEROPTERA_NO_BAETID	Control - Reference	-3.82	0	0
Breewood	PCT_EPHEMEROPTERA_NO_BAETID	Control - Treatment	-0.03	0.978	0.978
Breewood	PCT_EPHEMEROPTERA_NO_BAETID	Reference - Treatment	7.5	0	0
Breewood	PCT_EPT	Control - Reference	-2.97	0.003	0.006
Breewood	PCT_EPT	Control - Treatment	0.78	0.438	0.438
Breewood	PCT_EPT	Reference - Treatment	8.64	0	0
Breewood	PCT_INTOL_0_3	Control - Reference	-3.98	0	0
Breewood	PCT_INTOL_0_3	Control - Treatment	-0.27	0.79	0.79
Breewood	PCT_INTOL_0_3	Reference - Treatment	7.73	0	0
Breewood	PCT_PLECOPTERA	Control - Reference	-3.73	0	0
Breewood	PCT_PLECOPTERA	Control - Treatment	0.02	0.983	0.983
Breewood	PCT_PLECOPTERA	Reference - Treatment	7.42	0	0
Breewood	RICH_CLING	Control - Reference	-3.83	0	0
Breewood	RICH_CLING	Control - Treatment	-0.04	0.971	0.971
Breewood	RICH_CLING	Reference - Treatment	7.89	0	0
Breewood	RICH_EPHEMEROPTERA	Control - Reference	-3.69	0	0
Breewood	RICH_EPHEMEROPTERA	Control - Treatment	0.25	0.803	0.803
Breewood	RICH_EPHEMEROPTERA	Reference - Treatment	7.8	0	0
Breewood	RICH_PLECOPTERA	Control - Reference	-3.66	0	0.001

Breewood	RICH_PLECOPTERA	Control - Treatment	0.07	0.944	0.944
Breewood	RICH_PLECOPTERA	Reference - Treatment	7.36	0	0
Church Creek	ASPT_MOD	Control - Reference	-4.58	0	0
Church Creek	ASPT_MOD	Control - Treatment	-0.79	0.428	0.428
Church Creek	ASPT_MOD	Reference - Treatment	5.4	0	0
Church Creek	MARGALEFS	Control - Reference	-5.25	0	0
Church Creek	MARGALEFS	Control - Treatment	-1.81	0.07	0.07
Church Creek	MARGALEFS	Reference - Treatment	4.75	0	0
Church Creek	PCT_BURROW	Control - Reference	4.7	0	0
Church Creek	PCT_BURROW	Control - Treatment	2.52	0.012	0.012
Church Creek	PCT_BURROW	Reference - Treatment	-2.82	0.005	0.01
Church Creek	PCT_INTOL_0_4	Control - Reference	-4.35	0	0
Church Creek	PCT_INTOL_0_4	Control - Treatment	0.01	0.995	0.995
Church Creek	PCT_INTOL_0_4	Reference - Treatment	5.24	0	0
Church Creek	PCT_NON_HYDROP_TRICHOPTERA	Control - Reference	-3.37	0.001	0.002
Church Creek	PCT_NON_HYDROP_TRICHOPTERA	Control - Treatment	0	1	1
Church Creek	PCT_NON_HYDROP_TRICHOPTERA	Reference - Treatment	3.37	0.001	0.002
Church Creek	PCT_SHRED	Control - Reference	-4.78	0	0
Church Creek	PCT_SHRED	Control - Treatment	-0.71	0.478	0.478
Church Creek	PCT_SHRED	Reference - Treatment	5.14	0	0
Church Creek	RICH_MODTOL	Control - Reference	-4.1	0	0
Church Creek	RICH_MODTOL	Control - Treatment	-0.78	0.438	0.438
Church Creek	RICH_MODTOL	Reference - Treatment	1.31	0.192	0.384
Church Creek	RICH_SHRED	Control - Reference	-4.37	0	0
Church Creek	RICH_SHRED	Control - Treatment	-0.62	0.534	0.534
Church Creek	RICH_SHRED	Reference - Treatment	1.62	0.106	0.212
Moores Run	ASPT_MOD	Control - Reference	-4.35	0	0
Moores Run	ASPT_MOD	Control - Treatment	1.19	0.236	0.236
Moores Run	ASPT_MOD	Reference - Treatment	8.92	0	0
Moores Run	MARGALEFS	Control - Reference	-3.51	0	0.001
Moores Run	MARGALEFS	Control - Treatment	2.21	0.027	0.027
Moores Run	MARGALEFS	Reference - Treatment	9.52	0	0
Moores Run	PCT_BURROW	Control - Reference	4.48	0	0
Moores Run	PCT_BURROW	Control - Treatment	-0.69	0.488	0.488
Moores Run	PCT_BURROW	Reference - Treatment	-8.26	0	0
Moores Run	PCT_INTOL_0_4	Control - Reference	-4.16	0	0
Moores Run	PCT_INTOL_0_4	Control - Treatment	0.83	0.408	0.408
Moores Run	PCT_INTOL_0_4	Reference - Treatment	8.11	0	0
Moores Run	PCT_NON_HYDROP_TRICHOPTERA	Control - Reference	-3.37	0.001	0.002
Moores Run	PCT_NON_HYDROP_TRICHOPTERA	Control - Treatment	1.26	0.208	0.208
Moores Run	PCT_NON_HYDROP_TRICHOPTERA	Reference - Treatment	7.1	0	0
Moores Run	PCT_SHRED	Control - Reference	-3.67	0	0
Moores Run	PCT_SHRED	Control - Treatment	1.47	0.142	0.142
Moores Run	PCT_SHRED	Reference - Treatment	8.25	0	0
Moores Run	RICH_MODTOL	Control - Reference	-2.57	0.01	0.01
Moores Run	RICH_MODTOL	Control - Treatment	3.02	0.002	0.005
Moores Run	RICH_MODTOL	Reference - Treatment	8.62	0	0
Moores Run	RICH_SHRED	Control - Reference	-4.03	0	0
Moores Run	RICH_SHRED	Control - Treatment	1.07	0.286	0.286

