INFORMATION REPORT

TO: Chair and Members Public Works Committee	**WARD(S) AFFECTED:** CITY WIDE
COMMITTEE DATE: March 7, 2011	
SUBJECT/REPORT NO: 2010 Annual Drinking Water Report (PW11019) - (City Wide)	
SUBMITTED BY: Gerry Davis, CMA General Manager Public Works Department	**PREPARED BY:** Rosa Gonzalez 905.546.2424, Extension 5833 Geoff Rae 905.546.2424, Extension 4483
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 2010 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 2010 as well as those planned for 2011. 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.

The DWQMS Risk Assessment charts were reviewed and updated based on input from select staff across the ESI Division. Examples of updates include the results of the Woodward / Greenhill transmission main assessment, new preventative flushing limits for the well based drinking water systems and Fifty Road sub-system and reference to the new Backflow Prevention By-Law. As per requirements of the DWQMS Standard, the risk assessment will be re-done in 2011.

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 2010 infrastructure review it can be concluded that infrastructure is available, maintained, and improved when necessary.

Audit Program

The DWQMS accreditation process requires both 3rd Party Accreditation Audits by the Canadian General Standards Board (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. The on-site Verification Audit was conducted early February, 2011. A successful audit outcome is required to achieve full accreditation for our Operating Authority. Based on preliminary findings subject to review by CGSB, the auditor recommended that the Operating Authority receive full accreditation once corrective actions have been completed. Staff will formally communicate the results of the Verification Audit to Mayor and Council via a

Council Update Report in the Spring of 2011 once the final audit report has been received.

The Internal Audit Team conducted a full internal audit in November 2010. The fall 2010 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 2011). 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 2011 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 3rd 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.

The first DWQMS Top Management Review meeting was held on December 2nd, 2009. The action items associated with that meeting, as documented in the DWQMS Summary Report (2009), have all been addressed.

In 2010, the DWQMS Top Management Review was held on December 7th. Overall, meeting participants concluded that the DWQMS is suitable, adequate and effective. Continual improvement actions identified include the following:

- Compliance support to log and track best practices from MOE inspections along with non-compliances.
- Additional tools for staff to track projects including circulation of the overall project schedule for water projects and special identification of DWQMS projects.

- Further review of select water quality data and customer complaints.
- Completion of briefing notes that explain the project history, key roles and responsibilities and financing considerations related to the implementation of software to track training requirements.

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 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 2011 include the following:

Month of 2011	Scheduled DWQMS Milestones
February	• CGSB On-Site Verification Audit
April	• DWQMS Auditor Training for new recruits & Root Cause Investigation Training for entire Audit Team • Council Update Report – Results of Verification Audit
May	• Infrastructure Review Meetings
September	• Risk Assessment Review Meetings
October	• DWQMS Internal Audit
December	• DWQMS Top Management Review

APPENDIX A
REPORT PW11019

City of Hamilton's
Drinking Water Systems

SUMMARY REPORT FOR MUNICIPALITIES

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

BCOS
BEYOND COMPLIANCE OPERATING SYSTEM

Hamilton
Public Works

HamiltOn Water is Life

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1 HAMILTON DRINKING WATER SYSTEM (DWS)

1.1 Operational Upgrades - 2010

1.1.1 Woodward Water Treatment System and Water Outstations

Some of the major projects that were initiated in 2010 are as follows:

(Water Treatment)

- Engineering of High Lift Pumping Station Valve Replacement and Electrical Modifications
- Construction of Low Lift Pumping Station Upgrades at the Woodward Avenue Water Treatment Plant
- Construction of Low Lift Pumping station Intake Work upgrades at the Woodward Ave Water Treatment Plant
- Construction of High Lift Pumping Station Upgrades at the Woodward Avenue WTP

(Water Outstations)

- Construction of New Ferguson Avenue Pumping Station
- Construction of Hillcrest Reservoir Upgrades
- Assessment of Valve Chamber #3 in District 5
- Assessment of Ben Nevis Reservoir (HDR1C)
- Assessment of (HD016) Pumping Station
- Construction of Stonechurch and Garth Pumping Station Upgrades
- Construction of Kenilworth Ave Pumping Station upgrades

The above water treatment and water station upgrades and modifications are being undertaken at a cost of approximately $68.5 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 5,652 m of watermain was replaced stand alone and\or in coordination with roadwork at a cost of $8.4 million dollars.
- Approximately 6,210 m of watermain was rehabilitated using structural and\or cement mortar lining at a cost of $3.4 Million dollars.

1.2 Future Upgrades - 2011

1.2.1 Woodward Water Treatment System and Water Outstations

Some of the projects that are to be initiated in 2011 are as follows:

(Water Treatment)

- Engineering Study for Corrosion Control in the Distribution System

(Water Outstations)

- Design of Osler Rd Pumping Station (HD011) Upgrades
- Design of Garner Rd Pumping Station (HD018) Upgrades
- Design of Highland Rd and Pumping Station Upgrades (HD007 and HDR07)

The above upgrades and modifications will be undertaken at a cost of approximately $575,000.

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
2010-01-22	Second hydrant south of Twenty Rd on unopened road	Combined Chlorine = 0 mg/L Free Chlorine = 0 mg/L	Flushed and resampled the adverse location. All results were acceptable.
2010-04-14	Hydrant GJ09H020 on Aeropark Blvd.	Combined Chlorine = 0.03 mg/L Free Chlorine = 0 mg/L	Flushed and resampled the adverse location. All results were acceptable.
2010-05-13	Hydrant DL09H060 on Meadow Lane	Total Coliforms = 5 CFU/100mL	Resampled adverse location and 2 upstream locations. All results were acceptable. The adverse was not confirmed.

Notification Date	Location of Adverse	AWQI	Resolution
2010-06-04	Petro Canada Gas Station (Upper James and Haldibrook Rd)	Dichloromethane = 458 ug/L	The adverse location was resampled. The result was acceptable. The adverse was not confirmed. The abnormal result was not associated with the drinking water system. Instead, it was contamination of the sample containers.
2010-06-04	Post Office (Waterdown)	Dichloromethane = 478 ug/L	The adverse location was resampled. The result was acceptable. The adverse was not confirmed. The abnormal result was not associated with the drinking water system. Instead, it was contamination of the sample containers.
2010-06-04	Binbrook Pumping Station	Dichloromethane = 68 ug/L	The adverse location was resampled. The result was acceptable. The adverse was not confirmed. The abnormal result was not associated with the drinking water system. Instead, it was contamination of the sample containers.
2010-06-24	Shopper's Drug Mart on Mohawk Rd W	Total Coliforms = 8 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2010-07-05	Highlift Pump	Total Coliforms = 1 CFU/100mL	Resampled adverse location and 2 downstream locations. All results were acceptable. The adverse was not confirmed.

Notification Date	Location of Adverse	AWQI	Resolution
2010-07-23	Hydrant at 161 Studholme Rd	Total Coliforms = 14 CFU/100mL E. coli = 1 CFU/100mL	Resampled adverse location and 2 downstream locations. All results were acceptable. Repeated the resampling after 24 hours. All results were acceptable. The adverse was not confirmed.
2010-08-06	Fire Station at 1455 Main St W	Combined Chlorine = 0.14 mg/L Free Chlorine <0.02 mg/L	Flushed and resampled the adverse location. All results were acceptable.
2010-09-02	Blow off valve at 33 Thorpe St	Total Chlorine = 0.14 mg/L	Flushed and resampled the adverse location. All results were acceptable.
2010-10-16	Fire Station at 1455 Main St W	Total Coliforms = 41 CFU/100mL	Resampled adverse location and upstream and downstream locations. All results were acceptable. The adverse was not confirmed.
2010-10-29	2200 Brampton St	Total Chlorine = 0.05 mg/L	Flushed and resampled the adverse location. All results were acceptable.
2010-12-23	Fire Station at 246 Wentworth St. N.	Total Coliforms = 2 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: Hamilton DWS - 2010 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	270	272	246	262	253	300	266	272	157	287	188	181
2	270	213	191	260	253	205	276	271	396	283	260	162
3	266	177	247	260	252	191	295	272	293	191	261	256
4	267	193	184	260	254	233	263	273	297	200	281	254
5	265	258	249	176	252	263	301	272	290	198	283	256
6	207	208	248	168	237	263	346	287	274	353	252	255
7	171	290	247	178	168	264	362	292	136	239	166	210
8	177	270	250	257	169	264	250	294	245	321	218	215
9	271	270	246	254	191	263	270	292	330	269	278	180
10	268	211	247	254	209	263	270	295	304	207	274	254
11	269	220	102	255	267	263	272	174	296	236	256	256
12	250	271	262	254	264	259	270	344	293	275	261	255
13	248	272	203	253	264	258	271	311	258	198	264	256
14	247	268	162	254	225	190	299	293	180	202	255	253
15	248	270	171	251	168	179	270	294	345	253	251	253
16	247	189	220	250	169	232	331	293	391	288	250	253
17	246	177	287	164	264	287	329	292	244	286	237	250
18	248	212	292	167	267	297	325	293	292	223	175	171
19	246	271	253	170	264	280	265	292	287	159	133	162
20	247	257	251	172	266	282	250	333	289	255	232	233
21	247	249	250	267	265	292	147	340	228	284	261	257
22	208	250	251	302	265	267	332	333	274	286	261	257
23	178	136	248	229	265	263	321	273	275	271	259	257
24	176	252	248	267	264	239	282	190	232	269	259	255
25	225	200	165	264	272	267	266	196	276	270	259	254
26	269	299	219	254	258	266	267	287	279	260	259	255
27	270	295	214	162	248	267	272	292	287	182	256	253
28	267	246	265	264	246	267	273	326	290	204	254	253
29	270		264	256	317	266	273	319	139	259	253	159
30	271		263	255	350	267	271	323	289	158	254	163
31	268		262		384		272	282		198		260
Total	7,575	6,696	7,205	7,040	7,791	7,696	8,757	8,902	8,164	7,562	7,352	7,188
Average	244	239	232	235	251	257	282	287	272	244	245	232
Min	171	136	102	162	168	179	147	174	136	158	133	159
Max	271	299	292	302	384	300	362	344	396	353	283	260
PTTW limit	909	909	909	909	909	909	909	909	909	909	909	909

