INFORMATION REPORT

TO: Chair and Members Public Works Committee	**WARD(S) AFFECTED:** CITY WIDE
COMMITTEE DATE: March 18, 2013	
SUBJECT/REPORT NO: 2012 Annual Drinking Water Report (PW13017) - (City Wide)	
SUBMITTED BY: Gerry Davis, CMA General Manager Public Works Department	**PREPARED BY:** Dan McKinnon (905) 546-2424, Extension 5941
SIGNATURE:	

Council Direction:

Not Applicable

Information:

Under the Safe Drinking Water Act, there are several annual reporting requirements related to the operation and management of the City of Hamilton's five Drinking Water Systems. This Information Report provides a summary of these requirements and highlights key information. More detailed information is provided in the attached two Appendices (A & B).

Summary Report for Municipalities (Appendix A)

As per the Safe Drinking Water Act, Ontario Regulation, 170/03, Schedule 22, Council must receive an annual drinking water summary report by March 31st of each year. This 2012 summary report has been prepared in accordance with the requirements as defined in Schedule 22, for each of the City of Hamilton's five Drinking Water Systems. Specifically provided are lists of major capital upgrades initiated in 2012 as well as those planned for 2013. There were no Provincial Officer's Orders issued. All confirmed Adverse Water Quality Incidents were reported to the Ontario Ministry of Environment's Spills Action Centre and Public Health Services and are provided in the report. All water taking quantities and flow rates were within provincial water taking limits. Data related to the water quantities and flow rates for the five drinking water systems are also provided.

Drinking Water Quality Management System - Summary Report (Appendix B)

The submission of the Drinking Water Quality Management System (DWQMS) Summary Report satisfies requirements of the Drinking Water Quality Management System Standard.

The purpose of the DWQMS Summary Report is to inform Mayor and Council (Owners) of the performance and major milestones achieved in the City's DWQMS. Specifically, the Hamilton Water Division (Operating Authority) is required to inform Top Management (General Manager of Public Works and Director of Hamilton Water Division) and the Owner of the outcomes of the infrastructure and management reviews. The DWQMS Summary Report (Appendix B) exceeds these requirements and includes additional information relating to DWQMS audits, Standard of Care Training and other milestones of the DWQMS.

Risk Assessment Review

The DWQMS Standard requires that the Risk Assessment be reviewed on an annual basis to verify the currency and validity of the information and that the risk assessment process and outcomes be re-evaluated every three years. The Risk Assessment was conducted in the fall of 2012. The purpose of the 2012 Risk Assessment was to review the outcomes from 2011 and to focus on new and upgraded infrastructure, as well as critical watermains. The DWQMS Summary Report summarizes the outcomes of the 2012 risk assessment process.

Infrastructure Review

The Operating Authority must ensure and verify, on an annual basis, the adequacy of water related infrastructure. In order to satisfy the requirements of the DWQMS Standard, the Operating Authority conducted a formal annual review of its vertical (water treatment, storage and pumping) and horizontal (watermains) infrastructure. The scope of the review also considered the operation, maintenance and replacement of existing infrastructure assets as well as new infrastructure planned for the immediate and long-term future.

The evaluation of programs indicates that appropriate processes are in place to identify infrastructure needs. Based on the results of the 2012 infrastructure review, it can be concluded that infrastructure is available, maintained, and improved when necessary. The DWQMS Summary Report includes the major recommendations from the 2012 Infrastructure Review.

Standard of Care Training

Standard of Care requirements for Owners and Managers of municipal drinking water systems came into effect as of January 1st, 2013. Standard of Care is a statutory due diligence requirement identified in Section 19 of the Safe Drinking Water Act. Hamilton Water staff facilitated six Standard of Care training sessions in 2012 on June 13th, June 21st, September 18th, September 25th, November 15th and November 28th. Mr. Jim Merritt, Chair of the Ontario Drinking Water Advisory Council and highly regarded consultant who gave evidence at the Walkerton inquiry, assisted the Hamilton Water

team in delivering the training sessions. All Owners (Mayor and Council) received Standard of Care training.

Audit Program

The DWQMS accreditation process requires both 3rd Party Accreditation Audits and annual internal audit by the Operating Authority.

Hamilton Water has identified QMI-SAI Global as the new Accreditation Body for the DWQMS. The next on-site verification is anticipated to take place in 2014. In 2013, a 3rd Party Systems Audit or document review will be conducted.

The annual internal audit took place in late October / early November 2012. The audit assessed the implementation of all 21 elements of the DWQMS Standard and their related procedures across the Hamilton Water Division. Compliance & Regulations staff will be developing an Audit Plan for the 2013 DWQMS internal audits.

Management Review

The DWQMS Standard requires that Top Management participate in a management review of the DWQMS at least once per year. The Management Review is a formal presentation of compliance, operational, water quality, communication and infrastructure data. In 2012, the DWQMS Top Management Review was held on December 19th. Overall, meeting participants concluded that the DWQMS is suitable, adequate and effective. Continual improvement actions were identified and target dates for completion were determined. The DWQMS Summary Report (Appendix B) provides an overview of the results, a record of decisions and action items from the 2012 Management Review.

Update and Going Forward

The outcomes from the Management Review and internal and external DWQMS audits concluded that the DWQMS is adequate, suitable and effective and conforms to the requirements of the DWQMS Standard. Corrective action plans from audits and action items from the Management Review will be implemented to ensure continual improvement of the DWQMS. Major next steps related to the maintenance of the DWQMS in 2013 are included in Appendix B.

APPENDIX "A"
REPORT PW13017

City of Hamilton's
Drinking Water Systems

SUMMARY REPORT FOR MUNICIPALITIES

Safe Drinking Water Act, Ontario Regulation, 170/03, Schedule 22

BEYOND COMPLIANCE OPERATING SYSTEM

Hamilton
Public Works

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1 HAMILTON DRINKING WATER SYSTEM (DWS), WOODWARD SUB-SYSTEM

1.1 Operational Upgrades - 2012

1.1.1 Woodward Water Treatment System and Water Outstations

Projects Under Design:

- Kelly Street Stand Pipe (HDT01) Capital Improvements
- Old Ancaster Road Pump Station (HD012) Capacity Upgrade & Standby Power Installation
- Osler Drive (HD011) and Garner Road (HD018) Pumping Station Upgrades
- Woodward WTP Backwash Study

Projects Substantially Performed:

- Ben Nevis / Dewitt Road Reservoir (HDR1C) Rehabilitation
- Ferguson Avenue Pump Station Upgrades/Rehabilitation
- Stonechurch & Garth Reservoir & Pump Station (HDR05 / HD06A) Upgrades
- Woodward WTP Low Lift Pump Station Upgrades
- SCADA Hub Room A (located at 700 Woodward Ave)
- SCADA Upgrades at the Whitney & Main (HD017A), Greenhill (HD04B/5A), Highland (HD007), and Dewitt (HD08A) Outstations

The above water treatment and water station upgrades and modifications are being undertaken at a cost of approximately $36.9 million dollars.

1.1.2 Distribution System - Pipes

As part of the City's Asset Management Program, the following water upgrades and rehabilitations were completed:

- Approximately 9.1 km of watermain was replaced stand alone and\or in coordination with roadwork at a cost of $17.6 million dollars.
- Approximately 3.3 km of watermain was rehabilitated using structural and\or cement mortar lining at a cost of $2.7 million dollars.

1.2 Future Upgrades - 2013

1.2.1 Woodward Water Treatment System and Water Outstations

Project Design:

- HDR1B Greenhill Avenue Reservoir and Valve House Upgrades
- Highland Rd Reservoir (HDR07) and Pumping Station (HD007) Upgrades

- Hillcrest Reservoir (HDR02) Access/Control, East Cell, Watermain - Contract 3
- Kenilworth Pumping Station (HD005) Upgrades - Phase II
- Main & Whitney (HD17A) Water Outstation Upgrades
- Pressure Reducing Valves - rebuild / replace - City Wide
- Governor Road Pump Station HD12A (Governors @ Huntingwood) Upgrades
- Valve Chamber No. 3 (District 5) Upgrades

Construction:

- HD018 (Glancaster Rd & Hwy 53) & HD011 (Osler Rd) Upgrades
- Highland Gardens Park (HD03A) Pumping Station
- Highland Rd Reservoir (HDR07) and Pumping Station (HD007) Upgrades
- Hillcrest Reservoir (HDR02) Access/Control, East Cell, Watermain - Contract 3
- Kelly Street Stand Pipe HDT01 - Phase I
- Kenilworth Pumping Station (HD005) Upgrades - Phase II
- Old Ancaster Rd Pumping Station (HD012) Capacity Upgrades
- Pressure Reducing Valves - rebuild / replace - City Wide
- Valve Chamber No. 3 (District 5)

The above upgrades and modifications will be undertaken at a cost of approximately $50.1 million dollars

1.3 Provincial Officer's Orders

There are no Provincial Officer's Orders for the Hamilton DWS.

1.4 Adverse Water Quality Reports (AWQI) - Hamilton DWS

The following AWQIs were reported to the Ministry of the Environment's Spills Action Centre (MOE SAC) and Public Health Services (PHS).

Notification Date	Location of Adverse	AWQI	Resolution
2012-04-27	Fire Station17, 363 Isaac Brock, Stoney Creek	Total Coliforms = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2012-08-25	7-15, Water Pumping Station	Total Coliforms = 6 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were

Notification Date	Location of Adverse	AWQI	Resolution
	HD007, 293 Highland Rd W		acceptable. The adverse was not confirmed.
2012-09-07	Hydrant DM10H232, 397 King St. W., Dundas	Total Chlorine = 0.19 mg/L	Watermain was flushed to restore chlorine. Results were acceptable.
2012-09-06	HDR11 Cell #1, Woodley Lane Reservoir, Dundas	Total Chlorine = 0.12 mg/L	Isolated, drained and refilled cell #1. Chlorine levels restored. Result was acceptable.
2012-09-27	1-15, Hamilton Harbor Commission, James St. N.	Total Coliforms = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2012-11-01	A-SS-A, Jerseyville Rd, Ancaster	Total Coliforms = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2012-11-21	10-17, 407 Wilson St E, Ancaster	Total Coliforms = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.

1.5 Water Production Reports - Summary

The following provides a summary of daily flow rates and instantaneous peak flow rates in comparison to the capacity of the water works as identified in the Permit to Take Water. This information is tabulated in the accompanying tables.

