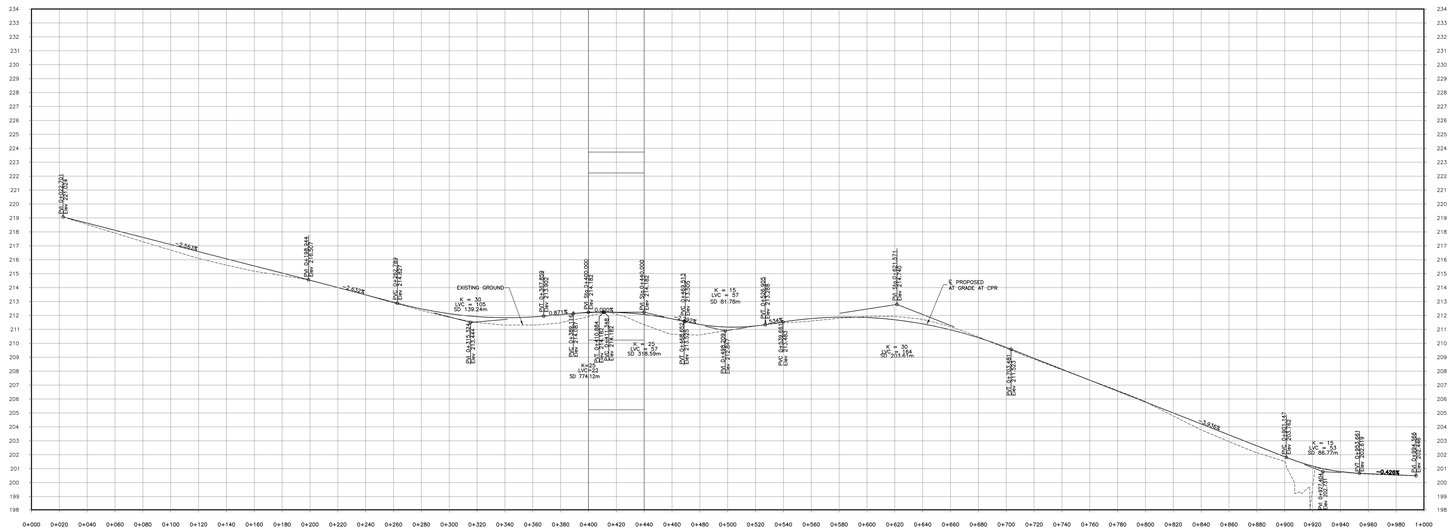
APPENDIX

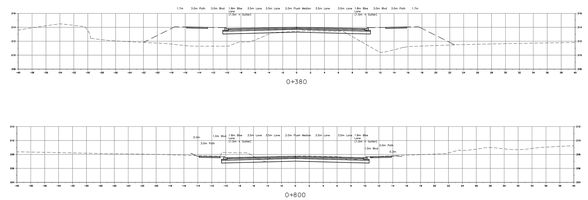
G HYDROGEOLOGY REPORT

APPENDIX

C CONCEPTUAL ROAD ALIGNMENT DESIGN DRAWINGS

STEELES AVENUE W





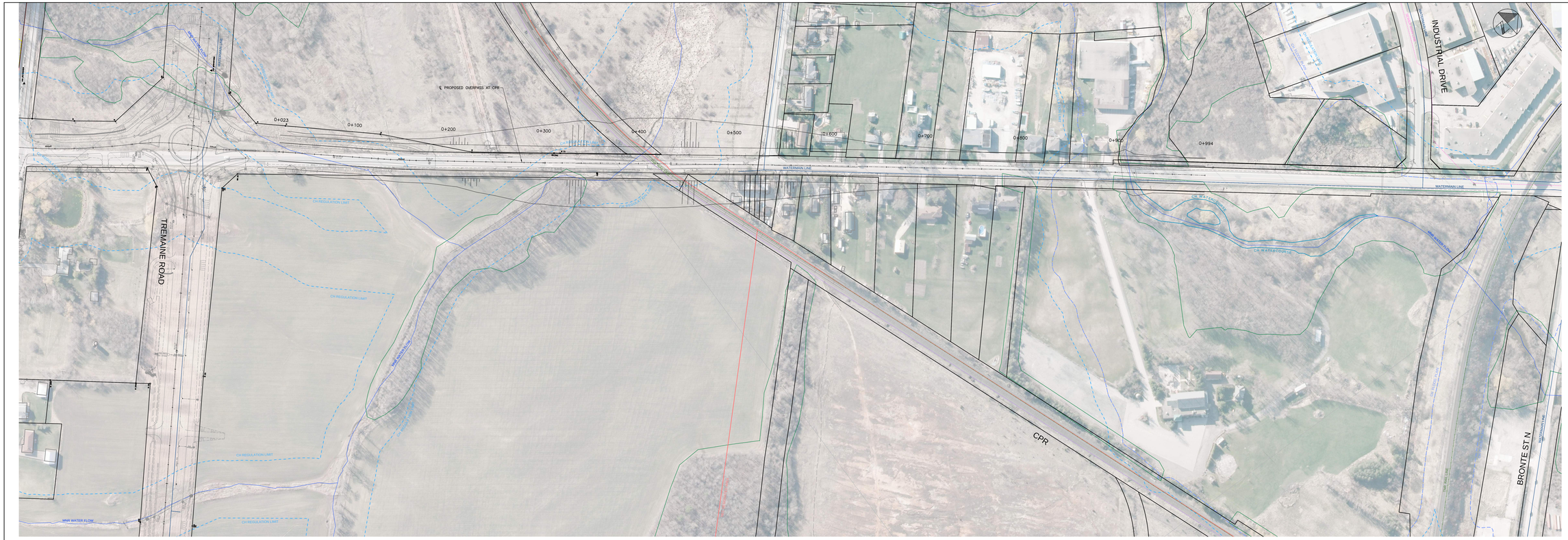
TYPICAL SECTIONS AT GRADE

wsp

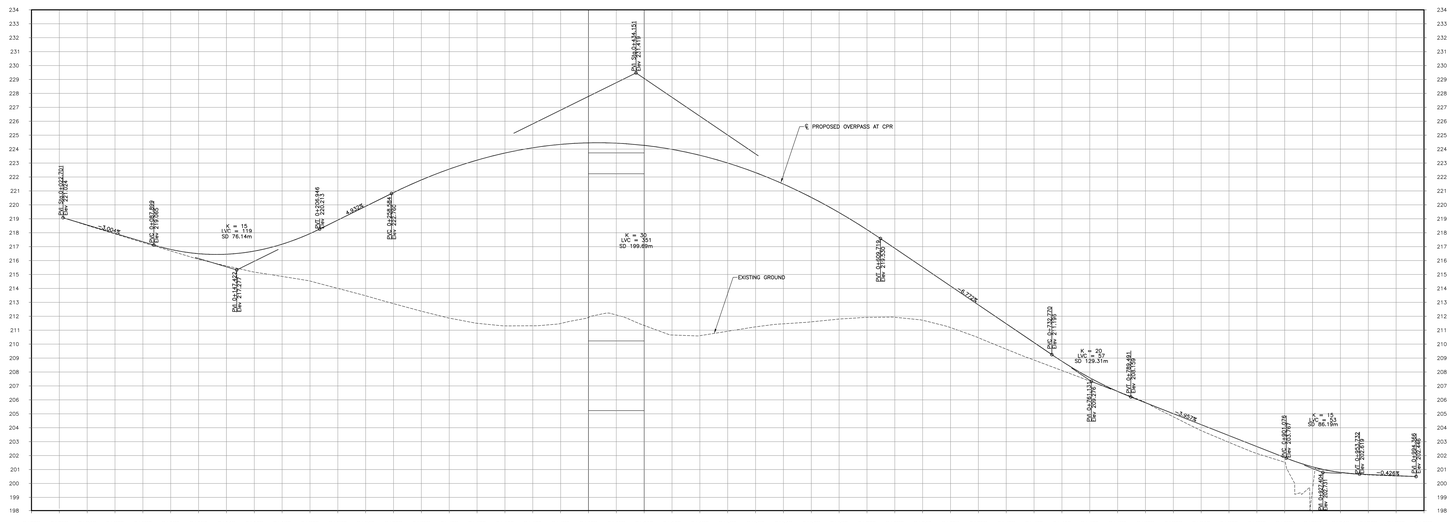
Halton REGION

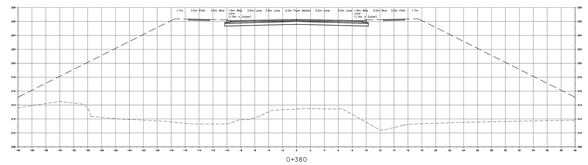
STEELES AVENUE
OPTION 1 AT GRADE
PLAN AND PROFILE

