



INFORMATION REPORT

TO: Chair and Members Public Works Committee	WARD(S) AFFECTED: CITY WIDE
COMMITTEE DATE: March 5, 2012	
SUBJECT/REPORT NO: 2011 Annual Drinking Water Report (PW12018) - (City Wide)	
SUBMITTED BY: Gerry Davis, CMA General Manager Public Works Department	PREPARED BY: Rosa Gonzalez (905) 546-2424, Extension 5833 Dan McKinnon (905) 546-2424, Extension 5941
SIGNATURE:	

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.

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 2011 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 2011 as well as those planned for 2012. There were no Provincial Officer's Orders issued. All confirmed Adverse Water Quality Incidents reported to the Ontario Ministry of Environment's Spills Action Centre and Public Health Services are provided. All water taking quantities and flow rates were within provincial water taking limits summary. 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 major milestones achieved in the implementation of the City's DWQMS. Specifically, the Operating Authority is required to inform Top Management (General Manager of Public Works, Senior Director of the Environment & Sustainable Infrastructure (ESI)

Division and Director of Water and Wastewater Operations) and Owner of the outcomes of the infrastructure and management reviews. This report exceeds these requirements and includes additional information relating to DWQMS audits and other milestones of the DWQMS.

Risk Assessment Review

The DWQMS Operational Plan includes a Risk Assessment. The Risk Assessment identifies and assesses the probability and severity of normal and abnormal incidents on the ability to deliver safe clean drinking water. 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 re-evaluation of the Risk Assessment was conducted in late 2011 to early 2012 since 2011 was the third year. As part of the 're-do', additional system related detail was added and data fields were simplified. As per requirements of the DWQMS Standard, the risk assessment outcomes will be reviewed again in 2012.

Infrastructure Review

The Operating Authority must ensure and verify, on an annual basis, the adequacy of water related infrastructure. According to the DWQMS Standard, infrastructure is adequate if it is: available, maintained, and improved when necessary. 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. These programs may be iterative and identify needs on an on-going basis (e.g. reservoir inspections) or periodic (e.g. site specific risk assessments). Based on the information collected, needs are assessed, prioritized and communicated to the owner through the annual budget process. Based on the results of the 2011 infrastructure review it can be concluded that infrastructure is available, maintained, and improved when necessary.

Audit Program

The DWQMS accreditation process requires both Third Party Accreditation Audits and annual internal audits by the Operating Authority.

The cycle of Third Party Accreditation Audits includes an on-site Verification Audit every three years and Systems Audit or documentation review every year. The Operating Authority successfully passed the Verification Audit in February 2011 and received confirmation of full accreditation in July 2011. The Mayor officially presented the accreditation certificates to the Systems Management Representative (SMR) and the Compliance Support Group on November 21, 2011. This presentation was accompanied by a Council Update Report summarizing the status of the DWQMS

accreditation. In early 2012, the Operating Authority will participate in a Third Party Systems Audit or document review.

The annual internal audit took place in late October / early November 2011. The audit assessed the implementation of all 21 elements of the DWQMS Standard and their related procedures across relevant water and wastewater sections of the ESI Division. The DWQMS Audit Report was circulated to the relevant ESI directors and sectional managers, quality assurance staff and internal auditors (January 2012). The quality non-conformances and opportunities for improvements have since been reviewed and the root cause investigations are now underway. Following this, corrective action plans will be implemented by delegated staff, where required.

Compliance & Regulations staff will be developing an Audit Plan for the 2012 DWQMS internal audits. The Audit Plan will be reviewed and approved by relevant water and wastewater directors and section managers prior to implementation.

Management Review

The 'DO' component of the Management Review element of the DWQMS Standard requires that Top Management participate in a management review of the DWQMS at least once per year and as an output of the meeting:

- Consider the results of the management review and identify deficiencies and action items to address deficiencies,
- Provide 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.

The inputs to the Management Review process are comprehensive. The Management Review is a formal presentation of compliance, operational, water quality, communication and infrastructure data. The information is presented to Top Management, the Systems Management Representative, the Director of Water and Wastewater Engineering and managers of the water and wastewater sections of ESI Division. Examples of inputs include non-compliances, adverse water quality incidents, critical control limits of the drinking water systems, internal and third party audit results, results of emergency response drills, water quality trends, customer feedback, results of the infrastructure review and other items as required in the DWQMS Standard.

In 2012, the DWQMS Top Management Review was held on December 7. Overall, meeting participants concluded that the DWQMS is suitable, adequate and effective. Continual improvement actions were identified and target dates for completion were determined.

Detailed information about these recommendations and action plans for going forward is included in Appendix B.

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

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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.

An effective 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 2012 include the following:

Month of 2012	Scheduled DWQMS Milestones
January to June	<ul style="list-style-type: none">• Investigate and correct internal audit findings from DWQMS Internal Audit• Purchase and roll out new training software to track staff training and licences
February\March	<ul style="list-style-type: none">• Annual O.Reg. 170 Schedule 22 Report and DWQMS Summary Report to Council
March	<ul style="list-style-type: none">• First SMT Meeting of 2012
May	<ul style="list-style-type: none">• Infrastructure Review Meetings
June	<ul style="list-style-type: none">• Standard of Care Training - Owners and Management
July	<ul style="list-style-type: none">• SMT Meeting # 2
September	<ul style="list-style-type: none">• Risk Assessment Review Meetings• SMT Meeting # 3
October / November	<ul style="list-style-type: none">• DWQMS Internal Audit
December	<ul style="list-style-type: none">• DWQMS Top Management Review

APPENDIX A - PW12018

City of Hamilton's
Drinking Water Systems

SUMMARY REPORT FOR MUNICIPALITIES

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



Hamilton
Public Works

Summary Report for Municipalities
BCOS Record #: PW-WW-R-004-009
Issue #: 1



Hamilton
Water is Life

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1 HAMILTON DRINKING WATER SYSTEM (DWS)

1.1 Operational Upgrades - 2011

1.1.1 Woodward Water Treatment System and Water Outstations

Some of the major projects that were initiated in 2011 are as follows:

(Water Treatment)

Projects Under Design:

- Valve Chamber #3 (District 5) Upgrades
- Woodward WTP Corrosion Control Study
- New Highland Gardens Park Pumping Station
- Hillcrest Water Reservoir Upgrades (Contract 4)

Projects Under Construction:

- Woodward Water Treatment Plant (WTP) Lowlift Pumping Station Upgrades
- Dewitt / Ben Nevis Water Reservoir Rehabilitation
- Ferguson Avenue Pumping Station Upgrades
- Stonechurch Reservoir Pumping Station Upgrades

Projects Substantially Performed:

- Woodward WTP Upgrades
- Woodward WTP High Lift Electrical Upgrades
- Hillcrest Water Reservoir (HDR02) Upgrades
- Kenilworth Pumping Station Upgrades

The above water treatment and water station upgrades and modifications are being undertaken at a cost of approximately \$70.0 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 8.9km of watermain was replaced stand alone and/or in coordination with roadwork at a cost of \$6.8 million dollars.
- Approximately 6.3km of watermain was rehabilitated using structural and/or cement mortar lining at a cost of \$2.8 Million dollars.

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1.2 Future Upgrades - 2012

1.2.1 Woodward Water Treatment System and Water Outstations

Some of the projects that are to be initiated in 2012 are as follows:

(Water Treatment)

Project Design:

- Glancaster Road and Osler Road Water Pumping Stations
- Highland Road Reservoir and Pumping Station Upgrades
- Conceptual Design - Woodward WTP Process Upgrades
- Old Ancaster Road Pumping Station (HD012) Capacity Upgrade & Standby Power Installation
- Kenilworth Pumping Station Phase 2 Upgrades

The above upgrades and modifications will be undertaken at a cost of approximately \$4.2 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 MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2011-05-11	Fire Station 11, 24 Ray St. S.	Total Coliforms = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2011-05-12	Macs Convenience Store, 1460 King St. E.	Total Coliforms = 1 CFU/100mL E. coli = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. Repeated the resampling after 24 hours. All results were acceptable. The

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Notification Date	Location of Adverse	AWQI	Resolution
			adverse was not confirmed.
2011-06-25	Fire Station 3, 935 Garth St.	Total Coliforms = 1 CFU/100mL	Resampled adverse location, an upstream and two downstream locations. All results were acceptable. The adverse was not confirmed.
2011-08-10	Fire Station 10, 1455 Main St. W.	Total Chlorine = 0.24 mg/L Free Chlorine = 0.02 mg/L Combined Chlorine = 0.22 mg/L	Watermain was flushed to restore chlorine. Results were acceptable.
2011-08-19	Highlift Pump 4	Total Coliforms = 1 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2011-09-17	Fire Station 17, 363 Isaac Brock, Stoney Creek	Total Coliforms = 12 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2011-09-19	Sewage pumping station, 526 Winona Rd, Stoney Creek	Total Chlorine = 0.15 mg/L Free Chlorine = < 0.02 mg/L Combined Chlorine = 0.15 mg/L	Watermain was flushed to restore chlorine. Results were acceptable.
2011-09-23	Hydrant GE05H066, Regional Rd 56, Binbrook	Total Chlorine = 0.18 mg/L Free Chlorine = 0.04 mg/L Combined Chlorine	Watermain was flushed to restore chlorine. Results were acceptable.

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Notification Date	Location of Adverse	AWQI	Resolution
		= 0.14 mg/L	
2011-09-25	Hydrant GE05H066, Regional Rd 56, Binbrook	Total Chlorine = 0.19 mg/L Free Chlorine = 0.03 mg/L Combined Chlorine = 0.16 mg/L	Watermain was flushed to restore chlorine. Results were acceptable.

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.