Table 1-1: Woodward Treatment Plant - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day
1	273	286	153	299	135	233	289	261	323	209	230	276
2	242	279	187	294	267	284	286	271	191	186	201	204
3	234	269	248	187	261	276	291	283	390	237	274	208
4	209	164	244	208	259	269	291	413	278	223	267	187
5	178	246	115	196	257	263	284	248	126	216	172	198
6	197	201	155	289	188	190	291	222	244	280	202	246
7	307	122	259	285	166	185	356	282	238	245	208	221
8	309	185	248	181	262	274	371	275	280	273	203	286
9	147	194	248	167	226	266	259	273	266	204	205	251
10	237	208	247	175	264	268	270	223	249	168	242	127
11	212	275	240	188	257	211	306	266	266	212	208	133
12	204	275	171	188	258	216	269	304	227	229	194	227
13	207	189	184	270	258	228	294	215	285	225	200	217
14	300	160	142	288	264	242	375	188	237	326	243	252
15	296	193	142	281	173	289	357	231	291	168	248	270
16	190	190	271	199	174	355	280	273	233	169	239	95
17	225	150	270	174	208	324	189	263	247	212	283	207
18	288	278	266	171	225	315	327	262	234	157	239	229
19	257	271	288	194	312	64	299	287	227	184	167	225
20	168	265	247	276	321	322	269	247	270	358	201	159
21	202	144	162	269	370	337	314	267	184	189	208	209
22	274	207	166	270	271	316	294	244	291	214	207	281
23	298	130	212	256	277	377	269	272	229	155	218	170
24	255	257	249	254	275	241	231	310	234	181	238	173
25	165	226	278	191	282	270	279	250	218	149	239	356
26	169	248	219	166	282	209	265	281	214	256	175	133
27	225	175	219	158	285	291	243	276	267	284	175	105
28	288	171	283	261	273	297	213	242	216	194	182	199
29	282	248	166	263	274	297	315	273	272	226	221	273
30	202		167	259	275	290	192	273	221	177	200	174
31	128		142		204		281	239		215		203
Total	7,168	6,207	6,588	6,856	7,803	8,000	8,850	8,213	7,444	6,721	6,490	6,493
Average	231	214	213	229	252	267	285	265	248	217	216	209
Min	128	122	115	158	135	64	189	188	126	149	167	95
Max	309	286	288	299	370	377	375	413	390	358	283	356
PTTW limit	909	909	909	909	909	909	909	909	909	909	909	909

Figure 1-1: Woodward Treatment Plant - 2012 Monthly Production (Summary)

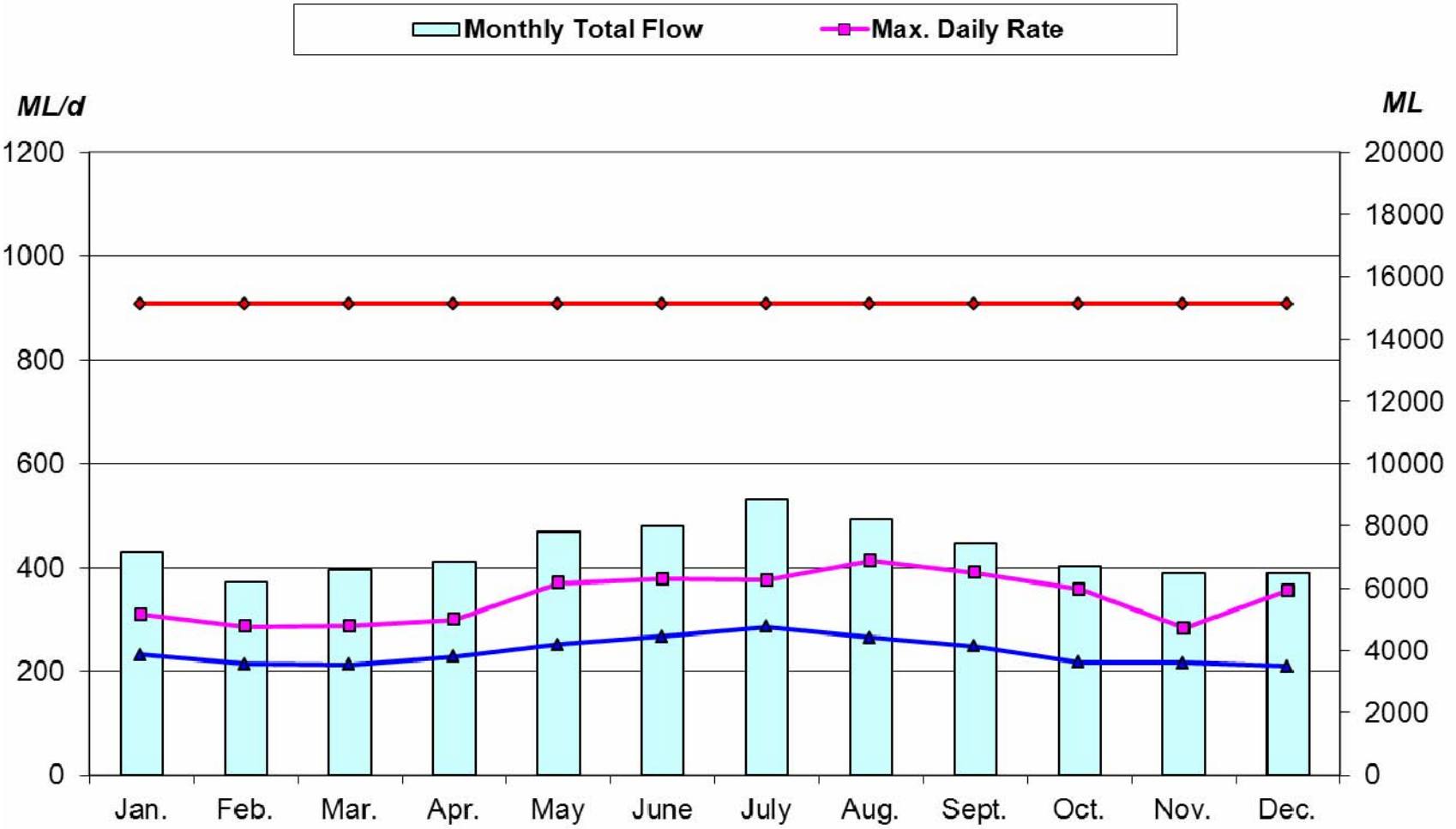

Table 1-2: Woodward Treatment Plant - 2012 Monthly Production (Summary)

Woodward	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	ML	7,168	6,207	6,588	6,856	7,803	8,000	8,850	8,213	7,444	6,721	6,490	6,493
Average	ML/d	231	214	213	229	252	267	285	265	248	217	216	209
Maximum	ML/d	309	286	288	299	370	377	375	413	390	358	283	356
PTTW	ML/d	909	909	909	909	909	909	909	909	909	909	909	909

2 HAMILTON DWS, FIFTY ROAD SUB-SYSTEM

2.1 Operational Upgrades - 2012

In 2012, no projects were scheduled.

2.2 Future Upgrades - 2013

Design and Construction:

- Stoney Creek Water Outstations (HD009 & HDR10, HDR1C) Upgrades.

The above project is being undertaken at a cost of approximately 850 thousand dollars.

2.3 Provincial Officer's Orders

There are no Provincial Officer's Orders for the Fifty Road DWS.

2.4 Adverse Water Quality Reports

There were no AWQIs for the reporting period.

2.5 Water Production Reports - Summary

The Fifty Road DWS receives treated water from the Town of Grimsby Water Distribution System.

3 CARLISLE DWS

3.1 Operational Upgrades - 2012

Projects Under Construction

- Carlisle Water Tower Refurbishment and FDC01/02 Well House Replacement.

The above project is being undertaken at a cost of approximately $2.8 million dollars.

3.2 Future Upgrades - 2013

No projects have been scheduled for 2013

3.3 Provincial Officer's Orders

There are no Provincial Officer's Orders for the Carlisle DWS.

3.4 Adverse Water Quality Reports - Carlisle DWS

There were no AWQIs for the reporting period.

3.5 Water Production Reports - Summary

The following provides a summary of daily flow rates and instantaneous peak flow rates in comparison to the capacity of the water works as identified in the Permit to Take Water. This information is tabulated in the accompanying tables.

Table 3-1: Carlisle DWS (FDC01 & FDC02) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day
1	242	172	264	213	260	99	301	6	40	77	5	203
2	68	214	286	133	378	5	372	3	206	153	3	0
3	441	213	287	206	307	3	414	0	114	33	87	239
4	167	348	8	189	399	9	372	3	3	124	6	2
5	212	336	480	407	371	158	53	4	4	133	108	106
6	202	149	156	270	408	6	165	7	164	11	46	13
7	289	179	163	270	312	3	179	0	157	17	374	162
8	291	238	181	299	338	6	120	0	85	14	127	40
9	240	159	7	217	348	0	268	5	87	10	269	168
10	281	217	394	210	362	3	143	0	7	2	262	9
11	247	309	231	226	439	216	447	6	3	163	274	21
12	264	258	112	283	693	3	290	7	4	32	207	49
13	257	182	176	295	445	85	147	9	139	132	63	92
14	249	196	271	363	668	329	206	2	4	49	195	102
15	245	251	271	233	321	260	60	11	6	9	55	60
16	202	275	173	269	291	163	335	3	88	3	334	238
17	216	289	189	303	490	105	342	6	100	6	2	8
18	226	289	266	353	519	76	370	3	2	2	4	259
19	228	195	193	207	522	257	270	115	4	8	120	194
20	373	192	223	372	554	29	238	291	4	3	74	19
21	204	206	226	365	575	3	372	48	64	54	88	161
22	228	210	225	328	520	6	312	263	37	55	6	89
23	206	217	187	286	219	379	63	3	41	102	5	133
24	201	196	263	223	422	234	3	114	168	4	152	76
25	213	385	297	273	614	194	14	73	139	116	55	153
26	214	284	188	226	116	474	0	147	3	359	208	112
27	229	131	209	310	144	429	10	153	7	182	0	3
28	295	183	194	416	481	576	12	3	132	226	91	184
29	334	179	247	392	581	454	222	4	2	191	43	78
30	245		297	330	461	406	106	234	135	130	48	116
31	128		311		162		3	190		2		89
Total	7,436	6,653	6,975	8,468	12,721	4,973	6,211	1,712	1,949	2,401	3,313	3,177
Average	240	229	225	282	410	166	200	55	65	77	110	102
Min	68	131	7	133	116	0	0	0	2	2	0	0
Max	441	385	480	416	693	576	447	291	206	359	374	259
PTTW limit	851	851	851	851	851	851	851	851	851	851	851	851

Figure 3-1: Carlisle DWS (FDC01 & FDC02) - 2012 Monthly Production (Summary)