Figure 1-1: Hamilton DWS - 2010 Monthly Production (Summary)

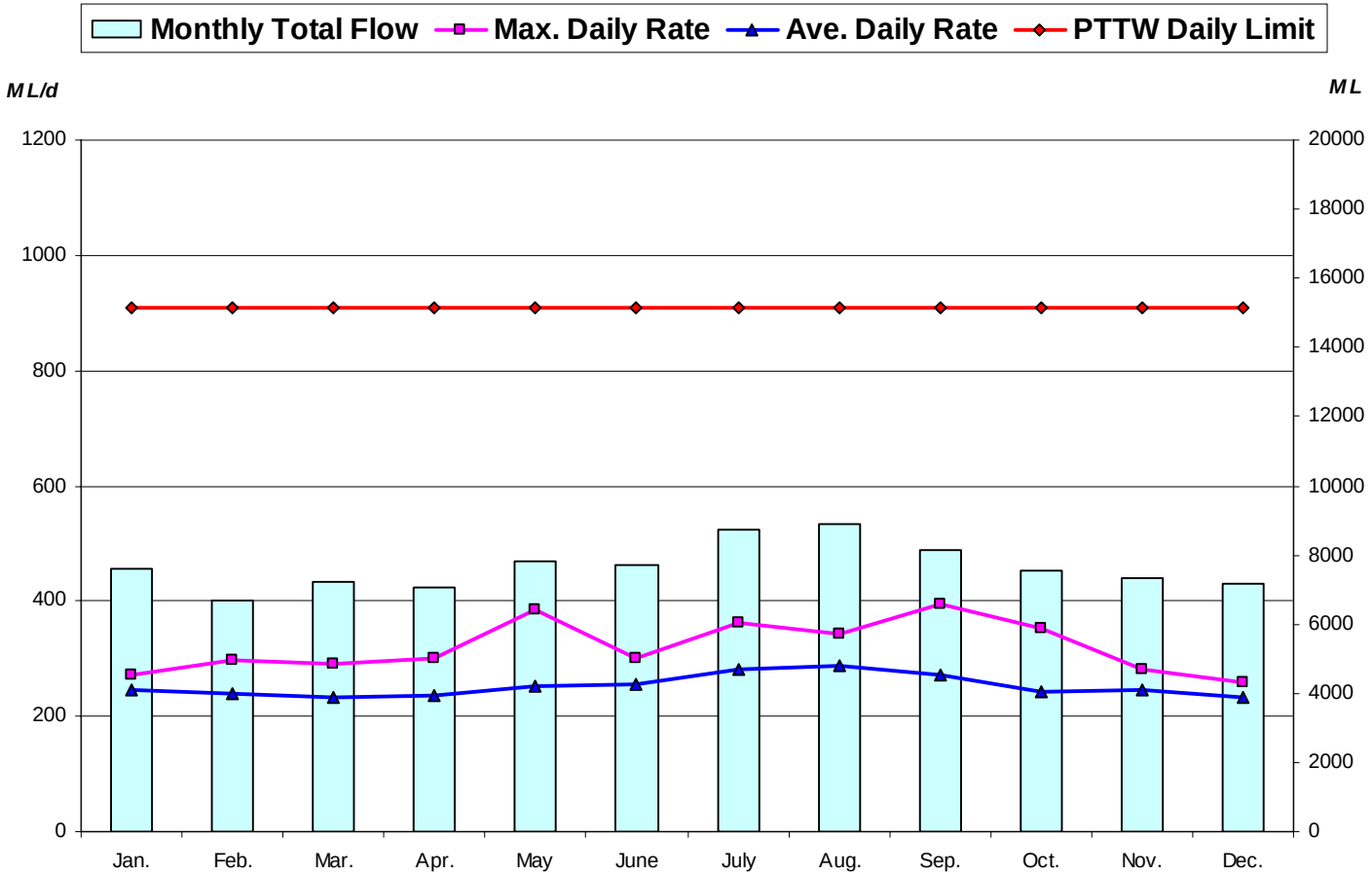

Table 1-2: Hamilton DWS - 2010 Monthly Production (Summary)

Woodward	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	ML	7,575	6,696	7,205	7,040	7,791	7,696	8,757	8,902	8,164	7,562	7,352	7,188
Average	ML/d	244	239	232	235	251	257	282	287	272	244	245	232
Maximum	ML/d	271	299	292	302	384	300	362	344	396	353	283	260
PTTW	ML/d	909	909	909	909	909	909	909	909	909	909	909	909

2 FIFTY ROAD DRINKING WATER SUB-SYSTEM

2.1 Operational Upgrades - 2010

In 2010, the following project was initiated:

- Assessment of 50 Rd Reservoir and Pumping Station (HD009 and HDR10)

The above project is being undertaken at a cost of approximately $37,000.

2.2 Future Upgrades - 2011

The following project will be initiated in 2011:

- Design of 50 Rd Reservoir and Pumping Station (HD009 and HDR10)

The above project is being undertaken at a cost of approximately $50,000.

2.3 Provincial Officer's Orders

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

2.5 Adverse Water Quality Reports

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

2.6 Water Production Reports - Summary

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

3 CARLISLE DRINKING WATER SYSTEM (DWS)

3.1 Operational Upgrades - 2010

In 2010 no projects were initiated.

3.2 Future Upgrades - 2011

The following project will be initiated in 2011:

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

The above project is being undertaken at a cost of approximately $2.5 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

The following AWQIs were reported to MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2010-06-08	FDC02 (Treated) FDC03 (R) (Treated) FDC05 (Treated)	Sodium = 29.4 mg/L Sodium = 43.0 mg/L Sodium = 36.9 mg/L	The adverse locations were resampled. The result was not acceptable. The results were confirmed. Residents were mailed a letter, written by Public Health Services, about sodium. Public Health was given a list of addresses to which the letters were mailed.

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) - 2010 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	4	8	734	82	386	136	524	266	13	11	303	382
2	8	6	118	135	15	418	559	240	0	7	210	477
3	8	5	8	233	2	176	383	762	0	9	204	330
4	10	6	10	2	21	9	323	527	0	12	185	437
5	12	7	7	328	60	85	394	556	0	10	12	358
6	7	391	11	90	14	139	319	463	0	10	230	434
7	8	281	11	9	342	77	494	597	0	10	82	444
8	48	10	11	15	528	314	421	556	15	10	48	406
9	340	10	10	325	734	99	97	317	16	9	107	56
10	275	6	9	147	716	8	162	8	0	9	25	158
11	158	8	8	165	659	9	209	8	0	12	18	428
12	482	30	8	313	24	10	101	251	0	10	16	282
13	10	6	8	10	13	124	194	357	17	10	10	521
14	8	8	75	168	91	33	142	518	13	10	9	337
15	8	422	10	39	641	53	211	439	9	14	12	272
16	6	511	9	11	17	14	115	336	9	10	10	60
17	6	238	9	14	326	114	410	0	9	14	11	4
18	46	6	8	11	411	137	401	0	18	21	16	3
19	6	7	8	10	526	137	258	0	13	13	14	3
20	11	10	9	92	542	129	234	0	12	10	11	192
21	10	10	10	102	530	219	317	0	54	11	10	207
22	5	8	8	386	118	123	482	0	5	9	310	48
23	5	10	8	86	257	246	111	0	15	7	233	5
24	7	6	10	81	270	303	320	0	7	9	135	6
25	9	12	11	75	733	262	306	0	10	15	48	8
26	8	11	246	245	721	9	12	0	8	10	144	7
27	6	8	5	357	730	9	252	0	10	9	7	12
28	7	265	7	245	300	87	35	0	9	12	181	8
29	7		9	186	696	555	362	0	9	11	276	4
30	10		190	258	339	496	253	0	10	140	109	3
31	9		73		314		149	0		511		3
Total	1,541	2,303	1,656	4,217	11,076	4,527	8,549	6,201	280	965	2,988	5,897
Average	50	82	53	141	357	151	276	200	9	31	100	190
Min	4	5	5	2	2	8	12	0	0	7	7	3
Max	482	511	734	386	734	555	559	762	54	511	310	521
PTTW limit	851	851	851	851	851	851	851	851	851	851	851	851