Summary Report for Municipalities

Table 1-1: Hamilton DWS - 2011 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	258	218	305	113	255	302	270	268	254	276	297	282
2	256	163	303	261	193	301	272	258	292	286	186	269
3	256	212	248	260	208	273	291	268	319	227	259	166
4	255	310	296	272	235	297	223	287	246	183	226	198
5	255	306	301	199	278	316	280	249	289	242	288	275
6	230	304	282	306	309	353	264	315	221	269	278	271
7	160	275	255	304	309	283	340	307	202	274	223	212
8	163	258	221	266	223	262	318	229	184	273	87	134
9	259	259	163	167	253	274	357	272	238	269	256	179
10	260	257	262	198	283	277	325	229	282	270	287	281
11	258	258	306	310	240	294	309	216	282	238	225	274
12	175	258	302	245	263	290	331	277	271	147	168	228
13	259	259	288	308	230	179	395	283	265	265	192	197
14	255	303	263	306	270	323	343	319	268	263	310	236
15	256	300	268	295	303	226	303	237	264	197	231	204
16	257	300	165	257	276	200	339	220	209	176	166	189
17	255	299	211	258	212	257	343	291	370	178	172	195
18	254	256	311	200	207	265	336	309	285	182	290	293
19	254	258	306	303	253	280	286	275	165	234	285	206
20	252	273	304	277	271	129	316	305	204	186	263	186
21	253	236	306	190	306	319	324	258	288	295	171	157
22	252	162	303	302	302	309	319	255	350	292	170	215
23	252	259	157	300	284	209	389	219	204	285	78	302
24	254	260	200	297	244	192	425	180	233	228	229	297
25	158	262	218	296	272	286	321	194	265	182	283	294
26	254	273	217	162	168	287	325	315	262	181	278	168
27	256	304	303	221	226	257	280	362	267	143	277	172
28	255	231	304	301	248	283	293	308	215	289	213	175
29	255		303	299	176	288	262	198	111	271	207	174
30	254		302	276	258	161	387	242	166	214	151	176
31	254		263		294		261	326		185		183
Total	7,526	7,312	8,237	7,747	7,845	7,971	9,826	8,273	7,469	7,199	6,745	6,787
Average	243	261	266	258	253	266	317	267	249	232	225	219
Min	158	162	157	113	168	129	223	180	111	143	78	134
Max	260	310	311	310	309	353	425	362	370	295	310	302
PTTW limit	909	909	909	909	909	909	909	909	909	909	909	909

Summary Report for Municipalities

Figure 1-1: Hamilton DWS - 2011 Monthly Production (Summary)

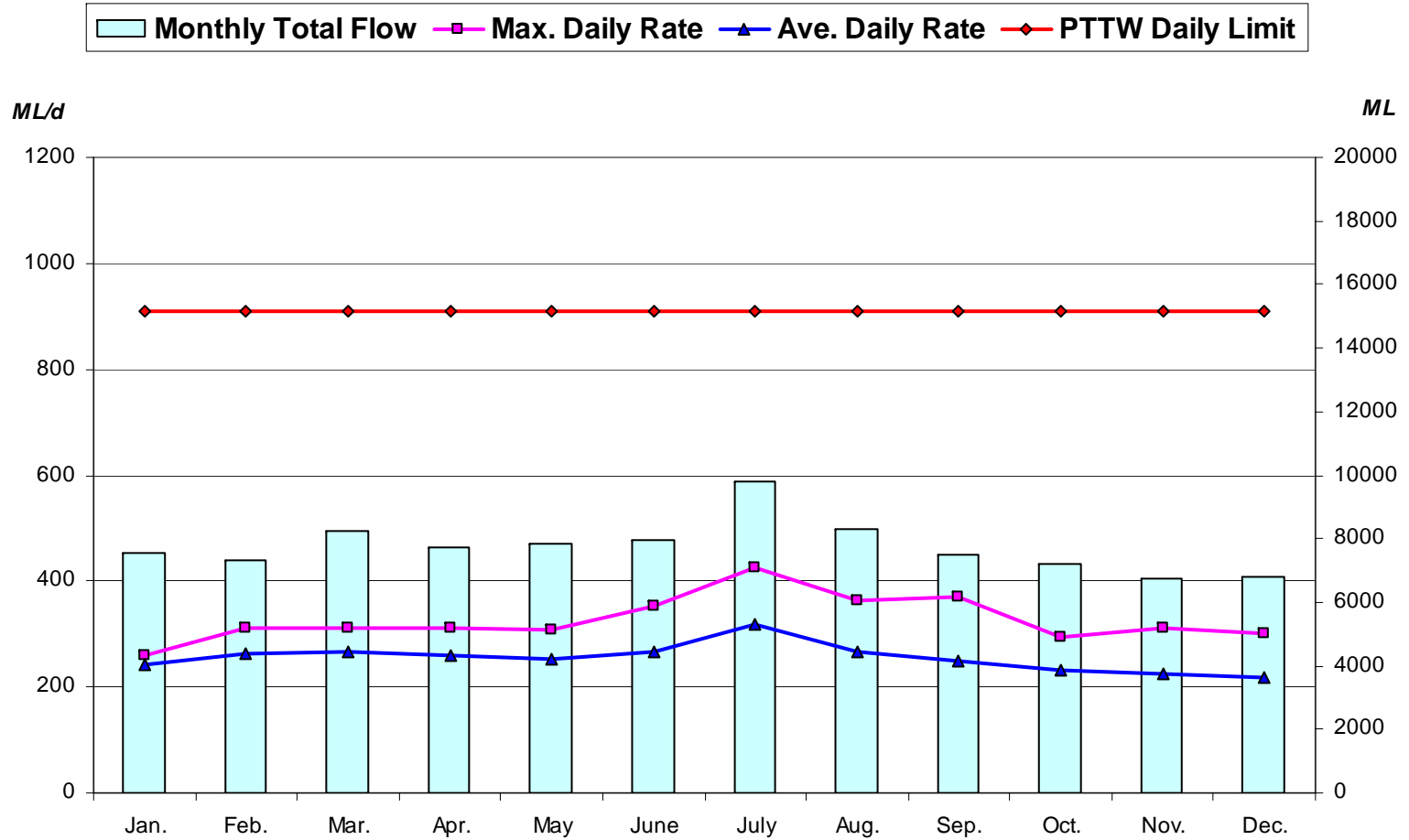


Table 1-2: Hamilton DWS - 2011 Monthly Production (Summary)

Woodward	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	ML	7,526	7,312	8,237	7,747	7,845	7,971	9,826	8,273	7,469	7,199	6,745	6,787
Average	ML/d	243	261	266	258	253	266	317	267	249	232	225	219
Maximum	ML/d	260	310	311	310	309	353	425	362	370	295	310	302
PTTW	ML/d	909	909	909	909	909	909	909	909	909	909	909	909

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2 FIFTY ROAD DRINKING WATER SUB-SYSTEM

2.1 Operational Upgrades - 2011

In 2011, no projects were scheduled.

Future Upgrades - 2012

In 2012 no projects have been scheduled.

2.2 Provincial Officer's Orders

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

2.3 Adverse Water Quality Reports

There were no Adverse Water Quality Incidents for the reporting period.

2.4 Water Production Reports - Summary

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

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3 CARLISLE DRINKING WATER SYSTEM (DWS)

3.1 Operational Upgrades - 2011

The following project was initiated:

- Design of Carlisle Water Tower Refurbishment and Well House Replacement (FDC01/02).

The above project is being undertaken at a cost of approximately \$500,000.

3.2 Future Upgrades - 2012

The following project will be initiated in 2012:

- Construction of Carlisle Tower (FDT01) Refurbishment and Well House (FDC01/02) Replacement.

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

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 Adverse Water Quality Incidents 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.

Summary Report for Municipalities

Table 3-1: Carlisle DWS (FDC01 & FDC02) - 2011 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	4	193	211	222	294	297	594	475	11	6	257	358
2	5	169	208	210	264	495	556	596	0	5	260	136
3	4	193	213	267	243	446	528	237	126	7	255	373
4	4	191	257	184	120	262	414	45	22	16	147	300
5	6	196	191	225	271	474	368	116	147	3	213	111
6	4	288	238	191	381	372	384	83	79	4	264	282
7	3	158	217	214	451	408	429	168	16	0	189	190
8	4	197	205	281	417	328	552	194	30	6	317	192
9	3	69	227	249	194	372	660	148	43	137	241	222
10	5	163	213	226	207	368	505	88	92	17	143	406
11	4	145	187	159	524	495	557	214	409	3	245	206
12	3	300	234	321	223	436	589	302	176	6	372	184
13	5	228	196	209	600	454	607	288	228	5	213	240
14	4	149	168	216	207	503	576	192	309	5	206	216
15	5	191	174	251	337	543	607	87	86	4	264	235
16	5	126	182	264	321	576	548	316	81	6	181	253
17	4	260	185	281	280	416	519	501	402	8	237	338
18	3	208	243	253	345	539	420	466	85	9	197	276
19	4	232	191	293	140	581	509	121	249	523	235	181
20	4	291	224	41	243	539	565	205	7	183	256	236
21	3	205	223	156	586	482	517	52	49	218	191	266
22	5	226	222	441	445	98	306	53	292	219	289	238
23	4	276	204	229	294	79	359	257	89	220	158	257
24	7	218	213	334	340	131	280	89	5	238	239	336
25	4	177	206	420	232	414	414	187	0	253	253	265
26	3	271	195	629	234	619	181	131	10	238	198	346
27	7	235	140	178	455	521	254	59	4	230	268	246
28	4	205	178	183	351	224	46	112	6	174	270	322
29	5		283	143	340	535	119	544	4	313	144	221
30	6		252	625	289	441	453	124	113	196	75	61
31	35		256		346		338	87		175		472
Total	173	5,760	6,536	7,894	9,976	12,451	13,752	6,537	3,171	3,427	6,775	7,965
Average	6	206	211	263	322	415	444	211	106	111	226	257
Min	3	69	140	41	120	79	46	45	0	0	75	61
Max	35	300	283	629	600	619	660	596	409	523	372	472
PTTW limit	851	851	851	851	851	851	851	851	851	851	851	851

Summary Report for Municipalities

Figure 3-1: Carlisle DWS (FDC01 & FDC02) - 2011 Monthly Production (Summary)

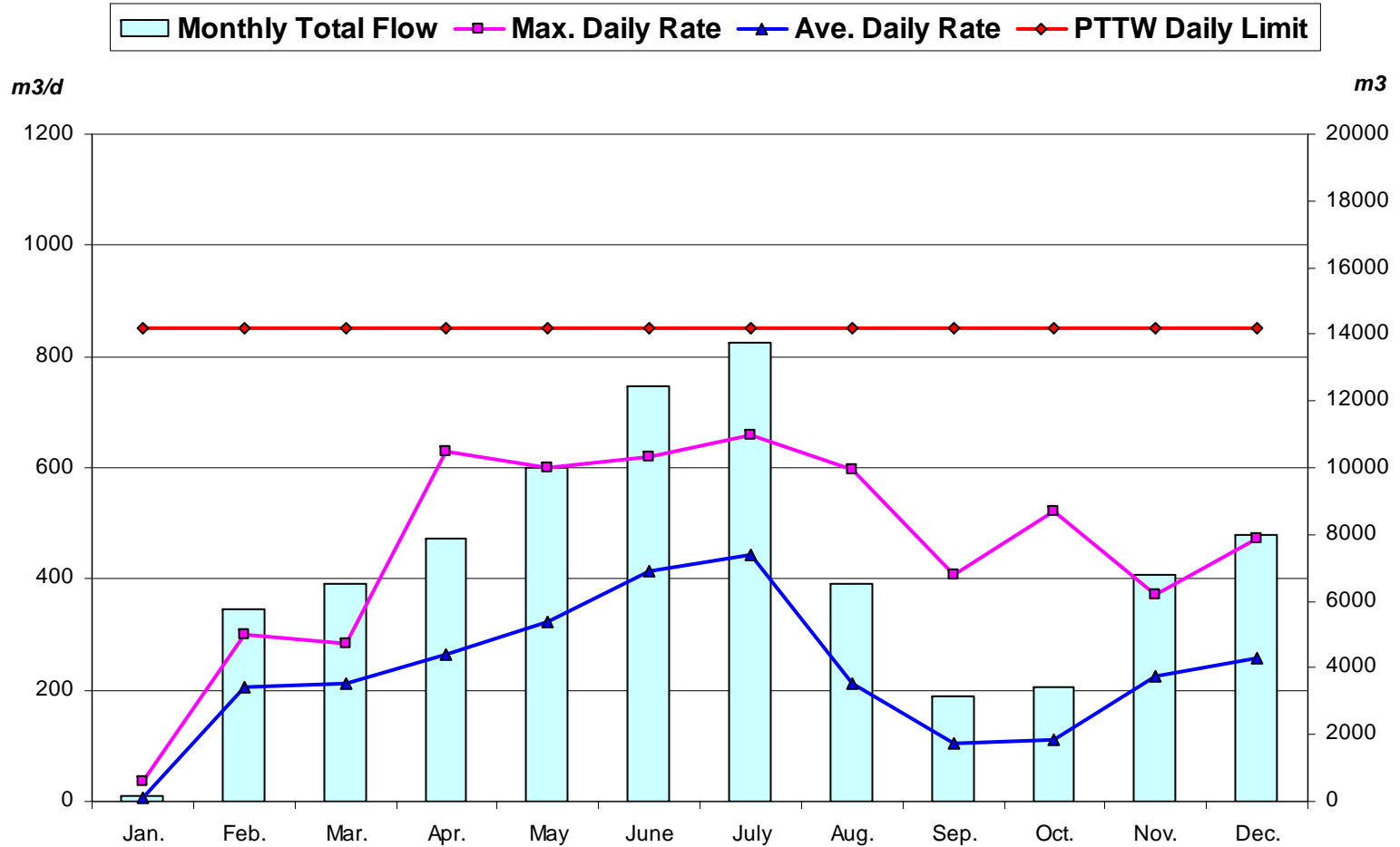


Table 3-2: Carlisle DWS (FDC01 & FDC02) - 2011 Monthly Production (Summary)