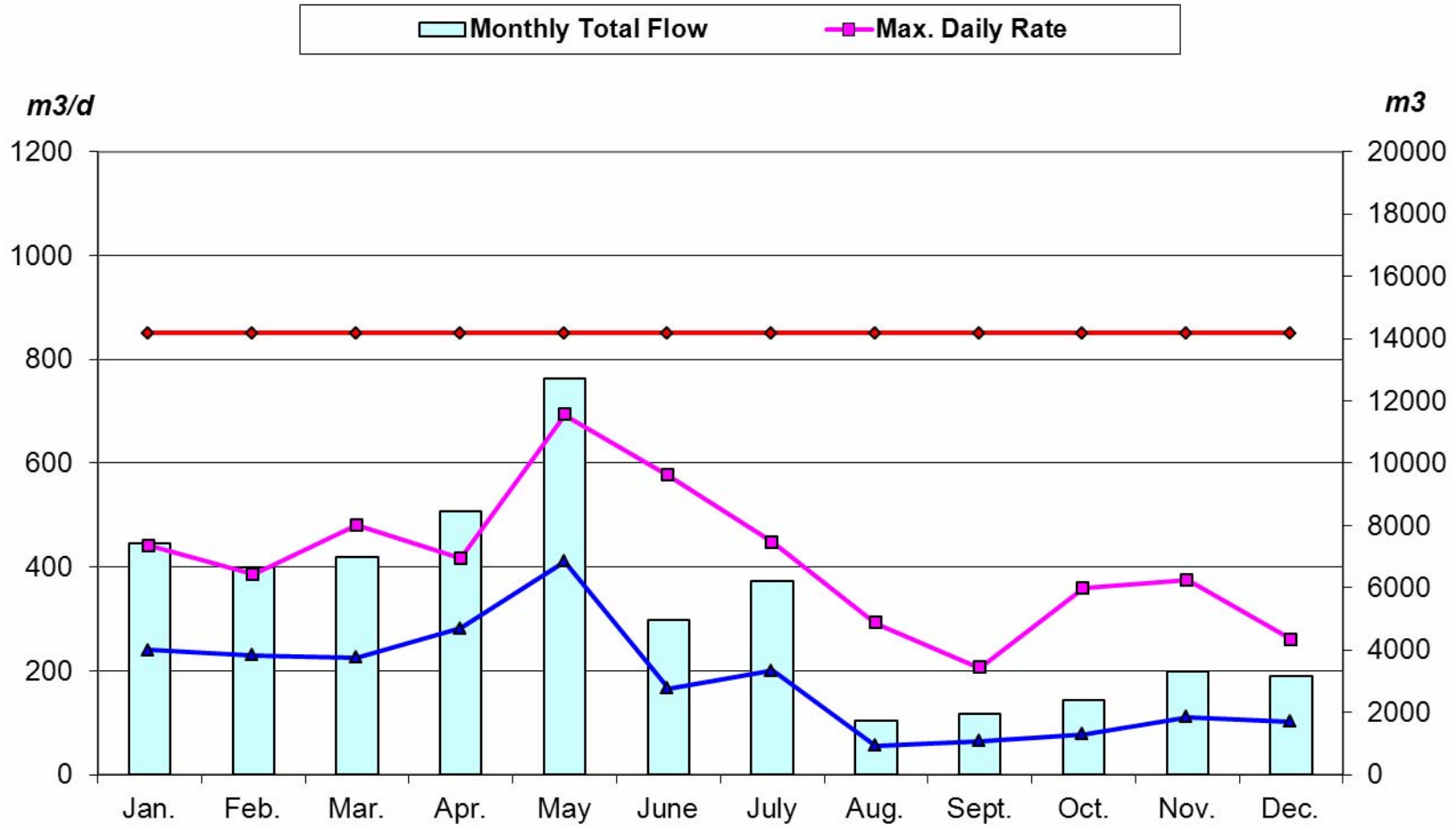

Table 3-2: Carlisle DWS (FDC01 & FDC02) - 2012 Monthly Production (Summary)

FDC01, FDC02	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	7,436	6,653	6,975	8,468	12,721	4,973	6,211	1,712	1,949	2,401	3,313	3,177
Average	m^3/d	240	229	225	282	410	166	200	55	65	77	110	102
Maximum	m^3/d	441	385	480	416	693	576	447	291	206	359	374	259
PTTW	m^3/d	851	851	851	851	851	851	851	851	851	851	851	851

Table 3-3: Carlisle DWS (FDC03) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day
1	0	0	0	0	0	53	1,316	848	1,743	46	576	426
2	51	0	0	27	0	0	1,192	1,734	1,736	0	524	60
3	0	0	0	0	0	0	605	1,724	1,696	0	367	432
4	0	0	0	0	0	36	694	1,725	1,668	0	142	19
5	0	0	0	0	0	0	1,602	1,217	483	0	513	664
6	0	0	20	0	0	0	1,378	1,673	1,030	0	0	0
7	0	0	0	0	33	0	1,622	1,721	1,291	0	0	539
8	0	24	0	0	0	0	1,644	1,716	663	42	34	0
9	34	108	0	33	0	0	1,618	1,348	887	0	0	496
10	0	0	0	0	1	0	1,599	745	814	0	0	86
11	0	0	0	65	1	47	842	807	943	0	0	745
12	0	0	25	0	0	0	1,374	903	1,098	0	0	135
13	0	0	0	0	0	0	1,583	736	1,102	0	36	406
14	0	31	0	0	0	0	1,587	1,073	653	0	0	258
15	0	0	0	0	0	541	1,551	589	1,088	85	0	165
16	25	0	0	25	0	1,237	1,554	1,021	832	0	0	530
17	0	0	0	0	0	479	1,534	1,145	866	0	0	25
18	0	0	0	0	0	569	1,531	924	389	0	0	0
19	0	0	26	0	0	779	1,004	1,032	626	0	50	397
20	0	28	0	0	0	1,011	1,606	585	548	0	0	110
21	0	0	0	0	116	1,245	1,747	1,074	622	0	0	484
22	0	0	0	0	854	0	1,409	1,049	353	47	0	314
23	23	0	0	31	1,411	631	1,392	1,649	484	0	0	260
24	0	0	0	0	138	790	1,375	1,636	54	0	0	307
25	0	0	0	0	115	552	1,730	1,625	0	0	0	570
26	0	0	31	0	1,702	60	877	1,598	0	0	341	396
27	0	24	0	0	1,095	546	1,080	1,489	0	0	179	428
28	0	0	0	0	483	167	1,200	1,081	0	0	562	219
29	0	0	0	0	484	1,089	1,739	1,506	0	58	222	0
30	0		0	25	1,012	956	1,742	538	0	461	308	604
31	0		0		251		1,356	726		0		203
Total	133	215	102	206	7,694	10,786	43,083	37,236	21,667	738	3,853	9,278
Average	4	7	3	7	248	360	1,390	1,201	722	24	128	299
Min	0	0	0	0	0	0	605	538	0	0	0	0
Max	51	108	31	65	1,702	1,245	1,747	1,734	1,743	461	576	745
PTTW limit	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160

Figure 3-2: Carlisle DWS (FDC03) - 2012 Monthly Production (Summary)

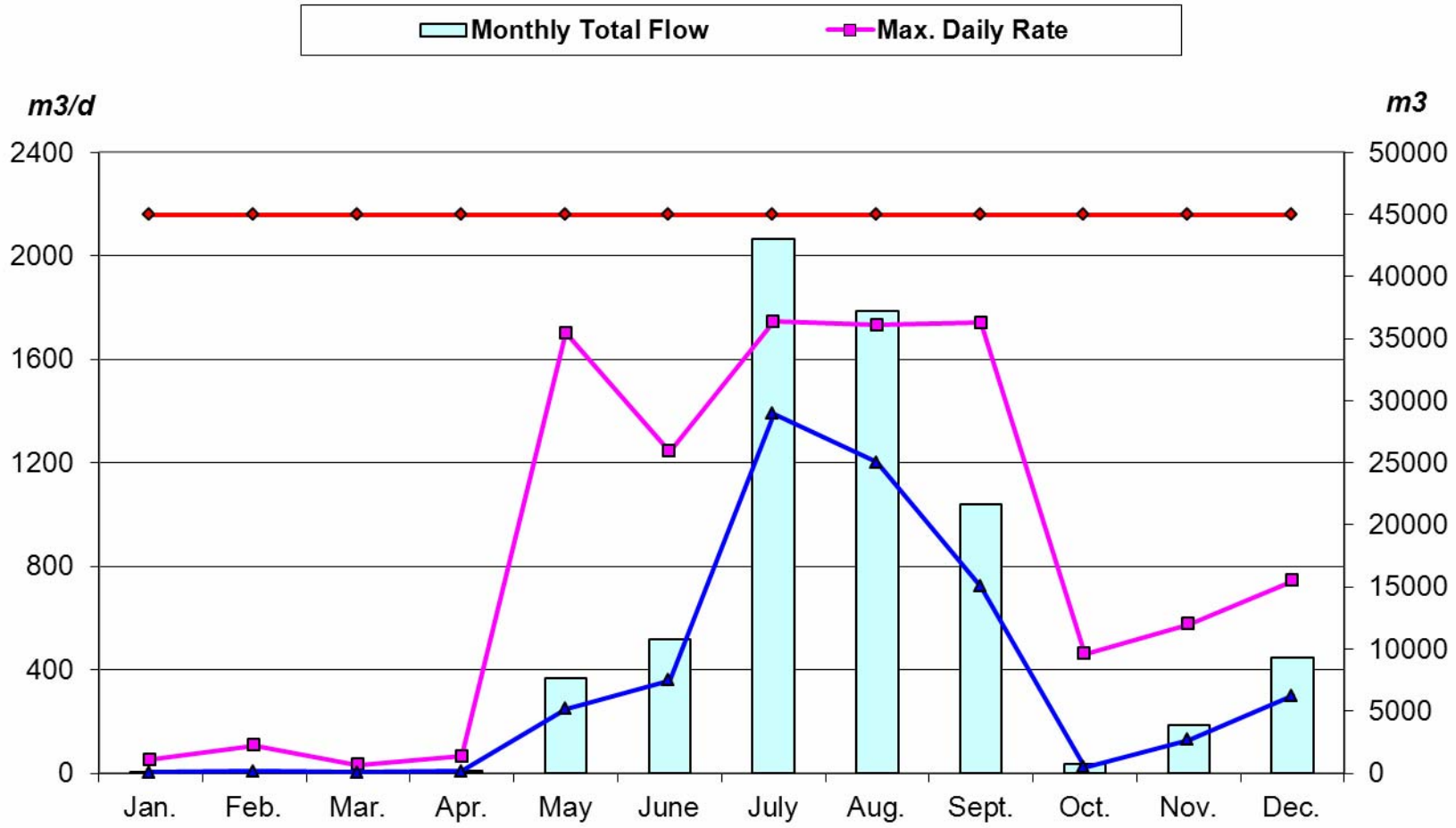

Table 3-4: Carlisle DWS (FDC03) - 2012 Monthly Production (Summary)

FDC03R	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	133	215	102	206	7,694	10,786	43,083	37,236	21,667	738	3,853	9,278
Average	m^3/d	4	7	3	7	248	360	1,390	1,201	722	24	128	299
Maximum	m^3/d	51	108	31	65	1,702	1,245	1,747	1,734	1,743	461	576	745
PTTW	m^3/d	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160

Table 3-5: Carlisle DWS (FDC05) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day
1	0	0	0	0	0	969	893	0	0	319	19	0
2	26	0	0	32	0	1,108	1,013	0	0	418	0	0
3	0	0	0	0	0	870	785	0	29	346	0	29
4	0	0	0	0	0	322	1,038	0	0	544	0	0
5	0	0	0	0	0	899	969	0	0	678	32	0
6	0	0	37	0	0	1,115	943	41	0	467	0	0
7	0	0	0	0	36	1,110	931	0	0	519	0	0
8	0	94	0	0	0	918	979	0	0	579	5	0
9	31	71	0	23	0	1,109	814	0	0	508	0	0
10	0	0	0	0	0	1,108	932	0	28	241	2	28
11	0	0	0	79	3	1,086	1,010	0	0	525	0	0
12	0	0	25	0	0	1,109	859	0	0	241	0	0
13	0	0	0	0	0	1,117	980	35	0	346	32	0
14	0	25	0	0	0	1,080	916	0	0	728	333	0
15	0	0	0	0	446	1,101	902	0	0	530	0	0
16	26	0	0	28	816	868	346	0	0	480	286	0
17	0	0	0	0	801	1,090	783	0	29	447	197	15
18	0	0	0	0	715	1,060	560	0	0	473	444	0
19	0	0	23	0	791	1,085	614	0	0	682	341	0
20	0	28	0	0	966	1,069	80	31	0	638	41	0
21	0	0	0	0	1,055	1,059	0	419	0	137	291	0
22	0	0	0	0	438	1,088	0	226	0	453	823	0
23	16	0	0	31	682	647	44	0	0	358	83	0
24	0	0	0	0	1,072	1,016	0	0	404	126	554	20
25	0	0	0	0	1,071	1,031	0	0	541	312	0	0
26	0	0	30	0	955	1,081	2	0	563	0	39	0
27	0	27	0	0	905	1,068	0	24	674	0	0	0
28	0	0	0	0	1,006	1,023	0	0	632	0	0	0
29	0	0	0	0	1,023	1,049	0	0	898	0	0	0
30	0		0	27	989	1,007	2	689	335	35	0	0
31	0		0		979		0	492		0		22
Total	99	245	116	219	14,750	30,263	16,394	1,959	4,133	11,130	3,522	113
Average	3	8	4	7	476	1,009	529	63	138	359	117	4
Min	0	0	0	0	0	322	0	0	0	0	0	0
Max	31	94	37	79	1,072	1,117	1,038	689	898	728	823	29
PTTW	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296