DATE:	SCALE:	DWG No.:
NOVEMBER, 2017	1:1000	



STEELES AVENUE W





TYPICAL SECTIONS OVERPASS

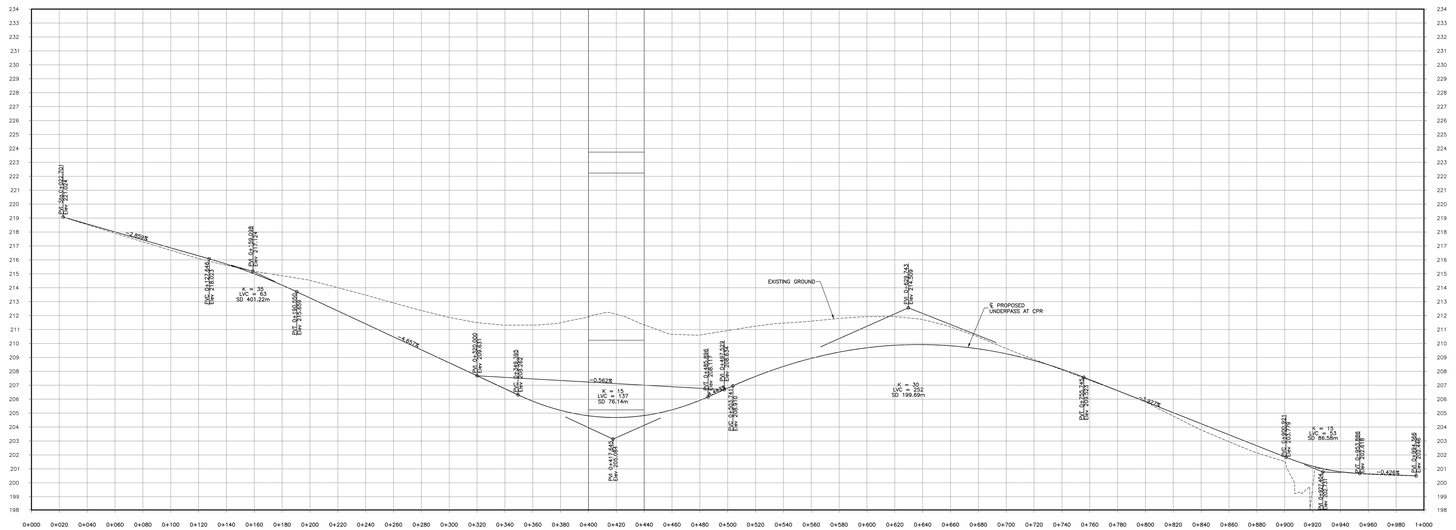
wsp

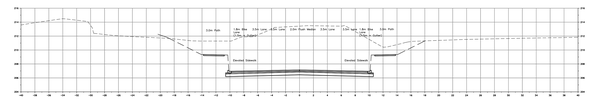
Halton REGION

STEELES AVENUE
OPTION 1 OVERPASS
PLAN AND PROFILE

DATE:	SCALE:	DWG No.:
NOVEMBER, 2017	1:1000	

STEELES AVENUE W





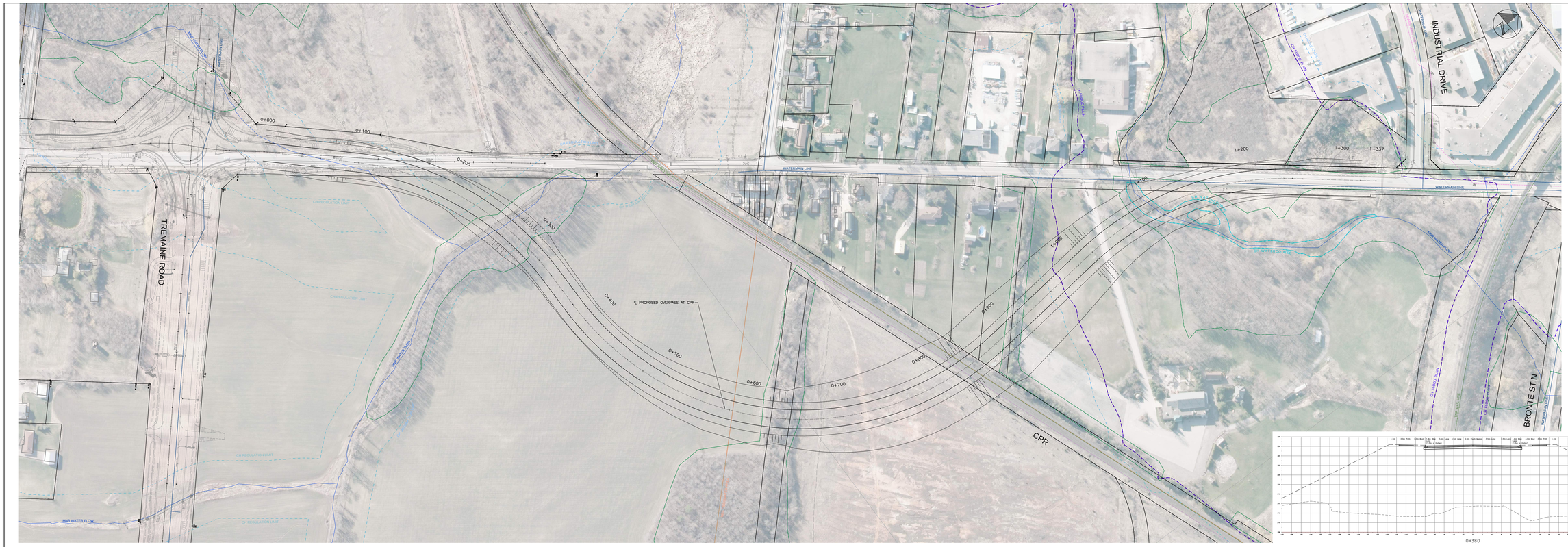
TYPICAL SECTIONS UNDERPASS

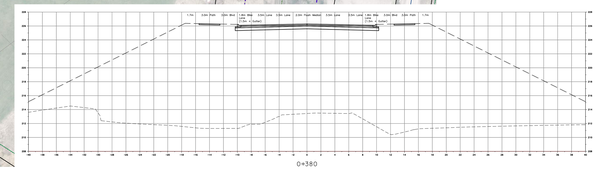
wsp

Halton REGION

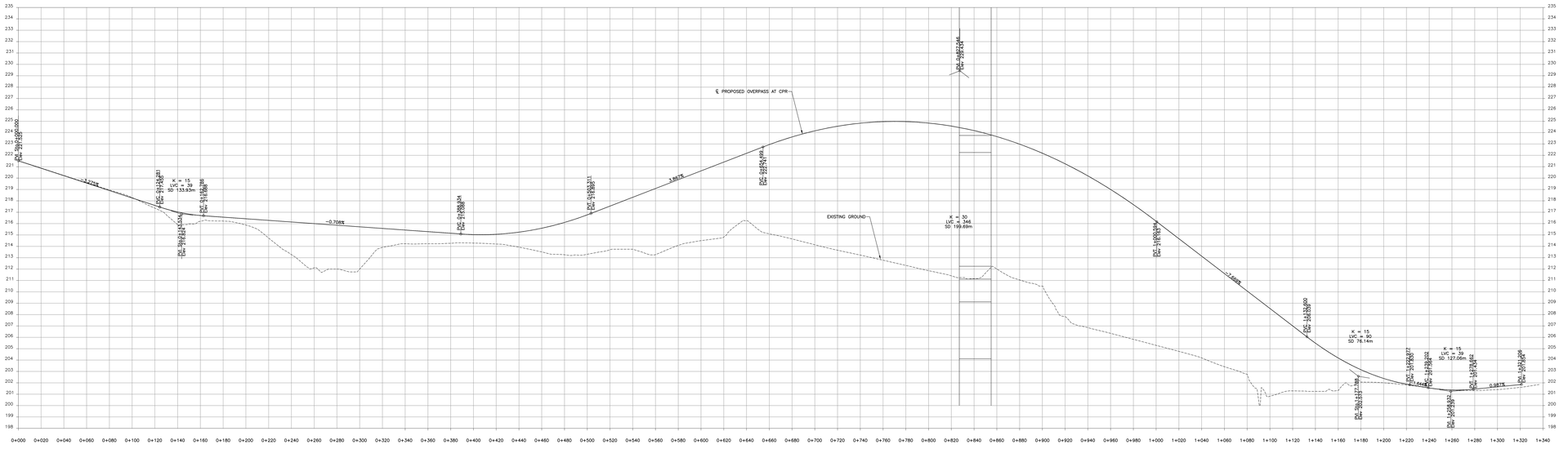
STEELES AVENUE OPTION 1 UNDERPASS PLAN AND PROFILE

DATE:	SCALE:	DWG No.:
NOVEMBER, 2017	1:1000	





STEELES AVENUE W



TYPICAL SECTIONS OVERPASS

WSP

Halton REGION

STEELES AVENUE
OPTION 2 OVERPASS
PLAN AND PROFILE

DATE:	SCALE:	DWG. No.:
NOVEMBER, 2017	1:1000	

APPENDIX

D WATER QUALITY CERTIFICATES OF ANALYSIS

Maxxam
A Bureau Veritas Group Company

Your Project #: 17M-00979
Your C.O.C. #: 110700

Attention:Peter Van Driel

WSP Canada Group Limited
582 Lancaster St W
Kitchener, ON
Canada N2K 1M3

Report Date: 2017/12/11
Report #: R4906165
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7R2512
Received: 2017/12/01, 18:32

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dissolved Aluminum (0.2 u, clay free)	2	N/A	2017/12/07	CAM SOP-00447	EPA 6020B m
Alkalinity	2	N/A	2017/12/06	CAM SOP-00448	SM 22 2320 B m
1,3-Dichloropropene Sum	2	N/A	2017/12/08		EPA 8260C m
Chromium (VI) in Water	2	N/A	2017/12/08	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	2	N/A	2017/12/07	CAM SOP-00457	OMOE E3015 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2017/12/05	CAM SOP-00446	SM 22 5310 B m
Dissolved Oxygen	2	2017/12/05	2017/12/05	CAM SOP-00427	SM 22 4500 O G m
Petroleum Hydrocarbons F2-F4 in Water (2)	2	2017/12/06	2017/12/07	CAM SOP-00316	CCME PHC-CWS m
Hardness (calculated as CaCO3)	2	N/A	2017/12/06	CAM SOP 00102/00408/00447	SM 2340 B
Mercury	1	2017/12/06	2017/12/07	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	2	N/A	2017/12/08	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	2	N/A	2017/12/08	CAM SOP-00441	EPA GS I-2522-90 m
pH	2	N/A	2017/12/06	CAM SOP-00413	SM 4500H+ B m
Field pH (3)	2	N/A	2017/12/06		Field pH Meter
Field Temperature (3)	2	N/A	2017/12/06		Field Thermometer
Total Phosphorus (Colourimetric)	2	2017/12/07	2017/12/07	CAM SOP-00407	SM 22 4500 P B H m
Turbidity	2	N/A	2017/12/06	CAM SOP-00417	SM 22 2130 B m
Un-ionized Ammonia	2	2017/12/05	2017/12/11		
Volatile Organic Compounds and F1 PHCs	2	N/A	2017/12/07	CAM SOP-00230	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 17M-00979
Your C.O.C. #: 110700

Attention:Peter Van Driel

WSP Canada Group Limited
582 Lancaster St W
Kitchener, ON
Canada N2K 1M3

Report Date: 2017/12/11
Report #: R4906165
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7R2512
Received: 2017/12/01, 18:32

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(3) This is a field test, therefore, the results relate to items that were not analysed at Maxxam Analytics Inc.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ashton Gibson, Project Manager
Email: AGibson@maxxam.ca
Phone# (905) 817-5700

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

RESULTS OF ANALYSES OF WATER

Maxxam ID			FRF349			FRF349		FRF350		
Sampling Date			2017/12/01 16:30			2017/12/01 16:30		2017/12/01 17:00		
COC Number			110700			110700		110700		
	UNITS	Criteria	CREEK NW-1-E	RDL	QC Batch	CREEK NW-1-E Lab-Dup	QC Batch	16MI6 CK.	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	-	380	1.0	5299321			310	1.0	5299321
Total Un-ionized Ammonia	mg/L	-	0.0005	0.0005	5299322			<0.0012	0.0012	5299322
Field Measurements										
Field Temperature	Celcius	-	5.8	N/A	ONSITE			4.9	N/A	ONSITE
Field pH	pH	**6.5:8.5**	7.70		ONSITE			8.19		ONSITE
Inorganics										
Total Ammonia-N	mg/L	-	0.062	0.050	5304422			<0.050	0.050	5304422
Dissolved Organic Carbon	mg/L	-	2.4	0.50	5300276			2.9	0.50	5300276
Dissolved Oxygen	mg/L	-	9.96		5300872	9.98	5300872	10.4		5300872
pH	pH	**6.5:8.5**	7.98		5300379			8.35		5300379
Total Phosphorus	mg/L	**0.01**	**0.013**	0.004	5303684			0.006	0.004	5303684
Turbidity	NTU	-	2.0	0.1	5299670			0.3	0.1	5299670
WAD Cyanide (Free)	ug/L	**5**	<1	1	5302557			<1	1	5302557
Alkalinity (Total as CaCO3)	mg/L	-	270	1.0	5300364			260	1.0	5300364

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

RESULTS OF ANALYSES OF WATER

Maxxam ID			FRF350		
Sampling Date			2017/12/01 17:00		
COC Number			110700		
	UNITS	Criteria	16MI6 CK. Lab-Dup	RDL	QC Batch
Inorganics					
Turbidity	NTU	-	0.3	0.1	5299670

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			FRF349			FRF349			FRF350		
Sampling Date			2017/12/01 16:30			2017/12/01 16:30			2017/12/01 17:00		
COC Number			110700			110700			110700		
	UNITS	Criteria	CREEK NW-1-E	RDL	QC Batch	CREEK NW-1-E Lab-Dup	RDL	QC Batch	16MI6 CK.	RDL	QC Batch
Metals											
Dissolved (0.2u) Aluminum (Al)	ug/L	**15**	<5	5	5300092	<5	5	5300092	<5	5	5300092
Chromium (VI)	ug/L	**1**	<0.50	0.50	5302731				<0.50	0.50	5302731
Mercury (Hg)	ug/L	**0.2**							<0.1	0.1	5302130
Total Antimony (Sb)	ug/L	**20**	<0.50	0.50	5304170				<0.50	0.50	5304170
Total Arsenic (As)	ug/L	**100**	<1.0	1.0	5304170				<1.0	1.0	5304170
Total Beryllium (Be)	ug/L	**11**	<0.50	0.50	5304170				<0.50	0.50	5304170
Total Boron (B)	ug/L	**200**	77	10	5304170				30	10	5304170
Total Cadmium (Cd)	ug/L	**0.2**	<0.10	0.10	5304170				<0.10	0.10	5304170
Total Chromium (Cr)	ug/L	**-**	<5.0	5.0	5304170				<5.0	5.0	5304170
Total Cobalt (Co)	ug/L	**0.9**	<0.50	0.50	5304170				<0.50	0.50	5304170
Total Copper (Cu)	ug/L	**5**	<1.0	1.0	5304170				<1.0	1.0	5304170
Total Iron (Fe)	ug/L	**300**	**370**	100	5304170				<100	100	5304170
Total Lead (Pb)	ug/L	**5**	<0.50	0.50	5304170				<0.50	0.50	5304170
Total Molybdenum (Mo)	ug/L	**40**	2.8	0.50	5306476				0.86	0.50	5306476
Total Nickel (Ni)	ug/L	**25**	<1.0	1.0	5304170				<1.0	1.0	5304170
Total Selenium (Se)	ug/L	**100**	<2.0	2.0	5304170				<2.0	2.0	5304170
Total Silver (Ag)	ug/L	**0.1**	<0.10	0.10	5304170				<0.10	0.10	5304170
Total Thallium (Tl)	ug/L	**0.3**	<0.050	0.050	5304170				<0.050	0.050	5304170
Total Tungsten (W)	ug/L	**30**	<1.0	1.0	5304170				<1.0	1.0	5304170
Total Uranium (U)	ug/L	**5**	1.4	0.10	5304170				0.48	0.10	5304170
Total Vanadium (V)	ug/L	**6**	<0.50	0.50	5306476				<0.50	0.50	5304170
Total Zinc (Zn)	ug/L	**30**	<5.0	5.0	5304170				<5.0	5.0	5304170
Total Zirconium (Zr)	ug/L	**4**	<1.0	1.0	5304170				<1.0	1.0	5304170