FDC01 FDC02	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	173	5,760	6,536	7,894	9,976	12,451	13,752	6,537	3,171	3,427	6,775	7,965
Average	m3/d	6	206	211	263	322	415	444	211	106	111	226	257
Maximum	m3/d	35	300	283	629	600	619	660	596	409	523	372	472
PTTW	m3/d	851	851	851	851	851	851	851	851	851	851	851	851

Summary Report for Municipalities

Table 3-3: Carlisle DWS (FDC03) - 2011 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	27	70	0	0	0	0	894	80	0	0	0	0
2	164	32	0	0	0	0	887	0	0	0	0	0
3	18	11	0	0	0	0	884	0	0	52	0	0
4	33	30	0	0	0	0	946	705	0	0	0	0
5	203	25	0	29	0	0	1,137	1,652	35	0	0	15
6	234	20	0	0	0	0	1,159	1,576	0	0	0	0
7	348	23	0	0	0	29	1,202	982	0	0	27	0
8	520	25	38	0	0	0	1,645	320	0	0	0	0
9	19	37	0	0	0	0	1,567	0	84	0	0	0
10	600	28	0	0	0	0	1,639	29	0	69	0	0
11	381	28	0	0	0	0	1,590	0	0	0	0	0
12	378	22	0	0	10	0	1,553	0	0	0	0	25
13	275	48	0	0	0	0	1,641	0	39	0	0	0
14	44	36	0	0	0	0	1,633	0	0	0	28	0
15	52	33	0	0	0	0	1,773	200	0	0	0	0
16	29	28	0	0	0	10	1,889	0	0	0	0	0
17	388	41	0	0	0	196	1,964	0	0	25	0	0
18	36	0	0	0	0	482	1,878	0	0	0	0	0
19	63	0	0	38	0	479	1,956	0	46	0	0	23
20	88	0	0	0	0	470	1,860	0	0	0	0	0
21	590	0	0	0	0	473	1,900	0	2	0	34	0
22	156	0	44	0	0	325	1,918	64	0	0	0	0
23	33	0	0	0	0	0	1,907	0	0	0	0	0
24	38	0	0	0	0	403	1,894	246	0	29	0	0
25	29	0	0	0	0	126	1,164	37	0	0	0	0
26	24	0	0	0	0	0	1,360	0	45	0	0	20
27	269	0	0	0	0	0	1,209	0	0	0	0	0
28	295	0	0	0	0	0	579	322	0	0	22	0
29	212	0	0	0	0	410	0	0	0	0	0	0
30	238	0	0	0	0	881	0	177	0	0	0	0
31	175	0	0	0	0	0	0	0	0	27	0	0
Total	5,961	537	82	67	10	4,285	41,628	6,389	250	201	111	83
Average	192	19	3	2	0	143	1,343	206	8	6	4	3
Min	18	0	0	0	0	0	0	0	0	0	0	0
Max	600	70	44	38	10	881	1,964	1,652	84	69	34	25
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

Summary Report for Municipalities

Figure 3-2: Carlisle DWS (FDC03) - 2011 Monthly Production (Summary)

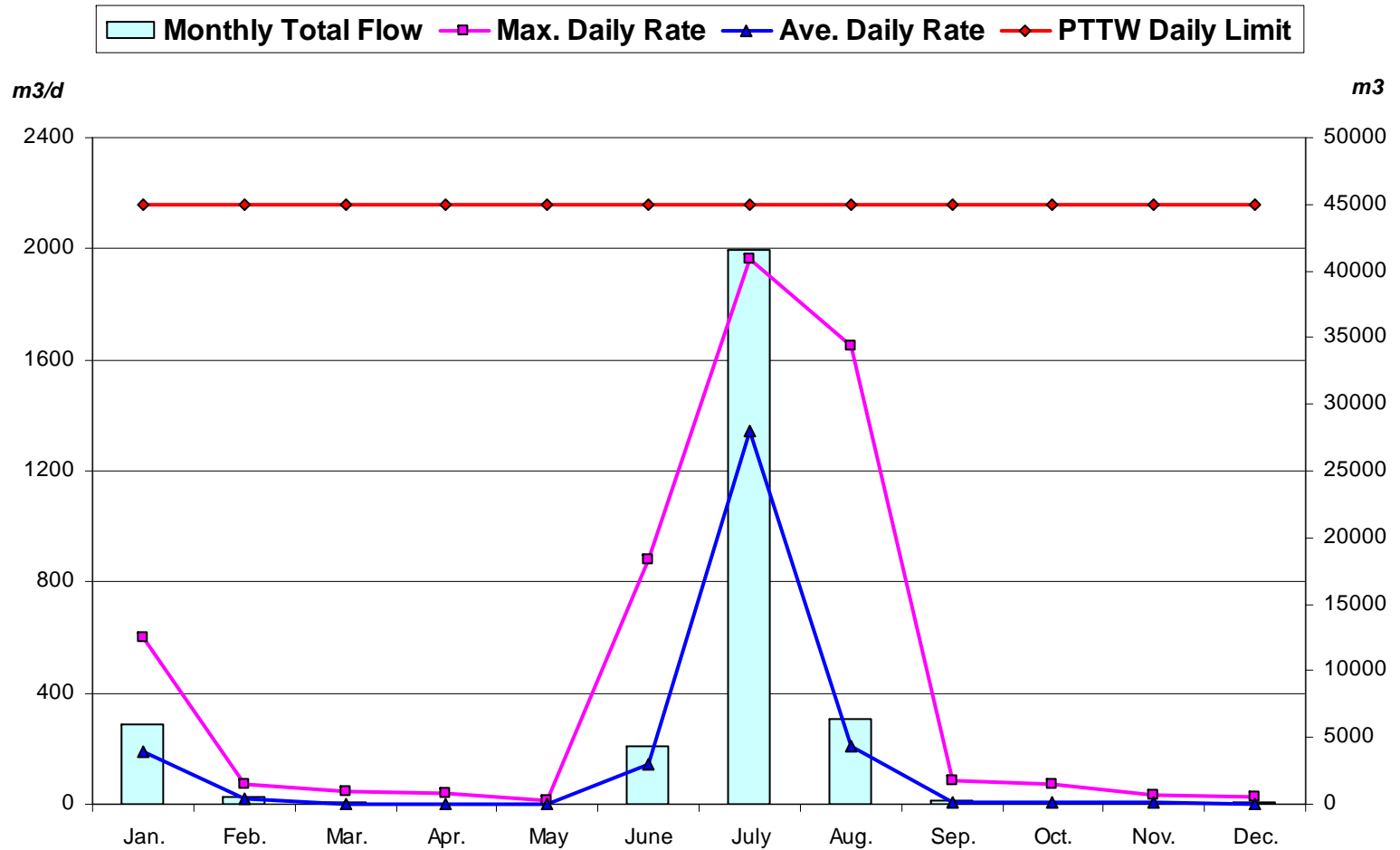


Table 3-4: Carlisle DWS (FDC03) - 2011 Monthly Production (Summary)

FDC03R	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	5,961	537	82	67	10	4,285	41,628	6,389	250	201	111	83
Average	m3/d	192	19	3	2	0	143	1,343	206	8	6	4	3
Maximum	m3/d	600	70	44	38	10	881	1,964	1,652	84	69	34	25
PTTW	m3/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

Summary Report for Municipalities

Table 3-5: Carlisle DWS (FDC05) - 2011 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	400	26	0	0	0	88	0	1,045	960	658	0	0
2	410	33	0	0	0	0	0	1,085	966	648	0	0
3	443	7	0	0	0	0	0	1,065	1,103	361	0	0
4	397	19	0	0	0	0	525	416	798	452	0	0
5	213	29	0	0	0	0	258	74	684	658	0	15
6	171	19	0	0	0	0	226	0	410	645	0	0
7	125	32	0	0	0	0	276	105	778	518	22	0
8	16	14	41	0	0	0	0	767	685	312	0	0
9	17	386	0	0	0	0	0	874	654	665	0	0
10	43	34	0	0	0	0	0	807	418	615	0	0
11	269	19	0	0	0	0	26	888	680	632	0	0
12	193	13	0	26	13	0	0	1,008	705	619	0	26
13	105	19	0	0	0	0	0	1,114	170	276	0	0
14	340	33	0	0	0	0	0	1,111	705	442	23	0
15	485	22	0	0	0	0	0	960	696	297	0	0
16	279	14	0	0	0	4	0	1,116	496	726	0	0
17	287	4	0	0	0	15	0	1,121	470	247	0	0
18	375	0	0	0	0	0	40	917	706	0	0	0
19	106	0	0	0	408	0	0	786	683	0	0	23
20	27	0	0	0	0	0	0	1,109	670	0	0	11
21	377	0	0	0	0	22	0	1,104	177	0	27	0
22	329	0	0	0	0	222	209	515	9	0	0	0
23	486	0	0	0	0	577	206	856	424	0	0	0
24	264	0	0	0	79	220	89	619	689	19	0	0
25	537	0	0	0	0	0	513	476	684	0	0	0
26	174	0	0	0	0	0	1,064	837	658	0	0	21
27	137	0	0	0	0	469	1,072	1,105	668	0	0	0
28	311	0	0	0	0	866	1,037	513	657	0	24	0
29	319		21	0	0	122	1,078	219	431	0	0	0
30	221		0	0	60	0	1,102	1,013	276	0	0	0
31	25		0		0		994	1,103		22		0
Total	7,881	723	61	26	560	2,605	8,714	24,732	18,109	8,813	96	96
Average	254	26	2	1	18	87	281	798	604	284	3	3
Min	16	0	0	0	0	0	0	0	9	0	0	0
Max	537	386	41	26	408	866	1,102	1,121	1,103	726	27	26
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

Summary Report for Municipalities

Figure 3-3: Carlisle DWS (FDC05) - 2011 Monthly Production (Summary)