Figure 3-3: Carlisle DWS (FDC05) - 2012 Monthly Production (Summary)

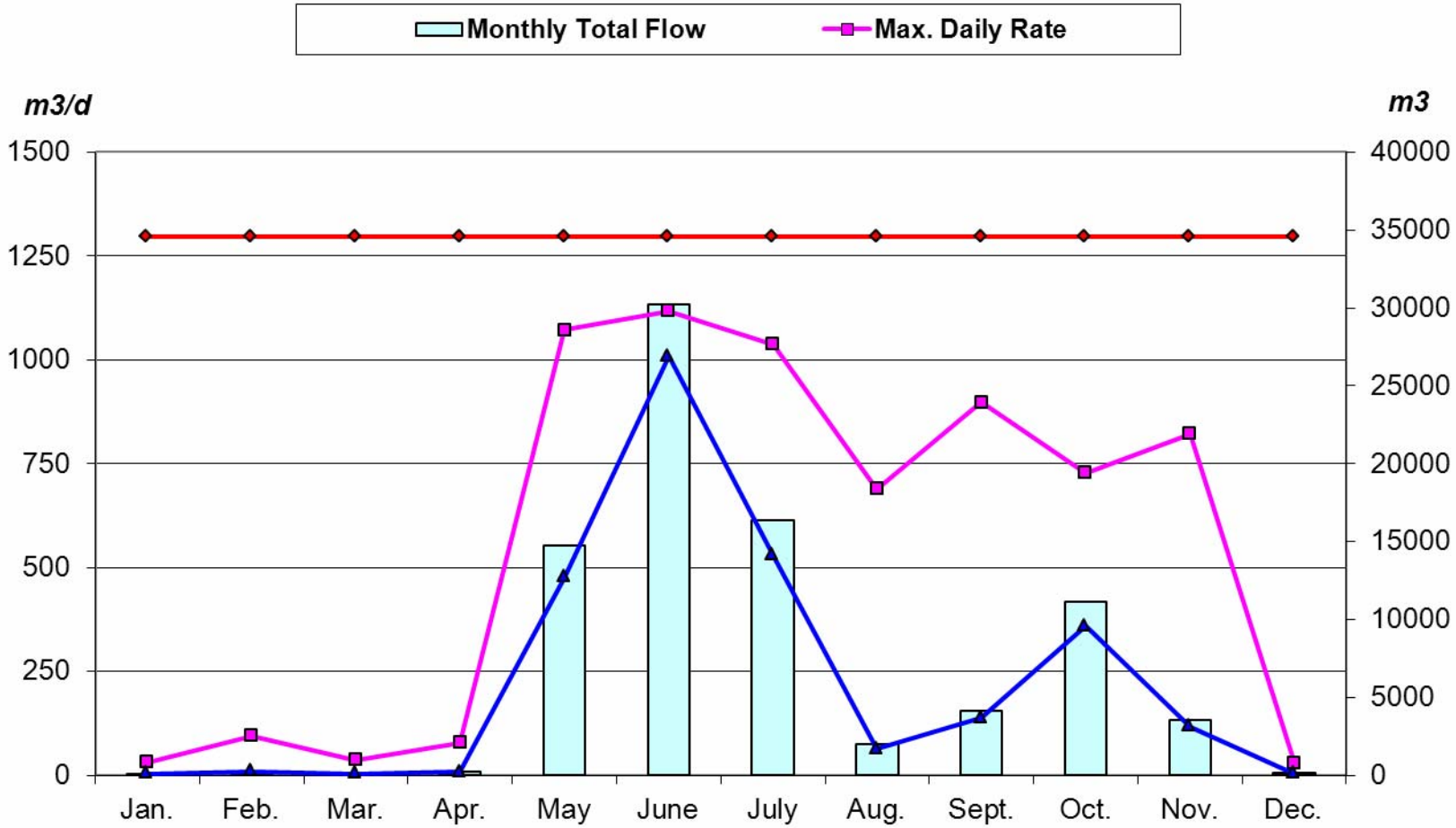

Table 3-6: Carlisle DWS (FDC05) - 2012 Monthly Production (Summary)

FDC05	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	99	245	116	219	14,750	30,263	16,394	1,959	4,133	11,130	3,522	113
Average	m^3/d	3	8	4	7	476	1,009	529	63	138	359	117	4
Maximum	m^3/d	31	94	37	79	1,072	1,117	1,038	689	898	728	823	29
PTTW	m^3/d	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296

4 FREELTON DWS

4.1 Operational Upgrades - 2012

In 2012, no projects were scheduled.

4.2 Future Upgrades – 2013

No projects have been scheduled for 2013.

4.3 Provincial Officer's Orders

There are no Provincial Officer's Orders for the Freelton DWS.

4.4 Adverse Water Quality Reports - Freelton DWS

The following AWQI was reported to MOE SAC and PHS

Notification Date	Location of Adverse	AWQI	Resolution
2012-08-01	Freelton FDF03 Treated	Total Coliforms = 4 CFU/100mL	Resampled adverse location and three downstream locations. All results were acceptable. The adverse was not confirmed.

4.5 Water Production Reports - Summary

The following provides a summary of daily flow rates and instantaneous peak flow rates in comparison to the capacity of the water works as identified in the Permit to Take Water. This information is tabulated in the accompanying tables.

Table 4-1: Freelton DWS (FDF01) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day
1	0	0	0	0	253	0	0	477	356	0	54	0
2	0	0	268	442	0	283	0	24	125	240	0	0
3	186	258	0	80	89	0	0	215	176	130	0	381
4	0	0	0	0	144	258	0	251	294	3	321	55
5	67	0	0	0	0	92	0	240	0	0	34	0
6	194	209	372	282	300	0	16	43	288	273	56	0
7	0	24	0	0	0	285	0	319	0	0	0	51
8	275	0	0	80	76	195	0	154	285	211	0	0
9	0	218	206	170	240	0	119	166	0	105	368	0
10	226	42	0	435	0	305	263	0	299	160	0	0
11	0	0	0	59	85	0	397	279	136	0	0	453
12	0	267	0	0	179	342	110	0	1	121	0	708
13	264	0	145	266	190	124	298	292	268	0	372	0
14	0	132	0	0	489	23	384	130	0	0	0	0
15	0	0	0	0	0	283	111	0	219	267	0	0
16	270	0	296	0	303	346	252	411	52	86	0	523
17	82	224	0	195	0	0	523	0	276	0	315	457
18	0	0	0	0	308	299	239	0	111	0	64	79
19	16	186	225	0	0	187	548	298	0	281	0	0
20	264	73	58	270	281	294	98	106	246	94	72	60
21	0	135	0	0	279	68	473	238	21	0	0	740
22	0	0	18	203	39	252	0	175	0	0	0	632
23	266	0	365	60	332	144	34	143	274	370	131	0
24	90	287	0	143	358	146	54	319	0	0	0	0
25	8	0	26	8	63	127	0	209	277	0	396	563
26	189	0	227	36	276	0	60	444	0	0	0	545
27	143	498	111	222	459	0	0	111	230	353	26	10
28	0	67	0	0	175	0	308	304	97	28	0	327
29	0	0	0	286	232	0	124	143	0	14	190	378
30	262		259	0	130	0	195	113	277	69	186	0
31	122		0		319		185	184		232		0
Total	2,922	2,620	2,576	3,240	5,598	4,056	4,791	5,790	4,308	3,037	2,584	5,962
Average	94	90	83	108	181	135	155	187	144	98	86	192
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	275	498	372	442	489	346	548	477	356	370	396	740
PTTW limit	878	878	878	878	878	878	878	878	878	878	878	878

Figure 4-1: Freelton DWS (FDF01) - 2012 Monthly Production (Summary)

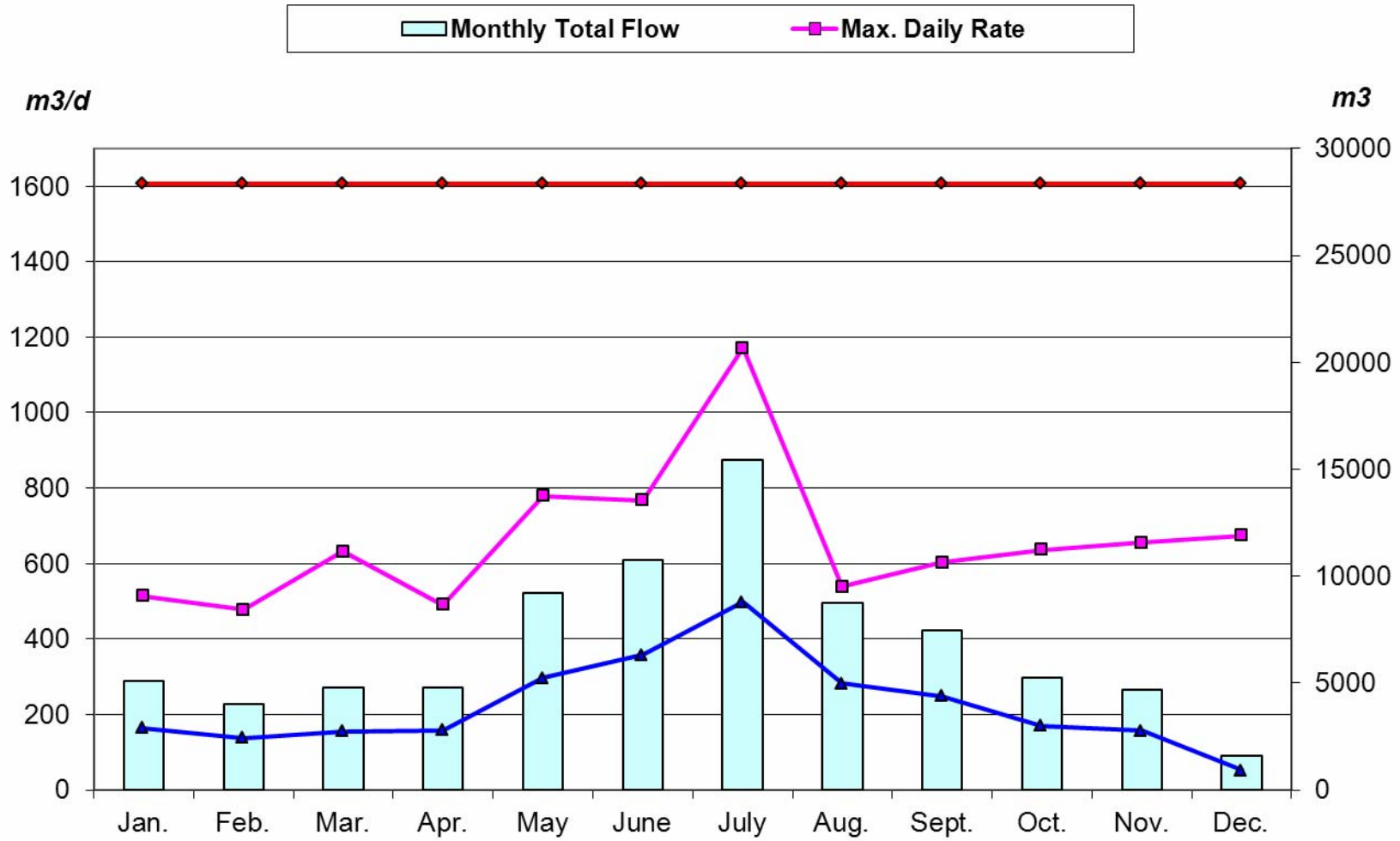

Table 4-2: Freelton DWS (FDF01) - 2012 Monthly Production (Summary)