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID			FRF349	FRF350			FRF350		
Sampling Date			2017/12/01 16:30	2017/12/01 17:00			2017/12/01 17:00		
COC Number			110700	110700			110700		
	UNITS	Criteria	CREEK NW-1-E	16MI6 CK.	RDL	QC Batch	16MI6 CK. Lab-Dup	RDL	QC Batch
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/L	-	<0.50	<0.50	0.50	5298243			
Volatile Organics									
Acetone (2-Propanone)	ug/L	-	<10	<10	10	5300166	<10	10	5300166
Benzene	ug/L	**100**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Bromodichloromethane	ug/L	**200**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Bromoform	ug/L	**60**	<1.0	<1.0	1.0	5300166	<1.0	1.0	5300166
Bromomethane	ug/L	**0.9**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Carbon Tetrachloride	ug/L	**-**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Chlorobenzene	ug/L	**15**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Chloroform	ug/L	**-**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Dibromochloromethane	ug/L	**40**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
1,2-Dichlorobenzene	ug/L	**2.5**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
1,3-Dichlorobenzene	ug/L	**2.5**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
1,4-Dichlorobenzene	ug/L	**4**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Dichlorodifluoromethane (FREON 12)	ug/L	**-**	<1.0	<1.0	1.0	5300166	<1.0	1.0	5300166
1,1-Dichloroethane	ug/L	**200**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
1,2-Dichloroethane	ug/L	**100**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
1,1-Dichloroethylene	ug/L	**40**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
cis-1,2-Dichloroethylene	ug/L	**200**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
trans-1,2-Dichloroethylene	ug/L	**200**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
1,2-Dichloropropane	ug/L	**0.7**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
cis-1,3-Dichloropropene	ug/L	**-**	<0.30	<0.30	0.30	5300166	<0.30	0.30	5300166
trans-1,3-Dichloropropene	ug/L	**7**	<0.40	<0.40	0.40	5300166	<0.40	0.40	5300166
Ethylbenzene	ug/L	**8**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Ethylene Dibromide	ug/L	**5**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Hexane	ug/L	**-**	<1.0	<1.0	1.0	5300166	<1.0	1.0	5300166
Methylene Chloride(Dichloromethane)	ug/L	**100**	<2.0	<2.0	2.0	5300166	<2.0	2.0	5300166
Methyl Ethyl Ketone (2-Butanone)	ug/L	**400**	<10	<10	10	5300166	<10	10	5300166
Methyl Isobutyl Ketone	ug/L	**-**	<5.0	<5.0	5.0	5300166	<5.0	5.0	5300166
Methyl t-butyl ether (MTBE)	ug/L	**200**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Styrene	ug/L	**4**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID			FRF349	FRF350			FRF350		
Sampling Date			2017/12/01 16:30	2017/12/01 17:00			2017/12/01 17:00		
COC Number			110700	110700			110700		
	UNITS	Criteria	CREEK NW-1-E	16MI6 CK.	RDL	QC Batch	16MI6 CK. Lab-Dup	RDL	QC Batch
1,1,1,2-Tetrachloroethane	ug/L	**20**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
1,1,2,2-Tetrachloroethane	ug/L	**70**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Tetrachloroethylene	ug/L	**50**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Toluene	ug/L	**0.8**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
1,1,1-Trichloroethane	ug/L	**10**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
1,1,2-Trichloroethane	ug/L	**800**	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Trichloroethylene	ug/L	**20**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Trichlorofluoromethane (FREON 11)	ug/L	-	<0.50	<0.50	0.50	5300166	<0.50	0.50	5300166
Vinyl Chloride	ug/L	**600**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
p+m-Xylene	ug/L	-	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
o-Xylene	ug/L	**40**	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
Total Xylenes	ug/L	-	<0.20	<0.20	0.20	5300166	<0.20	0.20	5300166
F1 (C6-C10)	ug/L	-	<25	<25	25	5300166	<25	25	5300166
F1 (C6-C10) - BTEX	ug/L	-	<25	<25	25	5300166	<25	25	5300166
Surrogate Recovery (%)									
4-Bromofluorobenzene	%	-	89	90		5300166	92		5300166
D4-1,2-Dichloroethane	%	-	103	105		5300166	104		5300166
D8-Toluene	%	-	99	97		5300166	97		5300166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		FRF349	FRF350	FRF350		
Sampling Date		2017/12/01 16:30	2017/12/01 17:00	2017/12/01 17:00		
COC Number		110700	110700	110700		
	UNITS	CREEK NW-1-E	16MI6 CK.	16MI6 CK. Lab-Dup	RDL	QC Batch
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	100	5302790
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	<200	200	5302790
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	200	5302790
Reached Baseline at C50	ug/L	Yes	Yes	Yes		5302790
Surrogate Recovery (%)						
o-Terphenyl	%	97	96	96		5302790

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

TEST SUMMARY

Maxxam ID: FRF349
Sample ID: CREEK NW-1-E
Matrix: Water

Collected: 2017/12/01
Shipped:
Received: 2017/12/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5300092	N/A	2017/12/07	Arefa Dabhad
Alkalinity	AT	5300364	N/A	2017/12/06	Surinder Rai
1,3-Dichloropropene Sum	CALC	5298243	N/A	2017/12/08	Automated Statchk
Chromium (VI) in Water	IC	5302731	N/A	2017/12/08	Lang Le
Free (WAD) Cyanide	SKAL/CN	5302557	N/A	2017/12/07	Xuanhong Qiu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5300276	N/A	2017/12/05	Anastasia Hamanov
Dissolved Oxygen	DO	5300872	2017/12/05	2017/12/05	Frank Zhang
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5302790	2017/12/06	2017/12/07	Barbara Wowk
Hardness (calculated as CaCO3)		5299321	N/A	2017/12/06	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	5304170	N/A	2017/12/08	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5304422	N/A	2017/12/08	Charles Opoku-Ware
pH	AT	5300379	N/A	2017/12/06	Surinder Rai
Field pH	PH	ONSITE	N/A	2017/12/04	Ashton Gibson
Field pH	PH	ONSITE	N/A	2017/12/04	Ashton Gibson
Total Phosphorus (Colourimetric)	LACH/P	5303684	2017/12/07	2017/12/07	Amanpreet Sappal
Turbidity	AT	5299670	N/A	2017/12/06	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5299322	2017/12/11	2017/12/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5300166	N/A	2017/12/07	Karen Hughes

Maxxam ID: FRF349 Dup
Sample ID: CREEK NW-1-E
Matrix: Water

Collected: 2017/12/01
Shipped:
Received: 2017/12/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5300092	N/A	2017/12/07	Arefa Dabhad
Dissolved Oxygen	DO	5300872	2017/12/05	2017/12/05	Frank Zhang

Maxxam ID: FRF350
Sample ID: 16MI6 CK.
Matrix: Water

Collected: 2017/12/01
Shipped:
Received: 2017/12/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5300092	N/A	2017/12/07	Arefa Dabhad
Alkalinity	AT	5300364	N/A	2017/12/06	Surinder Rai
1,3-Dichloropropene Sum	CALC	5298243	N/A	2017/12/08	Automated Statchk
Chromium (VI) in Water	IC	5302731	N/A	2017/12/08	Lang Le
Free (WAD) Cyanide	SKAL/CN	5302557	N/A	2017/12/07	Xuanhong Qiu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5300276	N/A	2017/12/05	Anastasia Hamanov
Dissolved Oxygen	DO	5300872	2017/12/05	2017/12/05	Frank Zhang
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5302790	2017/12/06	2017/12/07	Barbara Wowk
Hardness (calculated as CaCO3)		5299321	N/A	2017/12/06	Automated Statchk
Mercury	CV/AA	5302130	2017/12/06	2017/12/07	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5304170	N/A	2017/12/08	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5304422	N/A	2017/12/08	Charles Opoku-Ware
pH	AT	5300379	N/A	2017/12/06	Surinder Rai

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

TEST SUMMARY

Maxxam ID: FRF350
Sample ID: 16MI6 CK.
Matrix: Water

Collected: 2017/12/01
Shipped:
Received: 2017/12/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Field pH	PH	ONSITE	N/A	2017/12/04	Ashton Gibson
Field pH	PH	ONSITE	N/A	2017/12/04	Ashton Gibson
Total Phosphorus (Colourimetric)	LACH/P	5303684	2017/12/07	2017/12/07	Amanpreet Sappal
Turbidity	AT	5299670	N/A	2017/12/06	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5299322	2017/12/11	2017/12/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5300166	N/A	2017/12/07	Karen Hughes

Maxxam ID: FRF350 Dup
Sample ID: 16MI6 CK.
Matrix: Water

Collected: 2017/12/01
Shipped:
Received: 2017/12/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5302790	2017/12/06	2017/12/07	Barbara Wowk
Turbidity	AT	5299670	N/A	2017/12/06	Neil Dassanayake
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5300166	N/A	2017/12/07	Karen Hughes