Figure 3-1: Carlisle DWS (FDC01 & FDC02) - 2010 Monthly Production (Summary)

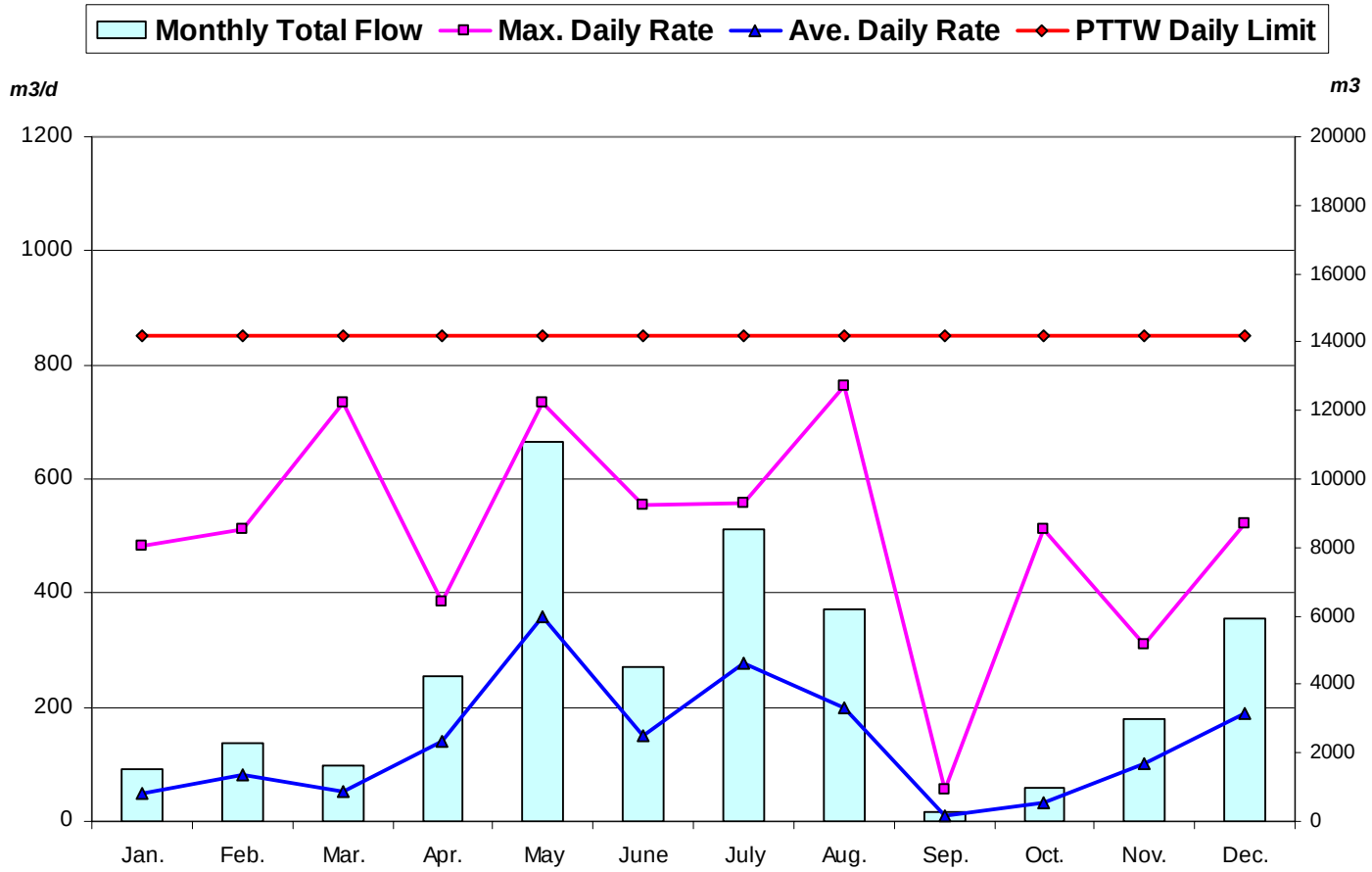

Table 3-2: Carlisle DWS (FDC01 & FDC02) - 2010 Monthly Production (Summary)

FDC01, FDC02	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m3	1,541	2,303	1,656	4,217	11,076	4,527	8,549	6,201	280	965	2,988	5,897
Avg.	m3/d	50	82	53	141	357	151	276	200	9	31	100	190
Max	m3/d	482	511	734	386	734	555	559	762	54	511	310	521
PTTW	m3/d	851	851	851	851	851	851	851	851	851	851	851	851

Table 3-3: Carlisle DWS (FDC03) - 2010 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	358	206	243	0	495	375	719	459	1,029	48	137	90
2	425	251	460	0	844	233	961	518	893	38	175	18
3	550	467	125	0	746	99	1,391	588	477	44	226	41
4	260	298	54	0	698	72	1,420	47	43	65	210	28
5	516	411	27	0	599	158	909	1,061	20	67	381	251
6	230	86	448	0	317	192	1,625	864	32	50	380	31
7	420	284	279	0	675	438	1,128	524	61	44	301	35
8	231	410	37	0	26	384	1,429	1,186	196	48	362	143
9	31	336	48	79	22	87	912	384	55	35	497	403
10	22	389	35	44	35	20	503	461	60	45	100	105
11	36	514	277	38	408	60	1,213	814	170	76	30	0
12	27	225	159	41	270	50	1,175	548	55	730	581	198
13	44	422	416	30	274	41	1,121	561	79	385	745	31
14	43	213	88	24	273	51	1,134	35	46	621	616	24
15	205	0	194	28	42	137	1,022	141	32	446	280	27
16	168	0	386	240	855	167	603	808	55	472	511	39
17	403	361	380	187	782	51	763	1,000	47	623	349	33
18	79	384	371	511	295	229	893	1,063	66	397	554	32
19	0	387	300	188	479	931	960	1,299	70	406	355	195
20	0	217	352	297	561	619	1,013	1,394	32	417	498	27
21	475	402	398	381	734	423	950	944	39	462	443	243
22	281	424	378	376	766	291	575	424	15	543	46	93
23	200	432	373	385	756	234	384	48	66	414	205	17
24	7	422	329	33	937	86	284	172	3	420	263	19
25	520	304	291	326	492	123	318	305	54	526	385	328
26	585	282	0	490	1,014	92	326	117	41	385	344	199
27	367	14	0	22	984	47	971	171	85	409	321	344
28	406	6	0	30	1,585	55	703	334	31	503	315	288
29	289		0	439	1,312	0	816	848	50	271	311	26
30	460		0	22	1,058	143	651	1,271	53	331	151	24
31	37		0		735		284	1,122		46		98
Total	7,675	8,146	6,451	4,210	19,069	5,889	27,157	19,507	3,954	9,369	10,072	3,430
Average	248	291	208	140	615	196	876	629	132	302	336	111
Min	0	0	0	0	22	0	284	35	3	35	30	0
Max	585	514	460	511	1,585	931	1,625	1,394	1,029	730	745	403
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) - 2010 Monthly Production (Summary)