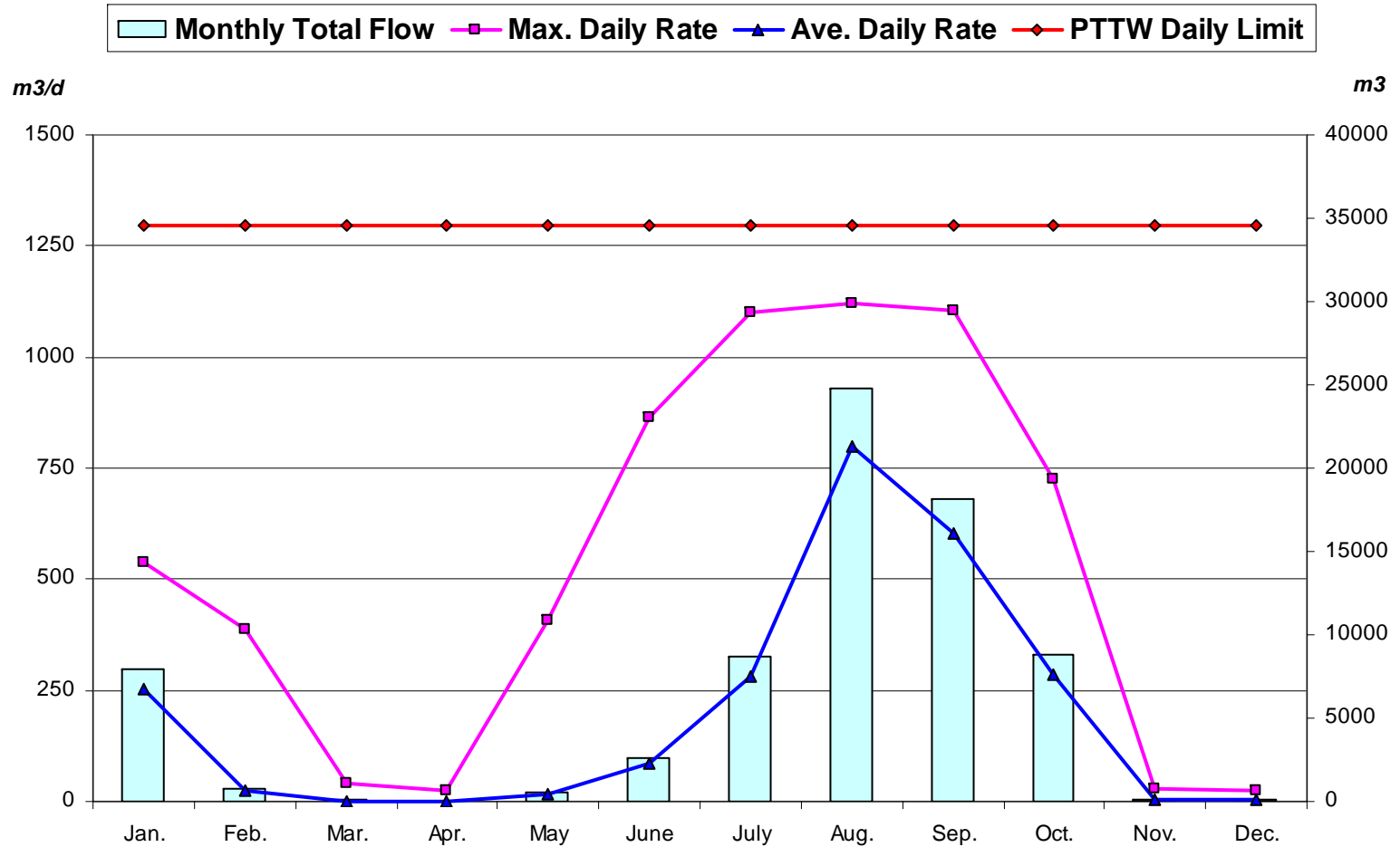


Table 3-6: Carlisle DWS (FDC05) - 2011 Monthly Production (Summary)

FDC05	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	7,881	723	61	26	560	2,605	8,714	24,732	18,109	8,813	96	96
Average	m3/d	254	26	2	1	18	87	281	798	604	284	3	3
Maximum	m3/d	537	386	41	26	408	866	1,102	1,121	1,103	726	27	26
PTTW	m3/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

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4 FREELTON DRINKING WATER SYSTEM (DWS)

4.1 Operational Upgrades - 2011

In 2011, the following project was initiated:

- Freelton Well System Upgrades Substantially Performed.

The above upgrade is being undertaken at a cost of approximately \$2.7 million dollars.

4.2 Future Upgrades – 2012

In 2012 no projects have been scheduled.

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

There were no Adverse Water Quality Incidents for the reporting period.

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.

Prior to its decommissioning in July 2011, there were no water takings from the Freelton FDF02 well in 2011.

FDF03 began providing water to the distribution system in June 2011.

Summary Report for Municipalities

Table 4-1: Freelton DWS (FDF01) - 2011 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	86	369	575	482	70	14	0	153	15	0	114	0
2	595	646	19	418	93	232	0	857	23	0	0	30
3	680	162	327	275	295	171	0	445	0	0	244	0
4	489	14	128	704	675	654	0	0	0	245	95	0
5	107	469	482	164	639	717	0	0	0	21	0	297
6	259	639	700	22	46	341	0	0	38	278	192	84
7	642	187	100	483	334	0	0	0	0	62	0	0
8	448	413	352	702	387	0	0	46	16	87	161	0
9	17	208	554	280	351	0	0	312	0	147	0	270
10	25	211	10	9	356	13	0	27	0	67	140	0
11	647	275	19	415	321	0	0	185	0	226	2	0
12	419	501	365	696	118	0	0	692	41	0	181	157
13	646	410	374	79	659	0	0	453	0	234	0	203
14	49	313	516	258	649	0	0	656	19	44	183	0
15	19	13	372	664	418	0	0	133	0	0	39	0
16	467	447	264	19	392	0	0	90	0	0	0	5
17	409	652	283	252	157	0	0	755	0	0	410	363
18	642	27	503	152	250	0	0	501	0	356	239	0
19	260	28	416	619	632	0	0	73	20	661	0	0
20	7	449	274	649	139	0	0	0	26	213	478	221
21	276	701	26	31	404	0	0	0	0	0	264	0
22	660	330	299	427	646	0	0	0	0	0	261	0
23	651	15	295	660	641	0	0	27	270	0	58	19
24	60	443	398	22	353	0	0	0	79	0	0	302
25	10	683	709	212	106	0	0	0	57	0	0	0
26	537	111	302	510	646	0	0	0	315	119	211	0
27	644	21	23	675	393	0	0	0	65	0	82	308
28	74	628	366	108	39	0	0	0	30	141	0	0
29	462		706	316	422	0	0	8	218	0	38	0
30	390		281	665	703	0	0	31	0	428	0	358
31	16		14		294		0	0		0		0
Total	10,693	9,366	10,052	10,968	11,629	2,142	0	5,443	1,233	3,329	3,390	2,617
Average	345	334	324	366	375	71	0	176	41	107	113	84
Min	7	13	10	9	39	0	0	0	0	0	0	0
Max	680	701	709	704	703	717	0	857	315	661	478	363
PTTW limit	878	878	878	878	878	878	878	878	878	878	878	878

Summary Report for Municipalities

Figure 4-1: Freelon DWS (FDF01) - 2011 Monthly Production (Summary)

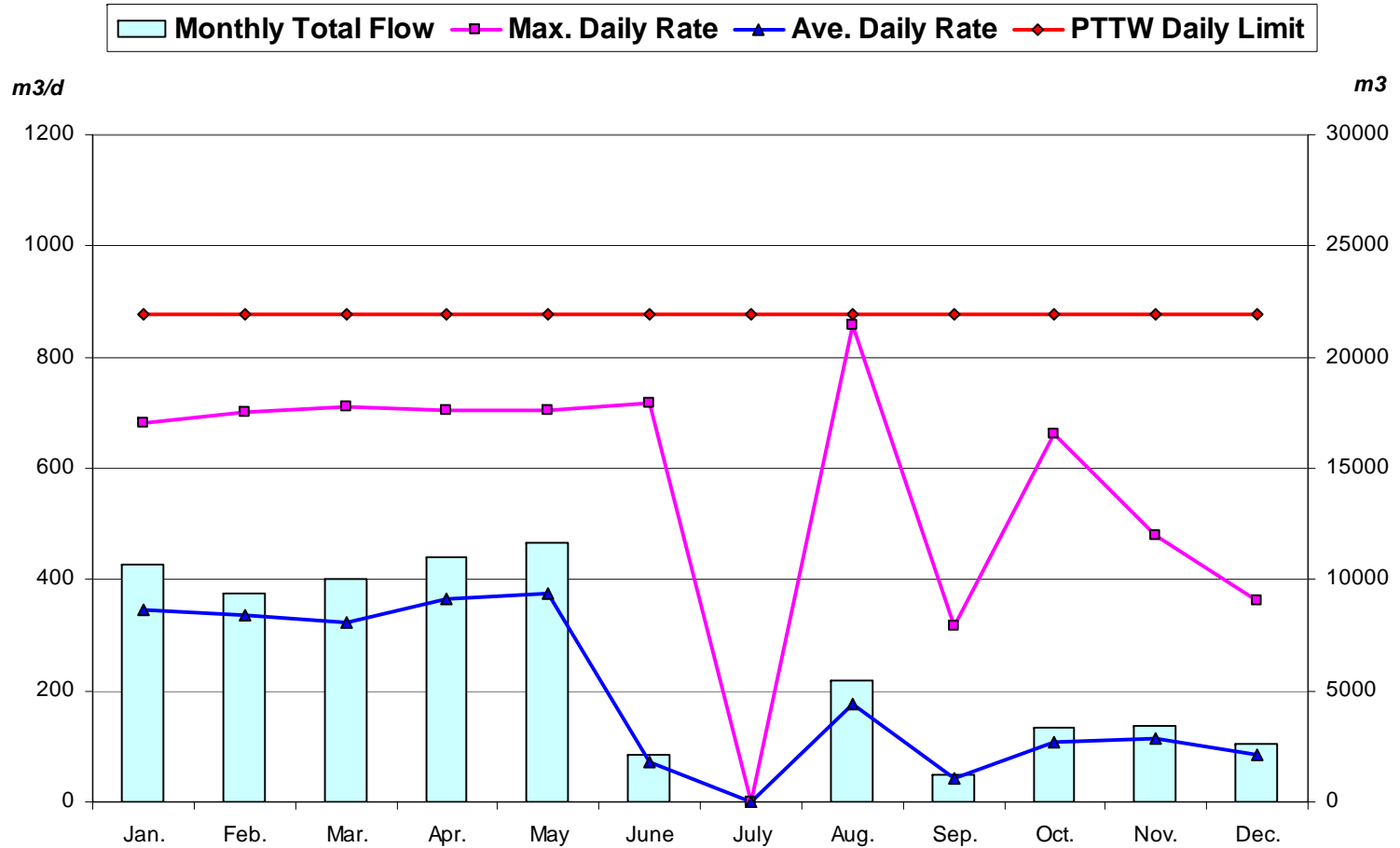


Table 4-2: Freelon DWS (FDF01) - 2011 Monthly Production (Summary)

FDF01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	10,693	9,366	10,052	10,968	11,629	2,142	0	5,443	1,233	3,329	3,390	2,617
Average	m3/d	345	334	324	366	375	71	0	176	41	107	113	84
Maximum	m3/d	680	701	709	704	703	717	0	857	315	661	478	363
PTTW	m3/d	878	878	878	878	878	878	878	878	878	878	878	878