FDF01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	2,922	2,620	2,576	3,240	5,598	4,056	4,791	5,790	4,308	3,037	2,584	5,962
Average	m^3/d	94	90	83	108	181	135	155	187	144	98	86	192
Maximum	m^3/d	275	498	372	442	489	346	548	477	356	370	396	740
PTTW	m^3/d	878	878	878	878	878	878	878	878	878	878	878	878

Table 4-3: Freelton DWS (FDF03) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day
1	513	0	0	0	434	0	723	356	602	0	92	0
2	0	0	447	388	0	485	759	29	244	408	0	0
3	275	440	0	98	152	0	518	366	297	214	0	650
4	0	0	0	0	247	442	656	422	530	7	549	95
5	114	66	0	0	0	219	667	407	0	0	59	0
6	332	477	632	480	511	0	787	73	484	463	92	0
7	0	43	0	0	0	486	1,171	539	0	0	0	674
8	432	0	0	138	130	289	697	259	482	355	41	148
9	0	371	349	293	410	0	547	284	0	181	607	0
10	372	72	0	47	0	519	446	0	509	199	0	0
11	0	0	621	0	145	0	675	473	229	0	0	35
12	0	454	0	0	304	436	188	0	240	422	0	0
13	429	0	253	444	0	264	530	495	452	0	631	0
14	0	209	0	0	266	40	653	220	0	0	0	0
15	0	0	0	463	0	482	190	0	369	461	0	0
16	448	0	432	0	517	588	429	435	90	60	0	0
17	138	377	0	326	0	0	869	336	469	0	537	0
18	0	0	0	0	506	507	430	0	188	0	110	0
19	0	317	482	0	193	319	0	507	0	474	0	0
20	452	123	175	463	691	485	0	178	414	162	628	0
21	0	232	0	0	535	137	963	404	36	0	0	0
22	0	0	27	346	57	507	113	295	0	0	0	0
23	454	0	321	105	562	245	744	242	461	636	0	0
24	156	431	0	230	602	248	484	532	0	0	0	0
25	0	0	45	10	105	768	130	0	468	0	656	0
27	161	291	188	379	778	754	0	185	256	608	61	0
28	0	87	0	0	438	683	521	514	165	48	0	0
29	0	0	0	490	409	707	208	241	0	41	322	0
30	448		442	0	222	750	333	192	468	117	315	0
31	120		0		505		314	314		391		0
Total	5,085	3,989	4,804	4,761	9,189	10,733	15,438	8,761	7,455	5,247	4,698	1,601
Average	164	138	155	159	296	358	498	283	248	169	157	52
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	513	477	632	490	778	768	1,171	539	602	636	656	674
PTTW limit	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607

Figure 4-2: Freelton DWS (FDF03) - 2012 Monthly Production (Summary)

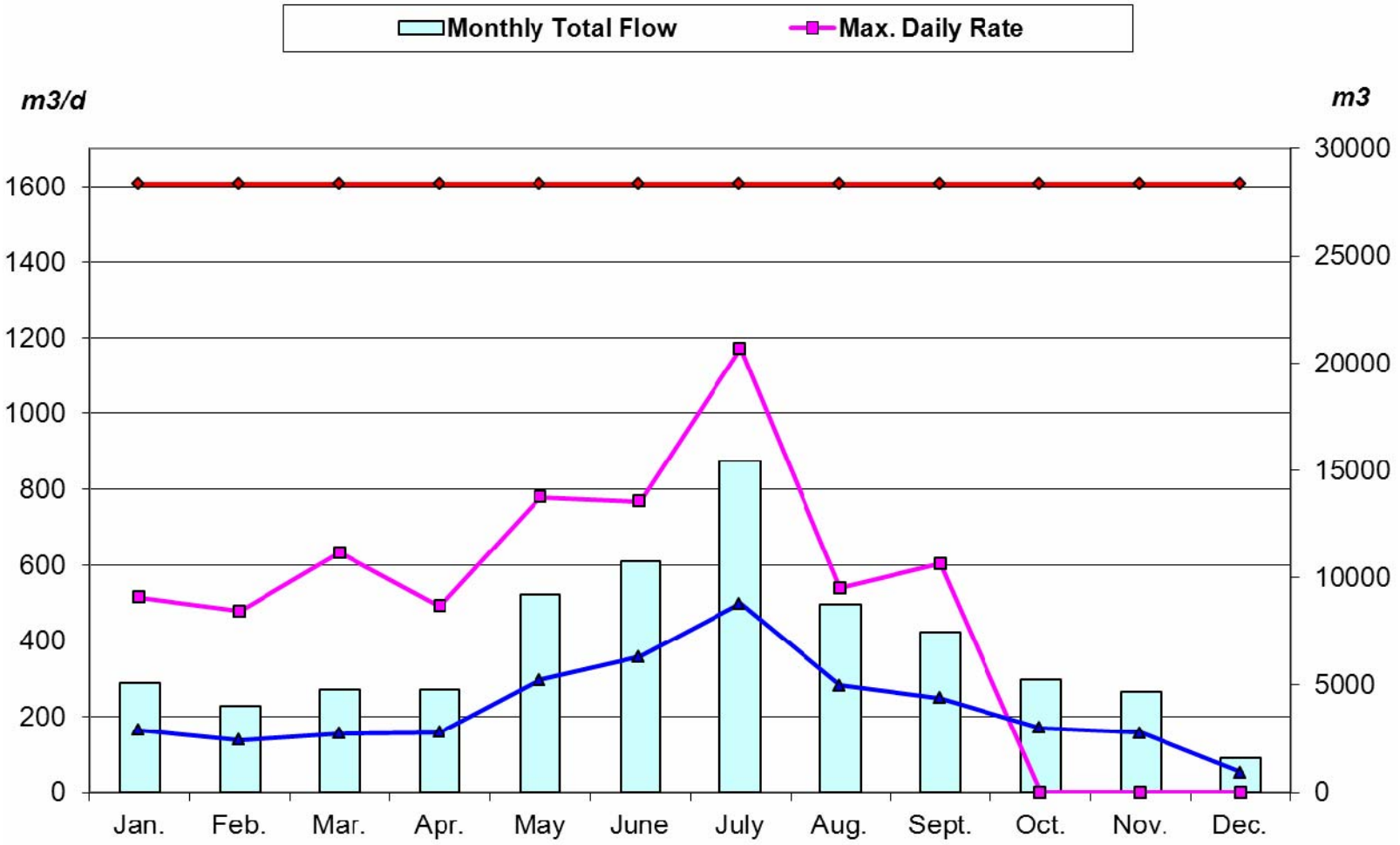

Table 4-4: Freelton DWS (FDF03) - 2012 Monthly Production (Summary)

FDF03	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	5,085	3,989	4,804	4,761	9,189	10,733	15,438	8,761	7,455	5,247	4,698	1,601
Average	m^3/d	164	138	155	159	296	358	498	283	248	169	157	52
Maximum	m^3/d	513	477	632	490	778	768	1,171	539	602	636	656	674
PTTW	m^3/d	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607

5 GREENSVILLE DWS

5.1 Operational Upgrades – 2012

In 2012, no projects were scheduled.

5.2 Future Upgrades – 2013

No projects have been scheduled for 2013.

5.3 Provincial Officer's Orders

There are no Provincial Officer's Orders for the Greensville DWS.

5.4 Adverse Water Quality Reports

The following AWQI was reported to MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2012-07-06	Greensville Sampling Station B (1 Forest Ave)	Total Coliforms = 6 CFU/100mL	Resampled adverse location as well as the treated water and another sampling station. All results were acceptable. The adverse was not confirmed.

5.5 Water Production Reports - Summary

The following provides a summary of daily flow rates and instantaneous peak flow rates in comparison to the capacity of the water works as identified in the Permit to Take Water.

This information is tabulated in the accompanying tables (please see the next 2 pages).

Table 5-1: Greensville DWS (FDG01) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day	m^3/day
1	41	33	30	37	32	41	70	41	65	35	31	31
2	38	34	29	34	31	41	86	41	63	34	29	33
3	35	43	34	34	39	41	54	44	66	35	35	27
4	33	51	36	35	30	33	73	64	54	33	37	27
5	32	50	30	30	34	38	64	36	59	37	29	29
6	30	44	29	38	46	45	73	50	59	35	34	30
7	41	46	29	36	38	62	60	54	42	38	28	32
8	42	45	29	43	37	79	72	60	38	37	30	34
9	37	45	26	35	34	60	60	38	42	31	29	37
10	35	49	34	32	36	60	63	35	35	32	35	35
13	65	83	81	70	81	72	100	69	71	67	65	67
14	92	65	63	91	75	71	88	58	76	0	65	65
15	69	66	63	73	84	117	67	64	73	0	63	80
16	71	65	60	68	82	102	105	98	89	0	60	76
17	64	64	67	88	79	87	73	69	66	0	67	70
18	82	93	82	67	85	75	88	73	67	0	92	65
19	64	68	62	73	145	107	67	73	68	0	66	66
20	66	86	66	71	89	118	69	61	63	0	63	69
21	92	67	62	89	126	74	94	87	62	0	64	67
22	72	69	65	70	91	85	79	72	70	74	67	98
23	70	67	63	84	121	102	87	65	85	59	58	72
24	70	76	67	67	126	111	81	87	67	61	76	71
25	69	71	74	70	149	89	73	85	66	65	72	66
26	65	83	67	69	145	94	73	92	74	59	63	61
27	83	62	60	67	158	90	63	80	78	66	62	57
28	73	60	63	71	146	95	85	79	63	74	63	80
29	75	79	65	91	131	117	66	76	83	71	66	63
30	80		73	62	135	112	88	79	74	60	64	61
31	64		76		133		57	91		59		82
Total	2,269	2,100	2,133	2,238	3,080	2,649	2,755	2,280	2,204	1,552	2,004	2,156
Average	73	72	69	75	99	88	89	74	73	50	67	70
Min	64	60	58	62	64	67	57	54	60	0	56	57
Max	92	93	93	92	158	118	130	98	92	94	92	98
PTTW limit	327	327	327	327	327	327	327	327	327	327	327	327