Moores Run	RICH_SHRED	Reference - Treatment	8.05	0	0
Peter Pan Run	PCT_EPHEMEROPTERA	Control - Reference	-5.24	0	0
Peter Pan Run	PCT_EPHEMEROPTERA	Control - Treatment	2.26	0.024	0.024
Peter Pan Run	PCT_EPHEMEROPTERA	Reference - Treatment	11.16	0	0
Peter Pan Run	PCT_EPHEMEROPTERA_NO_BAETID	Control - Reference	-4.64	0	0
Peter Pan Run	PCT_EPHEMEROPTERA_NO_BAETID	Control - Treatment	2.99	0.003	0.003
Peter Pan Run	PCT_EPHEMEROPTERA_NO_BAETID	Reference - Treatment	11.36	0	0
Peter Pan Run	PCT_EPT	Control - Reference	-5.17	0	0
Peter Pan Run	PCT_EPT	Control - Treatment	2.64	0.008	0.008
Peter Pan Run	PCT_EPT	Reference - Treatment	12.06	0	0
Peter Pan Run	PCT_INTOL_0_3	Control - Reference	-4.64	0	0
Peter Pan Run	PCT_INTOL_0_3	Control - Treatment	3.07	0.002	0.002
Peter Pan Run	PCT_INTOL_0_3	Reference - Treatment	11.95	0	0
Peter Pan Run	PCT_PLECOPTERA	Control - Reference	-0.66	0.511	0.511
Peter Pan Run	PCT_PLECOPTERA	Control - Treatment	4.14	0	0
Peter Pan Run	PCT_PLECOPTERA	Reference - Treatment	7.53	0	0
Peter Pan Run	RICH_CLING	Control - Reference	-2.74	0.006	0.006
Peter Pan Run	RICH_CLING	Control - Treatment	4.34	0	0
Peter Pan Run	RICH_CLING	Reference - Treatment	10.6	0	0
Peter Pan Run	RICH_EPHEMEROPTERA	Control - Reference	-4.16	0	0
Peter Pan Run	RICH_EPHEMEROPTERA	Control - Treatment	0.91	0.365	0.365
Peter Pan Run	RICH_EPHEMEROPTERA	Reference - Treatment	7.37	0	0
Peter Pan Run	RICH_PLECOPTERA	Control - Reference	-1	0.318	0.318
Peter Pan Run	RICH_PLECOPTERA	Control - Treatment	3.8	0	0
Peter Pan Run	RICH_PLECOPTERA	Reference - Treatment	7.14	0	0
Red Hill Branch	PCT_EPHEMEROPTERA	Control - Reference	-6.15	0	0
Red Hill Branch	PCT_EPHEMEROPTERA	Control - Treatment	2.44	0.015	0.015
Red Hill Branch	PCT_EPHEMEROPTERA	Reference - Treatment	6.52	0	0
Red Hill Branch	PCT_EPHEMEROPTERA_NO_BAETID	Control - Reference	-6.02	0	0
Red Hill Branch	PCT_EPHEMEROPTERA_NO_BAETID	Control - Treatment	2.36	0.018	0.018
Red Hill Branch	PCT_EPHEMEROPTERA_NO_BAETID	Reference - Treatment	6.35	0	0
Red Hill Branch	PCT_EPT	Control - Reference	-6.44	0	0
Red Hill Branch	PCT_EPT	Control - Treatment	2.8	0.005	0.005
Red Hill Branch	PCT_EPT	Reference - Treatment	8.29	0	0
Red Hill Branch	PCT_INTOL_0_3	Control - Reference	-6.33	0	0
Red Hill Branch	PCT_INTOL_0_3	Control - Treatment	3.37	0.001	0.001
Red Hill Branch	PCT_INTOL_0_3	Reference - Treatment	8.66	0	0
Red Hill Branch	PCT_PLECOPTERA	Control - Reference	-2.71	0.007	0.007
Red Hill Branch	PCT_PLECOPTERA	Control - Treatment	4.25	0	0
Red Hill Branch	PCT_PLECOPTERA	Reference - Treatment	6.44	0	0
Red Hill Branch	RICH_CLING	Control - Reference	-5.17	0	0
Red Hill Branch	RICH_CLING	Control - Treatment	3.79	0	0
Red Hill Branch	RICH_CLING	Reference - Treatment	8.34	0	0
Red Hill Branch	RICH_EPHEMEROPTERA	Control - Reference	-5.18	0	0
Red Hill Branch	RICH_EPHEMEROPTERA	Control - Treatment	2.57	0.01	0.01
Red Hill Branch	RICH_EPHEMEROPTERA	Reference - Treatment	6.13	0	0
Red Hill Branch	RICH_PLECOPTERA	Control - Reference	-3.58	0	0
Red Hill Branch	RICH_PLECOPTERA	Control - Treatment	3.59	0	0.001
Red Hill Branch	RICH_PLECOPTERA	Reference - Treatment	6.26	0	0