Summary Report for Municipalities

Table 4-3: Freelton DWS (FDF03) - 2011 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	0	0	0	0	0	0	442	550	401	680	212	906
2	0	0	0	0	0	0	892	556	462	0	0	165
3	0	0	0	0	0	0	320	556	456	0	129	0
4	0	0	0	0	0	0	1,157	524	466	476	222	0
5	0	0	0	0	0	0	766	168	410	0	0	575
6	0	0	0	0	0	0	638	831	569	346	372	74
7	0	0	0	0	0	897	728	602	0	122	0	75
8	0	0	0	0	0	199	824	490	696	169	312	0
9	0	0	0	0	0	538	884	275	402	285	0	437
10	0	0	0	0	0	363	926	302	466	130	442	0
11	0	0	0	0	0	334	786	202	389	388	0	0
12	0	0	0	0	0	429	763	0	219	0	480	250
13	0	0	0	0	0	380	905	0	386	393	0	403
14	0	0	0	0	0	403	1,017	0	458	32	353	0
15	0	0	0	0	0	552	817	200	415	0	75	0
16	0	0	0	0	0	489	1,123	502	300	0	0	10
17	0	0	0	0	0	507	831	0	734	0	0	567
18	0	0	0	0	0	658	940	0	401	73	0	0
19	0	0	0	0	0	533	905	518	497	0	0	18
20	0	0	0	0	0	726	882	495	388	0	0	461
21	0	0	0	0	0	425	946	356	50	0	0	0
22	0	0	0	0	0	696	981	673	0	513	443	0
23	0	0	0	0	0	3	911	225	465	35	110	34
24	0	0	0	0	0	664	837	705	154	465	0	514
25	0	0	0	0	0	527	877	0	110	72	0	0
26	0	0	0	0	0	482	801	928	353	176	406	0
27	0	0	0	0	0	550	766	461	223	0	159	525
28	0	0	0	0	0	363	662	495	0	272	0	0
29	0		0	0	0	720	588	118	400	0	44	0
30	0		0	0	0	664	613	798	0	233	2	384
31	0		0		0		670	165		0		0
Total	0	0	0	0	0	12,101	25,200	11,695	10,266	4,862	3,759	5,398
Average	0	0	0	0	0	403	813	377	342	157	125	174
Min	0	0	0	0	0	0	320	0	0	0	0	0
Max	0	0	0	0	0	897	1,157	928	734	680	480	906
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

Summary Report for Municipalities

Figure 4-2: Freelon DWS (FDF03) - 2011 Monthly Production (Summary)

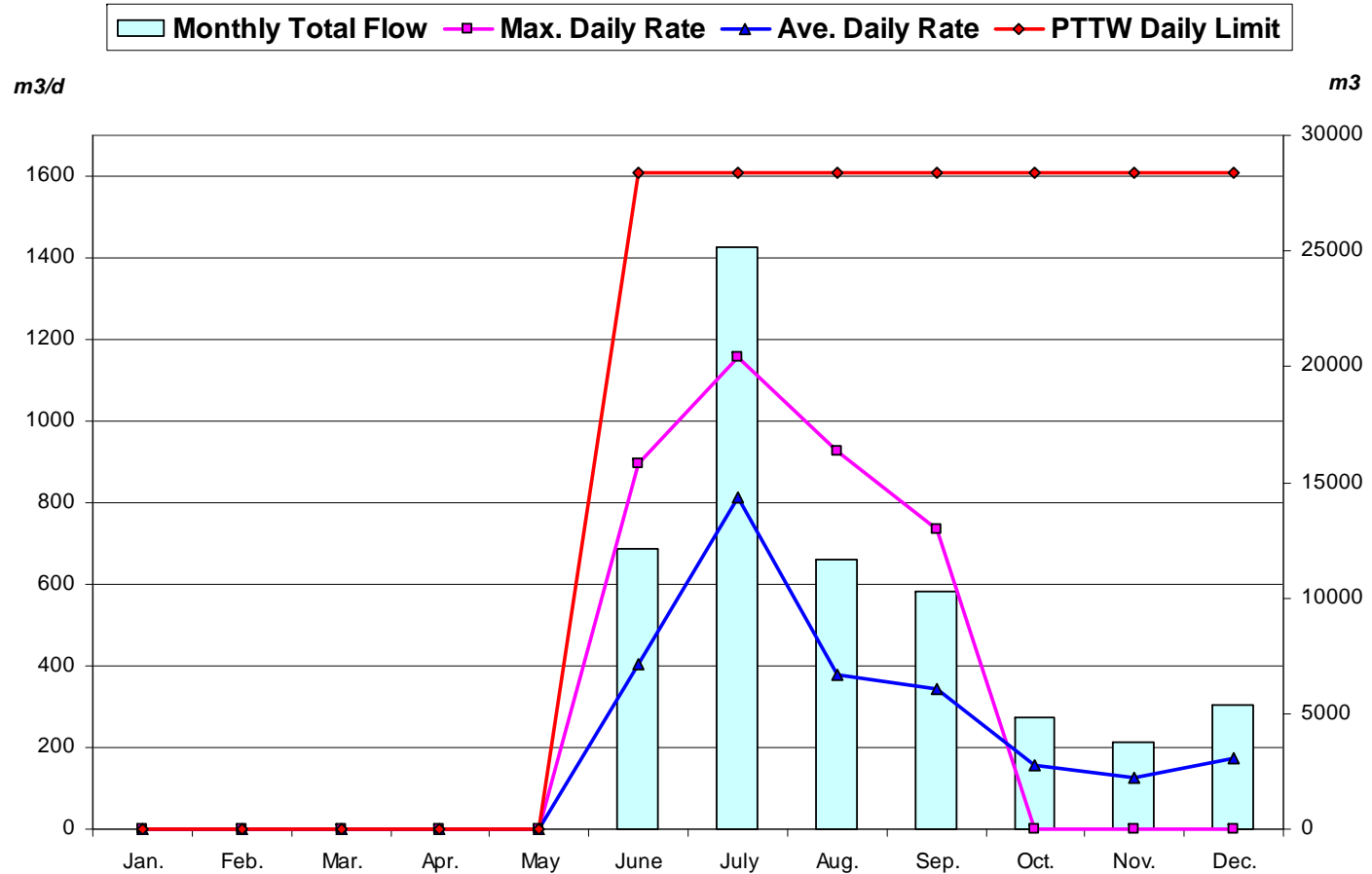


Table 4-4: Freelon DWS (FDF03) - 2011 Monthly Production (Summary)

FDF03	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	0	0	0	0	0	12,101	25,200	11,695	10,266	4,862	3,759	5,398
Average	m3/d	0	0	0	0	0	403	813	377	342	157	125	174
Maximum	m3/d	0	0	0	0	0	897	1,157	928	734	0	0	0
PTTW	m3/d	0	0	0	0	0	1,607	1,607	1,607	1,607	1,607	1,607	1,607

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5 GREENSVILLE DRINKING WATER SYSTEM (DWS)

5.1 Operational Upgrades – 2011

In 2011 no projects were initiated.

5.2 Future Upgrades – 2012

In 2012, no future upgrades are anticipated.

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 AWQIs were reported to MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2011-07-28	Greensville Sampling Station B (Forest Ave)	Total Coliforms = 2 CFU/100mL E. coli = 2 CFU/100mL	Resampled adverse location as well as the treated water and another sampling station. All results were acceptable. Repeated the resampling after 24 hours. All results were acceptable. A Boil Water Advisory was issued and users were notified door to door. The Boil Water Advisory was rescinded on Aug 1, 2011. 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).

Summary Report for Municipalities

Table 5-1: Greenville DWS (FDG01) - 2011 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	34	28	27	29	35	49	52	56	44	41	37	30
2	40	30	27	35	29	40	60	60	59	41	52	36
3	36	26	26	37	29	56	64	47	53	35	66	46
4	29	27	25	30	29	53	79	58	46	40	37	41
5	31	31	30	30	29	53	61	60	45	41	41	17
6	28	35	33	29	29	48	73	78	37	39	43	15
7	30	28	28	31	33	40	74	69	50	38	35	14
8	39	27	29	29	42	36	67	75	39	41	35	10
9	34	28	31	34	51	38	62	50	43	46	35	9
10	30	29	28	36	34	32	85	58	44	45	34	12
11	29	29	27	31	33	41	67	60	45	38	33	10
12	31	30	31	32	33	43	91	83	46	35	37	8
13	32	35	36	33	44	39	63	78	48	35	38	9
14	33	28	29	29	32	41	76	74	48	37	36	24
15	33	26	29	29	35	48	88	62	39	39	35	36
16	36	28	28	38	34	42	87	85	41	42	36	35
17	32	28	29	39	30	65	92	105	54	35	35	37
18	28	28	29	31	32	65	80	67	61	31	35	41
19	29	30	33	31	31	64	95	77	45	33	42	35
20	29	31	36	29	31	46	92	79	42	35	40	32
21	27	34	30	43	46	43	95	76	39	33	35	37
22	32	28	27	48	58	41	82	90	41	37	39	40
23	36	29	32	38	47	36	71	77	41	42	34	37
24	29	27	29	37	35	37	55	81	41	34	36	44
25	29	24	29	36	47	40	69	50	46	36	34	44
26	29	29	35	33	47	55	71	44	44	33	34	41
27	32	33	32	29	33	42	62	50	40	32	41	41
28	32	27	30	29	46	54	57	61	37	36	35	38
29	35		29	29	52	60	54	55	39	38	35	35
30	32		29	35	48	66	59	59	38	42	35	38
31	29		29		39		79	51		35		41
Total	984	809	922	1,002	1,171	1,411	2,262	2,074	1,335	1,166	1,138	936
Average	32	29	30	33	38	47	73	67	44	38	38	30
Min	27	24	25	29	29	32	52	44	37	31	33	8
Max	40	35	36	48	58	66	95	105	61	46	66	46
PTTW limit	197	197	197	197	197	197	197	197	197	197	197	197

Summary Report for Municipalities

Figure 5-1: Greenville DWS (FDG01) - 2011 Monthly Production (Summary)