Figure 5-1: Greensville DWS (FDG01) - 2012 Monthly Production (Summary)

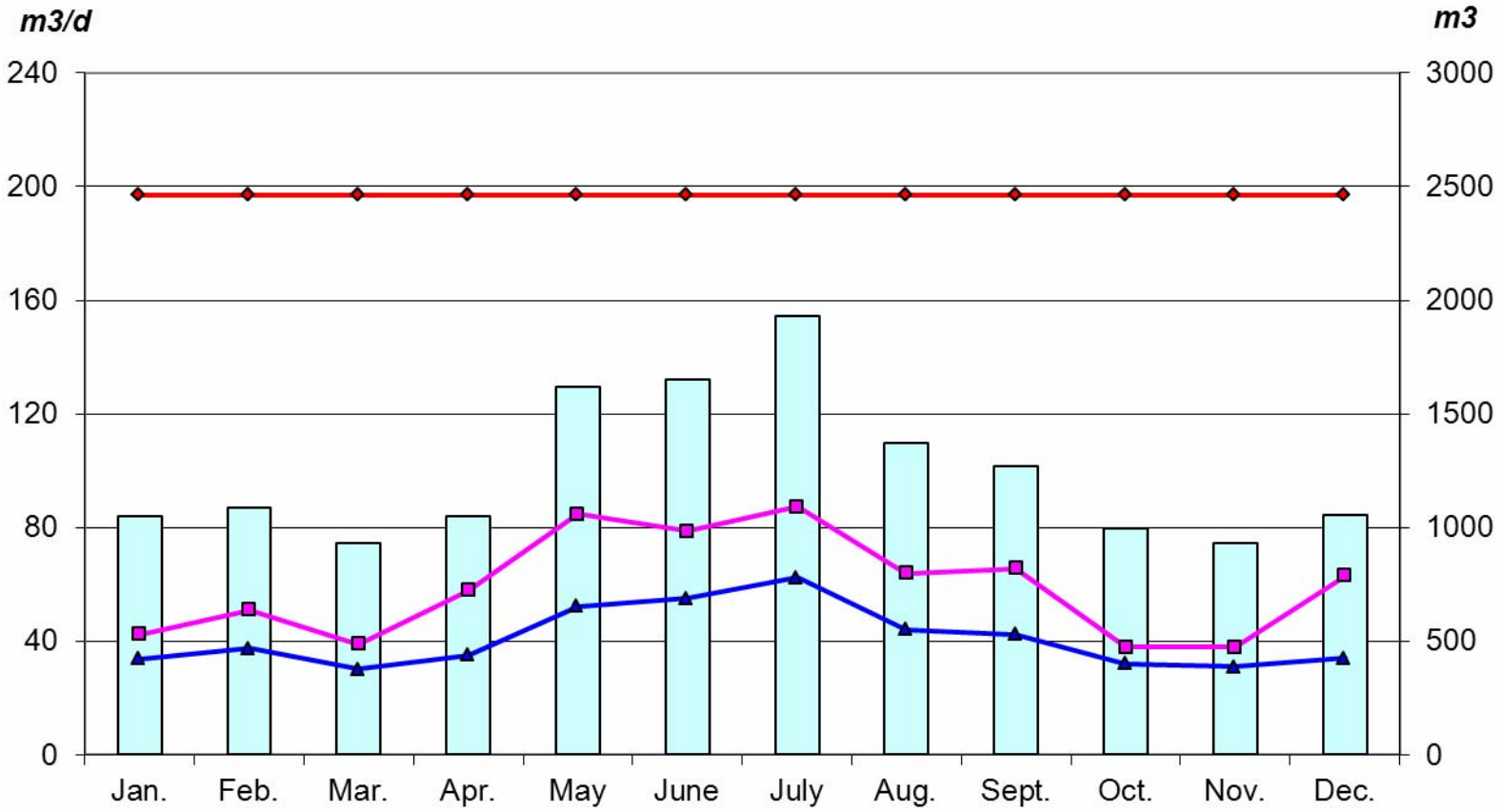

Table 5-2: Greensville DWS (FDG01) - 2012 Monthly Production (Summary)

FDG01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	1,051	1,090	932	1,052	1,619	1,653	1,933	1,370	1,273	994	934	1,055
Average	m^3/d	34	38	30	35	52	55	62	44	42	32	31	34
Maximum	m^3/d	42	51	39	58	85	79	87	64	66	38	38	63
PTTW	m^3/d	197	197	197	197	197	197	197	197	197	197	197	197

6 LYNDEN DWS

6.1 Operational Upgrades – 2012

In 2012, no projects were scheduled.

6.2 Future Upgrades - 2013

No projects have been scheduled for 2013.

New Lynden Well update:

- A pump test was conducted October 14th – 20th 2012 and the report is expected early 2013.
- There will be a Public Information Centre in the spring or fall 2013 followed by completion of the Environmental Assessment.
- A Capital Project is expected to be initiated late 2013 or mid-2014

6.3 Provincial Officer's Orders

There are no Provincial Officer's Orders for the Lynden DWS.

6.4 Adverse Water Quality Reports

The following AWQI was reported to MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2012-01-12	Lynden – Lynden Sampling Station B (LSSB)	Lead = 0.0105 mg/L	Resampled adverse location LSSB. The adverse was not confirmed.

6.5 Water Production Reports - Summary

The following provides a summary of daily flow rates and instantaneous peak flow rates in comparison to the capacity of the water works as identified in the Permit to Take Water. This information is tabulated in the accompanying tables.

Table 6-1: Lynden DWS (FDL01) - 2012 Daily Production

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day	m3/day
1	65	67	64	80	68	82	122	76	88	72	67	84
2	88	62	62	71	64	74	130	63	87	66	56	71
3	70	79	87	65	76	84	69	75	92	67	69	65
4	67	74	68	68	68	67	105	65	80	68	85	62
5	77	86	80	83	77	83	98	55	92	63	61	66
6	73	66	68	77	96	68	106	86	64	67	64	67
7	81	69	65	92	65	83	112	65	60	77	61	61
8	79	80	60	72	75	70	111	73	77	94	67	68
9	70	64	75	72	70	79	110	62	66	67	62	81
10	76	66	93	86	69	78	98	54	68	65	69	63
11	67	93	71	65	90	79	100	79	67	67	86	63
12	72	67	58	67	80	85	88	70	67	63	64	69
13	65	83	81	70	81	72	100	69	71	67	65	67
14	92	65	63	91	75	71	88	58	76	0	65	65
15	69	66	63	73	84	117	67	64	73	0	63	80
16	71	65	60	68	82	102	105	98	89	0	60	76
17	64	64	67	88	79	87	73	69	66	0	67	70
18	82	93	82	67	85	75	88	73	67	0	92	65
19	64	68	62	73	145	107	67	73	68	0	66	66
20	66	86	66	71	89	118	69	61	63	0	63	69
21	92	67	62	89	126	74	94	87	62	0	64	67
22	72	69	65	70	91	85	79	72	70	74	67	98
23	70	67	63	84	121	102	87	65	85	59	58	72
24	70	76	67	67	126	111	81	87	67	61	76	71
25	69	71	74	70	149	89	73	85	66	65	72	66
26	65	83	67	69	145	94	73	92	74	59	63	61
27	83	62	60	67	158	90	63	80	78	66	62	57
28	73	60	63	71	146	95	85	79	63	74	63	80
29	75	79	65	91	131	117	66	76	83	71	66	63
30	80		73	62	135	112	88	79	74	60	64	61
31	64		76		133		57	91		59		82
Total	2,269	2,100	2,133	2,238	3,080	2,649	2,755	2,280	2,204	1,552	2,004	2,156
Average	73	72	69	75	99	88	89	74	73	50	67	70
Min	64	60	58	62	64	67	57	54	60	0	56	57
Max	92	93	93	92	158	118	130	98	92	94	92	98
PTTW limit	327	327	327	327	327	327	327	327	327	327	327	327

Figure 6-1: Lynden DWS (FDL01) - 2012 Monthly Production (Summary)

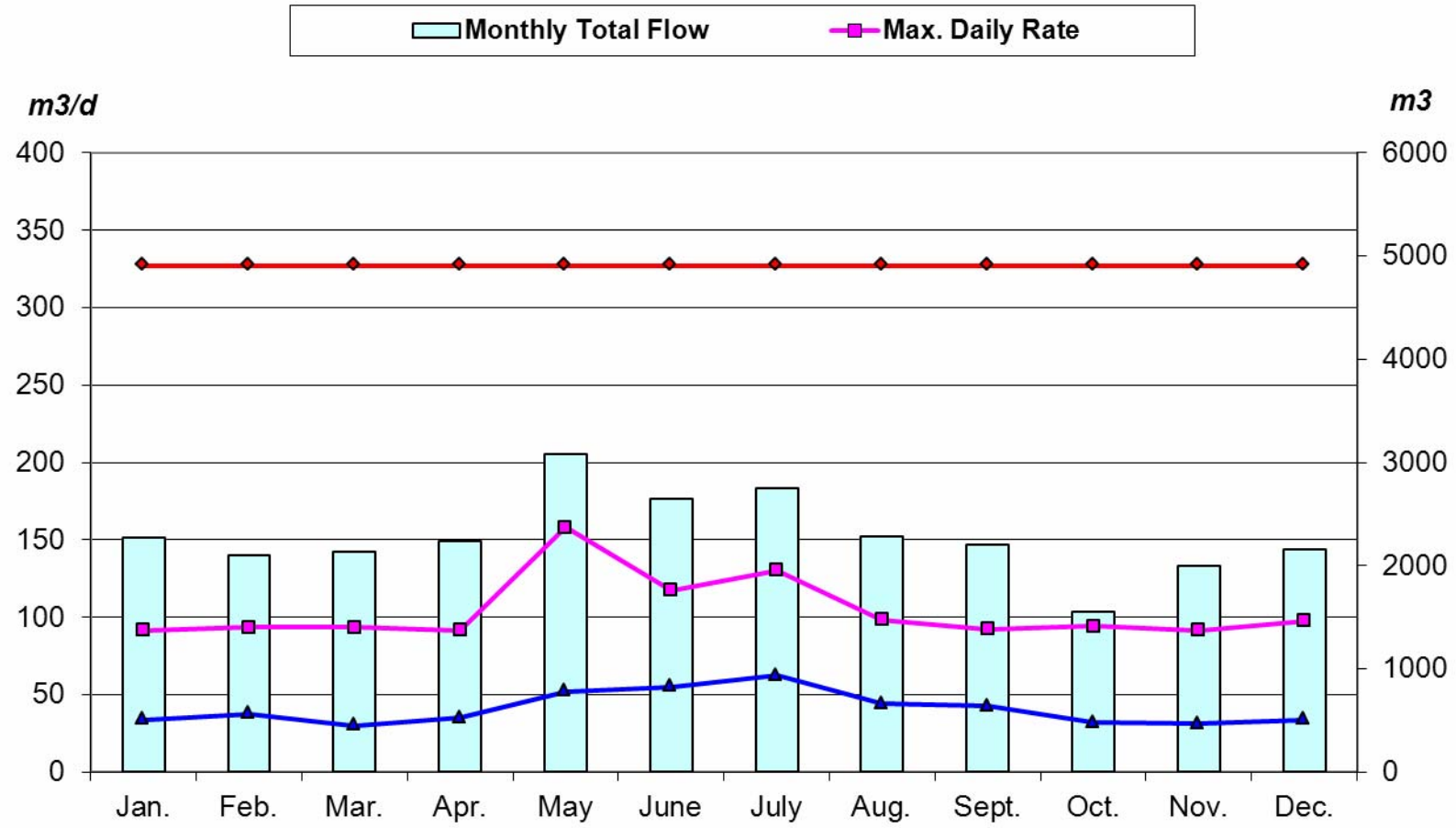

Table 6-2: Lynden DWS (FDL01) - 2012 Monthly Production (Summary)