Scotts Level Branch	PCT_EPHEMEROPTERA	Control - Reference	-5.3	0	0
Scotts Level Branch	PCT_EPHEMEROPTERA	Control - Treatment	4.43	0	0
Scotts Level Branch	PCT_EPHEMEROPTERA	Reference - Treatment	12.16	0	0
Scotts Level Branch	PCT_EPHEMEROPTERA_NO_BAETID	Control - Reference	-5.34	0	0
Scotts Level Branch	PCT_EPHEMEROPTERA_NO_BAETID	Control - Treatment	4.48	0	0
Scotts Level Branch	PCT_EPHEMEROPTERA_NO_BAETID	Reference - Treatment	11.95	0	0
Scotts Level Branch	PCT_EPT	Control - Reference	-4.6	0	0
Scotts Level Branch	PCT_EPT	Control - Treatment	5.81	0	0
Scotts Level Branch	PCT_EPT	Reference - Treatment	14.76	0	0
Scotts Level Branch	PCT_INTOL_0_3	Control - Reference	-4.73	0	0
Scotts Level Branch	PCT_INTOL_0_3	Control - Treatment	5.88	0	0
Scotts Level Branch	PCT_INTOL_0_3	Reference - Treatment	14.65	0	0
Scotts Level Branch	PCT_PLECOPTERA	Control - Reference	-2.36	0.018	0.018
Scotts Level Branch	PCT_PLECOPTERA	Control - Treatment	6.58	0	0
Scotts Level Branch	PCT_PLECOPTERA	Reference - Treatment	11.06	0	0
Scotts Level Branch	RICH_CLING	Control - Reference	-3.64	0	0
Scotts Level Branch	RICH_CLING	Control - Treatment	6.67	0	0
Scotts Level Branch	RICH_CLING	Reference - Treatment	14.16	0	0
Scotts Level Branch	RICH_EPHEMEROPTERA	Control - Reference	-4.45	0	0
Scotts Level Branch	RICH_EPHEMEROPTERA	Control - Treatment	5.14	0	0
Scotts Level Branch	RICH_EPHEMEROPTERA	Reference - Treatment	12.05	0	0
Scotts Level Branch	RICH_PLECOPTERA	Control - Reference	-3.08	0.002	0.002
Scotts Level Branch	RICH_PLECOPTERA	Control - Treatment	6.17	0	0
Scotts Level Branch	RICH_PLECOPTERA	Reference - Treatment	11.43	0	0
Stewart-April Lane	PCT_EPHEMEROPTERA	Control - Reference	-2.48	0.013	0.026
Stewart-April Lane	PCT_EPHEMEROPTERA	Control - Treatment	0.44	0.659	0.659
Stewart-April Lane	PCT_EPHEMEROPTERA	Reference - Treatment	13.61	0	0
Stewart-April Lane	PCT_EPHEMEROPTERA_NO_BAETID	Control - Reference	-2.56	0.011	0.021
Stewart-April Lane	PCT_EPHEMEROPTERA_NO_BAETID	Control - Treatment	0.23	0.821	0.821
Stewart-April Lane	PCT_EPHEMEROPTERA_NO_BAETID	Reference - Treatment	12.84	0	0
Stewart-April Lane	PCT_EPT	Control - Reference	-2.43	0.015	0.03
Stewart-April Lane	PCT_EPT	Control - Treatment	0.47	0.636	0.636
Stewart-April Lane	PCT_EPT	Reference - Treatment	13.65	0	0
Stewart-April Lane	PCT_INTOL_0_3	Control - Reference	-2.09	0.036	0.073
Stewart-April Lane	PCT_INTOL_0_3	Control - Treatment	0.81	0.415	0.415
Stewart-April Lane	PCT_INTOL_0_3	Reference - Treatment	13.67	0	0
Stewart-April Lane	PCT_PLECOPTERA	Control - Reference	0.06	0.955	0.955
Stewart-April Lane	PCT_PLECOPTERA	Control - Treatment	2.44	0.015	0.029
Stewart-April Lane	PCT_PLECOPTERA	Reference - Treatment	10.89	0	0
Stewart-April Lane	RICH_CLING	Control - Reference	-2.14	0.032	0.065
Stewart-April Lane	RICH_CLING	Control - Treatment	0.42	0.674	0.674
Stewart-April Lane	RICH_CLING	Reference - Treatment	11.59	0	0
Stewart-April Lane	RICH_EPHEMEROPTERA	Control - Reference	-1.64	0.101	0.202
Stewart-April Lane	RICH_EPHEMEROPTERA	Control - Treatment	0.66	0.511	0.511
Stewart-April Lane	RICH_EPHEMEROPTERA	Reference - Treatment	10.02	0	0
Stewart-April Lane	RICH_PLECOPTERA	Control - Reference	-1.78	0.075	0.149
Stewart-April Lane	RICH_PLECOPTERA	Control - Treatment	0.81	0.417	0.417
Stewart-April Lane	RICH_PLECOPTERA	Reference - Treatment	11.26	0	0