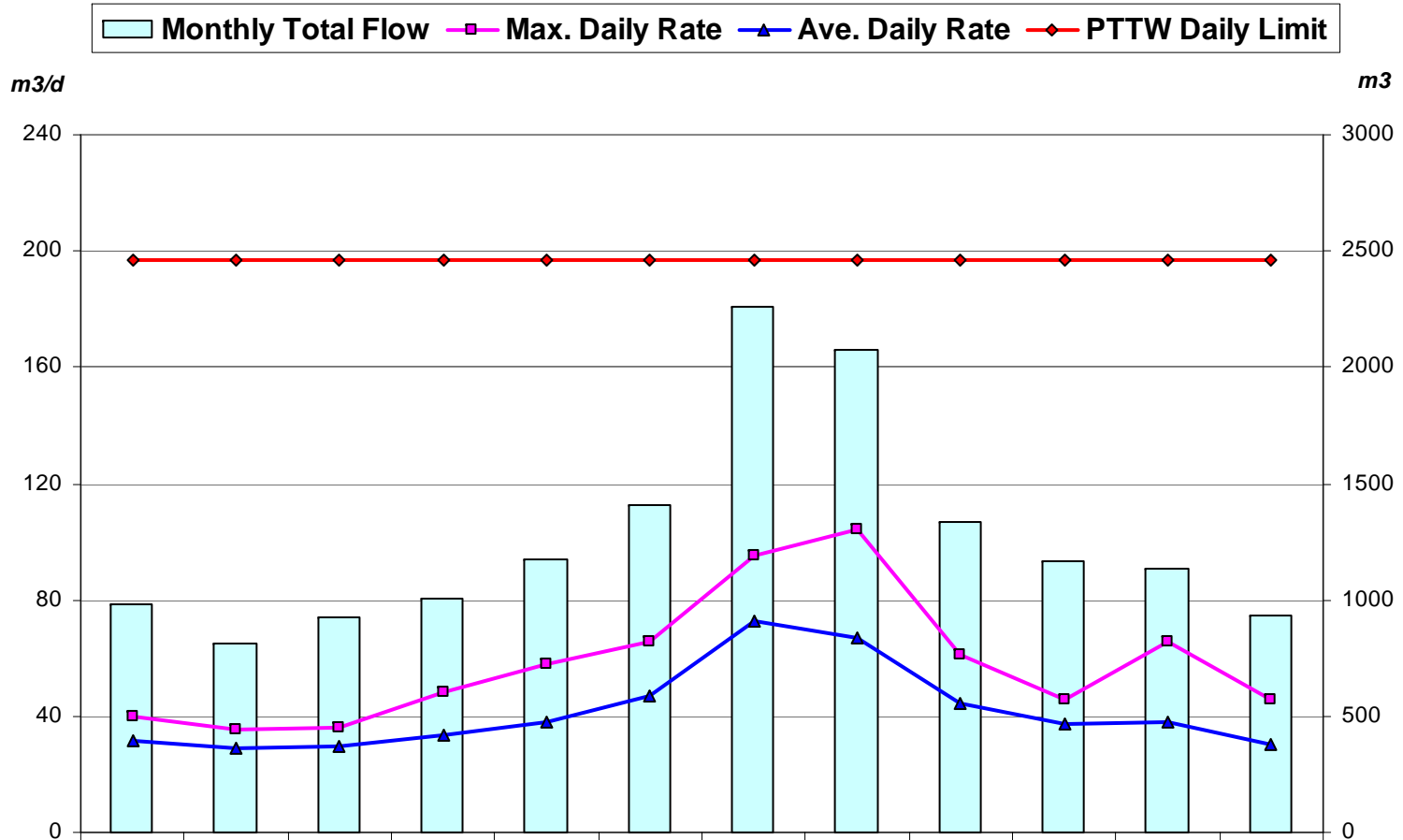


Table 5-2: Greenville DWS (FDG01) - 2011 Monthly Production (Summary)

FDG01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	984	809	922	1,002	1,171	1,411	2,262	2,074	1,335	1,166	1,138	936
Average	m3/d	32	29	30	33	38	47	73	67	44	38	38	30
Maximum	m3/d	40	35	36	48	58	66	95	105	61	46	66	46
PTTW	m3/d	197	197	197	197	197	197	197	197	197	197	197	197

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6 LYNDEN DRINKING WATER SYSTEM (DWS)

6.1 Operational Upgrades – 2011

In 2011 no projects were initiated.

6.2 Future Upgrades – 2012

The following project will be initiated in 2012

- Design - New Lynden Well

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 AWQIs were reported to MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2011-08-17	FDL01-TREATED	Lead = 0.0183 mg/L	Resampled adverse location, Lynden Sampling Station A and Lynden Sampling Station B. All results were acceptable. The adverse was not confirmed.

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Notification Date	Location of Adverse	AWQI	Resolution
2011-09-06	Lynden Sampling Station A (Margaret Street)	Lead = 0.0154 mg/L	<p>Resampled adverse location along with four blowoffs and the treated. Results were acceptable for the Sampling Station A, two of the blow offs and the treated. Resamples from the other two blow offs resulted in AWQIs on September 8, 2011.</p> <p>A Drinking Water Advisory was issued by Public Health Services on September 7, 2011 and remains in effect as of preparation of this report.</p> <p>The adverse was not confirmed for Lynden Sampling Station A.</p>
2011-09-06	Lynden - FY02V014 Blow off valve	Lead = 0.0276 mg/L	<p>Resampled adverse location. The resample failed resulting in an AWQI on September 8, 2011. A Drinking Water Advisory was issued by Public Health Services on September 7, 2011 and remains in effect as of preparation of this report. The adverse was confirmed.</p>
2011-09-08	Lynden - FY02V014 Blow off vale	Lead = 0.0268 mg/L	<p>On going resolution. A Drinking Water Advisory was issued by Public Health Services on September 7, 2011 and remains in effect as of preparation of this report. The adverse was confirmed.</p>
2011-09-07	Lynden - FY02V005 Blow off valve	Lead = 0.0118 mg/L	<p>Resampled adverse location. Result was acceptable. The adverse was not confirmed.</p>

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Notification Date	Location of Adverse	AWQI	Resolution
2011-09-07	Lynden - FY03V014 Blow off valve	Lead = 0.0194 mg/L	Resampled adverse location. The resample failed resulting in an AWQI on September 8, 2011. A Drinking Water Advisory was issued by Public Health Services on September 7, 2011 and remains in effect as of preparation of this report. The adverse was confirmed.
2011-09-08	Lynden - FY03V014 Blow off valve	Lead = 0.0160 mg/L	On going resolution. A Drinking Water Advisory was issued by Public Health Services on September 7, 2011 and remains in effect as of preparation of this report. The adverse was 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.

Summary Report for Municipalities

Table 6-1: Lynden DWS (FDL01) - 2011 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	73	50	53	76	81	120	132	130	76	75	69	69
2	84	71	53	77	64	104	98	107	92	74	65	60
3	67	51	60	68	79	98	63	89	116	66	63	84
4	80	49	51	86	66	92	98	62	259	68	65	87
5	78	50	74	71	85	135	120	71	118	71	79	62
6	74	65	58	67	72	139	117	71	108	77	72	67
7	67	60	63	67	80	115	148	112	97	60	67	67
8	87	65	48	69	95	117	143	115	70	71	64	74
9	89	57	55	89	93	111	143	87	67	82	65	65
10	76	57	53	73	67	101	149	86	109	83	64	73
11	74	58	53	65	74	125	107	87	83	66	61	92
12	79	57	77	60	98	138	123	82	98	66	75	77
13	86	73	71	80	86	152	136	90	73	66	73	69
14	84	65	68	66	89	86	127	105	71	65	65	66
15	86	54	63	61	98	95	123	64	95	86	67	71
16	107	60	76	78	102	37	157	25	67	72	62	67
17	89	68	70	60	87	38	116	37	93	71	65	86
18	79	59	65	75	93	77	120	67	88	73	64	76
19	86	78	81	52	105	114	118	98	83	67	81	99
20	85	60	75	59	111	109	151	88	74	61	91	69
21	83	65	67	54	116	137	161	88	73	61	72	73
22	80	54	63	58	69	106	141	95	73	77	72	71
23	102	57	79	78	121	90	148	88	67	73	73	72
24	91	59	57	54	81	78	88	73	97	72	71	105
25	81	44	59	66	98	90	88	154	86	66	77	76
26	84	60	48	55	86	111	89	98	71	64	72	71
27	76	56	68	87	86	102	86	139	67	67	93	89
28	76	64	76	70	89	116	87	121	62	70	73	75
29	67		55	61	119	113	83	123	68	96	68	67
30	54		60	85	128	93	105	109	63	73	69	73
31	64		59		81		92	122		64		82
Total	2,490	1,666	1,958	2,068	2,799	3,142	3,656	2,883	2,663	2,201	2,116	2,335
Average	80	59	63	69	90	105	118	93	89	71	71	75
Min	54	44	48	52	64	37	63	25	62	60	61	60
Max	107	78	81	89	128	152	161	154	259	96	93	105
PTTW limit	327	327	327	327	327	327	327	327	327	327	327	327

Summary Report for Municipalities

Figure 6-1: Lynden DWS (FDL01) - 2011 Monthly Production (Summary)

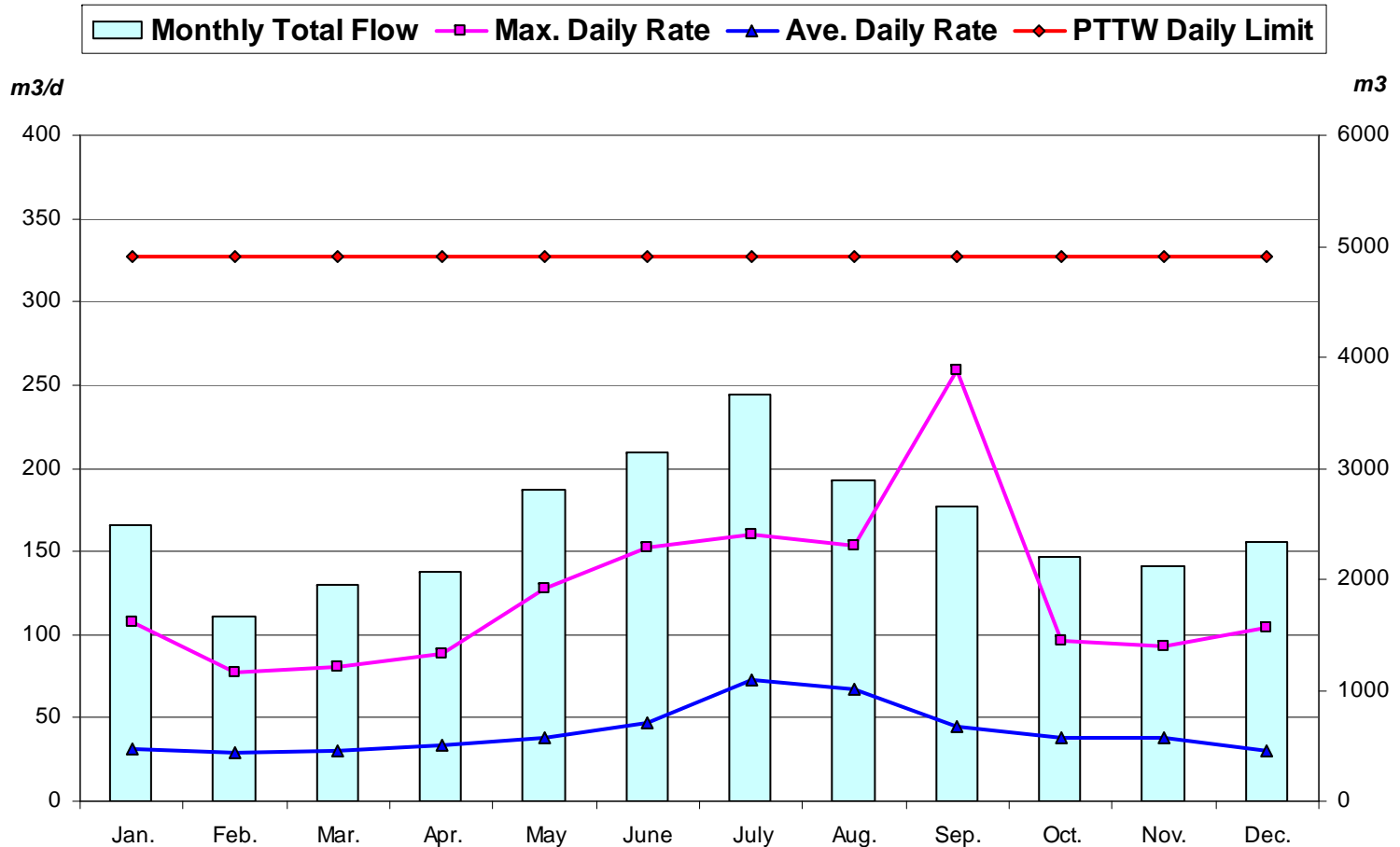


Table 6-2: Lynden DWS (FDL01) - 2011 Monthly Production (Summary)

FDL01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	2,490	1,666	1,958	2,068	2,799	3,142	3,656	2,883	2,663	2,201	2,116	2,335
Average	m3/d	80	59	63	69	90	105	118	93	89	71	71	75
Maximum	m3/d	107	78	81	89	128	152	161	154	259	96	93	105
PTTW	m3/d	327	327	327	327	327	327	327	327	327	327	327	327



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BCOS software tracks the revision history of document.