FDL01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	m^3	2,269	2,100	2,133	2,238	3,080	2,649	2,755	2,280	2,204	1,552	2,004	2,156
Average	m^3/d	73	72	69	75	99	88	89	74	73	50	67	70
Maximum	m^3/d	92	93	93	92	158	118	130	98	92	94	92	98
PTTW	m^3/d	327	327	327	327	327	327	327	327	327	327	327	327

APPENDIX "B"
REPORT PW13017

City of Hamilton's
Drinking Water Systems

DWQMS SUMMARY REPORT (2012)

Safe Drinking Water Act

BEYOND COMPLIANCE OPERATING SYSTEM

Hamilton
Public Works

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1 INTRODUCTION

1.1 Purpose

This Drinking Water Quality Management System (DWQMS) Summary Report is being submitted to Council (Owner) on behalf of Top Management (General Manager, Public Works and Director of Hamilton Water) of the City's drinking water systems. The purpose of this DWQMS Summary Report is to keep Owners (Mayor and Council) of the City's drinking water systems informed about the ongoing performance of the DWQMS including major milestones achieved in 2012. This report also assists Owners in meeting their Standard of Care responsibilities under the Safe Drinking Water Act.

This DWQMS Summary Report is key communication tool from Top Management to the Owner as referenced in Element 12 Communications of the DWQMS Standard. This Report also meets the communication requirements of Elements 14 Review and Provision of Infrastructure and Element 20 Management Review of DWQMS Standard as identified in Section 4. and 6. respectively.

1.2 Scope

The DWQMS Standard requires that the Operating Authority report on certain aspects of the DWQMS to Owners (Mayor and Council), specifically the outcomes of Element 14 Review and Provision of Infrastructure and Element 20 Management Review. This report fulfills the communication requirements of these elements and exceeds the Standard's requirements by providing information on external and internal DWQMS audits, risk assessment and other major milestones of the DWQMS.

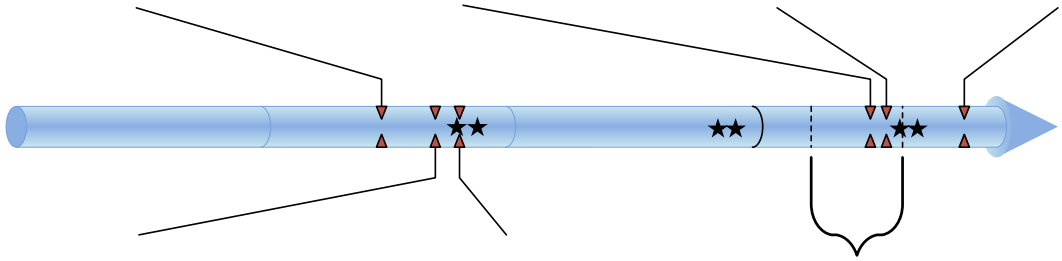
1.3 Overview of Key Milestones

DWQMS milestones related to the accreditation of the City's Operating Authority are described below:

- November 2008 - DWQMS Operational Plan endorsed by Owners,
- April 2009 – Operating Authority achieves Partial Scope; Entire DWQMS accreditation,
- June 2009 – Operating Authority receives Municipal Drinking Water Licences and Drinking Water Works Permits for all five City drinking water systems,
- February 2011 – On-site Verification Audit by Canadian General Standards Board (CGSB),
- July 2011 – Operating Authority achieves Full Scope; Entire DWQMS accreditation.

Figure 1-1 illustrates key DWQMS milestones which occurred in 2012 which includes six Standard of Care training sessions for Owners (Mayor and Council) of the City's drinking water systems.

Figure 1-1: Project Pipeline



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Hamilton Water has identified QMI-SAI Global (QMI) as its new Accreditation Body in 2012 and will undergo a Systems Audit (document review) in 2013 and on-site Verification Audit in 2014. The Licences for the City's five drinking water systems will also have to be renewed in 2014.

1.4 DWQMS Operational Summary

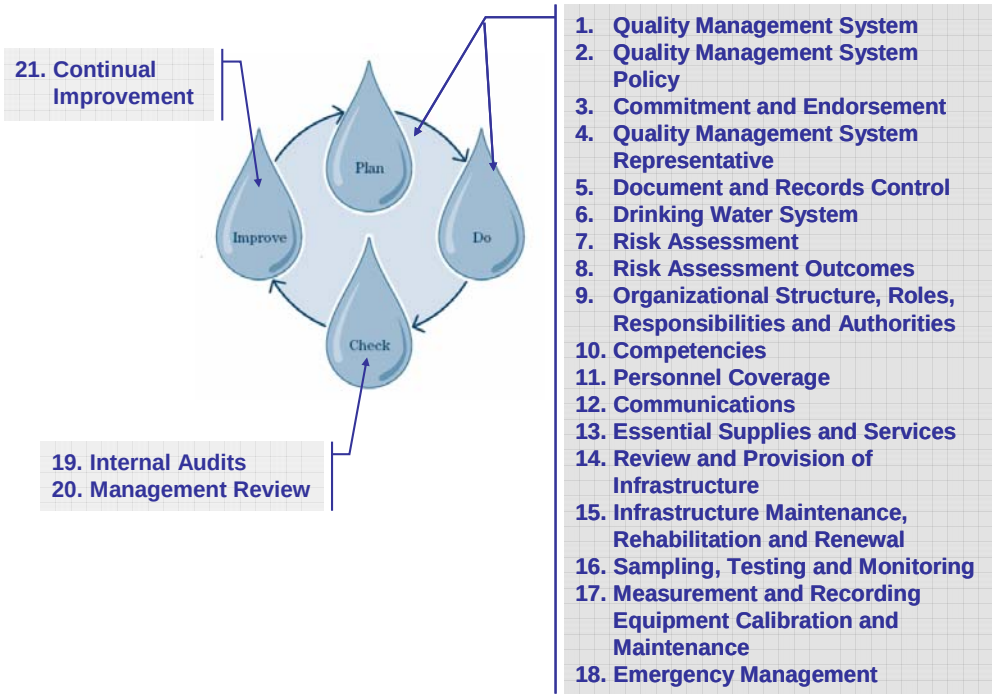
May 16, 2012
Infrastructure Review Hori
Meeting

Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard. The Ministry of the Environment initiated a review of the Standard in April 2012, however, no revisions have been proposed to date.

The following sections of this report include an overview of milestones related to the following elements of the DWQMS:

- Section 2 - Element 8 Risk Assessment Outcomes
- Section 3 – Element 10 Competencies
- Section 3 - Element 14 Review and Provision of Infrastructure,
- Section 4 - Element 19 Internal Audits,
- Section 5 - Element 20 Management Review.

Figure 1-2: DWQMS Standard Elements



Corrosion Control Plan

The City of Hamilton requires a Corrosion Control Plan (CCP) for the Woodward drinking water sub-system. The CCP is required because it has been identified that the Woodward DWS has over 10 % of lead samples taken from residential and non-residential plumbing systems that exceeded 10 µg/L in two subsequent sampling rounds. It is important to note that the Community Lead Sampling Program included over 130 sampling locations in the downtown core and surrounding areas as per the legal requirement that sampling points be from lead plumbing or suspected lead plumbing or plumbing connected to or suspected to be connected to lead service pipes.

The Corrosion Control Plan was accepted by the Ministry of the Environment (MOE) on June 7th, 2011. A treatment based corrosion control plan is being recommended using phosphate-based inhibition without pH adjustment. The Operating Authority has constructed pipe loops from recovered lead services to assess the effectiveness of alternative treatments. The Pipe Loop Testing Project is currently in the later part of the passivation or dosing phase of the testing and the project is expected to be completed in 2013. An update to Owners (Mayor and Council) will be provided once the results of the pipe loop testing are compiled and reviewed by Hamilton Water's management team.

DWS Licences & Permits Approvals

There were no Amendments to the City's DWSs submitted to MOE in 2012. However, there were 21 Form 1 approvals for extensions to the distribution system, 4 Form 2s for like for like infrastructure replacements (e.g. pumps) and no Form 3 approvals for diesel generators.

2 RISK ASSESSMENT

2.1 Overview

The DWQMS Standard requires that the Risk Assessment be reviewed on an annual basis and redone every three years to verify the currency and validity of the information. A re-evaluation of the Risk Assessment scope, criteria, data fields and update of risk assessment data was conducted in 2011 as it was the 3 year "redo" milestone for the Risk Assessment. The purpose of the 2012 Risk Assessment was to review the outcomes from 2011 and the focus was on new and upgraded infrastructure as well as critical watermains.

Staff from across Hamilton Water collaborated on updating the existing information considering the following key questions:

- Are identified control measures still valid and if so, are they still in place?
- Have additional controls been implemented?
- How has equipment condition, raw water quality, operational controls etc. revised the risk score?
- Are any modified "Risk Factors" now considered to be Critical Control Risks?

2.2 Key Updates

As part of the Risk Assessment process changes, including capital upgrades in the DWSs, are considered and the associated risk scores (i.e., likelihood of occurrence) are updated as needed. The following includes a list of completed capital upgrades that were considered in the 2012 Risk Assessment:

- Emergency backup power added to the Kenilworth and Ferguson pumping stations
- Capital upgrades to Ferguson Avenue and Stonechurch & Garth pumping stations
- Upgrades to Stonechurch & Garth, Hillcrest and Ben Nevis/Dewitt Road reservoirs
- Upgrades to the chlorination system at the raw water intake (Woodard WTP)
- Improved site security at water treatment locations and some pumping stations
- Upgrades to the Highlift Pumping Station and Lowlift Pumping Station
- Chlorine leak detection system improvements for the chlorine rail cars (Woodward Ave. WTP)
- SCADA upgrades that add system redundancy

In 2013, the scope of the Risk Assessment will be increased to include critical large valves in the water distribution system.

3 COMPETENCIES

3.1 Standard of Care Training

Standard of Care for Owners and Managers of municipal drinking water systems came into effect as of January 1st, 2013. Standard of Care is a statutory due diligence requirement identified in Section 19 of the Safe Drinking Water Act. Hamilton Water facilitated six Standard of Care training sessions in 2012 on June 13th, June 21st, September 18th, September 25th, November 15th and November 28th. Mr. Jim Merritt, Chair of the Ontario Drinking Water Advisory Council and a highly regarded consultant, who gave evidence at the Walkerton inquiry, assisted the Hamilton Water team in delivering the training sessions. All Owners (Mayor and Council) received Standard of Care training which included the following:

- Key stakeholders for City's drinking water systems,
- Details on standard of care requirements,
- Background on Walkerton incident and results of inquiry,
- Overview of legal framework related to water,
- System specific examples of how Hamilton Water meets and sometimes exceeds legal requirements, and
- Current issues related to the City's drinking water systems.