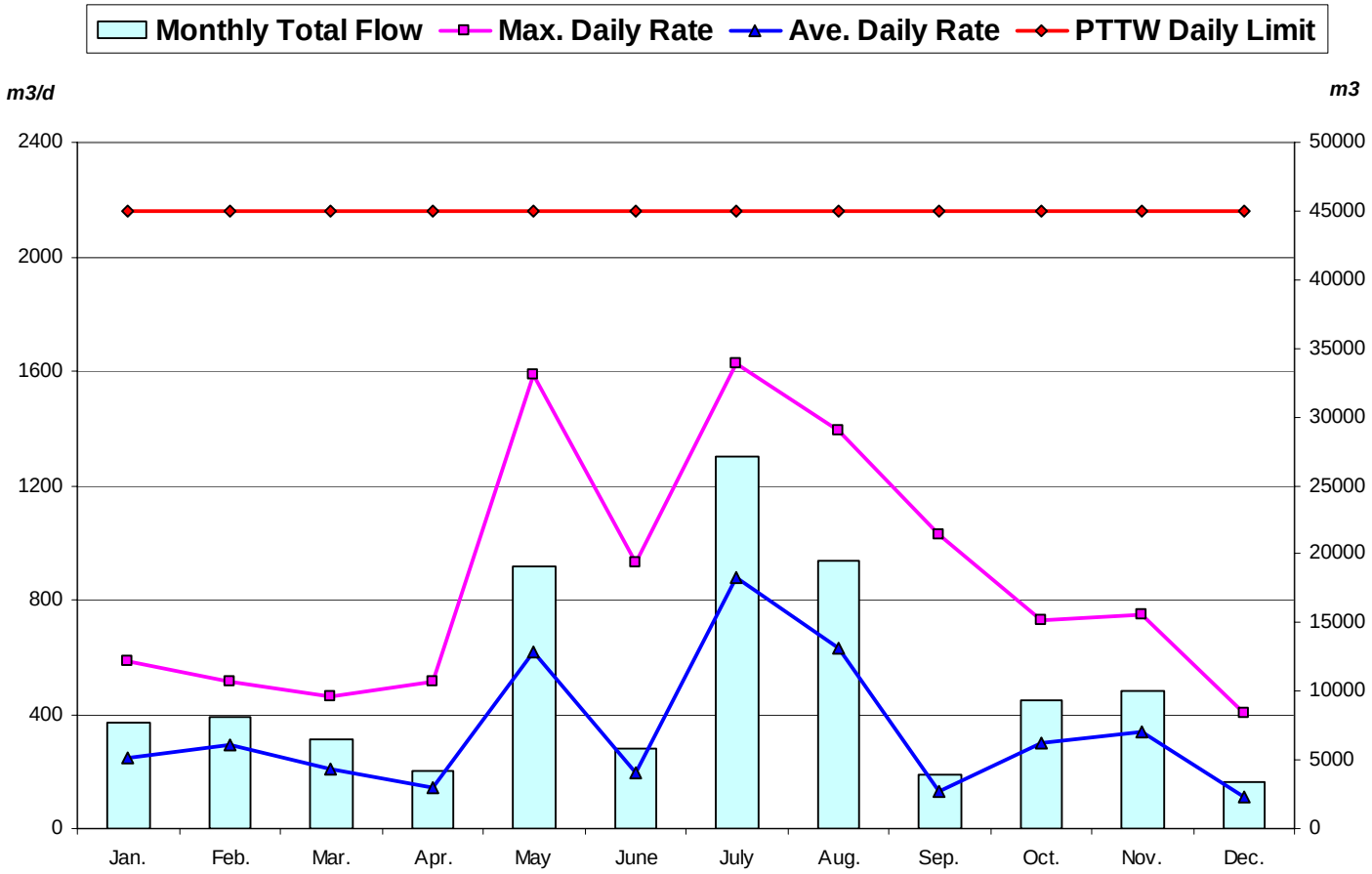

Table 3-4: Carlisle DWS (FDC03) - 2010 Monthly Production (Summary)

FDC03R	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m^3	7,675	8,146	6,451	4,210	19,069	5,889	27,157	19,507	3,954	9,369	10,072	3,430
Avg.	m^3/d	248	291	208	140	615	196	876	629	132	302	336	111
Max	m^3/d	585	514	460	511	1,585	931	1,625	1,394	1,029	730	745	403
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) - 2010 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	14	151	0	300	405	735	23	855	803	451	0	0
2	27	231	118	486	33	685	34	447	1,062	521	0	0
3	20	12	409	283	163	465	30	465	1,024	661	0	0
4	35	23	376	407	65	700	152	724	963	236	0	0
5	109	16	229	683	208	658	933	452	803	580	0	0
6	22	14	15	362	254	581	327	572	973	314	0	0
7	177	13	16	442	131	322	687	504	955	545	0	0
8	27	24	456	359	19	638	290	310	511	434	0	0
9	131	17	600	397	19	748	194	722	1,081	533	0	0
10	171	16	286	397	23	677	430	482	749	580	0	175
11	257	19	203	386	28	928	215	364	876	257	0	0
12	30	33	13	447	293	1,086	189	568	877	13	0	0
13	327	194	242	400	409	681	162	488	699	0	0	0
14	438	50	626	274	277	921	398	1,137	749	0	0	0
15	224	29	66	475	382	1,074	577	1,078	838	0	0	232
16	275	6	15	307	164	607	746	436	684	0	0	49
17	64	10	17	274	24	761	462	803	422	0	0	416
18	287	30	10	73	421	883	160	966	629	0	0	705
19	502	17	173	347	23	337	47	691	938	0	0	111
20	222	286	92	233	312	238	137	565	538	0	0	13
21	119	46	16	0	44	720	454	588	743	0	0	4
22	13	17	19	0	18	347	746	386	588	0	0	348
23	10	8	16	199	29	348	170	645	699	0	0	560
24	111	16	22	636	132	550	213	583	778	0	0	519
25	410	178	76	193	260	624	406	835	771	0	0	118
26	18	132	354	19	632	880	815	1,110	734	0	0	468
27	32	15	417	253	499	695	427	1,121	532	0	0	61
28	32	20	487	435	318	416	331	1,047	588	0	0	135
29	28		422	407	630	563	321	976	362	0	0	463
30	37		276	483	1,135	378	401	569	467	0	0	396
31	449		346		1,115		753	753		0		435
Total	4,617	1,623	6,410	9,958	8,467	19,246	11,231	21,244	22,435	5,124	0	5,208
Average	149	58	207	332	273	642	362	685	748	165	0	168
Min	10	6	0	0	18	238	23	310	362	0	0	0
Max	502	286	626	683	1,135	1,086	933	1,137	1,081	661	0	705
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) - 2010 Monthly Production (Summary)

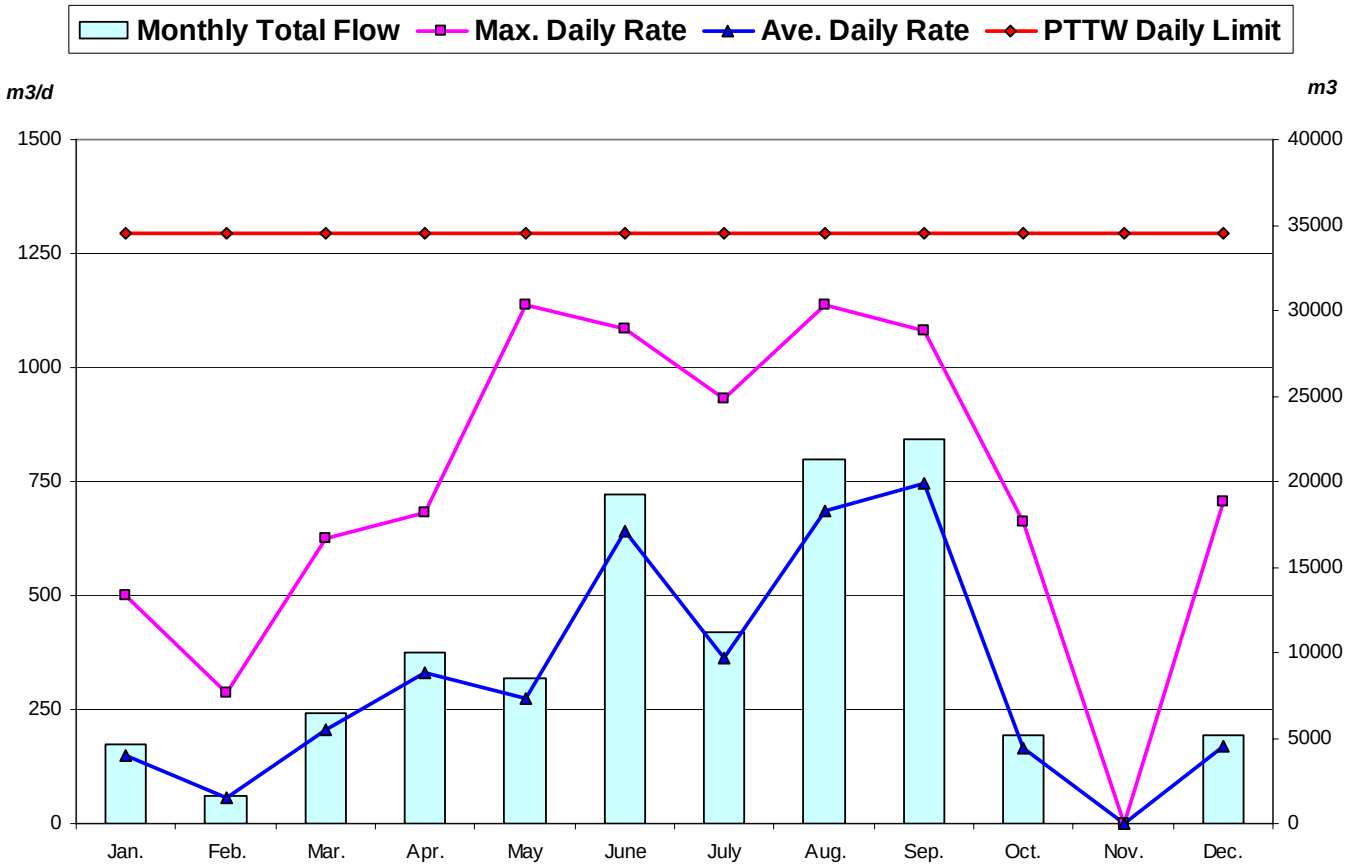

Table 3-6: Carlisle DWS (FDC05) - 2010 Monthly Production (Summary)

FDC05	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m^3	4,617	1,623	6,410	9,958	8,467	19,246	11,231	21,244	22,435	5,124	0	5,208
Avg.	m^3/d	149	58	207	332	273	642	362	685	748	165	0	168
Max	m^3/d	502	286	626	683	1,135	1,086	933	1,137	1,081	661	0	705
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 DRINKING WATER SYSTEM (DWS)

4.1 Operational Upgrades - 2010

In 2010, the following project was initiated:

- Construction of Freelton Water Supply System Upgrades

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

4.2 Future Upgrades – 2011

In 2011 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

The following AWQIs were reported to MOE SAC and PHS.