APPENDIX B - PW12018

City of Hamilton's
Drinking Water Systems

DWQMS SUMMARY REPORT
(2011)
Safe Drinking Water Act



Hamilton
Public Works



Hamilton
Water is Life

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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 Water & Wastewater Operations) of the City's drinking water systems. The purpose of this DWQMS Summary Report is to keep the Owner (Mayor and Council) of the City's drinking water systems informed about major milestones of the DWQMS. This DWQMS Summary 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 2. and 4. respectively.

1.2 Scope

The DWQMS Standard requires that the Operating Authority report on certain aspects of the DWQMS to the Owner (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.

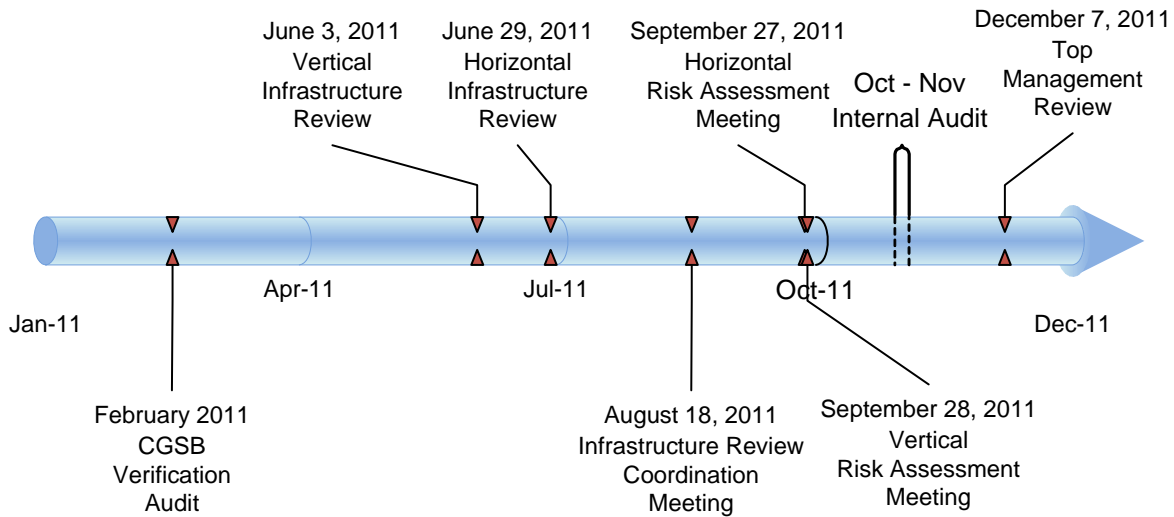
1.3 Overview of Key Milestones

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

- November 2008 - DWQMS Operational Plan endorsed by Owner,
 - 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 2012 – Operating Authority achieves Full Scope; Entire DWQMS accreditation,
- Figure 1-1 illustrates key DWQMS milestones which occurred in 2011.

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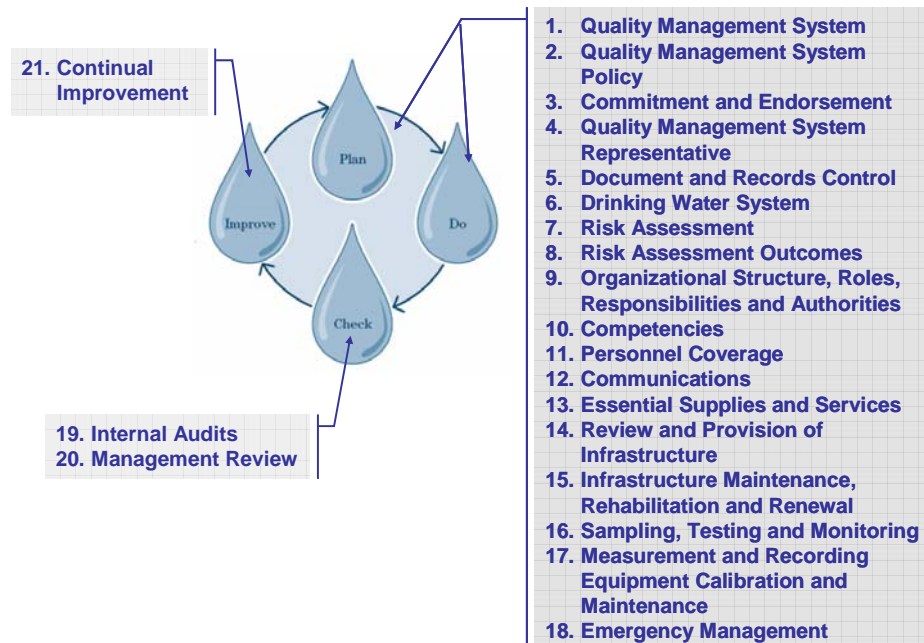
Figure 1-1: Project Pipeline



1.4 DWQMS Operational Summary

Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard. The Ministry of the Environment has initiated a review of the Standard in April 2012.

Figure 1-2: DWQMS Standard Elements



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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 14 Review and Provision of Infrastructure,
- Section 4 - Element 19 Internal Audits,
- Section 5 - Element 20 Management Review.

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.

The Corrosion Control Plan was accepted by the Ministry of the Environment (MOE) on June 7th, 2011. It is estimated that there are approximately 25,000 lead service lines (LSLs) in the Woodward Drinking Water System. The City, on average, replaces 500 LSLs per year therefore it would take over 50 years to complete full LSL replacements. In addition, although the City may replace the City side, homeowners are not required to replace their lead service lines on their property. Therefore LSL replacement program may not bring the City in compliance with existing water quality requirements.

A treatment based corrosion control plan is being recommended using phosphate-based inhibition with or 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 passivation or dosing phase of the testing and the project is expected to be completed in 2012. The overall schedule for the remaining components of the CCP are:

Year	CCP Task
2011 / 2012	<ul style="list-style-type: none"> • Pipe loop testing • Consultation with stakeholders
2012 Onward	<ul style="list-style-type: none"> • Consultation with the public
2012 – 2014	<ul style="list-style-type: none"> • Design & construction of preferred CCP system
2014 Onward	<ul style="list-style-type: none"> • Post implementation monitoring

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Amendments to DWS Licences & Permits

The Compliance Support Group has created a procedure to define the new process to review and amend the drinking water system (DWS) licences and permits including key roles and responsibilities.

Amendments to the City’s DWSs include the following:

DWS Name	Scope of Amendment	Status of Approval
Hamilton DWS – Woodward Sub-System	<ul style="list-style-type: none"> Amendment - Hamilton DWS - Schedule D: Conditions for Relief from Regulatory Requirements 	Approved May 11, 2011
Carlisle DWS	<ul style="list-style-type: none"> Amendment - Carlisle DWS - Tower refurbishment and well house replacement 	Approved August 12 th , 2011

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 late 2011 to early 2012 since 2011 was the 3 year “redo” milestone for the Risk Assessment. Key decisions resulting from the Risk Assessment process were implemented with the ultimate goal to add additional system related detail and simplify the data fields. Significant changes are summarized below:

- Additional clarity was added to the Likelihood and Severity risk assessment criteria and Detectability would not be used as a criterion at this time,
- Additional detail was added in terms of types of hazards and station specific risks,
- Add more location data related to well system and pressure districts,

As well as the changes in approach, staff from across the ESI Division 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?

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2.2 Key Updates

The major outcomes of the Risk Assessment review are summarized as follows:

- Changes to flushing criteria to increase proactive flushing,
- Improvements to Woodward WTP including Filter Building, emergency power and other upgrades,
- Addition of Waterdown Tower,
- Emergency power at wells and pumping stations,
- Decommissioning of a well (FDF02) and addition of new well (FDF03) in Freelton drinking water system,
- Stricter turbidity limits for wells systems with cartridge filters.

3 REVIEW AND PROVISION OF INFRASTRUCTURE

3.1 Purpose

The Operating Authority must ensure and verify, on an annual basis, the adequacy of water related infrastructure. According to the DWQMS Standard, infrastructure is adequate if it is: available, maintained, and improved when necessary. 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. This DWQMS Summary Report (2011) includes a brief summary of the results of the DWQMS Infrastructure Review.

3.2 Process

The Operating Authority assembled teams of representatives from across relevant sections of the ESI Division to conduct the review of infrastructure. Teams met in June 2011 to discuss vertical and horizontal infrastructure and a coordination meeting was held in August 2011.

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

Infrastructure Type	Input Data
Horizontal Infrastructure - Small Capital	<ul style="list-style-type: none"> • Leak Detection & Water Loss Audits • Corrosion Protection Planning • Valve and Meter Replacement

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Infrastructure Type	Input Data
	<ul style="list-style-type: none"> • Preventative Maintenance • Emergency Repairs • Customer Complaints • Lead Service Replacement Program
Horizontal Infrastructure - Large Capital	<ul style="list-style-type: none"> • Replaced, Rehabilitated and New Watermains • Stand-Alone and Coordinated Works (i.e., with Sewers and Roads) • Condition Assessments
Vertical Infrastructure Small Capital	<ul style="list-style-type: none"> • Preventative Maintenance • Emergency Repairs • Capital Upgrades - Coordination and Scheduling
Vertical Infrastructure - Large Capital	<ul style="list-style-type: none"> • Master Plan Schedule • Site Specific Condition Assessments • Reservoir Inspection • Water Capital Projects Lists

3.3 Overview of Results

Overall, the review concluded that vertical and horizontal infrastructure is generally found to be:

- Available, when needed,
- Maintained, as necessary, and
- Improved, when necessary.

Participants in the infrastructure review process updated the water infrastructure comments from the State of the Infrastructure Report. Those comments are included in the DWQMS Infrastructure Review Report.

Vertical Infrastructure

2011 represents a peak in construction of water infrastructure. There are challenges to ensure the uninterrupted supply of water when accommodating construction and start up / shut down activities. Staff also discussed the operational challenges of the raw water for Carlisle DWS Wells 3 and 5. Mineral content in the raw water results in fouling of UV lamps and requires a significant amount of maintenance time. This well site is offline for an estimated 50% of each year (typically during winter months) to reduce operational costs since alternative wells can meet winter water demands. The 2011 IR identified the need for a pilot study of Wells 3 and 5 within the Carlisle DWS to address raw water concerns.