Table A3. Habitat metrics comparisons.

MS4	Metric	Comparison	Z	P.unadj	P.adj
Acton/Hamilton	BANKS	Control - Reference	0.469	0.639	0.639
Acton/Hamilton	BANKS	Control - Treatment	-1.942	0.052	0.104
Acton/Hamilton	BANKS	Reference - Treatment	-2.498	0.012	0.037
Acton/Hamilton	EPI_SUB	Control - Reference	-3.226	0.001	0.004
Acton/Hamilton	EPI_SUB	Control - Treatment	-3.022	0.003	0.005
Acton/Hamilton	EPI_SUB	Reference - Treatment	-0.460	0.645	0.645
Airpark Business Center	EPI_SUB	Control - Reference	-2.948	0.003	0.006
Airpark Business Center	EPI_SUB	Control - Treatment	1.744	0.081	0.081
Airpark Business Center	EPI_SUB	Reference - Treatment	6.452	0.000	0.000
Airpark Business Center	RIFF	Control - Reference	-3.790	0.000	0.000
Airpark Business Center	RIFF	Control - Treatment	1.209	0.227	0.227
Airpark Business Center	RIFF	Reference - Treatment	5.026	0.000	0.000
Bear Branch	BANKS	Control - Reference	1.221	0.222	0.222
Bear Branch	BANKS	Control - Treatment	2.954	0.003	0.009
Bear Branch	BANKS	Reference - Treatment	1.733	0.083	0.166
Bear Branch	BANKV	Control - Reference	0.783	0.434	0.434
Bear Branch	BANKV	Control - Treatment	2.231	0.026	0.077
Bear Branch	BANKV	Reference - Treatment	1.617	0.106	0.212
Bear Branch	CH_ALT	Control - Reference	-0.320	0.749	0.749
Bear Branch	CH_ALT	Control - Treatment	1.830	0.067	0.134
Bear Branch	CH_ALT	Reference - Treatment	2.499	0.012	0.037
Bear Branch	EPI_SUB	Control - Reference	-3.370	0.001	0.002
Bear Branch	EPI_SUB	Control - Treatment	-2.612	0.009	0.018
Bear Branch	EPI_SUB	Reference - Treatment	1.277	0.201	0.201
Bear Branch	FLOW	Control - Reference	1.646	0.100	0.100
Bear Branch	FLOW	Control - Treatment	3.460	0.001	0.002
Bear Branch	FLOW	Reference - Treatment	1.978	0.048	0.096
Bear Branch	SED	Control - Reference	-0.599	0.549	0.549
Bear Branch	SED	Control - Treatment	2.841	0.004	0.009
Bear Branch	SED	Reference - Treatment	3.892	0.000	0.000
Breewood	BANKS	Control - Reference	-0.269	0.788	0.788
Breewood	BANKS	Control - Treatment	3.570	0.000	0.001
Breewood	BANKS	Reference - Treatment	5.579	0.000	0.000
Breewood	BANKV	Control - Reference	-3.066	0.002	0.004
Breewood	BANKV	Control - Treatment	0.963	0.335	0.335
Breewood	BANKV	Reference - Treatment	6.959	0.000	0.000
Breewood	CH_ALT	Control - Reference	-1.819	0.069	0.069
Breewood	CH_ALT	Control - Treatment	2.209	0.027	0.054
Breewood	CH_ALT	Reference - Treatment	7.320	0.000	0.000
Breewood	EMBED	Control - Reference	-1.131	0.258	0.258
Breewood	EMBED	Control - Treatment	3.500	0.000	0.001
Breewood	EMBED	Reference - Treatment	7.243	0.000	0.000
Breewood	EPI_SUB	Control - Reference	-5.638	0.000	0.000
Breewood	EPI_SUB	Control - Treatment	-0.240	0.810	0.810
Breewood	EPI_SUB	Reference - Treatment	7.120	0.000	0.000
Breewood	FLOW	Control - Reference	-3.498	0.000	0.001
Breewood	FLOW	Control - Treatment	-0.066	0.947	0.947
Breewood	FLOW	Reference - Treatment	5.752	0.000	0.000