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.3°C

Sample FRF349, Total Metals Analysis by ICPMS: Test repeated.
Sample FRF350, Total Metals Analysis by ICPMS: Test repeated.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5299670	NYS	Spiked Blank	Turbidity	2017/12/06		99	%	85 - 115
5299670	NYS	Method Blank	Turbidity	2017/12/06	<0.1		NTU	
5299670	NYS	RPD [FRF350-01]	Turbidity	2017/12/06	2.6		%	20
5300092	ADA	Matrix Spike [FRF349-01]	Dissolved (0.2u) Aluminum (Al)	2017/12/07		100	%	80 - 120
5300092	ADA	Spiked Blank	Dissolved (0.2u) Aluminum (Al)	2017/12/07		101	%	80 - 120
5300092	ADA	Method Blank	Dissolved (0.2u) Aluminum (Al)	2017/12/07	<5		ug/L	
5300092	ADA	RPD [FRF349-01]	Dissolved (0.2u) Aluminum (Al)	2017/12/07	NC		%	20
5300166	KH2	Matrix Spike [FRF349-06]	4-Bromofluorobenzene	2017/12/07		97	%	70 - 130
			D4-1,2-Dichloroethane	2017/12/07		103	%	70 - 130
			D8-Toluene	2017/12/07		100	%	70 - 130
			Acetone (2-Propanone)	2017/12/07		103	%	60 - 140
			Benzene	2017/12/07		104	%	70 - 130
			Bromodichloromethane	2017/12/07		92	%	70 - 130
			Bromoform	2017/12/07		96	%	70 - 130
			Bromomethane	2017/12/07		103	%	60 - 140
			Carbon Tetrachloride	2017/12/07		87	%	70 - 130
			Chlorobenzene	2017/12/07		95	%	70 - 130
			Chloroform	2017/12/07		98	%	70 - 130
			Dibromochloromethane	2017/12/07		98	%	70 - 130
			1,2-Dichlorobenzene	2017/12/07		96	%	70 - 130
			1,3-Dichlorobenzene	2017/12/07		100	%	70 - 130
			1,4-Dichlorobenzene	2017/12/07		103	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/12/07		91	%	60 - 140
			1,1-Dichloroethane	2017/12/07		105	%	70 - 130
			1,2-Dichloroethane	2017/12/07		99	%	70 - 130
			1,1-Dichloroethylene	2017/12/07		106	%	70 - 130
			cis-1,2-Dichloroethylene	2017/12/07		99	%	70 - 130
			trans-1,2-Dichloroethylene	2017/12/07		99	%	70 - 130
			1,2-Dichloropropane	2017/12/07		95	%	70 - 130
			cis-1,3-Dichloropropene	2017/12/07		92	%	70 - 130
			trans-1,3-Dichloropropene	2017/12/07		93	%	70 - 130
			Ethylbenzene	2017/12/07		92	%	70 - 130
			Ethylene Dibromide	2017/12/07		105	%	70 - 130
			Hexane	2017/12/07		103	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/12/07		104	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/12/07		112	%	60 - 140
			Methyl Isobutyl Ketone	2017/12/07		102	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/12/07		93	%	70 - 130
			Styrene	2017/12/07		90	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/12/07		98	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/12/07		108	%	70 - 130
			Tetrachloroethylene	2017/12/07		91	%	70 - 130
			Toluene	2017/12/07		92	%	70 - 130
			1,1,1-Trichloroethane	2017/12/07		89	%	70 - 130
			1,1,2-Trichloroethane	2017/12/07		104	%	70 - 130
			Trichloroethylene	2017/12/07		93	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/12/07		93	%	70 - 130
			Vinyl Chloride	2017/12/07		103	%	70 - 130
			p+m-Xylene	2017/12/07		92	%	70 - 130
			o-Xylene	2017/12/07		92	%	70 - 130
			F1 (C6-C10)	2017/12/07		89	%	60 - 140
5300166	KH2	Spiked Blank	4-Bromofluorobenzene	2017/12/07		100	%	70 - 130
			D4-1,2-Dichloroethane	2017/12/07		101	%	70 - 130
			D8-Toluene	2017/12/07		100	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acetone (2-Propanone)	2017/12/07		105	%	60 - 140
			Benzene	2017/12/07		113	%	70 - 130
			Bromodichloromethane	2017/12/07		99	%	70 - 130
			Bromoform	2017/12/07		98	%	70 - 130
			Bromomethane	2017/12/07		110	%	60 - 140
			Carbon Tetrachloride	2017/12/07		95	%	70 - 130
			Chlorobenzene	2017/12/07		102	%	70 - 130
			Chloroform	2017/12/07		105	%	70 - 130
			Dibromochloromethane	2017/12/07		102	%	70 - 130
			1,2-Dichlorobenzene	2017/12/07		98	%	70 - 130
			1,3-Dichlorobenzene	2017/12/07		104	%	70 - 130
			1,4-Dichlorobenzene	2017/12/07		106	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/12/07		104	%	60 - 140
			1,1-Dichloroethane	2017/12/07		114	%	70 - 130
			1,2-Dichloroethane	2017/12/07		104	%	70 - 130
			1,1-Dichloroethylene	2017/12/07		118	%	70 - 130
			cis-1,2-Dichloroethylene	2017/12/07		106	%	70 - 130
			trans-1,2-Dichloroethylene	2017/12/07		110	%	70 - 130
			1,2-Dichloropropane	2017/12/07		101	%	70 - 130
			cis-1,3-Dichloropropene	2017/12/07		96	%	70 - 130
			trans-1,3-Dichloropropene	2017/12/07		94	%	70 - 130
			Ethylbenzene	2017/12/07		99	%	70 - 130
			Ethylene Dibromide	2017/12/07		107	%	70 - 130
			Hexane	2017/12/07		115	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/12/07		110	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/12/07		114	%	60 - 140
			Methyl Isobutyl Ketone	2017/12/07		105	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/12/07		100	%	70 - 130
			Styrene	2017/12/07		96	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/12/07		103	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/12/07		110	%	70 - 130
			Tetrachloroethylene	2017/12/07		99	%	70 - 130
			Toluene	2017/12/07		100	%	70 - 130
			1,1,1-Trichloroethane	2017/12/07		98	%	70 - 130
			1,1,2-Trichloroethane	2017/12/07		107	%	70 - 130
			Trichloroethylene	2017/12/07		103	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/12/07		103	%	70 - 130
			Vinyl Chloride	2017/12/07		115	%	70 - 130
			p+m-Xylene	2017/12/07		100	%	70 - 130
			o-Xylene	2017/12/07		100	%	70 - 130
			F1 (C6-C10)	2017/12/07		93	%	60 - 140
5300166	KH2	Method Blank	4-Bromofluorobenzene	2017/12/07		91	%	70 - 130
			D4-1,2-Dichloroethane	2017/12/07		101	%	70 - 130
			D8-Toluene	2017/12/07		99	%	70 - 130
			Acetone (2-Propanone)	2017/12/07	<10		ug/L	
			Benzene	2017/12/07	<0.20		ug/L	
			Bromodichloromethane	2017/12/07	<0.50		ug/L	
			Bromoform	2017/12/07	<1.0		ug/L	
			Bromomethane	2017/12/07	<0.50		ug/L	
			Carbon Tetrachloride	2017/12/07	<0.20		ug/L	
			Chlorobenzene	2017/12/07	<0.20		ug/L	
			Chloroform	2017/12/07	<0.20		ug/L	
			Dibromochloromethane	2017/12/07	<0.50		ug/L	
			1,2-Dichlorobenzene	2017/12/07	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,3-Dichlorobenzene	2017/12/07	<0.50		ug/L	
			1,4-Dichlorobenzene	2017/12/07	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2017/12/07	<1.0		ug/L	
			1,1-Dichloroethane	2017/12/07	<0.20		ug/L	
			1,2-Dichloroethane	2017/12/07	<0.50		ug/L	
			1,1-Dichloroethylene	2017/12/07	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2017/12/07	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2017/12/07	<0.50		ug/L	
			1,2-Dichloropropane	2017/12/07	<0.20		ug/L	
			cis-1,3-Dichloropropene	2017/12/07	<0.30		ug/L	
			trans-1,3-Dichloropropene	2017/12/07	<0.40		ug/L	
			Ethylbenzene	2017/12/07	<0.20		ug/L	
			Ethylene Dibromide	2017/12/07	<0.20		ug/L	
			Hexane	2017/12/07	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2017/12/07	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/12/07	<10		ug/L	
			Methyl Isobutyl Ketone	2017/12/07	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/12/07	<0.50		ug/L	
			Styrene	2017/12/07	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2017/12/07	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2017/12/07	<0.50		ug/L	
			Tetrachloroethylene	2017/12/07	<0.20		ug/L	
			Toluene	2017/12/07	<0.20		ug/L	
			1,1,1-Trichloroethane	2017/12/07	<0.20		ug/L	
			1,1,2-Trichloroethane	2017/12/07	<0.50		ug/L	
			Trichloroethylene	2017/12/07	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2017/12/07	<0.50		ug/L	
			Vinyl Chloride	2017/12/07	<0.20		ug/L	
			p+m-Xylene	2017/12/07	<0.20		ug/L	
			o-Xylene	2017/12/07	<0.20		ug/L	
			Total Xylenes	2017/12/07	<0.20		ug/L	
			F1 (C6-C10)	2017/12/07	<25		ug/L	
			F1 (C6-C10) - BTEX	2017/12/07	<25		ug/L	
5300166	KH2	RPD [FRF350-08]	Acetone (2-Propanone)	2017/12/07	NC		%	30
			Benzene	2017/12/07	NC		%	30
			Bromodichloromethane	2017/12/07	NC		%	30
			Bromoform	2017/12/07	NC		%	30
			Bromomethane	2017/12/07	NC		%	30
			Carbon Tetrachloride	2017/12/07	NC		%	30
			Chlorobenzene	2017/12/07	NC		%	30
			Chloroform	2017/12/07	NC		%	30
			Dibromochloromethane	2017/12/07	NC		%	30
			1,2-Dichlorobenzene	2017/12/07	NC		%	30
			1,3-Dichlorobenzene	2017/12/07	NC		%	30
			1,4-Dichlorobenzene	2017/12/07	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2017/12/07	NC		%	30
			1,1-Dichloroethane	2017/12/07	NC		%	30
			1,2-Dichloroethane	2017/12/07	NC		%	30
			1,1-Dichloroethylene	2017/12/07	NC		%	30
			cis-1,2-Dichloroethylene	2017/12/07	NC		%	30
			trans-1,2-Dichloroethylene	2017/12/07	NC		%	30
			1,2-Dichloropropane	2017/12/07	NC		%	30
			cis-1,3-Dichloropropene	2017/12/07	NC		%	30
			trans-1,3-Dichloropropene	2017/12/07	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Ethylbenzene	2017/12/07	NC		%	30
			Ethylene Dibromide	2017/12/07	NC		%	30
			Hexane	2017/12/07	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/12/07	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/12/07	NC		%	30
			Methyl Isobutyl Ketone	2017/12/07	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/12/07	NC		%	30
			Styrene	2017/12/07	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/12/07	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/12/07	NC		%	30
			Tetrachloroethylene	2017/12/07	NC		%	30
			Toluene	2017/12/07	NC		%	30
			1,1,1-Trichloroethane	2017/12/07	NC		%	30
			1,1,2-Trichloroethane	2017/12/07	NC		%	30
			Trichloroethylene	2017/12/07	NC		%	30
			Trichlorofluoromethane (FREON 11)	2017/12/07	NC		%	30
			Vinyl Chloride	2017/12/07	NC		%	30
			p+m-Xylene	2017/12/07	NC		%	30
			o-Xylene	2017/12/07	NC		%	30
			Total Xylenes	2017/12/07	NC		%	30
			F1 (C6-C10)	2017/12/07	NC		%	30
			F1 (C6-C10) - BTEX	2017/12/07	NC		%	30
5300276	AHA	Matrix Spike	Dissolved Organic Carbon	2017/12/05		94	%	80 - 120
5300276	AHA	Spiked Blank	Dissolved Organic Carbon	2017/12/05		96	%	80 - 120
5300276	AHA	Method Blank	Dissolved Organic Carbon	2017/12/05	<0.50		mg/L	
5300276	AHA	RPD	Dissolved Organic Carbon	2017/12/05	0.45		%	20
5300364	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2017/12/06		98	%	85 - 115
5300364	SAU	Method Blank	Alkalinity (Total as CaCO3)	2017/12/06	<1.0		mg/L	
5300364	SAU	RPD	Alkalinity (Total as CaCO3)	2017/12/06	0.21		%	20
5300379	SAU	Spiked Blank	pH	2017/12/06		101	%	98 - 103
5300379	SAU	RPD	pH	2017/12/06	0.41		%	N/A
5302130	RON	Matrix Spike	Mercury (Hg)	2017/12/07		101	%	75 - 125
5302130	RON	Spiked Blank	Mercury (Hg)	2017/12/07		99	%	80 - 120
5302130	RON	Method Blank	Mercury (Hg)	2017/12/07	<0.1		ug/L	
5302130	RON	RPD	Mercury (Hg)	2017/12/07	NC		%	20
5302557	XQI	Matrix Spike	WAD Cyanide (Free)	2017/12/07		100	%	80 - 120
5302557	XQI	Spiked Blank	WAD Cyanide (Free)	2017/12/07		99	%	80 - 120
5302557	XQI	Method Blank	WAD Cyanide (Free)	2017/12/07	<1		ug/L	
5302557	XQI	RPD	WAD Cyanide (Free)	2017/12/07	NC		%	20
5302731	LLE	Matrix Spike	Chromium (VI)	2017/12/08		96	%	80 - 120
5302731	LLE	Spiked Blank	Chromium (VI)	2017/12/08		99	%	80 - 120
5302731	LLE	Method Blank	Chromium (VI)	2017/12/08	<0.50		ug/L	
5302731	LLE	RPD	Chromium (VI)	2017/12/08	NC		%	20
5302790	BWW	Matrix Spike [FRF349-02]	o-Terphenyl	2017/12/07		87	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/12/07		93	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/12/07		91	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/12/07		90	%	50 - 130
5302790	BWW	Spiked Blank	o-Terphenyl	2017/12/07		86	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/12/07		91	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2017/12/07		91	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2017/12/07		88	%	60 - 130
5302790	BWW	Method Blank	o-Terphenyl	2017/12/06		86	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/12/06	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2017/12/06	<200		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			F4 (C34-C50 Hydrocarbons)	2017/12/06	<200		ug/L	
5302790	BWW	RPD [FRF350-03]	F2 (C10-C16 Hydrocarbons)	2017/12/07	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/12/07	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/12/07	NC		%	30
5303684	ASP	Matrix Spike	Total Phosphorus	2017/12/07		89	%	80 - 120
5303684	ASP	QC Standard	Total Phosphorus	2017/12/07		87	%	80 - 120
5303684	ASP	Spiked Blank	Total Phosphorus	2017/12/07		90	%	80 - 120
5303684	ASP	Method Blank	Total Phosphorus	2017/12/07	<0.004		mg/L	
5303684	ASP	RPD	Total Phosphorus	2017/12/07	NC		%	20
5304170	PBA	Matrix Spike	Total Antimony (Sb)	2017/12/08		102	%	80 - 120
			Total Arsenic (As)	2017/12/08		102	%	80 - 120
			Total Beryllium (Be)	2017/12/08		101	%	80 - 120
			Total Boron (B)	2017/12/08		94	%	80 - 120
			Total Cadmium (Cd)	2017/12/08		103	%	80 - 120
			Total Chromium (Cr)	2017/12/08		97	%	80 - 120
			Total Cobalt (Co)	2017/12/08		103	%	80 - 120
			Total Copper (Cu)	2017/12/08		103	%	80 - 120
			Total Iron (Fe)	2017/12/08		101	%	80 - 120
			Total Lead (Pb)	2017/12/08		104	%	80 - 120
			Total Nickel (Ni)	2017/12/08		99	%	80 - 120
			Total Selenium (Se)	2017/12/08		108	%	80 - 120
			Total Silver (Ag)	2017/12/08		100	%	80 - 120
			Total Thallium (Tl)	2017/12/08		102	%	80 - 120
			Total Tungsten (W)	2017/12/08		104	%	80 - 120
			Total Uranium (U)	2017/12/08		100	%	80 - 120
			Total Vanadium (V)	2017/12/08		95	%	80 - 120
			Total Zinc (Zn)	2017/12/08		104	%	80 - 120
			Total Zirconium (Zr)	2017/12/08		99	%	80 - 120
5304170	PBA	Spiked Blank	Total Antimony (Sb)	2017/12/08		101	%	80 - 120
			Total Arsenic (As)	2017/12/08		102	%	80 - 120
			Total Beryllium (Be)	2017/12/08		106	%	80 - 120
			Total Boron (B)	2017/12/08		98	%	80 - 120
			Total Cadmium (Cd)	2017/12/08		103	%	80 - 120
			Total Chromium (Cr)	2017/12/08		97	%	80 - 120
			Total Cobalt (Co)	2017/12/08		103	%	80 - 120
			Total Copper (Cu)	2017/12/08		100	%	80 - 120
			Total Iron (Fe)	2017/12/08		100	%	80 - 120
			Total Lead (Pb)	2017/12/08		103	%	80 - 120
			Total Nickel (Ni)	2017/12/08		100	%	80 - 120
			Total Selenium (Se)	2017/12/08		106	%	80 - 120
			Total Silver (Ag)	2017/12/08		99	%	80 - 120
			Total Thallium (Tl)	2017/12/08		101	%	80 - 120
			Total Tungsten (W)	2017/12/08		99	%	80 - 120
			Total Uranium (U)	2017/12/08		100	%	80 - 120
			Total Vanadium (V)	2017/12/08		98	%	80 - 120
			Total Zinc (Zn)	2017/12/08		105	%	80 - 120
			Total Zirconium (Zr)	2017/12/08		97	%	80 - 120
5304170	PBA	Method Blank	Total Antimony (Sb)	2017/12/08	<0.50		ug/L	
			Total Arsenic (As)	2017/12/08	<1.0		ug/L	
			Total Beryllium (Be)	2017/12/08	<0.50		ug/L	
			Total Boron (B)	2017/12/08	<10		ug/L	
			Total Cadmium (Cd)	2017/12/08	<0.10		ug/L	
			Total Chromium (Cr)	2017/12/08	<5.0		ug/L	
			Total Cobalt (Co)	2017/12/08	<0.50		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2017/12/08	<1.0		ug/L	
			Total Iron (Fe)	2017/12/08	<100		ug/L	
			Total Lead (Pb)	2017/12/08	<0.50		ug/L	
			Total Nickel (Ni)	2017/12/08	<1.0		ug/L	
			Total Selenium (Se)	2017/12/08	<2.0		ug/L	
			Total Silver (Ag)	2017/12/08	<0.10		ug/L	
			Total Thallium (Tl)	2017/12/08	<0.050		ug/L	
			Total Tungsten (W)	2017/12/08	<1.0		ug/L	
			Total Uranium (U)	2017/12/08	<0.10		ug/L	
			Total Vanadium (V)	2017/12/08	<0.50		ug/L	
			Total Zinc (Zn)	2017/12/08	<5.0		ug/L	
			Total Zirconium (Zr)	2017/12/08	<1.0		ug/L	
5304170	PBA	RPD	Total Antimony (Sb)	2017/12/08	NC		%	20
			Total Arsenic (As)	2017/12/08	NC		%	20
			Total Beryllium (Be)	2017/12/08	NC		%	20
			Total Boron (B)	2017/12/08	3.6		%	20
			Total Cadmium (Cd)	2017/12/08	NC		%	20
			Total Chromium (Cr)	2017/12/08	NC		%	20
			Total Cobalt (Co)	2017/12/08	3.7		%	20
			Total Copper (Cu)	2017/12/08	14		%	20
			Total Iron (Fe)	2017/12/08	NC		%	20
			Total Lead (Pb)	2017/12/08	NC		%	20
			Total Selenium (Se)	2017/12/08	NC		%	20
			Total Silver (Ag)	2017/12/08	NC		%	20
			Total Thallium (Tl)	2017/12/08	NC		%	20
			Total Tungsten (W)	2017/12/08	NC		%	20
			Total Uranium (U)	2017/12/08	NC		%	20
			Total Zinc (Zn)	2017/12/08	6.4		%	20
			Total Zirconium (Zr)	2017/12/08	NC		%	20
5304422	COP	Matrix Spike	Total Ammonia-N	2017/12/08		96	%	80 - 120
5304422	COP	Spiked Blank	Total Ammonia-N	2017/12/08		98	%	85 - 115
5304422	COP	Method Blank	Total Ammonia-N	2017/12/08	<0.050		mg/L	
5304422	COP	RPD	Total Ammonia-N	2017/12/08	9.6		%	20
5306476	PBA	Matrix Spike	Total Molybdenum (Mo)	2017/12/11		104	%	80 - 120
			Total Vanadium (V)	2017/12/11		98	%	80 - 120
5306476	PBA	Spiked Blank	Total Molybdenum (Mo)	2017/12/11		97	%	80 - 120
			Total Vanadium (V)	2017/12/11		96	%	80 - 120
5306476	PBA	Method Blank	Total Molybdenum (Mo)	2017/12/11	<0.50		ug/L	
			Total Vanadium (V)	2017/12/11	<0.50		ug/L	
5306476	PBA	RPD	Total Molybdenum (Mo)	2017/12/11	6.3		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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Maxxam Job #: B7R2512
Report Date: 2017/12/11