4 REVIEW AND PROVISION OF INFRASTRUCTURE

4.1 Purpose

The Operating Authority must ensure and verify, on an annual basis, the adequacy of water infrastructure. In order to satisfy the requirements of the DWQMS Standard, the Operating Authority conducted a formal annual review of its vertical (water treatment, storage and pumping) and horizontal (watermains) infrastructure. The scope of the review also considered the operation, maintenance and replacement of existing infrastructure assets as well as new infrastructure planned for the immediate and long-term future. A Coordination Meeting is held with the Management Team of Hamilton Water to discuss the outcomes of both the horizontal and vertical infrastructure reviews. This DWQMS Summary Report (2012) includes a brief summary of the results of the DWQMS Infrastructure Review.

4.2 Process

The Operating Authority assembled teams of representatives from across relevant sections of Hamilton Water to conduct the review of water infrastructure. Teams met

in May and June 2012 to discuss vertical and horizontal infrastructure and a coordination meeting was held in June 2012.

The DWQMS Infrastructure Review teams collected and examined input data related to various asset management, maintenance and capital programs. A summary of the type of "indicator" data examined is provided below:

Infrastructure Type	Input Data
Horizontal Infrastructure - Small Capital	• Leak Detection & Water Loss Audits • Corrosion Protection Planning • Valve and Meter Replacement • Preventative Maintenance • Emergency Repairs • Customer Complaints • Lead Service Replacement Program
Horizontal Infrastructure - Large Capital	• Replaced, Rehabilitated and New Watermains • Stand-Alone and Coordinated Works (i.e., with Sewers and Roads) • Condition Assessments • Master Plan Schedule
Vertical Infrastructure Small Capital	• Preventative Maintenance • Emergency Repairs • Capital Upgrades - Coordination and Scheduling
Vertical Infrastructure - Large Capital	• Master Plan Schedule • Site Specific Condition Assessments • Reservoir Inspection • Water Capital Projects Lists

4.3 Overview of Results

Overall, the review concluded that vertical and horizontal infrastructure is generally found to be available, when needed, and maintained and improved, when necessary. Below is a summary of some general continual improvement suggestions as well as some specific action items from the Vertical and Horizontal Infrastructure Review meetings.

General Infrastructure Review Process Continual Improvement Areas:

- Establish better linkages between the results of the infrastructure review and Asset Management's State of the Infrastructure Report (SOTI) including Director approval

of comments related to water infrastructure and consideration of the DWQMS Financial Plan,

- Assign responsibility for the identification and tracking of isolation and\or check valves. These orphaned valves are in the distribution system and are currently not part of an ongoing maintenance program.
- Increase scope of IR process to include meters and Meter Replacement Program
- Ensure meeting participants are given an update about the SCADA Master Plan implementation
- Ensure up to date capital project lists are available for discussion at the IR meetings.
- Include the York/Valley Road Pumping Station in the 2013 DWQMS Risk assessment.

The following action items relate to vertical infrastructure and depending on the subject, have been assigned to Plant Operations (PO), Water & Wastewater Engineering (WWW-E), Infrastructure & Source Water Planning (I&SWP) or Compliance & Regulations (C&R):

- Examine long term trends of nitrate levels in the raw water of the Greensville well.
- Review the service agreement for the Arcelor Mittal Water Pumping Station and provide information to Director.
- Determine if check valve at Kenilworth is included in an upcoming WWW-E capital project currently being developed.
- Add the clear wells as an agenda item to the upcoming meeting with WWW-E and PO related to WTP process improvement project. Include a discussion of water treatment plant capacity.
- Schedule meetings to discuss:
    - Low Lift PS zebra mussel control capital project,
    - New well for Lynden DWS and community updates on the project,
    - SCADA set points for Lynden DWS reservoir and tower,
    - Timing for the re-lining of the Kelly Street Reservoir, and
    - Valve exercising program Woodward WTP.

The following action items relate to horizontal infrastructure and depending on the subject, have been assigned to Water Distribution & Wastewater Collection (WD&WWC), Customer Service & Community Outreach (CS&CO), I&SWP, Asset Management (AM) or C&R:

- Give consideration to use of district pressure meters to help track water usage
- Set up regularly scheduled (annual or biannual) meetings for the large valve working group. At the next meeting, discuss ways to update WD&WWC on the status and completion of large valve projects on an on-going basis.

- Outline concerns about the use of hydrant adaptors for by-pass piping.
- Add the Binbrook-Fletcher Road Trunk Watermain project to the monthly capital coordination meeting.
- Prepare a list of developments requiring performance based flushing and sampling and follow up to WD&WC.
- Ensure that the status of the following items are discussed at the 2013 IR meetings: filter building turbidity meters; the status of the WTP valve exercising program (in general); the clear well check valves (specifically); and maintenance of 'orphaned' controlled valves in the distribution system.
- Schedule meetings to discuss:
    - Communications and updating information related to changing the pressure district boundaries as well as district pressure meters,
    - Process to upload preliminary drawing information to GIS/Hansen.

5 DWQMS AUDITS

The DWQMS accreditation process requires both 3rd Party Accreditation Audits and annual internal audits by the Operating Authority. The cycle of external audits includes an on-site Verification Audit every 3 years and Systems Audit or documentation review every year.

5.1 External DWQMS Audits

Hamilton Water has identified QMI as the new Accreditation Body for the DWQMS. The next on-site verification is anticipated to take place in 2014. In 2013, the Operating Authority will participate in a 3rd Party Systems Audit or document review.

5.2 Internal DWQMS Audits

The Operating Authority must conduct internal audits to evaluate the conformity of the DWQMS with the requirements of the DWQMS Standard and its procedures at least annually.

Internal Audit Team

The Audit Team consists of staff members from all sections Hamilton Water. The diversity of our Audit Team is an advantage and ensures that auditors do not audit water processes related to their job or area of authority. Independence of auditors avoids potential conflict of interest and provides a fresh set of eyes on water processes external to their day to day responsibilities. Two new auditors, identified in 2012, participated as observers in audit interviews.

Fall 2012 Audit

The Internal Audit Team conducted a full internal audit in late October / early

November 2012. The fall 2012 audit assessed the implementation of all 21 elements of the DWQMS Standard and included a process audit of the new Transfer of Assets procedure. Key meetings relating to the internal audit include:

- Opening meeting – Friday October 23rd, 2012,
- Closing meeting – Tuesday November 26th, 2012.

Continual improvement initiatives related to the audit process include streamlining the process for Opportunities for Improvement and developing an audit survey. The non-conformances, potential nonconformances will be uploaded in the BCOS Database and where root cause investigations will be undertaken in early 2013. Following this, corrective action plans will be implemented by delegated staff, where required.

2013 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2013 DWQMS internal audits. The Audit Plan will be reviewed and approved by the management team prior to implementation.

6 MANAGEMENT REVIEW

The PLAN component of Element 20 Management Review of the DWQMS Standard requires a documented procedure to describe how the Operating Authority reviews the suitability, adequacy and effectiveness of the DWQMS. The 'DO' component of the element requires that Top Management participate in a management review at least once per year. Required outputs of the meeting are:

- Consideration of the results of the management review and identifying deficiencies and action items to address deficiencies,
- Provide a record of decisions and actions items related to management review action items including responsibilities and timelines,
- Report the results of the management review to the Owner.

In 2012, the DWQMS Top Management Review was held on December 19th. Attendees included Top Management (General Manager of Public Works and Director of Hamilton Water), Section Managers, Overall Responsible Operators (OROs) for treatment and distribution, System Management Representative and staff from the Compliance Support Group.

Management Review Action Items

Overall, Top Management and Section Managers concluded that the DWQMS is suitable, adequate and effective and recommended continual improvement actions as summarized in Table 6-1.

Table 6-1: Management Review Outcomes

Summary of Action Items	Due Date	Title
Provide Sustainable Initiatives with the list of equipment that needs to be repaired as identified by the MOE inspector (Woodward DWS).	Jan.\Feb 2013	QA Supervisor, PO
WWW-E to provide CSG with an up-to-date project list for consideration in the Risk Assessment Process. Project list to include completed projects as well as upcoming projects in all stages of the process, including warranty period.	Fall 2013	Manager WWW-E
Managers to provide names of potential new internal auditors (if any) to CSG.	March 2013	All Hamilton Water Sections
PO to review emergency response processes to determine how third party contractors are engaged and\or if they are included on emergency contact lists.	Feb. March 2013	QA Supervisor, PO
CSG to include a discussion of managers' participation in Divisional emergency planning and response at the next HW-SMT meeting.	March 2013	CSG
CSG to use CS&CO's revised data (instead of data provided to OMBI) for calculating the number of lead services in the 2013 TMR meeting.	Dec. 2013	CSG
CSG to provide ten years' worth of water production data in order to identify trends.	Dec. 2013	CSG
CSG to provide the method of calculating population served as a reference.	Dec. 2013	CSG
CSG to include microcystins in Water Quality Report for next TMR meeting.	Dec. 2013	CSG
When listing or referring to capital projects, CSG to ensure that proper, consistent project names be used.	Dec. 2013	CSG

Summary of Action Items	Due Date	Title
WWW-E to select a BLT representative for I&SWP, WWW-E and the Sustainable Initiatives sections.	Jan. 2013	Director WWW-E
Director Hamilton Water to be invited to the next Capital Coordination Meeting and to take that opportunity to address Design Engineering Section regarding their performance scheduling large valve replacement and rehabilitation projects.	Feb. 2013	Director Hamilton Water
I&SWP to ensure that large valve projects be added as a regular agenda item to the ongoing Capital Coordination Meetings.	Feb. 2013	Manager I&SWP
Director WWW-E to investigate the possibility of changing the codes to indicate DWQMS projects in the budget process.	Spring 2013	Director WWW-E
Director Hamilton Water to schedule a meeting to discuss an Implementation Plan for the Master Plan.	Jan. 2013	Director Hamilton Water

7 CONCLUSIONS

The outcomes from the Management Review and the internal DWQMS audit concluded that the DWQMS is adequate, suitable and effective and conforms to the requirements of the DWQMS Standard. Corrective action plans from the audit and action items from the Management Review will be implemented to ensure continual improvement of the DWQMS.

8 NEXT STEPS – TIMELINE

The management system requires ongoing commitment by staff and management. A challenge will be to ensure the maintenance and improvement of the system continues to be a high priority of the Operating Authority. Major next steps related to the maintenance of the DWQMS in 2013 include the following:

Month of 2013	Scheduled DWQMS Milestones
January to June	• Investigate and correct internal audit findings from DWQMS Internal Audit • Roll out new training software to track staff training and licences
February\March	• Annual 0.Reg. 170 Schedule 22 Report and DWQMS Summary Report to Council • DWQMS 3rd Party Systems Audit
March	• First SMT Meeting of 2013
April	• Infrastructure Review Meetings
June	• SMT Meeting # 2
September	• SMT Meeting # 3 • DWQMS Internal Audit
October	• Risk Assessment Review Meetings
December	• DWQMS Top Management Review

BCOS software tracks the revision history of document.