Breewood	RIFF	Control - Reference	-1.270	0.204	0.204
Breewood	RIFF	Control - Treatment	2.029	0.042	0.085
Breewood	RIFF	Reference - Treatment	5.794	0.000	0.000
Breewood	SED	Control - Reference	-1.845	0.065	0.065
Breewood	SED	Control - Treatment	1.896	0.058	0.116
Breewood	SED	Reference - Treatment	6.773	0.000	0.000
Church Creek	EPI_SUB	Control - Reference	-1.146	0.252	0.504
Church Creek	EPI_SUB	Control - Treatment	0.284	0.776	0.776
Church Creek	EPI_SUB	Reference - Treatment	3.142	0.002	0.005
Moore's Run	BANKS	Control - Reference	0.760	0.447	0.894
Moores Run	BANKS	Control - Treatment	-0.161	0.872	0.872
Moores Run	BANKS	Reference - Treatment	-1.481	0.139	0.416
Moores Run	CH_ALT	Control - Reference	1.910	0.056	0.112
Moores Run	CH_ALT	Control - Treatment	2.470	0.014	0.041
Moores Run	CH_ALT	Reference - Treatment	1.249	0.211	0.211
Moores Run	EPI_SUB	Control - Reference	-2.223	0.026	0.052
Moores Run	EPI_SUB	Control - Treatment	-1.356	0.175	0.175
Moores Run	EPI_SUB	Reference - Treatment	2.374	0.018	0.053
Moores Run	SED	Control - Reference	-0.715	0.475	0.475
Moores Run	SED	Control - Treatment	-1.806	0.071	0.213
Moores Run	SED	Reference - Treatment	-1.783	0.075	0.149
Peter Pan Run	BANKS	Control - Reference	-3.937	0.000	0.000
Peter Pan Run	BANKS	Control - Treatment	1.150	0.250	0.250
Peter Pan Run	BANKS	Reference - Treatment	8.787	0.000	0.000
Peter Pan Run	BANKV	Control - Reference	-2.597	0.009	0.019
Peter Pan Run	BANKV	Control - Treatment	0.791	0.429	0.429
Peter Pan Run	BANKV	Reference - Treatment	5.830	0.000	0.000
Peter Pan Run	CH_ALT	Control - Reference	-2.875	0.004	0.012
Peter Pan Run	CH_ALT	Control - Treatment	-0.845	0.398	0.398
Peter Pan Run	CH_ALT	Reference - Treatment	2.328	0.020	0.040
Peter Pan Run	EMBED	Control - Reference	-1.948	0.051	0.051
Peter Pan Run	EMBED	Control - Treatment	2.671	0.008	0.015
Peter Pan Run	EMBED	Reference - Treatment	8.426	0.000	0.000
Peter Pan Run	EPI_SUB	Control - Reference	-1.774	0.076	0.076
Peter Pan Run	EPI_SUB	Control - Treatment	3.887	0.000	0.000
Peter Pan Run	EPI_SUB	Reference - Treatment	13.818	0.000	0.000
Peter Pan Run	FLOW	Control - Reference	-2.899	0.004	0.007
Peter Pan Run	FLOW	Control - Treatment	-0.375	0.708	0.708
Peter Pan Run	FLOW	Reference - Treatment	3.998	0.000	0.000
Peter Pan Run	RIFF	Control - Reference	-2.789	0.005	0.005
Peter Pan Run	RIFF	Control - Treatment	2.913	0.004	0.007
Peter Pan Run	RIFF	Reference - Treatment	12.101	0.000	0.000
Peter Pan Run	SED	Control - Reference	-2.844	0.004	0.009
Peter Pan Run	SED	Control - Treatment	0.777	0.437	0.437
Peter Pan Run	SED	Reference - Treatment	6.388	0.000	0.000
Red Hill Branch	BANKS	Control - Reference	-3.996	0.000	0.000
Red Hill Branch	BANKS	Control - Treatment	0.441	0.659	0.659
Red Hill Branch	BANKS	Reference - Treatment	3.561	0.000	0.001
Red Hill Branch	CH_ALT	Control - Reference	-3.434	0.001	0.002
Red Hill Branch	CH_ALT	Control - Treatment	-0.777	0.437	0.437
Red Hill Branch	CH_ALT	Reference - Treatment	1.529	0.126	0.253
Red Hill Branch	EMBED	Control - Reference	-2.279	0.023	0.045