WSP Canada Group Limited
Client Project #: 17M-00979
Sampler Initials: PMD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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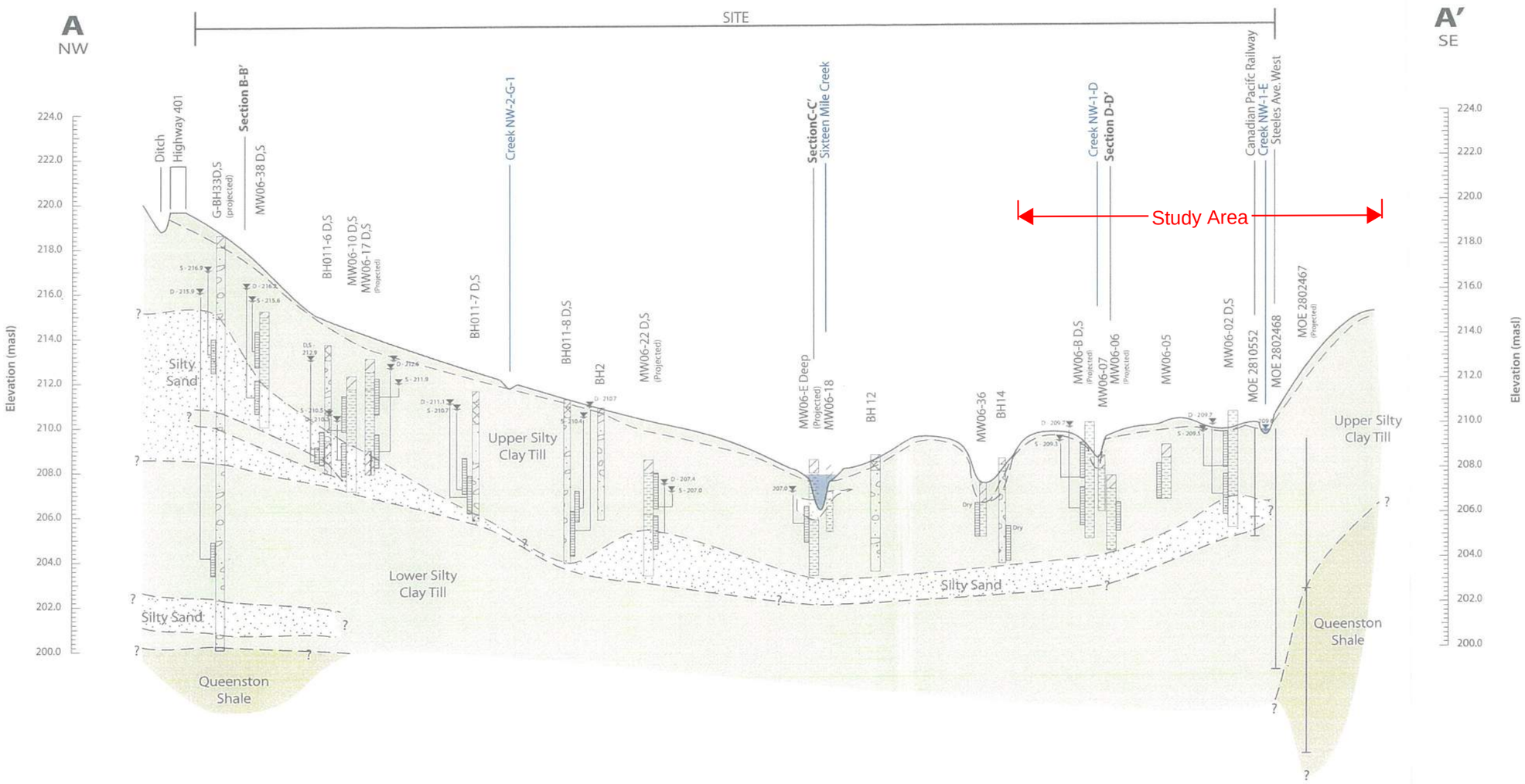
APPENDIX

E

EXCERPTS FROM THE MILTON HEIGHTS SUBWATERSHED IMPACT STUDY (RAND AND BEACON, 2013)



HYDROGEOLOGICAL INVESTIGATION

Milton Heights Neighbourhood,
Milton, Ontario

Figure 3.5

Schematic Cross Section A-A'
(Northwest - Southeast)

Legend

- Topsoil
- Fill
- Clay to Silty Clay
- Silt to Sandy Silt
- Sand and Silty Sand
- Till
- Red Shale
- Silty Sand layer within Till
- Screened waterlevel (masl) - August 2012 (D = Deep screen, S = Shallow screen)

Source: Geological data from AMEC (2006) individual borehole records.

Conditions encountered in the field may be different from the interpreted information presented on this figure.

Project # TB103025
Date: October 2013
Client: Milton Heights Landowners Group

Drawn by: RM
Checked by: SG
Revision No.: 4

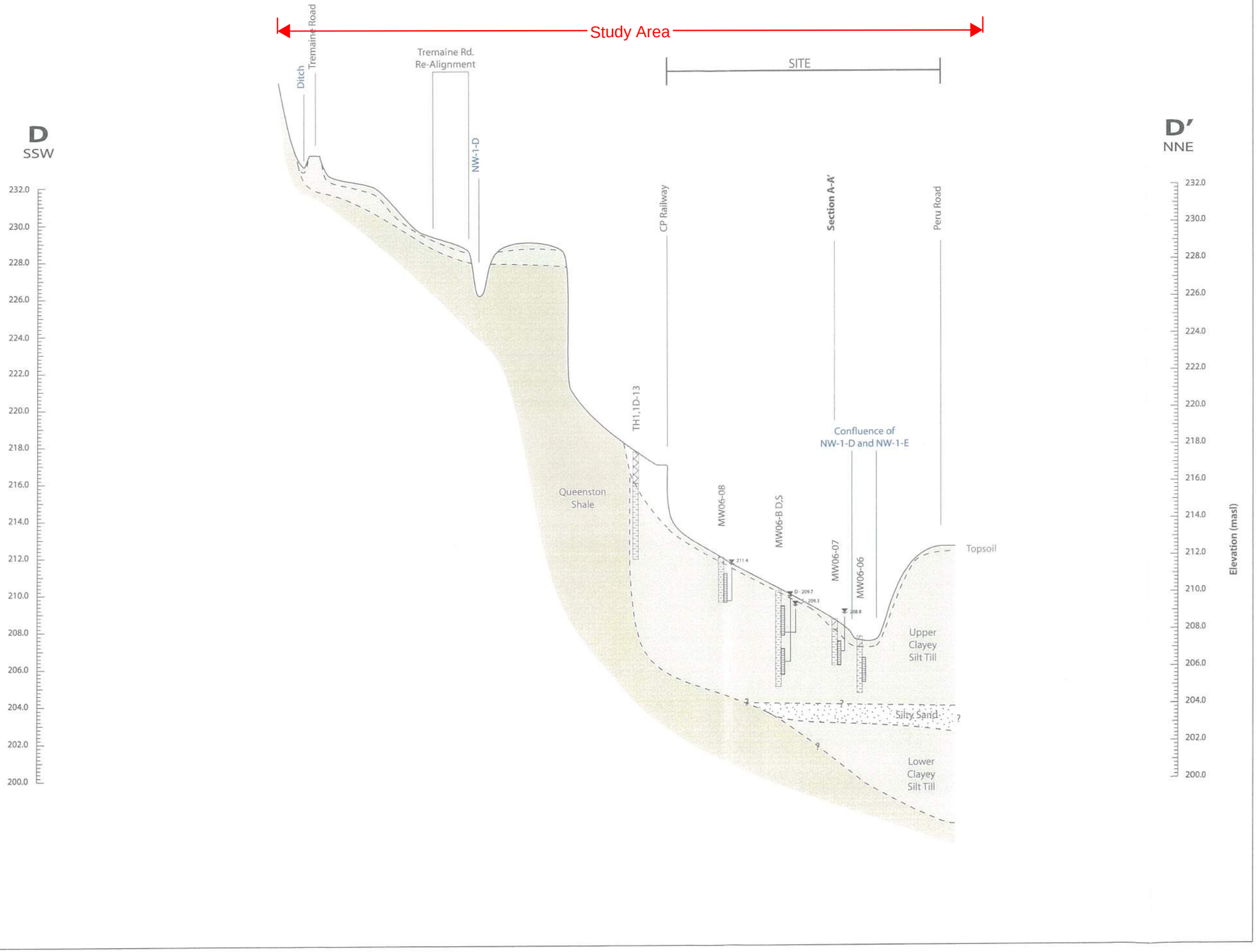
Horizontal Scale: 1cm = 90m
Vertical Scale: 1cm = 2m
Vertical Exaggeration: 45x

Meters
0 7 14 21 28

amec
AMEC Environment & Infrastructure
a Division of AMEC Americas Limited
505 Woodward Ave.
Hamilton, ON L8H 6N6

HYDROGEOLOGICAL INVESTIGATION
Milton Heights Neighbourhood, Milton, Ontario

Figure 3.8
Schematic Cross Section D-D'
(South southwest - North northeast)



Legend

- Topsoil
- Fill
- Clay to Silty Clay
- Silt to Sandy Silt
- Sand and Silty Sand
- Till
- Red Shale
- Silty Sand layer within Till
- Screened waterlevel (masl) - June 2011 (D = Deep screen, S = Shallow screen)

Source: Geological data from AMEC (2006 and 2002) and Golder (2006) individual borehole records.