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The PO Section has made significant gains in the development of the Enterprise Asset Management (EAM) program related to scheduling and data management aspects of the maintenance program. In addition, PO maintenance staff have been scheduling non-urgent repairs in consideration of availability of tools, equipment, replacement parts, and qualified staff. Improved reporting from the EAM program will help measure the overall performance of the PO maintenance program.

The ongoing capital projects related to the renewal of vertical infrastructure were discussed by participants. As stated above, 2010 to 2012 represent a peak in water capital projects which will continue throughout much of 2012. Some key projects related to the Woodward WTP to be completed in 2012 / 2013 include:

- SCADA Master Plan implementation,
- Low lift PS upgrades,
- High lift PS upgrades,
- Architectural and structural restoration of filter building,
- Rail car chlorine gas monitoring,
- Pre-treatment flocculation tank mixer replacement.

There are also significant upgrades planned and ongoing for outstations including standardization of sodium hypochlorite feed systems, removal of the Glancaster HD018 holding tank, and upgrades to York & Valley pumping station and Ben Nevis reservoir. Other outstation upgrades include the new Ferguson Pumping Station and upgrades to Hillcrest Reservoir, Stonechurch & Garth Pumping Station and Kenilworth Reservoir / Pumping Station.

Priority vertical infrastructure projects for 2012 were identified as noted below. Responsibility for completing the tasks has been assigned to Infrastructure & Source Water Planning (I&SWP), Water and Wastewater Engineering (WWW-E) and Plant Operations (PO) as noted below.

Infrastructure	Details of Need	Responsibility
Lynden wells	Examine well system. Proceed with capital improvements to existing wells if a new well site is not anticipated in near future.	I&SWP, WWW-E
Ferguson Pumping Station	Complete capital upgrades. Strengthen feeds to PD3. Examine potential for use of gravity feed.	PO, WWW-E
Ancaster water storage	Examine pressure issues in Ancaster. Determine whether a storage tower is required.	I&SWP

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Infrastructure	Details of Need	Responsibility
Pumping stations 12 & 12A	Initiate South Street PS design and re-assess location of Huntingwood PS.	PO, WWW-E
Carlisle DWS	Complete a pilot study for operation of Wells #3 and 5.	PO, WWW-E
Large valves	Establish a maintenance and inspection program for large valves	PO

Horizontal Infrastructure

Participants in the horizontal infrastructure review meeting identified the following issues for discussion:

- The I&SWP Section provided an update on the status of the All Pipes Model and next steps in the completion of the model,
- The Drinking Water Works Permit requires that DWS maps be updated to include watermain additions, modifications, replacements and extensions within 12 months of project being brought into service. The Customer Service & Community Outreach (CS&CO) Section is responsible for updating the DWS maps. It was recommended that further discussions be held with the Planning & Economic Development Department to ensure their staff are aware of the need to forward as-builts to CS&CO Section in a timely manner.
- In 2011, the Water Distribution & Wastewater Collection (WD&WWC) Section reported a marked increase in watermain breaks over previous years. The substantial increase in break frequency could be a function of the age of the infrastructure and pressure surges in the drinking water system that result from capital works projects and associated testing. Watermain break histories are considered in establishing the emergency water repair budget.
- The ESI Division will be upgrading to Hansen 8. The upgrade is required to maintain communication links to other critical software used by Divisional staff.

WD&WWC provided an update on the effectiveness of horizontal infrastructure maintenance programs. Horizontal maintenance programs include hydrant inspection and flow testing, valve exercising, watermain break repairs, operations of dead end flushing units and the substandard water service replacement program. No major changes to the horizontal water maintenance programs are planned for 2012.

The Asset Management Section manages infrastructure renewal for watermains and water distribution valves. The infrastructure review discussions identified the large

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valve replacement program and the Greenhill Trunk Watermain Inspection as two key issues for 2011.

In 2010 and 2011, there were delays in executing valve replacements due to the potential operational risks associated with the outstation upgrades. Priority valves have been identified and project plans are under development. It is anticipated that these projects will be tendered before year-end 2011 and initiated in early 2012. The Asset Management (AM) and WD&WWC Sections meet periodically to discuss large valve needs and identify valve projects that can be completed. Specific recommendations related to the large valve program are as follows:

- In planning large valve replacements, prioritize projects that are in the scope of a capital project that is 3 or more years away from initiation. This avoids extended deferral of the work due to interference with other capital projects.
- Consider identifying and prioritizing large valve replacements as discrete projects, rather than considering replacements as components of an annual program. This lends the projects more visibility and more urgency, reducing the risk of year-over-year deferral.
- Examine risks relating to pressure-reducing valves (PRVs) during the DWQMS Risk Assessment process.

A condition assessment was completed for a portion of the Greenhill Avenue trunk watermain (concrete pressure pipe) in 2010. Preliminary assessment findings indicated that one portion of the watermain showed signs of moderate distress, while six portions showed minor distress. Additionally, findings indicated that greater deterioration of the watermain's mortar coating was observed in areas where slag backfill was used. Upon completion of the initial Greenhill watermain inspection, the AM Section plans to complete inspections of the remaining portions of the watermain.

Priority horizontal infrastructure projects for 2012 were identified as noted below.

Infrastructure	Details of Need	Responsibility
Upper James watermain	Replace from Mohawk Road to Fennell St (<i>planned for 2014.</i>)	AM
Large valves	Repair large valves at Stonechurch Road & Garth St.	AM

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Infrastructure	Details of Need	Responsibility
Large valves	In past, high-priority large valve replacements have been deferred when they were able to be included in larger infrastructure projects.. This attempt to consolidate projects has led to deferral of selected large valve replacement needs. Prioritized large valve replacements should be initiated as stand-alone projects if they cannot be harmonized with a related project that is scheduled to begin within a three-year forecast.	WD&WW, AM
Greenhill watermain	Complete inspection of remaining segments of watermain.	AM
Nash watermain	Complete watermain inspection.	AM

4 DWQMS AUDITS

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

4.1 External DWQMS Audits

As stated, the Canadian General Standard Board (CGSB) is the MOE’s accreditation body for the DWQMS Standard. The Operating Authority successfully passed the CGSB Verification Audit in February 2011 and received confirmation of full accreditation in July 2011. The Mayor officially presented the accreditation certificates to the Systems Management Representative (SMR) and the Compliance Support Group on November 21st, 2011. This presentation was accompanied by a Council Update Report summarizing the status of the DWQMS accreditation.

In early 2012, the Operating Authority will participate in a 3rd Party Systems Audit or document review.

4.2 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 it’s procedures at least annually.

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Internal Audit Team

The Operating Authority recruited additional auditors in 2011. The recruitment process included DWQMS Auditor Training in April 2011. Subsequently, the full audit team received supplementary training related root cause investigation and process audits. The current audit team is adequate to sustain the internal audit program.

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.

Fall 2011 Audit

The Internal Audit Team conducted a full internal audit in late October / early November 2011. The fall 2011 audit assessed the implementation of all 21 elements of the DWQMS Standard and their related procedures across relevant water and wastewater operations and engineering sections of the ESI Division. The logistics of the audit are as follows:

- Opening meeting – Friday October 24th, 2011,
- Closing meeting – Tuesday November 8th, 2011.

Continual improvement initiatives related to the audit process include a focus on process audits and the introduction of potential nonconformances as new category of findings. Potential nonconformances are nonconformities that have not happened yet but will over time and therefore should go full root cause investigation and correction. The non-conformances, potential nonconformances and OFIs have since been uploaded in the BCOS Database and the root cause investigations are underway. Following this, corrective action plans will be implemented by delegated staff, where required.

2012 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2012 DWQMS internal audits. The Audit Plan will be reviewed and approved by the management team prior to implementation.

5 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:

- Consider the results of the management review and identify deficiencies and action items to address deficiencies,
- Provide a record of decisions and actions items related to management review

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action items including responsibilities and timelines,

- Report the results of the management review to the Owner.

In 2011, the DWQMS Top Management Review was held on December 7th. Attendees included Top Management (General Manager of Public Works and Director of Water and Wastewater Operations), Section Managers, SMR and representatives from the Compliance Support Group.

Management Review Action Items

Table 5-1 provides a summary of the decisions and action items from the management review meeting including responsibilities and timeframes for 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 5-1.

Table 5-1: Management Review Outcomes

Summary of Action Items	Due Date	Responsible Party
Director, PO and WWW-E to meet to discuss potential preventative measures and/or monitoring options to ensure adequate combined chlorine levels in the distribution system during abnormal operating conditions (Action item related to September 2011, AWQI in Binbrook).	Apr / May 2012	WWW-E & PO
I&SWP to determine if it is permissible to build watermains through the greenbelt to connect the Hamilton DWS to the Lynden DWS.	Mar / Apr 2012	I&SWP
PO and WWW-E to meet to discuss interim and long term solutions related to turbidity meter SCADA signal degradation.	Apr / May 2012	WWW-E & PO
PO and WD&WWC to meet to discuss a communication process to ensure PO is aware of activities in the distribution system that could potentially impact outstations or the WTP. Section managers and OROs to attend the meeting.	Feb / Mar 2012	PO& WD&WWC
CSG to meet to discuss findings from the 2009 internal audit and determine a plan to address the outstanding items. Proposed plan for each item to be discussed with SMT.	April 2012	CSG

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Summary of Action Items	Due Date	Responsible Party
CSG to discuss potential OMBI measures with SMT to select a specific set of measures for review at future TM Review Meetings.	Sept / Oct. 2012	CSG
CSG to include discussion of watermain capital projects and if possible include information regarding sustainability (% replacement of linear systems, average age of linear systems) of water distribution systems in the 2012 TMR Meeting.	Dec. 2012	CSG
CSG to meet with Senior Director, Director of WWW Operations, Manager of CS&CO and CS&CO staff to discuss the Standard of Care training.	Mar / Apr 2012	CSG
CSG to consider representing the Hansen customer complaints data as a percentage of the number of services.	Dec. 2012	CSG
CSG to attempt to contact those vendors that have not acknowledged receipt of the DWQMS Awareness Training materials.	Mar / Apr 2012	CSG
CSG to forward newly endorsed DWQMS Summary Report to CS&CO Section for upload to website and update DWQMS Operational Plan Binders.	Jan. / Feb 2012	CSG

6 CONCLUSIONS

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

7 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 2012 include the following:

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Month of 2012	Scheduled DWQMS Milestones
January to June	<ul style="list-style-type: none"> • Investigate and correct internal audit findings from DWQMS Internal Audit • Purchase and roll out new training software to track staff training and licences
February\March	<ul style="list-style-type: none"> • Annual O.Reg. 170 Schedule 22 Report and DWQMS Summary Report to Council
March	<ul style="list-style-type: none"> • First SMT Meeting of 2012
May	<ul style="list-style-type: none"> • Infrastructure Review Meetings
June	<ul style="list-style-type: none"> • Standard of Care Training – Owners and Management
July	<ul style="list-style-type: none"> • SMT Meeting # 2
September	<ul style="list-style-type: none"> • Risk Assessment Review Meetings • SMT Meeting # 3
October / November	<ul style="list-style-type: none"> • DWQMS Internal Audit
December	<ul style="list-style-type: none"> • DWQMS Top Management Review

BCOS software tracks the revision history of document.