Red Hill Branch	EMBED	Control - Treatment	1.635	0.102	0.102
Red Hill Branch	EMBED	Reference - Treatment	5.217	0.000	0.000
Red Hill Branch	EPI_SUB	Control - Reference	-3.909	0.000	0.000
Red Hill Branch	EPI_SUB	Control - Treatment	1.558	0.119	0.119
Red Hill Branch	EPI_SUB	Reference - Treatment	8.979	0.000	0.000
Red Hill Branch	RIFF	Control - Reference	-5.645	0.000	0.000
Red Hill Branch	RIFF	Control - Treatment	-0.029	0.977	0.977
Red Hill Branch	RIFF	Reference - Treatment	6.696	0.000	0.000
Scotts Level Branch	BANKS	Control - Reference	-3.968	0.000	0.000
Scotts Level Branch	BANKS	Control - Treatment	-1.382	0.167	0.167
Scotts Level Branch	BANKS	Reference - Treatment	1.528	0.127	0.253
Scotts Level Branch	CH_ALT	Control - Reference	-3.386	0.001	0.002
Scotts Level Branch	CH_ALT	Control - Treatment	0.530	0.596	0.596
Scotts Level Branch	CH_ALT	Reference - Treatment	1.790	0.073	0.147
Scotts Level Branch	EMBED	Control - Reference	-2.286	0.022	0.044
Scotts Level Branch	EMBED	Control - Treatment	1.625	0.104	0.104
Scotts Level Branch	EMBED	Reference - Treatment	3.597	0.000	0.001
Scotts Level Branch	EPI_SUB	Control - Reference	-4.345	0.000	0.000
Scotts Level Branch	EPI_SUB	Control - Treatment	0.645	0.519	0.519
Scotts Level Branch	EPI_SUB	Reference - Treatment	4.035	0.000	0.000
Scotts Level Branch	RIFF	Control - Reference	-5.867	0.000	0.000
Scotts Level Branch	RIFF	Control - Treatment	-0.026	0.980	0.980
Scotts Level Branch	RIFF	Reference - Treatment	4.232	0.000	0.000
Stewart-April Lane	BANKS	Control - Reference	-2.388	0.017	0.034
Stewart-April Lane	BANKS	Control - Treatment	-1.093	0.274	0.274
Stewart-April Lane	BANKS	Reference - Treatment	13.502	0.000	0.000
Stewart-April Lane	EMBED	Control - Reference	0.312	0.755	0.755
Stewart-April Lane	EMBED	Control - Treatment	2.353	0.019	0.037
Stewart-April Lane	EMBED	Reference - Treatment	10.594	0.000	0.000
Stewart-April Lane	EPI_SUB	Control - Reference	-1.902	0.057	0.114
Stewart-April Lane	EPI_SUB	Control - Treatment	0.419	0.675	0.675
Stewart-April Lane	EPI_SUB	Reference - Treatment	12.055	0.000	0.000
Stewart-April Lane	RIFF	Control - Reference	-3.327	0.001	0.002
Stewart-April Lane	RIFF	Control - Treatment	-1.270	0.204	0.204
Stewart-April Lane	RIFF	Reference - Treatment	10.190	0.000	0.000

Table A4. Water quality metrics comparisons.

MS4	Metric	Comparison	Z	P.adj
Acton/Hamilton	DO	Control - Reference	1.38	0.333
Acton/Hamilton	DO	Control - Treatment	-1.24	0.213
Acton/Hamilton	DO	Reference - Treatment	-2.32	0.061
Acton/Hamilton	PH	Control - Reference	2.87	0.008
Acton/Hamilton	PH	Control - Treatment	-0.69	0.489
Acton/Hamilton	PH	Reference - Treatment	-2.93	0.01
Acton/Hamilton	SPCOND	Control - Reference	5.67	0
Acton/Hamilton	SPCOND	Control - Treatment	-0.07	0.946
Acton/Hamilton	SPCOND	Reference - Treatment	-4.47	0
Acton/Hamilton	TURB_NTU	Control - Reference	1.46	0.436
Acton/Hamilton	TURB_NTU	Control - Treatment	0.61	0.543
Acton/Hamilton	TURB_NTU	Reference - Treatment	-0.92	0.72
Bear Branch	DO	Control - Reference	0.64	0.52
Bear Branch	DO	Control - Treatment	-2.8	0.01
Bear Branch	DO	Reference - Treatment	-3.53	0.001
Bear Branch	PH	Control - Reference	2.72	0.013
Bear Branch	PH	Control - Treatment	-0.61	0.54
Bear Branch	PH	Reference - Treatment	-3.54	0.001
Bear Branch	SPCOND	Control - Reference	4.27	0
Bear Branch	SPCOND	Control - Treatment	-1.56	0.118
Bear Branch	SPCOND	Reference - Treatment	-6.24	0
Breewood	DO	Control - Reference	0.41	0.685
Breewood	DO	Control - Treatment	2.85	0.009
Breewood	DO	Reference - Treatment	3.66	0.001
Breewood	PH	Control - Reference	4.45	0
Breewood	PH	Control - Treatment	1.76	0.079
Breewood	PH	Reference - Treatment	-2.41	0.032
Breewood	SPCOND	Control - Reference	3.63	0.001
Breewood	SPCOND	Control - Treatment	-2.17	0.03
Breewood	SPCOND	Reference - Treatment	-7.25	0
Breewood	TURB_NTU	Control - Reference	-2.26	0.072
Breewood	TURB_NTU	Control - Treatment	-0.57	0.565
Breewood	TURB_NTU	Reference - Treatment	0.7	0.972
Church Creek	DO	Control - Reference	0.12	0.907
Church Creek	DO	Control - Treatment	-0.88	0.759
Church Creek	DO	Reference - Treatment	-2.14	0.096
Church Creek	SPCOND	Control - Reference	1.65	0.197
Church Creek	SPCOND	Control - Treatment	-0.77	0.444
Church Creek	SPCOND	Reference - Treatment	-5.17	0
Church Creek	TURB_NTU	Control - Reference	1.47	0.284