Notification Date	Location of Adverse	AWQI	Resolution
2010-06-08	FDF01 (Treated)	Sodium = 54.0 mg/L	The adverse location was resampled. The result was not acceptable. The adverse was confirmed. Residents were mailed a letter, written by Public Health Services, about sodium. Public Health was given a list of addresses to which the letters were mailed.

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.

There were no water takings from the Freelton FDF02 well in 2010.

Table 4-1: Freelton DWS (FDF01) - 2010 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	218	279	172	423	52	711	687	75	665	639	10	678
2	656	8	626	623	595	740	10	700	658	63	503	346
3	582	367	614	577	605	717	486	689	350	14	730	74
4	7	629	472	0	138	399	706	683	19	421	418	194
5	282	380	16	363	356	172	708	370	438	638	12	687
6	643	8	392	488	613	703	708	372	670	605	384	423
7	131	277	619	513	504	195	682	688	660	32	454	10
8	12	505	78	618	11	379	548	381	128	344	460	402
9	529	623	37	106	289	688	699	353	396	645	16	672
10	639	117	594	244	625	234	688	683	660	307	398	344
11	267	276	617	400	617	432	279	677	635	11	584	155
12	16	600	89	455	608	353	405	41	271	325	16	32
13	353	14	13	388	601	9	686	447	380	639	402	369
14	538	450	576	348	49	340	678	691	647	380	679	671
15	559	487	633	258	248	704	674	688	375	8	14	329
16	307	13	125	614	635	690	35	683	61	390	19	10
17	21	240	286	579	631	29	529	681	660	632	426	329
18	352	596	371	14	623	226	692	644	647	101	724	678
19	632	422	8	279	613	703	645	670	170	343	54	462
20	79	34	486	627	120	687	13	670	238	629	431	14
21	11	379	632	579	437	310	392	485	651	18	400	169
22	384	586	417	355	632	11	698	12	233	220	19	672
23	634	468	15	601	625	461	683	344	408	636	461	481
24	623	4	341	339	626	689	347	655	641	287	557	27
25	12	330	626	400	632	289	18	355	277	24	24	322
26	168	617	226	595	628	368	495	380	12	491	370	670
27	631	79	28	290	569	688	694	614	623	626	616	384
28	428	11	467	302	638	111	318	667	635	220	228	105
29	9		626	607	647	314	334	423	41	327	14	401
30	308		362	601	737	669	689	378	340	511	270	670
31	630		10		789		349	669		12		298
Total	10,659	8,802	10,575	12,589	15,493	13,023	15,575	15,868	12,591	10,538	9,693	11,080
Average	344	314	341	420	500	434	502	512	420	340	323	357
Min	7	4	8	0	11	9	10	12	12	8	10	10
Max	656	629	633	627	789	740	708	700	670	645	730	687
PTTW limit	878	878	878	878	878	878	878	878	878	878	878	878

Figure 4-1: Freelton DWS (FDF01) - 2010 Monthly Production (Summary)

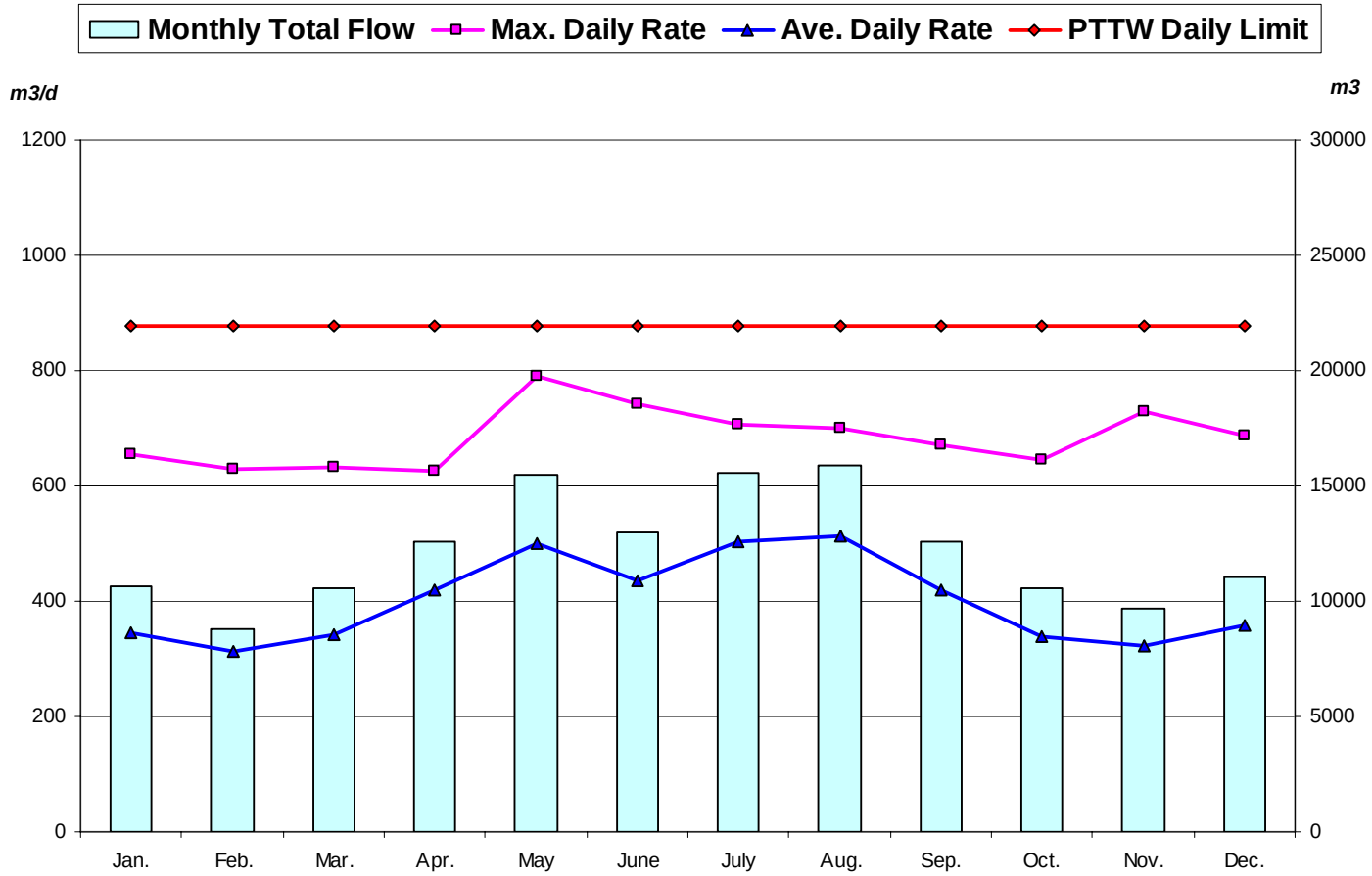

Table 4-2: Freelton DWS (FDF01) - 2010 Monthly Production (Summary)

FDF01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m^3	10,659	8,802	10,575	12,589	15,493	13,023	15,575	15,868	12,591	10,538	9,693	11,080
Avg,	m^3/d	344	314	341	420	500	434	502	512	420	340	323	357
Max	m^3/d	656	629	633	627	789	740	708	700	670	645	730	687
PTTW	m^3/d	878	878	878	878	878	878	878	878	878	878	878	878

5 GREENSVILLE DRINKING WATER SYSTEM (DWS)

5.1 Operational Upgrades – 2010

In 2010 no projects were initiated.

5.2 Future Upgrades – 2011

In 2011 no projects have been scheduled.

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
2010-03-01	FDG01 (Treated)	Free Chlorine Residual was below the required CT value for disinfection	The chlorination system was repaired. The chlorine contact chamber was flushed and chlorine was restored to acceptable levels.
2010-03-01	FDG01 (Treated)	Free Chlorine Residual was below the required CT value for disinfection	The chlorine contact chamber was flushed and chlorine was restored to acceptable levels.
2010-06-04	Sample Station B	Dichloromethane = 63 ug/L	The adverse location was resampled. The result was acceptable. The adverse was not confirmed. The abnormal result was not associated with the drinking water system. Instead, it was contamination of the sample containers.
2010-06-08	FDG01 (Treated)	Sodium = 120 mg/L	The adverse location was resampled. The result was not acceptable. The adverse was confirmed. Residents

			were mailed a letter, written by Public Health Services, about sodium. Public Health was given a list of addresses to which the letters were mailed.