Conditions encountered in the field may be different from the interpreted information presented on this figure.

Project # TB103025
Date: October 2013
Client: Milton Heights Landowners Group

Drawn by: RM
Checked by: SG
Revision No.: 3

Horizontal Scale: 1cm = 50m
Vertical Scale: 1cm = 2m
Vertical Exaggeration: 25x

Meters
0 50 100 150 200

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APPENDIX

F MECP WELL RECORDS

MOECC Water Well Records

Well Record #

2800707 **Lot** 001 **Conc** 02 MILTON TOWN (ESQUESING) / HALTON

Date 11/2/1951 **DD/MM/YYYY**

Elev 200.8 (masl) **Easting** 588680 **Northing** 4818515
/ Domestic Water Supply **UTM RC** 9 **unknown UTM**
Water Found 13.4 (mbgs) 187.4 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 5.2 (mbgs) 195.7 (masl)
Pumping WL (mbgs) (masl)
Pump Rate 9.1 (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	200.8		
9.4	191.4		CLAY / /
14.6	186.2	RED	SHALE / /

2800708 **Lot** 001 **Conc** 02 MILTON TOWN (ESQUESING) / HALTON

Date 4/25/1959 **DD/MM/YYYY**

Elev 211.0 (masl) **Easting** 588423 **Northing** 4818226
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 13.7 (mbgs) 197.3 (masl) FRESH
Casing Diameter 7 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 4.6 (mbgs) 206.4 (masl)
Pumping WL 18.3 (mbgs) 192.7 (masl)
Pump Rate 0.0 (LPM) 1 / 0
Spec. Cap. 0.00 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	211.0		
11.3	199.7		CLAY / /
18.3	192.7	RED	SHALE / /

2800709 **Lot** 001 **Conc** 02 MILTON TOWN (ESQUESING) / HALTON

Date 7/17/1959 **DD/MM/YYYY**

Elev 211.7 (masl) **Easting** 588424 **Northing** 4818276
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 12.8 (mbgs) 198.9 (masl) FRESH
Casing Diameter 7 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 3.7 (mbgs) 208.0 (masl)
Pumping WL 12.8 (mbgs) 198.9 (masl)
Pump Rate 9.1 (LPM) 2 / 0
Spec. Cap. 0.99 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	211.7		
6.1	205.6	BROWN	CLAY / /
11.6	200.1	RED	CLAY / /
18.9	192.8	RED	SHALE / /

2800710 **Lot** 001 **Conc** 02 MILTON TOWN (ESQUESING) / HALTON

Date 11/6/1959 **DD/MM/YYYY**

Elev 210.3 (masl) **Easting** 588229 **Northing** 4818427
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 15.2 (mbgs) 195.1 (masl) MINERIAL
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 6.1 (mbgs) 204.2 (masl)
Pumping WL 16.5 (mbgs) 193.8 (masl)
Pump Rate 9.1 (LPM) 2 / 0
Spec. Cap. 0.88 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	210.3		
3.0	207.2		CLAY / /
9.1	201.2		CLAY / MEDIUM SAND /
14.9	195.4		CLAY / GRAVEL /
16.5	193.8	RED	SHALE / /

Well Record #

2800711 — **Lot** 001 **Conc** 02 — MILTON TOWN (ESQUESING) / HALTON

Date 4/13/1961 **DD/MM/YYYY**

Elev 200.5 (masl) **Easting** 588685 **Northing** 4818495
/ Commerical Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 10.7 (mbgs) 189.8 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	7.6	(mbgs)	192.9	(masl)
Pumping WL	21.9	(mbgs)	178.5	(masl)
Pump Rate	4.5	(LPM)	2 / 30	
Spec. Cap.	0.32	(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	200.5		
1.5	199.0		PREVIOUSLY DUG / /
8.2	192.3		CLAY / GRAVEL /
21.9	178.5	RED	SHALE / /

2800712 — **Lot** 001 **Conc** 02 — MILTON TOWN (ESQUESING) / HALTON

Date 3/14/1965 **DD/MM/YYYY**

Elev 204.0 (masl) **Easting** 588892 **Northing** 4818804
/ Commerical Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 23.2 (mbgs) 180.9 (masl) FRESH
Casing Diameter 7 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	10.7	(mbgs)	193.4	(masl)
Pumping WL	24.4	(mbgs)	179.6	(masl)
Pump Rate	54.6	(LPM)	2 / 0	
Spec. Cap.	3.98	(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	204.0		
17.7	186.3	BROWN	CLAY / /
20.4	183.6		HARDPAN / /
25.9	178.1		LIMESTONE / /

2800713 — **Lot** 001 **Conc** 02 — MILTON TOWN (ESQUESING) / HALTON

Date 7/25/1966 **DD/MM/YYYY**

Elev 205.1 (masl) **Easting** 588340 **Northing** 4818577
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 16.2 (mbgs) 188.9 (masl) FRESH
Casing Diameter 5 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	7.3	(mbgs)	197.8	(masl)
Pumping WL	16.2	(mbgs)	188.9	(masl)
Pump Rate	4.5	(LPM)	2 / 0	
Spec. Cap.	0.51	(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	205.1		
0.6	204.5		TOPSOIL / /
10.7	194.4	BROWN	CLAY / /
13.4	191.7	RED	CLAY / /
15.5	189.5	BLUE	CLAY / /
16.5	188.6		MEDIUM SAND / GRAVEL /

2801687 — **Lot** **Conc** — MILTON TOWN (MILTON) / HALTON

Date 7/10/1953 **DD/MM/YYYY**

Elev 198.7 (masl) **Easting** 589106 **Northing** 4818606
/ Domestic Water Supply **UTM RC** 9 **unknown UTM**
Water Found 12.5 (mbgs) 186.2 (masl) FRESH
Casing Diameter inch **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? Y

SWL		(mbgs)		(masl)
Pumping WL	3.0	(mbgs)	195.6	(masl)
Pump Rate	22.7	(LPM)	0 / 30	
Spec. Cap.		(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	198.7		
1.8	196.8		PREVIOUSLY DUG / /
7.9	190.8		CLAY / MEDIUM SAND /
13.1	185.6	RED	SHALE / /

Well Record #

2802467 — **Lot** 015 **Conc** 01 — MILTON TOWN (TRAFALGAR) / HALTON

Date 10/30/1959 **DD/MM/YYYY**

Elev 209.3 (masl) **Easting** 588609 **Northing** 4818253
/ Domestic Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 10.7 (mbgs) 198.6 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	8.5	(mbgs)	200.7	(masl)
Pumping WL	18.3	(mbgs)	191.0	(masl)
Pump Rate	9.1	(LPM)	2 / 0	
Spec. Cap.	0.93	(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	209.3		
1.8	207.5		PREVIOUSLY DUG / /
6.7	202.6		CLAY / GRAVEL /
21.3	187.9	RED	SHALE / /

2802468 — **Lot** 015 **Conc** 01 — MILTON TOWN (TRAFALGAR) / HALTON

Date 11/10/1964 **DD/MM/YYYY**

Elev 209.7 (masl) **Easting** 588484 **Northing** 4818123
/ Domestic Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 7.6 (mbgs) 202.0 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	7.6	(mbgs)	202.0	(masl)
Pumping WL	9.1	(mbgs)	200.5	(masl)
Pump Rate	13.6	(LPM)	24 / 0	
Spec. Cap.	8.95	(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	209.7		
1.5	208.1		TOPSOIL / /
10.7	199.0	BROWN	CLAY / /

2802469 — **Lot** 015 **Conc** 01 — MILTON TOWN (TRAFALGAR) / HALTON

Date 7/21/1965 **DD/MM/YYYY**

Elev 212.1 (masl) **Easting** 588274 **Northing** 4817823
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 9.1 (mbgs) 203.0 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	7.6	(mbgs)	204.5	(masl)
Pumping WL	9.1	(mbgs)	203.0	(masl)
Pump Rate	45.5	(LPM)	24 / 0	
Spec. Cap.	29.83	(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	212.1		
9.1	203.0	RED	CLAY / /
10.7	201.5	RED	SHALE / /

2802488 — **Lot** **Conc** — MILTON TOWN (MILTON) / HALTON

Date 3/3/1952 **DD/MM/YYYY**

Elev 198.4 (masl) **Easting** 589294 **Northing** 4818588
/ Not Used Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 8.5 (mbgs) 189.8 (masl) FRESH
Casing Diameter 6 inch **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	4.6	(mbgs)	193.8	(masl)
Pumping WL		(mbgs)		(masl)
Pump Rate	90.9	(LPM)	/	
Spec. Cap.		(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	198.4		
8.5	189.8		MEDIUM SAND / /

2803797 — **Lot** 015 **Conc** 07 — MILTON TOWN (NELSON) / HALTON

Date 11/28/1971 **DD/MM/YYYY**

Elev 237.1 (masl) **Easting** 587994 **Northing** 4817153
/ Domestic Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 4.9 (mbgs) 232.2 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N

SWL	1.8	(mbgs)	235.3	(masl)
Pumping WL	6.7	(mbgs)	230.4	(masl)
Pump Rate		(LPM)	/	
Spec. Cap.		(LPM/m)	Hour / Minute	

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	237.1		
0.3	236.8	BROWN	TOPSOIL / /

Well Record #

1.8	235.3	BROWN		CLAY /	/
6.7	230.4	RED		SHALE /	/

2804115 **Lot** 015 **Conc** 01 MILTON TOWN (TRAFALGAR) / HALTON

Date 12/7/1972 **DD/MM/YYYY**

Elev 204.7 (masl) **Easting** 588831 **Northing** 4818273
/ Commerical Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 2.1 (mbgs) 202.6 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 0.6 (mbgs) 204.1 (masl)
Pumping WL 12.2 (mbgs) 192.5 (masl)
Pump Rate 9.1 (LPM) 1 / 0
Spec. Cap. 0.78 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color		Soil Descriptions
0.0	204.7			
12.2	192.5	RED	SHALE /	/

2804581 **Lot** 015 **Conc** 07 MILTON TOWN (NELSON) / HALTON

Date 8/7/1974 **DD/MM/YYYY**

Elev 234.0 (masl) **Easting** 587977 **Northing** 4817390
/ Abandoned-Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color		Soil Descriptions
0.0	234.0			
2.7	231.3	RED	CLAY /	/
22.9	211.2	RED	SHALE /	/

2804651 **Lot** 015 **Conc** 07 MILTON TOWN (NELSON) / HALTON

Date 11/12/1974 **DD/MM/YYYY**

Elev 227.0 (masl) **Easting** 588075 **Northing** 4817314
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 10.7 (mbgs) 216.3 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 2.7 (mbgs) 224.2 (masl)
Pumping WL 14.9 (mbgs) 212.1 (masl)
Pump Rate 9.1 (LPM) 1 / 0
Spec. Cap. 0.75 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color		Soil Descriptions
0.0	227.0			
1.8	225.2	BROWN	CLAY /	/
15.8	211.1	RED	SHALE /	/

2804741 **Lot** 015 **Conc** 01 MILTON TOWN (TRAFALGAR) / HALTON

Date 5/14/1975 **DD/MM/YYYY**

Elev 219.8 (masl) **Easting** 588102 **Northing** 4817548
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 6.7 (mbgs) 213.1 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL (mbgs) (masl)
Pumping WL 11.3 (mbgs) 208.5 (masl)
Pump Rate 9.1 (LPM) 1 / 0
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color		Soil Descriptions
0.0	219.8			
1.8	218.0	BROWN	CLAY /	/
5.2	214.6	RED	CLAY /	/
11.9	207.9	RED	SHALE /	/

Well Record #

2806950 — **Lot** 015 **Conc** 01 — MILTON TOWN (TRAFALGAR) / HALTON

Date 3/7/1988 **DD/MM/YYYY**

Elev 225.9 (masl) **Easting** 588046 **Northing** 4817442
/ Domestic Water Supply **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 6.1 (mbgs) 219.8 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 2.4 (mbgs) 223.5 (masl)
Pumping WL 8.8 (mbgs) 217.1 (masl)
Pump Rate 45.5 (LPM) 2 / 0
Spec. Cap. 7.10 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	225.9		
0.3	225.6	BROWN	TOPSOIL / /
6.1	219.8	BROWN	CLAY / STONES /
10.1	215.8	RED	SHALE / VERY / HARD

2807949 — **Lot** 001 **Conc** 07 — MILTON TOWN (NASSAGAWEYA) / HALTON

Date 1/7/1992 **DD/MM/YYYY**

Elev 283.2 (masl) **Easting** 587721 **Northing** 4817090
/ Domestic Water Supply **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 8.8 (mbgs) 274.4 (masl) Not stated
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 7.3 (mbgs) 275.9 (masl)
Pumping WL 17.4 (mbgs) 265.8 (masl)
Pump Rate 18.2 (LPM) 3 / 0
Spec. Cap. 1.81 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	283.2		
1.8	281.4	BROWN	CLAY / LOOSE /
5.2	278.0	BROWN	CLAY / BOULDERS / LOOSE
8.5	274.7	GREY	CLAY / BOULDERS /
18.0	265.2	GREY	SHALE / HARD /
18.3	264.9	RED	SHALE / HARD /