Church Creek	TURB_NTU	Control - Treatment	-0.11	0.913
Church Creek	TURB_NTU	Reference - Treatment	-4.02	0
Moores Run	DO	Control - Reference	0.15	0.882
Moores Run	DO	Control - Treatment	-2.24	0.05
Moores Run	DO	Reference - Treatment	-5.64	0
Moores Run	PH	Control - Reference	0.91	0.363
Moores Run	PH	Control - Treatment	-1.77	0.155
Moores Run	PH	Reference - Treatment	-6.76	0
Moores Run	SPCOND	Control - Reference	2.08	0.075
Moores Run	SPCOND	Control - Treatment	-0.79	0.427
Moores Run	SPCOND	Reference - Treatment	-7.35	0
Peter Pan Run	DO	Control - Reference	-0.6	1
Peter Pan Run	DO	Control - Treatment	0.27	0.786
Peter Pan Run	DO	Reference - Treatment	2.1	0.106
Peter Pan Run	PH	Control - Reference	0.89	0.376
Peter Pan Run	PH	Control - Treatment	-1.53	0.252
Peter Pan Run	PH	Reference - Treatment	-5.82	0
Peter Pan Run	SPCOND	Control - Reference	4.66	0
Peter Pan Run	SPCOND	Control - Treatment	-1.72	0.086
Peter Pan Run	SPCOND	Reference - Treatment	-15.09	0
Peter Pan Run	TURB_NTU	Control - Reference	-1.73	0.169
Peter Pan Run	TURB_NTU	Control - Treatment	-2.6	0.028
Peter Pan Run	TURB_NTU	Reference - Treatment	-0.31	0.753
Red Hill Branch	DO	Control - Reference	-3.73	0.001
Red Hill Branch	DO	Control - Treatment	-2.39	0.034
Red Hill Branch	DO	Reference - Treatment	-0.55	0.582
Red Hill Branch	PH	Control - Reference	0.49	0.621
Red Hill Branch	PH	Control - Treatment	-1.54	0.246
Red Hill Branch	PH	Reference - Treatment	-2.05	0.12
Red Hill Branch	SPCOND	Control - Reference	5.22	0
Red Hill Branch	SPCOND	Control - Treatment	-0.26	0.798
Red Hill Branch	SPCOND	Reference - Treatment	-3.5	0.001
Red Hill Branch	TURB_NTU	Control - Reference	-0.67	0.505
Red Hill Branch	TURB_NTU	Control - Treatment	1.11	0.538
Red Hill Branch	TURB_NTU	Reference - Treatment	1.6	0.33
Scotts Level Branch	DO	Control - Reference	-4.11	0
Scotts Level Branch	DO	Control - Treatment	-5.24	0
Scotts Level Branch	DO	Reference - Treatment	-3.14	0.002
Scotts Level Branch	PH	Control - Reference	0.35	0.727
Scotts Level Branch	PH	Control - Treatment	-2.49	0.025
Scotts Level Branch	PH	Reference - Treatment	-5.71	0
Scotts Level Branch	SPCOND	Control - Reference	4.88	0
Scotts Level Branch	SPCOND	Control - Treatment	-0.41	0.679
Scotts Level Branch	SPCOND	Reference - Treatment	-5.69	0

Scotts Level Branch	TURB_NTU	Control - Reference	-0.64	0.52
Scotts Level Branch	TURB_NTU	Control - Treatment	-1.54	0.37
Scotts Level Branch	TURB_NTU	Reference - Treatment	-1.24	0.432
Stewart-April Lane	DO	Control - Reference	0.69	0.489
Stewart-April Lane	DO	Control - Treatment	1.19	0.466
Stewart-April Lane	DO	Reference - Treatment	3.17	0.005
Stewart-April Lane	PH	Control - Reference	1.01	0.623
Stewart-April Lane	PH	Control - Treatment	0.8	0.421
Stewart-April Lane	PH	Reference - Treatment	-1.29	0.594
Stewart-April Lane	SPCOND	Control - Reference	-0.22	0.827
Stewart-April Lane	SPCOND	Control - Treatment	-3.06	0.004
Stewart-April Lane	SPCOND	Reference - Treatment	-16.83	0
Stewart-April Lane	TURB_NTU	Control - Reference	-0.73	1
Stewart-April Lane	TURB_NTU	Control - Treatment	-0.68	0.992
Stewart-April Lane	TURB_NTU	Reference - Treatment	0.19	0.85

Table A5. Regressions of impervious cover vs. stream health metrics.