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) - 2010 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	35	30	36	29	35	40	43	46	54	42	29	29
2	36	27	37	35	49	34	48	48	45	35	31	28
3	37	26	32	35	32	30	49	36	46	43	29	28
4	34	27	31	37	36	29	55	48	43	33	29	29
5	32	28	29	34	41	39	63	41	42	31	29	34
6	29	34	33	29	29	35	73	48	48	33	35	31
7	31	37	40	29	25	33	54	54	44	33	36	28
8	31	28	32	29	31	32	82	55	37	38	31	26
9	35	25	30	31	38	29	60	41	33	40	31	26
10	35	29	30	42	34	29	73	32	36	43	30	27
11	30	30	34	41	28	38	47	36	41	42	29	31
12	29	30	29	28	30	35	41	48	42	36	28	33
13	29	34	34	24	32	39	38	40	34	35	29	29
14	29	31	31	29	27	34	30	51	43	33	36	32
15	29	33	32	29	41	33	32	63	38	31	34	29
16	34	30	27	31	51	35	41	60	40	35	29	29
17	35	31	29	29	33	34	35	45	32	35	30	35
18	28	32	26	42	35	40	41	47	40	28	32	39
19	29	29	29	30	38	52	28	47	38	29	32	35
20	30	34	29	29	40	54	35	60	35	29	35	37
21	29	39	37	30	53	37	48	43	34	26	38	41
22	29	29	29	30	49	33	40	39	31	28	30	32
23	30	29	27	28	47	31	36	38	32	41	29	37
24	35	24	26	35	53	48	35	30	36	37	30	44
25	29	31	32	35	41	42	34	35	44	29	30	38
26	28	28	29	28	81	41	31	46	37	27	29	37
27	30	40	52	29	96	62	40	40	34	29	34	37
28	31	33	42	35	60	35	37	49	33	31	36	33
29	29		29	35	72	34	34	59	47	32	30	33
30	35		30	41	89	48	32	54	63	37	28	36
31	37		32		50		40	55		39		40
Total	980	856	997	969	1,395	1,133	1,376	1,434	1,202	1,058	938	1,020
Average	32	31	32	32	45	38	44	46	40	34	31	33
Min	28	24	26	24	25	29	28	30	31	26	28	26
Max	37	40	52	42	96	62	82	63	63	43	38	44
PTTW limit	197	197	197	197	197	197	197	197	197	197	197	197

Figure 5-1: Greensville DWS (FDG01) - 2010 Monthly Production (Summary)

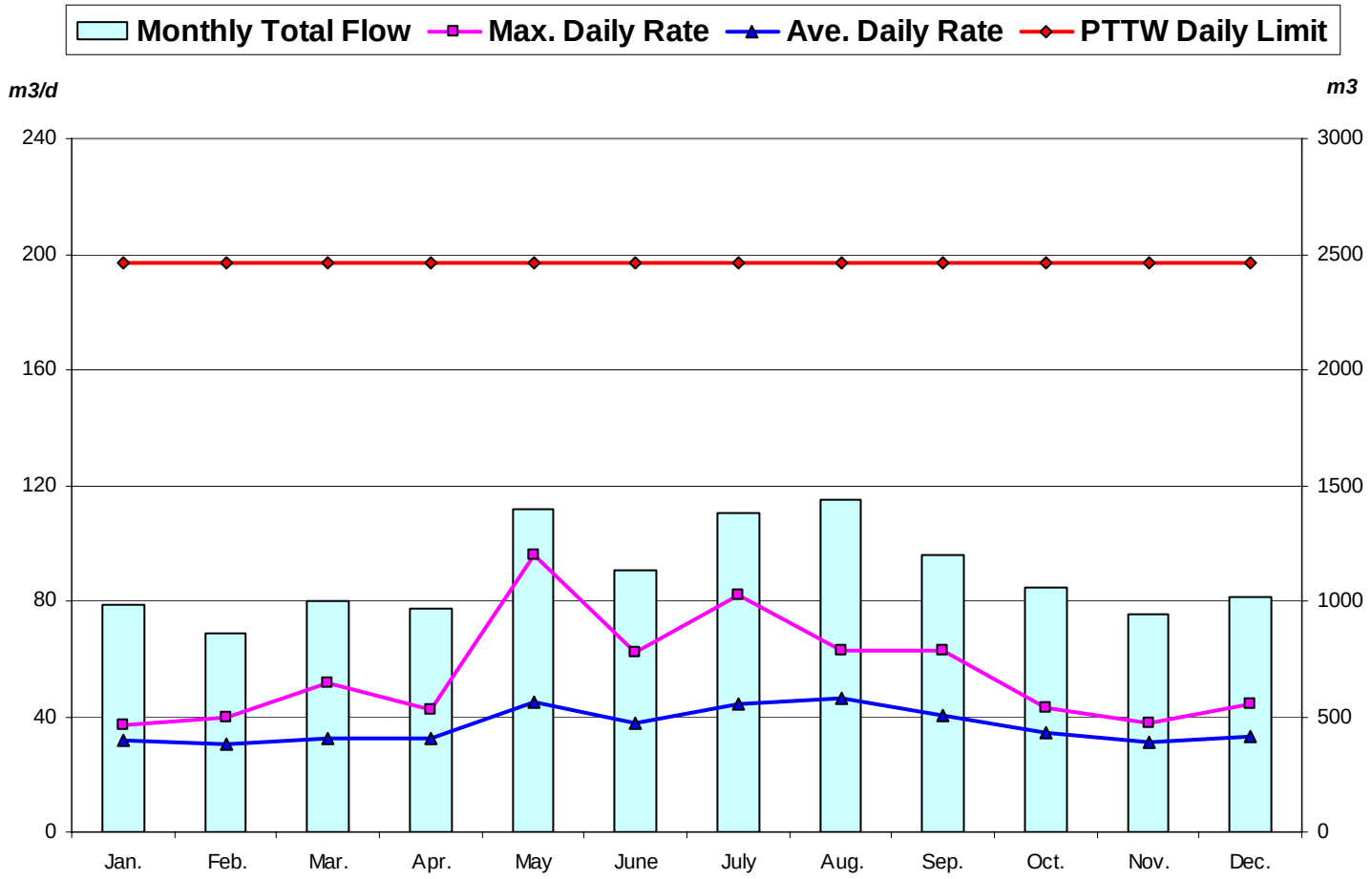

Table 5-2: Greensville DWS (FDG01) - 2010 Monthly Production (Summary)

FDG01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m^3	980	856	997	969	1,395	1,133	1,376	1,434	1,202	1,058	938	1,020
Average	m^3/d	32	31	32	32	45	38	44	46	40	34	31	33
Maximum	m^3/d	37	40	52	42	96	62	82	63	63	43	38	44
PTTW	m^3/d	197	197	197	197	197	197	197	197	197	197	197	197

6 LYNDEN DRINKING WATER SYSTEM (DWS)

6.1 Operational Upgrades – 2010

In 2010 no projects were initiated.

6.2 Future Upgrades – 2011

In 2011 no projects have been scheduled.

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
2010-06-04	Sample Station A	Dichloromethane = 204 ug/L	The adverse location was resampled. The result was acceptable. The adverse was not confirmed. The abnormal result was not associated with the drinking water system. Instead, it was contamination of the sample containers.
2010-06-08	FDL01 (Treated)	Sodium = 58.0 mg/L	The adverse location was resampled. The result was not acceptable. The adverse was confirmed. Residents were mailed a letter, written by Public Health Services, about sodium. Public Health was given a list of addresses to which the letters were mailed.