2808036 — **Lot** 015 **Conc** 07 — MILTON TOWN (NELSON) / HALTON

Date 9/10/1991 **DD/MM/YYYY**

Elev 224.6 (masl) **Easting** 588135 **Northing** 4817234
/ Domestic Water Supply **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 8.5 (mbgs) 216.1 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL 7.0 (mbgs) 217.6 (masl)
Pumping WL 15.2 (mbgs) 209.4 (masl)
Pump Rate 18.2 (LPM) 1 / 0
Spec. Cap. 2.21 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	224.6		
0.9	223.7	BROWN	CLAY / /
5.5	219.1	RED	CLAY / /
16.8	207.9	RED	SHALE / HARD /

2808109 — **Lot** 001 **Conc** 02 — MILTON TOWN (ESQUESING) / HALTON

Date 2/2/1993 **DD/MM/YYYY**

Elev 206.7 (masl) **Easting** 588641 **Northing** 4818887
/ Not Used Observation Wells **UTM RC** 9 **unknown UTM**
Water Found 6.1 (mbgs) 200.6 (masl) FRESH
Casing Diameter **Casing Material:**
Top of Screen 6.1 (mbgs) **Bottom of Screen** 12.2 (mbgs)
Screen Interva 6.1 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.7		
6.1	200.6	BROWN	SILT / CLAY / DRY
12.2	194.6	GREY	SILT / CLAY / WATER-BEARING

Well Record #

2810099 — **Lot** 001 **Conc** 02 — MILTON TOWN (ESQUESING) / HALTON

Date 10/27/2004 **DD/MM/YYYY**

Elev 206.2 (masl) **Easting** 588630 **Northing** 4819102
/ Not Used Observation Wells **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 1.5 (mbgs) **Bottom of Screen** 4.6 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.2		/ /

2810552 — **Lot** 002 **Conc** 01 — MILTON TOWN (ESQUESING) / HALTON

Date 4/3/2006 **DD/MM/YYYY**

Elev 209.4 (masl) **Easting** 588353 **Northing** 4818074
/ Observation Wells **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 4.2 (mbgs) 205.2 (masl)
Casing Diameter 5 cm **Casing Material:**
Top of Screen 3.0 (mbgs) **Bottom of Screen** 4.5 (mbgs)
Screen Interva 1.5 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	209.4		
1.5	207.9	BROWN	CLAY / SILT /
3.6	205.8	BROWN	SILT / TILL / DRY
4.5	204.9	BROWN	SILT / TILL / SAND

6814036 — **Lot** **Conc** — HAMILTON CITY / WENTWORTH

Date 6/30/2004 **DD/MM/YYYY**

Elev 206.6 (masl) **Easting** 588412 **Northing** 4818881
/ Observation Wells **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 3.1 (mbgs) 203.5 (masl) FRESH
Casing Diameter cm **Casing Material:** PLASTIC
Top of Screen 7.8 (mbgs) **Bottom of Screen** 9.3 (mbgs)
Screen Interva 1.5 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.6		
1.5	205.1		SAND / GRAVEL /
3.1	203.5	BLUE	CLAY / FILL /
9.3	197.3	GREY	CLAY / /

7044060 — **Lot** **Conc** — MILTON TOWN (ESQUESING) / HALTON

Date 5/11/2006 **DD/MM/YYYY**

Elev 205.7 (masl) **Easting** 588498 **Northing** 4818709
/ Observation Wells **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 1.5 (mbgs) **Bottom of Screen** 4.6 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	205.7		/ /

7101497 — **Lot** 007 **Conc** 15 — HALTON HILLS TOWN (ACTON) / HALTON

Date 9/20/2007 **DD/MM/YYYY**

Elev 232.6 (masl) **Easting** 587994 **Northing** 4817349
/ Domestic Water Supply **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 29.0 (mbgs) 203.6 (masl) FRESH
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate 36.4 (LPM) 1 / 0
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	232.6		
30.5	202.1	RED	SHALE / / MEDIUM-GRAINED

Well Record #

7101600 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 10/16/2007 **DD/MM/YYYY**

Elev 203.3 (masl) **Easting** 588916 **Northing** 4818731
/ Not Used Observation Wells **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 13.6 (mbgs) 189.7 (masl) FRESH
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	203.3		
15.1	188.2	BROWN	SAND / SILT / CLAY

7103216 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 1/30/2008 **DD/MM/YYYY**

Elev 205.5 (masl) **Easting** 588477 **Northing** 4818700
/ Abandoned-Other **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing? N
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	205.5		
			/ /

7125331 **Lot** **Conc** MILTON TOWN (TRAFALGAR) / HALTON

Date 1/1/2009 **DD/MM/YYYY**

Elev 204.3 (masl) **Easting** 589123 **Northing** 4818753
/ Monitoring **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 7.0 (mbgs) 197.3 (masl) Not stated
Casing Diameter 5 cm **Casing Material:** PLASTIC
Top of Screen 6.0 (mbgs) **Bottom of Screen** 9.1 (mbgs)
Screen Interva 3.1 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	204.3		
1.5	202.8	BROWN	SAND / TOPSOIL / FILL
4.5	199.8	BROWN	CLAY / TILL /
7.6	196.7	GREY	CLAY / SILT /
9.1	195.2	BROWN	SAND / SILT /

7125332 **Lot** **Conc** MILTON TOWN (TRAFALGAR) / HALTON

Date 1/1/2009 **DD/MM/YYYY**

Elev 205.8 (masl) **Easting** 589100 **Northing** 4818903
/ Monitoring Observation Wells **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 6.0 (mbgs) 199.8 (masl) Not stated
Casing Diameter 5 cm **Casing Material:** PLASTIC
Top of Screen 6.0 (mbgs) **Bottom of Screen** 9.1 (mbgs)
Screen Interva 3.1 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	205.8		
1.5	204.3	BROWN	TOPSOIL / SAND /
4.0	201.8	BROWN	CLAY / GRAVEL /
7.6	198.2	BROWN	TILL / / DENSE
9.1	196.7	GREY	CLAY / SILT / SANDY

Well Record #

7131006

Lot **Conc** MILTON TOWN (ESQUESING) / HALTON

Date **DD/MM/YYYY**

Elev 206.2 (masl) **Easting** 588608 **Northing** 4819094

/ Monitoring Test Hole **UTM RC** 3 **margin of error : 10 - 30 m**

Water Found 0.9 (mbgs) 205.3 (masl) Not stated

Casing Diameter 5 cm **Casing Material:** PLASTIC

Top of Screen (mbgs) **Bottom of Screen** (mbgs)

Screen Interva (m)

Flowing?

SWL 0.3 (mbgs) 205.9 (masl)

Pumping WL (mbgs) (masl)

Pump Rate (LPM) /

Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.2		
1.2	205.4	GREY	FILL / /
	205.0	GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.4	GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.0	GREY	FILL / /
	205.4	GREY	FILL / /
	204.9	GREY	FILL / /
		GREY	FILL / /
	205.0	GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.4	GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.0	GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.4	GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.0	GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
	205.4	GREY	FILL / /
		GREY	FILL / /
	205.0	GREY	FILL / /
		GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.4	GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /
	205.0	GREY	FILL / /
		GREY	FILL / /
	204.9	GREY	FILL / /

Well Record #

4.5	201.7		SILT /	TILL	/ CLAYEY
			SILT /	TILL	/ CLAYEY
	201.6		SILT /	TILL	/ CLAYEY
	202.1		SILT /	TILL	/ CLAYEY
	201.7		SILT /	TILL	/ CLAYEY
			SILT /	TILL	/ CLAYEY
	201.6		SILT /	TILL	/ CLAYEY
	202.1		SILT /	TILL	/ CLAYEY
	201.7		SILT /	TILL	/ CLAYEY
			SILT /	TILL	/ CLAYEY
	201.6		SILT /	TILL	/ CLAYEY
	202.1		SILT /	TILL	/ CLAYEY
	201.7		SILT /	TILL	/ CLAYEY
			SILT /	TILL	/ CLAYEY
	201.6		SILT /	TILL	/ CLAYEY
	202.1		SILT /	TILL	/ CLAYEY
	201.6		SILT /	TILL	/ CLAYEY

7147731 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 5/26/2010 **DD/MM/YYYY**

Elev 208.9 (masl) **Easting** 588956 **Northing** 4819079
/ Test Hole Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl)

Casing Diameter **Casing Material:**

Top of Screen 5.5 (mbgs) **Bottom of Screen** 7.0 (mbgs)

Screen Interva 1.5 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	208.9				
1.8	207.0	BROWN	FILL /		/ DRY
5.2	203.7	BROWN	SILT /	TILL	/ OTHER
7.0	201.9	GREY	SILT /	TILL	/ OTHER

7150312 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 8/3/2010 **DD/MM/YYYY**

Elev 208.8 (masl) **Easting** 588966 **Northing** 4818925
/ Monitoring and Te **UTM RC** 4 **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl)

Casing Diameter 2 inch **Casing Material:** PLASTIC

Top of Screen 3.0 (mbgs) **Bottom of Screen** 6.1 (mbgs)

Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	208.8				
0.6	208.2	BROWN	SAND /	GRAVEL	/ FILL
4.6	204.2	BROWN	SILT /	GRAVEL	/ CLAY
6.1	202.7	GREY	SILT /	CLAY	/ TILL

7150313 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 8/3/2010 **DD/MM/YYYY**

Elev 209.6 (masl) **Easting** 588928 **Northing** 4818956
/ Monitoring and Te **UTM RC** 4 **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl)

Casing Diameter 2 inch **Casing Material:** PLASTIC

Top of Screen 2.4 (mbgs) **Bottom of Screen** 5.5 (mbgs)

Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	209.6				
0.6	209.0	BROWN	SAND /	GRAVEL	/ FILL
4.3	205.3	BROWN	SILT /	GRAVEL	/ TILL
5.5	204.1	GREY	SILT /	CLAY	/ TILL

Well Record #

7150314 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 8/3/2010 **DD/MM/YYYY**

Elev 209.1 (masl) **Easting** 588957 **Northing** 4818896
/ Monitoring and Te **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 2.4 (mbgs) **Bottom of Screen** 5.5 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	209.1		
0.3	208.8	BROWN	GRAVEL / SAND / FILL
3.0	206.1	BROWN	SILT / CLAY / TILL
5.5	203.6	GREY	SILT / CLAY / TILL

7150315 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 8/4/2010 **DD/MM/YYYY**

Elev 208.4 (masl) **Easting** 588978 **Northing** 4819015
/ Monitoring and Te **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 2.4 (mbgs) **Bottom of Screen** 5.5 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	208.4		
0.3	208.0	BROWN	SAND / GRAVEL / FILL
3.7	204.7	BROWN	SILT / CLAY / GRAVEL
5.5	202.9	GREY	SILT / CLAY / GRAVEL

7150316 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 8/4/2010 **DD/MM/YYYY**

Elev 208.9 (masl) **Easting** 588953 **Northing** 4819007
/ Monitoring and Te **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 0.9 (mbgs) **Bottom of Screen** 3.4 (mbgs)
Screen Interva 2.4 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	208.9		
0.6	208.3	BROWN	GRAVEL / SAND / FILL
3.4	205.6	BROWN	SILT / SAND / GRAVEL

7150317 **Lot** **Conc** MILTON TOWN (MILTON) / HALTON

Date 8/4/2010 **DD/MM/YYYY**

Elev 208.5 (masl) **Easting** 588977 **Northing** 4818973
/ Monitoring and Te **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 2.4 (mbgs) **Bottom of Screen** 7.0 (mbgs)
Screen Interva 4.6 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	208.5		
0.6	207.9	BROWN	GRAVEL / SAND / FILL
4.6	203.9	BROWN	SILT / CLAY / SAND
7.0	201.4	GREY	SILT / CLAY / SAND

Well Record #

7177413 — **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 1/31/2012 **DD/MM/YYYY**

Elev 206.2 (masl) **Easting** 589087 **Northing** 4818980
/ Monitoring Observation Wells **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 5 cm **Casing Material:** PLASTIC
Top of Screen 4.5 (mbgs) **Bottom of Screen** 7.5 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.2		/ /
0.2	206.0	BROWN	SAND / GRAVEL / DENSE
2.0	204.2	BROWN	SILT / SAND / HARD
4.0	202.2	GREY	SILT / SAND / HARD
6.5	199.7	GREY	CLAY / SILT / DENSE
7.5	198.7		