Metric	Influence	Region	Coefficient	t-value	p-value
BIBI Score	IC	Coastal	-1.062	-18.973	0.000
BIBI Score	IC	Inland	-1.317	-20.948	0.000
BANKS	IC	Coastal	0.000	0.000	1.000
BANKS	IC	Inland	0.041	3.384	0.001
EPI_SUB	IC	Coastal	-0.031	-2.832	0.005
EPI_SUB	IC	Inland	-0.072	-10.212	0.000
SPCOND	IC	Coastal	9.753	22.897	0.000
SPCOND	IC	Inland	11.535	34.614	0.000

Note: 90th percentile quantile regression used for BIBI score, BANKS, EPI_SUB; median for SPCOND. Red text = significant negative effect on stream health; green text = significant positive effect on stream health. Dataset includes 1st and 2nd order streams in the SEP, UNP and LNP bioregions from MS4 sites used in study and BIBI database.

BANKS, bank stability; EPI_SUB, epifaunal substrate; SPCOND, specific conductivity; IC, impervious cover.

Table A6. Regressions of forest cover vs. stream health metrics.

Metric	Influence	Region	Coefficient	t-value	p-value
BIBI Score	Forest	Coastal	0.695	12.806	0.000
BIBI Score	Forest	Inland	0.445	11.297	0.000
BANKS	Forest	Coastal	0.000	0.000	1.000
BANKS	Forest	Inland	0.000	0.000	1.000
EPI_SUB	Forest	Coastal	0.030	3.310	0.000
EPI_SUB	Forest	Inland	0.040	11.110	0.000
SPCOND	Forest	Coastal	-7.510	-31.930	0.000
SPCOND	Forest	Inland	-4.280	-19.930	0.000

Note: 90th percentile quantile regression used for BIBI score, BANKS, EPI_SUB; median for SPCOND. Green text = significant positive effect on stream health. Dataset includes 1st and 2nd order streams in the SEP, UNP and LNP bioregions from MS4 sites used in study and BIBI database.

BANKS, bank stability; EPI_SUB, epifaunal substrate; SPCOND, specific conductivity; IC, impervious cover.

Table A7. Combined effects of impervious cover and forested pervious cover.

Metric	Region	Influence	Coefficient	t-value	p-value
BIBI Score	Coastal	IC	-1.161	-22.478	0.000
BIBI Score	Coastal	Forested Pervious	-0.175	-5.224	0.000
BIBI Score	Inland	IC	-1.274	-20.696	0.000
BIBI Score	Inland	Forested Pervious	0.103	3.212	0.001
BANKS	Coastal	IC	0.035	1.094	0.274
BANKS	Coastal	Forested Pervious	0.035	1.403	0.161
BANKS	Inland	IC	0.053	2.789	0.005
BANKS	Inland	Forested Pervious	0.061	4.568	0.000
EPI_SUB	Coastal	IC	-0.033	-2.753	0.006
EPI_SUB	Coastal	Forested Pervious	-0.003	-0.220	0.826
EPI_SUB	Inland	IC	-0.058	-7.113	0.000
EPI_SUB	Inland	Forested Pervious	0.025	6.133	0.000
SPCOND	Coastal	IC	8.360	18.727	0.000
SPCOND	Coastal	Forested Pervious	-3.296	-7.679	0.000
SPCOND	Inland	IC	11.248	32.735	0.000
SPCOND	Inland	Forested Pervious	-1.101	-7.750	0.000

Note: 90th percentile quantile regression used for BIBI score, BANKS, EPI_SUB; median for SPCOND. Red text = significant negative effect on stream health; green text = significant positive effect on stream health. Dataset includes 1st and 2nd order streams in the SEP, UNP and LNP bioregions from MS4 sites used in study and BIBI database.

BANKS, bank stability; EPI_SUB, epifaunal substrate; SPCOND, specific conductivity; IC, impervious cover.

Table A8. Relationship between habitat and water quality metrics and BIBI score.

Metric	Influence	Coefficient	t-value	p-value
BIBI Score	IC	-1.027	-11.204	0.000
BIBI Score	WQ BMPs	-0.031	-0.616	0.538
BANKS	IC	0.068	0.492	0.623
BANKS	WQ BMPs	-0.090	-1.614	0.107
EPI_SUB	IC	-0.091	-3.216	0.001
EPI_SUB	WQ BMPs	-0.024	-2.605	0.009
SPCOND	IC	17.008	16.937	0.000
SPCOND	WQ BMPs	2.716	10.281	0.000

Note: quantile regression of stream health metrics as a function of impervious cover and impervious cover captured by water quality BMPs: BIBI score, BANKS, EPI_SUB regressions for the 90th percentile; SPCOND for the median. Red text indicates significant negative effect on stream health. Includes data from treatment and control catchments only; excludes reference catchments.

BANKS, bank stability; EPI_SUB, epifaunal substrate; SPCOND, specific conductivity; IC, impervious cover; WQ BMP; water quality best management practice.

Table A9. Relationship between habitat and water quality metrics and BIBI score.

Metric	Coefficient	t-value	p-value
BANKS	-0.829	-5.800	0.000
EPI_SUB	-1.383	-4.417	0.000
SPCOND	-0.075	-17.517	0.000

Note: 90th percentile quantile regression of BIBI score as a function of stream health. Red text indicates significant negative effect on stream health. Includes data from treatment, control, and reference catchments.