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) - 2010 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	77	57	60	67	68	78	103	78	81	71	70	59
2	88	61	58	69	86	102	118	92	54	55	58	54
3	73	60	63	78	82	89	132	72	71	63	57	60
4	63	60	64	67	71	70	148	89	78	62	60	62
5	69	67	61	72	99	98	145	68	55	54	62	65
6	66	62	67	66	68	72	158	68	85	54	72	53
7	67	73	61	67	69	83	108	99	84	72	73	53
8	63	60	62	69	73	106	110	79	57	49	72	60
9	79	61	60	59	75	64	86	69	60	62	54	61
10	77	60	56	71	90	96	78	97	81	69	65	62
11	73	59	57	83	63	73	96	60	82	65	53	82
12	64	57	63	63	71	105	89	79	60	73	72	77
13	60	71	65	69	73	75	71	87	74	56	63	68
14	65	62	64	62	61	101	113	87	54	58	68	72
15	56	69	63	59	92	78	121	63	70	59	61	88
16	65	58	63	56	100	92	71	74	54	74	55	70
17	59	61	60	70	114	80	91	84	68	56	63	82
18	68	62	59	69	84	96	72	67	75	70	56	79
19	63	71	53	73	94	123	77	67	60	52	67	87
20	60	69	62	62	110	103	83	86	67	60	67	61
21	61	90	66	63	73	107	68	85	54	64	67	80
22	59	61	60	80	86	87	82	78	72	59	52	92
23	60	60	57	73	74	103	67	59	59	78	66	67
24	61	60	66	72	143	73	86	75	73	75	57	79
25	56	60	62	66	121	98	61	58	59	75	60	55
26	60	58	61	60	92	110	87	76	74	55	69	81
27	59	61	74	68	135	81	83	81	57	65	60	73
28	60	84	70	65	138	79	62	70	69	67	65	71
29	57		76	84	141	100	74	78	52	57	70	63
30	81		67	91	150	93	67	86	58	86	72	68
31	58		64		86		81	83		59		66
Total	2,027	1,798	1,942	2,071	2,884	2,713	2,888	2,395	1,997	1,976	1,907	2,152
Average	65	64	63	69	93	90	93	77	67	64	64	69
Min	56	57	53	56	61	64	61	58	52	49	52	53
Max	88	90	76	91	150	123	158	99	85	86	73	92
PTTW limit	327	327	327	327	327	327	327	327	327	327	327	327

Figure 6-1: Lynden DWS (FDL01) - 2010 Monthly Production (Summary)

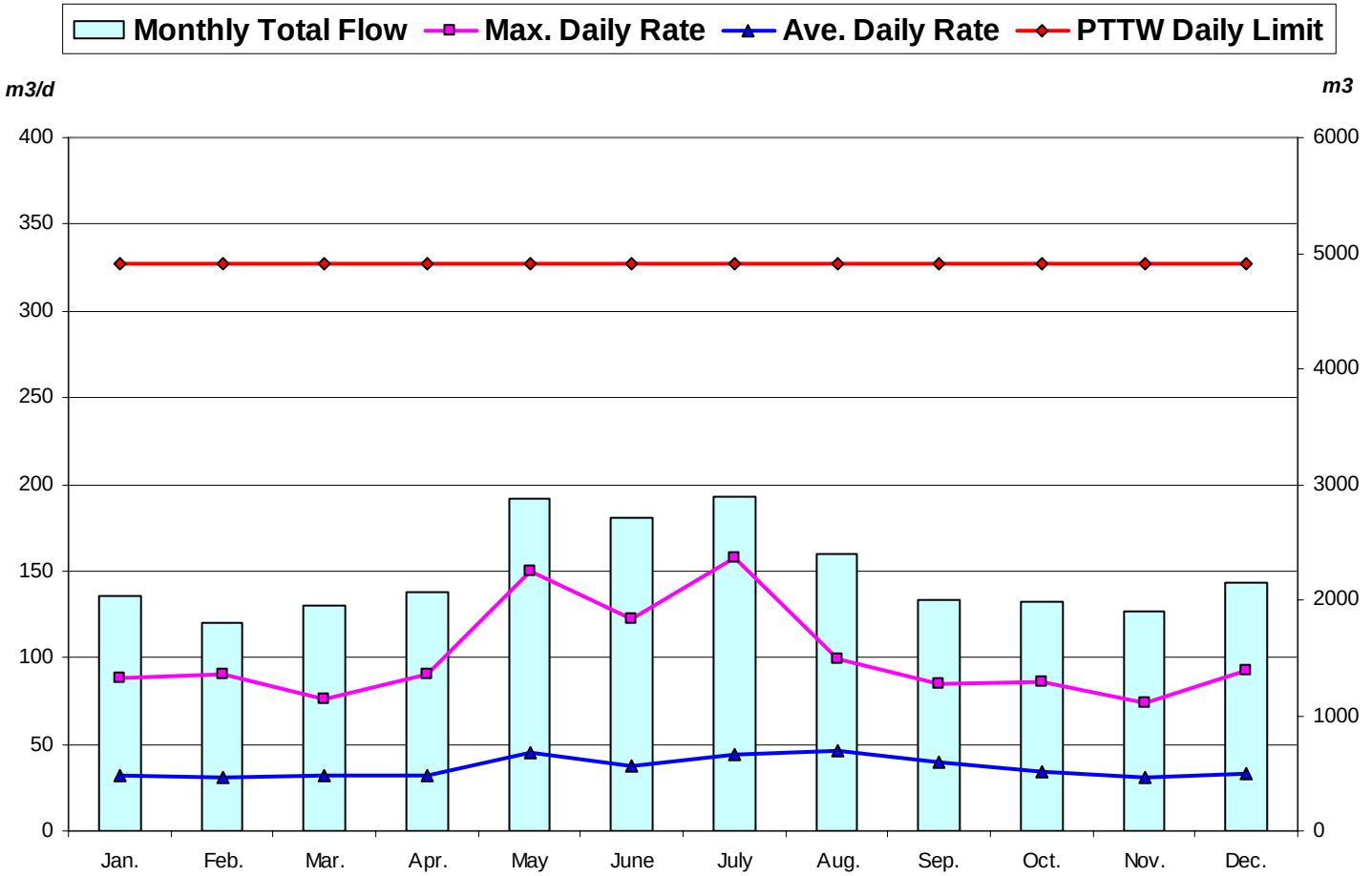

Table 6-2: Lynden DWS (FDL01) - 2010 Monthly Production (Summary)

FDL01	Units	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Total	m^3	2,027	1,798	1,942	2,071	2,884	2,713	2,888	2,395	1,997	1,976	1,907	2,152
Avg.	m^3/d	65	64	63	69	93	90	93	77	67	64	64	69
Max	m^3/d	88	90	76	91	150	123	158	99	85	86	73	92
PTTW	m^3/d	327	327	327	327	327	327	327	327	327	327	327	327

BCOS software tracks the revision history of document.

APPENDIX B
TO REPORT PW11019

City of Hamilton's
Drinking Water Systems

DWQMS SUMMARY REPORT (2010)

Safe Drinking Water Act

Hamilton
Public Works

BCOS
BEYOND COMPLIANCE OPERATING SYSTEM

HamiltOn Water is Life

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1 INTRODUCTION

1.1 Purpose

This Drinking Water Quality Summary (DWQMS) Report is being submitted to Council (Owner) on behalf of Top Management (General Manager, Public Works, Senior Director Environment & Sustainable Infrastructure and Director of Water & Wastewater Operations) of the City's drinking water systems. The purpose of this Drinking Water Quality Management System (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 Operational Plan, which is a requirement under the Safe Drinking Water Act (SDWA), 2002, was endorsed by Council (Owner) on November 12th, 2008 and submitted to Ministry of the Environment (MOE) and the accreditation body (Canadian General Standard Board) for acceptance prior to the January 1st, 2009 legislated deadline.

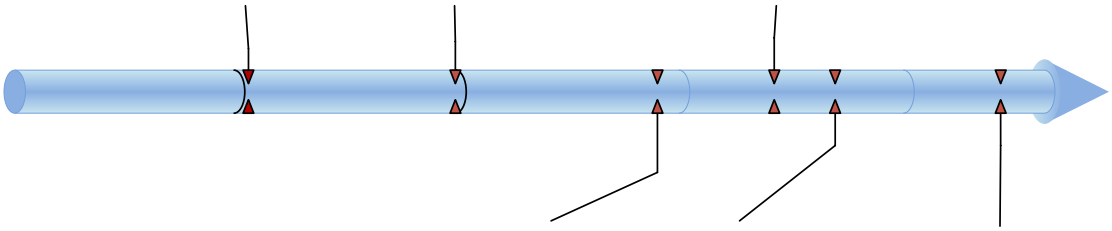
In addition, Municipal Drinking Water Licences and Drinking Water Works Permits (1 Licence and 1 Permit per drinking water system) were received for all five City drinking water systems in June 2009. As a result of the successful completion of the process, the City was one of the first municipalities to become an accredited Operating Authority in Ontario.

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

Figure 1-1 illustrates key DWQMS milestones which occurred in 2010.

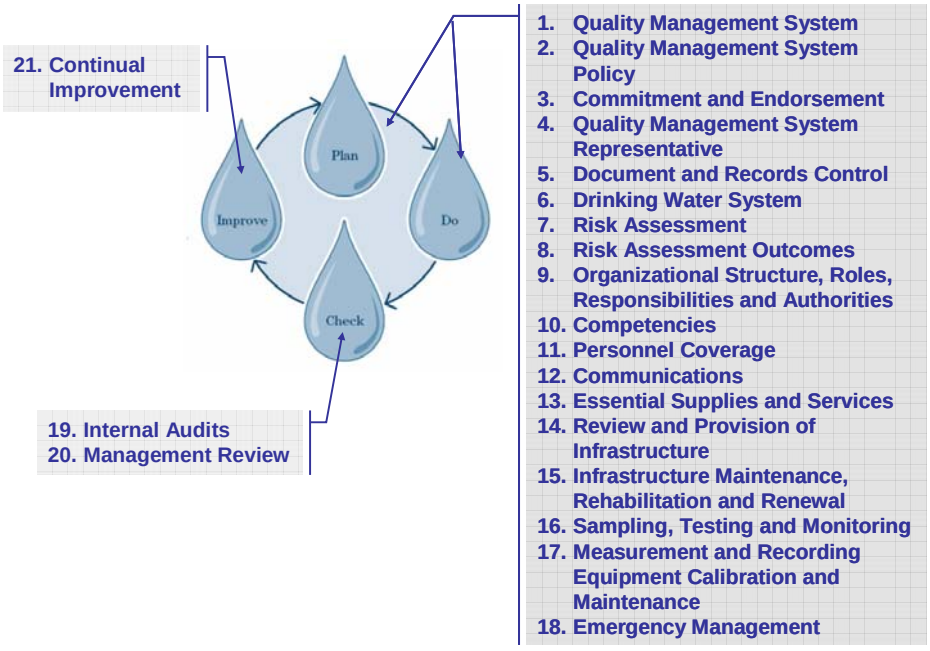
Figure 1-1: Project Pipeline



1.4 DWQMS Operational Summary

The DWQMS was developed in 2007 to 2008 and was implemented and improved since 2009. Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard.

Figure 1-2: DWQMS Standard Elements



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 forwarded to the Ministry of the Environment (MOE) prior to the November 25th, 2010 deadline and the City is awaiting comments from the MOE. 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 will be constructing pipe loops to assess the effectiveness of alternative treatments. The overall schedule for the remaining components of the CCP is:

Year	CCP Task
2011	• Pipe loop testing • Consultation with stakeholders
2011 Onward	• Consultation with the public
2012 – 2014	• Design & construction of preferred CCP system
2014 Onward	• Post implementation monitoring

Amendments to DWS Licences & Permits

The new DWS licences and permits and their amendment process represent a

significant change from the previous Certificate of Approval process. The Compliance Support Group has created a new procedure to define the new process to review and amend the DWS licences and permits including key roles and responsibilities.

Amendments to the City's drinking water systems (DWSs) include the following:

DWS Name	Scope of Amendment
Hamilton DWS – Woodward Sub-System	• Addition of one zebra mussel chlorination distribution system for the 1520 mm intake pipe and refurbishment of the existing 2400 mm intake zebra mussel chlorination distribution system. • New Ferguson Avenue Water Booster Pumping Station. • Upgrades to High Lift Pumping Station (approval pending). • Replacement of Woodward Avenue Treatment Plant Fluoride Building (approval pending).
Freelton DWS	• New building for FDF01, decommissioning of FDF02 and construction of FDF03.

2 RISK ASSESSMENT

2.1 Overview

The DWQMS Standard requires that the Risk Assessment be reviewed on an annual basis to verify the currency and validity of the information.

Staff from across the ESI Division, met in the fall of 2010 to review existing risk assessment information and provide updates as required. The review considered the following key questions:

- Are identified control measures still valid?
- Are the listed controls still in place?
- Have additional controls been implemented?
- Is the risk evaluation still valid?
- Have changes in equipment condition, raw water quality, etc. augmented the risk?
- Have newly-implemented controls or operational changes lessened the risk?
- Are any modified "Risk Factors" now considered to be Critical Control Risks?

2.2 Key Updates

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

Horizontal	Vertical
• Existing preventative flushing processes in the Woodward DWS were identified and added to the monitoring and response procedures where applicable. Proactive flushing occurs when combined chlorine is <0.5 mg/L and continues until 2x CCP (1 mg/L) limit is achieved. • New preventative flushing processes in the well based DWSs and 50 Road DWS were added to the monitoring and response procedures where applicable. Proactive flushing occurs when free chlorine is <0.25 mg/L and continues until 2x CCP (0.5 mg/L) limit is achieved. • New Backflow By-law that is now in effect. • Planned Woodward Water Treatment Plant (WTP) power expansion planned for 2012 - 2019). • New backup power plug-ins at Wells and the three portable generators. • Extended timeframe (2011) for the Ferguson upgrade project. • New watermain acceptance document. • New WWW-Engineering pressure release valve inspection process. • New Waterdown Tower.	• Woodward/Greenhill transmission main assessment that was conducted as well as the first phase of the pipe assessment. • Greenhill and Ferguson PS Risk Assessments' that were complete in 2010. • Contingency plan that developed for the Ferguson PS. • Well systems that use cartridge filters have stricter turbidity limits. • Pumping stations have standby power and that there are three new back up portable generators. • Assessment Reports for the Wellhead Protection Areas to be approved in 2011. • Study being conducted by I&SWP to improve drainage at the Lynden Well. • Freelton's back up well (FDF02) will be decommissioned in 2011. • The treatment for hydrogen sulphide may result in lead precipitate. • Upgrades to chlorine gas and rail lines are planned for 2011. • Refurbishment of the Low Lift Pumping Station. • Critical Control Limits and monitoring procedures added related to the new automated backwash system installed in 2009. • Updated to include status of construction project for filter building. • Provision of emergency power for Woodward WTP being planned.

As per the requirements of the DWQMS Standard, the risk assessment will be re-done in 2011.

3 REVIEW AND OF PROVISION 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 (2010) 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 April 2010 and September 2010 to discuss vertical and horizontal infrastructure respectively and a coordination meeting was held in September 2010.

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	• 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)

Infrastructure Type	Input Data
	• Condition Assessments
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

3.3 Overview of Results

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 2010 infrastructure review it can be concluded that infrastructure is available, maintained, and improved when necessary.

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. CGSB conducted the on-site Verification Audit in early February 2011. Based on preliminary findings subject to review by CGSB, the auditor recommended that the City's Operating Authority receive full accreditation once corrective actions have been completed. The SMR with assistance from the Compliance Support Group will communicate the results of the CGSB audit to Mayor and Council via a Council Update Report in the Spring of 2011.

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.

Internal Audit Team

The Operating Authority has an internal audit team roster of over 18 water and wastewater staff of the ESI Division. Audit Team members have undertaken DWQMS or quality auditing training to ensure competency with the DWQMS Standard and the auditing process.

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 2010 Audit

The Internal Audit Team conducted a full internal audit in November 2010. The fall 2009 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 29th, 2011,
- Closing meeting – Tuesday November 16th, 2011.

The SMR and Lead Auditor (Senior Regulatory Coordinator) met to discuss the findings; and to review the Opportunities For Improvement (OFI) and their approval or rejection. The DWQMS Audit findings were communicated as follows:

- Findings Summary Table forwarded to the SMT and our BCOS Lead Team to identify delegates for the root cause investigations,
- DWQMS Audit Report circulated to Top Management, SMT, BCOS Lead Team and auditors (January 2011).

The non-conformances (NCs) 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.

2011 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2011 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 action items including responsibilities and timelines,
- Report the results of the management review to the Owner.

The first DWQMS Top Management Review meeting was held on December 2nd, 2009. The action items associated with that meeting, as documented in the DWQMS Summary Report (2009), have all been closed. In 2010, the DWQMS Top Management Review was held on December 7th. Attendees included Top Management (General Manager of Public Works, Senior Director of the ESI Division and Director of Water and Wastewater Operations), SMT, Systems Management Representative (SMR) and representatives from the Compliance Support Group.

Management Review Action Items

Table 4-1 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 4-1.

Table 5-1: Management Review Outcomes

Summary of Action Items	Due Date	Responsible Party
Provide Compliance Support Group with regular updates (print outs) of the Project Charter Summary.	Early 2011	WWW-Engineering
Log MOE Inspection Best Practices (as well as non-compliances) in the BCOS Database including rationale if rejected or accepted.	Early 2011	Compliance Support Group (CSG)
Work with sections to identify and 'flag' key DWQMS projects for tracking in the MS Project Share Database.	June 2011	CSG
Review 2008 Geosmin data - one instance where treated results reported were higher than raw.	June 2011	CSG & Environmental Laboratory
Close action items in BCOS Database for issues discussed and resolved at TMR meeting.	Completed January 2011	CSG

Summary of Action Items	Due Date	Responsible Party
Review the EWLD (Lead Sampling) service requests for 2010. Action Update - Items were coded incorrectly. All but 3 are hydrant flushing for the lead sampling, 2 are size and types and one is a leaking service. Customer Service & Community Outreach have recoded entries.	May 2011	Customer Service & Community Outreach
Review operational performance indicators for use in 2011 Top Management Review Meeting.	December 2011	CSG
Develop a business plan for the Training Database and related software role-out.	May 2011	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

A 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 2011 include the following:

Month of 2011	Scheduled DWQMS Milestones
February	• CGSB On-Site Verification Audit
March	• Investigate and correct Verification Audit Findings • First SMT Meeting of 2011
April	• DWQMS Auditor Training for new recruits • Root Cause Investigation Training for Audit Team • Council Update Report – Results of Verification Audit
May	• Infrastructure Review Meetings

Month of 2011	Scheduled DWQMS Milestones
June	• 2nd SMT Meeting
September	• Risk Assessment Review Meetings
October	• DWQMS Internal Audit
December	• DWQMS Top Management Review - 3rd SMT Meeting

BCOS software tracks the revision history of document.