7177414 — **Lot** **Conc** MILTON TOWN (TRAFALGAR) / HALTON

Date 2/1/2012 **DD/MM/YYYY**

Elev 205.8 (masl) **Easting** 589103 **Northing** 4818934
/ Monitoring Observation Wells **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 5 cm **Casing Material:** PLASTIC
Top of Screen 5.3 (mbgs) **Bottom of Screen** 8.3 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	205.8		
0.3	205.5	BROWN	GRAVEL / SAND / LOOSE
1.0	204.8	BROWN	SAND / GRAVEL / DENSE
4.5	201.3	BROWN	SILT / SAND / HARD
7.0	198.8	GREY	SILT / SAND / HARD
8.3	197.5	GREY	CLAY / SILT / SAND

7177417 — **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 1/31/2012 **DD/MM/YYYY**

Elev 206.9 (masl) **Easting** 589046 **Northing** 4819052
/ Monitoring Observation Wells **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 5 cm **Casing Material:** PLASTIC
Top of Screen 3.8 (mbgs) **Bottom of Screen** 6.8 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.9		
0.3	206.6		/ /
4.5	202.4	BROWN	SAND / GRAVEL / LOOSE
6.0	200.9	GREY	SILT / SAND / DENSE
6.8	200.1	GREY	CLAY / SILT / DENSE

7179617 — **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 1/20/2012 **DD/MM/YYYY**

Elev 233.6 (masl) **Easting** 587660 **Northing** 4817830
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	233.6		
			/ /

Well Record #

7180021 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 4/10/2012 **DD/MM/YYYY**

Elev 206.8 (masl) **Easting** 589056 **Northing** 4819013
/ Abandoned-Other **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Depth (m)	Elev (masl)
0.0	206.8

Color **Soil Descriptions**

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute
/ /

7189039 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 4/8/2012 **DD/MM/YYYY**

Elev 207.5 (masl) **Easting** 588784 **Northing** 4818946
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Depth (m)	Elev (masl)
0.0	207.5

Color **Soil Descriptions**

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute
/ /

7198974 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 1/25/2013 **DD/MM/YYYY**

Elev 214.5 (masl) **Easting** 588048 **Northing** 4817980
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Depth (m)	Elev (masl)
0.0	214.5

Color **Soil Descriptions**

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute
/ /

7199512 **Lot** **Conc** MILTON TOWN (TRAFALGAR) / HALTON

Date 2/13/2013 **DD/MM/YYYY**

Elev 205.6 (masl) **Easting** 589113 **Northing** 4818908
/ Test Hole Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 6.1 (mbgs) **Bottom of Screen** 3.0 (mbgs)
Screen Interva -3.0 (m)

Depth (m)	Elev (masl)
0.0	205.6

Color **Soil Descriptions**

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute
/ /

7202130 **Lot** **Conc** MILTON TOWN (TRAFALGAR) / HALTON

Date 3/15/2012 **DD/MM/YYYY**

Elev 207.2 (masl) **Easting** 589261 **Northing** 4818427
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Depth (m)	Elev (masl)
0.0	207.2

Color **Soil Descriptions**

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute
/ /

Well Record #

7210256 — **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 10/11/2013 **DD/MM/YYYY**

Elev 216.7 (masl) **Easting** 587998 **Northing** 4818019
/ Monitoring Observation Wells **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found (mbgs) (masl)
Casing Diameter 5 cm **Casing Material:** PLASTIC
Top of Screen 5.1 (mbgs) **Bottom of Screen** 6.0 (mbgs)
Screen Interva 0.9 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	216.7		
2.0	214.7	BROWN	/ SILT / FILL
6.0	210.7	GREY	SILT / TILL / DENSE

7211057 — **Lot** 015 **Conc** 07 MILTON TOWN (NELSON) / HALTON

Date 7/24/2013 **DD/MM/YYYY**

Elev 245.0 (masl) **Easting** 587943 **Northing** 4817184
/ Domestic Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 31.7 (mbgs) 213.3 (masl) Untested
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL 8.0 (mbgs) 237.0 (masl)
Pumping WL 28.6 (mbgs) 216.4 (masl)
Pump Rate 4.5 (LPM) 1 /
Spec. Cap. 0.22 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	245.0		
1.2	243.8	RED	CLAY / /
31.7	213.3	RED	SHALE / /

7218347 — **Lot** 015 **Conc** 01 MILTON TOWN (TRAFALGAR) / HALTON

Date 10/9/2013 **DD/MM/YYYY**

Elev 222.6 (masl) **Easting** 588161 **Northing** 4817335
/ Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 12.5 (mbgs) 210.1 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL 1.2 (mbgs) 221.4 (masl)
Pumping WL 14.0 (mbgs) 208.6 (masl)
Pump Rate 109.1 (LPM) 2 /
Spec. Cap. 8.52 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	222.6		
0.3	222.3		TOPSOIL / /
5.2	217.4	BROWN	CLAY / /
8.5	214.0	RED	CLAY / /
18.3	204.3	RED	SHALE / /

7218658 — **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 9/3/2013 **DD/MM/YYYY**

Elev 221.9 (masl) **Easting** 587962 **Northing** 4817758
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	221.9		
			/ /

7239499 — **Lot** **Conc** MILTON TOWN (TRAFALGAR) / HALTON

Date 12/3/2014 **DD/MM/YYYY**

Elev 206.6 (masl) **Easting** 589035 **Northing** 4818862
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl) Untested
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 3.0 (mbgs) **Bottom of Screen** 6.1 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.6		

Well Record #

2.1	204.5	BROWN	CLAY /	FILL	/ SILTY
6.1	200.5	BROWN	CLAY /	SAND	/ GRAVEL

7245881 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 4/9/2015 **DD/MM/YYYY**

Elev 209.8 (masl) / Monitoring **Easting** 588149 **Northing** 4818350 **UTM RC** 6 **margin of error : 300 m - 1 km**

Water Found 0.9 (mbgs) 208.9 (masl)

Casing Diameter 2 inch **Casing Material:** PLASTIC

Top of Screen 2.4 (mbgs) **Bottom of Screen** 3.4 (mbgs)

Screen Interva 0.9 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	209.8				
1.4	208.3	BROWN	CLAY /	SILTY	/ GRAVEL
3.0	206.7	BROWN	CLAY /	TILL	/ SILTY
3.5	206.3	BROWN	SILT /	CLAY	/ WATER-BEARING
4.4	205.3	BROWN	SILT /	CLAY	/ WATER-BEARING
5.2	204.6	BROWN	CLAY /	SILTY	/ SAND

7247725 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 5/22/2015 **DD/MM/YYYY**

Elev 209.2 (masl) / Test Hole **Easting** 588864 **Northing** 4819120 **UTM RC** 4 **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl)

Casing Diameter **Casing Material:** Abandoned-Other

Top of Screen (mbgs) **Bottom of Screen** (mbgs)

Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	209.2				
4.6	204.6	GREY	/		/

7247726 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 5/22/2015 **DD/MM/YYYY**

Elev 209.2 (masl) / Test Hole **Easting** 588863 **Northing** 4819120 **UTM RC** 4 **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl)

Casing Diameter 2 inch **Casing Material:** PLASTIC

Top of Screen 7.6 (mbgs) **Bottom of Screen** 4.6 (mbgs)

Screen Interva -3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	209.2				
3.0	206.1	BROWN	SAND /	DRY	/
7.6	201.5	GREY	SILT /	SAND	/ WATER-BEARING

7250121 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 7/24/2015 **DD/MM/YYYY**

Elev 206.5 (masl) / **Easting** 588511 **Northing** 4818963 **UTM RC** 4 **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl)

Casing Diameter **Casing Material:**

Top of Screen (mbgs) **Bottom of Screen** (mbgs)

Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions		
0.0	206.5				
			/		/

Well Record #

7256655 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 12/8/2015 **DD/MM/YYYY**

Elev 206.4 (masl) **Easting** 589100 **Northing** 4819093
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 4.6 (mbgs) **Bottom of Screen** 7.6 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.4		
4.3	202.1	BROWN	CLAY / /
7.6	198.8	BROWN	CLAY / /

7256656 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 12/7/2015 **DD/MM/YYYY**

Elev 206.3 (masl) **Easting** 589109 **Northing** 4819065
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 5.2 (mbgs) **Bottom of Screen** 8.2 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.3		
4.9	201.4	BROWN	CLAY / /
8.2	198.1	GREY	CLAY / / DENSE

7256657 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 12/7/2015 **DD/MM/YYYY**

Elev 206.4 (masl) **Easting** 589118 **Northing** 4819081
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 1 inch **Casing Material:** OPEN HOLE
Top of Screen 5.8 (mbgs) **Bottom of Screen** 8.8 (mbgs)
Screen Interva 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.4		
5.8	200.6	BROWN	CLAY / /
8.8	197.6	GREY	CLAY / /

7275759 **Lot** 001 **Conc** 02 MILTON TOWN (ESQUESING) / HALTON

Date 9/21/2016 **DD/MM/YYYY**

Elev 206.0 (masl) **Easting** 588635 **Northing** 4819007
/ **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.0		
			/ /

7281180 **Lot** **Conc** MILTON TOWN (ESQUESING) / HALTON

Date 7/29/2016 **DD/MM/YYYY**

Elev 206.1 (masl) **Easting** 588634 **Northing** 4819099
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interva (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	206.1		
			/ /

APPENDIX

G ECOPLANS (2013) PRIVATE WATER WELL SURVEY SUMMARY

Additional Well Survey Data, Tremaine Road and Steeles Avenue, Milton. **Data source: WSP water well surveys, completed in 2016 in support of the Tremaine Road Realignment PTTW application**

Well ID	PropertyStreet	Well Type	Well Record Available	MOE Well Record No	Date Installed	Water Source	Water Use	GPS Well Datum	GPS Well Zone	GPS Well Easting	GPS Well Northing	GPS Well Elev	Depth of Water	Depth of Water Type	Depth of Well	Depth of Well Type	Well Condition
75	7780 Tremaine Road	Drilled	No		1991	Bedrock	Residential (Drinking)	NAD83	17	587994	4817366	213	7.82	Measured	30.48	Reported by Resident	Good
76	7720 Tremaine Road	Bored	No		1974	Bedrock	Residential (Drinking)	NAD83	17	588048	4817306	199	2.82	Measured	9.88	Measured	Poor
77	7696 Tremaine Road	Bored	No		1968	Bedrock	Residential (Drinking)	NAD83	17	588150	4817207		2.32	Measured	15.98	Measured	Good
78	7710 Tremaine Road	Dug	No		35 Years Ago		Residential (Non-Drinking)	NAD83	17	588012	4817155		2.23	Measured	6.74	Measured	Poor
79	7710 Tremaine Road	Dug	No		35 Years Ago		Well not in use	NAD83	17	587995	4817118		0	Reported by Re	4	Reported by Resident	Poor
80	7711 Tremaine Road	Bored	No		1984	Overburden	Residential (Drinking)	NAD83	17	588167	4817348		5.7	Measured	7.35	Measured	Poor
81	7781 Tremaine Road	Drilled	Yes	AO55145	Unknown	Unknown	Residential (Drinking)	NAD83	17	588097	4817471		+0.14	Measured	11.5	Measured	Poor
82	7781 Tremaine Road	Dug		n/a	Unknown	Unknown	Residential (Drinking)	NAD83	17	588100	4817477		0.47	Measured	4.46	Measured	Poor
83	7673 Tremaine Road	Dug	Yes	n/a	1989	Overburden	Residential (Drinking)	NAD83	17	588216	4817290	190	0.56	Measured	10	Measured	Fair
84	7682 Tremaine Road	Drilled	No		25 Years Ago	Bedrock	Residential (Drinking)	NAD83	17	588117	4816994	190	1.4	Measured	11.5	Measured	Good
85	7682 Tremaine Road	Dug		n/a	100 Years Old	Overburden	Well not in use	NAD83	17	588106	4817041	223	0.67	Measured	6.55	Measured	Poor
86	7692 Tremaine Road	Bored	No		1976	Bedrock	Residential (Drinking)	NAD83	17	588102	4817114	191	1.19	Measured	6.3	Measured	Fair
87	7692 Tremaine Road	Bored		n/a	Unknown	Unknown	Well not in use	NAD83	17	588094	4817139		0.08	Measured	1.72	Measured	Fair

APPENDIX

H

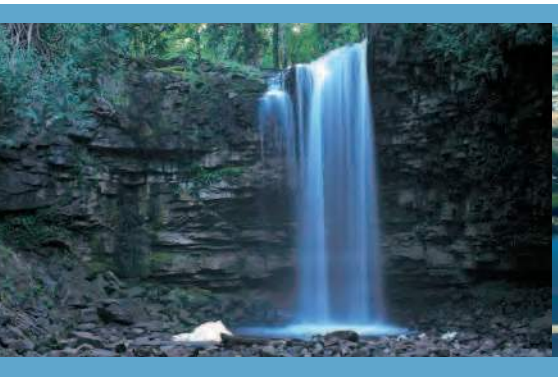
SELECTED FIGURES FROM THE HALTON-HAMILTON SOURCE PROTECTION AUTHORITY REPORT (JULY 2015)

Assessment Report

Halton Region

Source Protection Area

Approved by
the Ministry of the Environment and Climate Change
on August 5, 2015

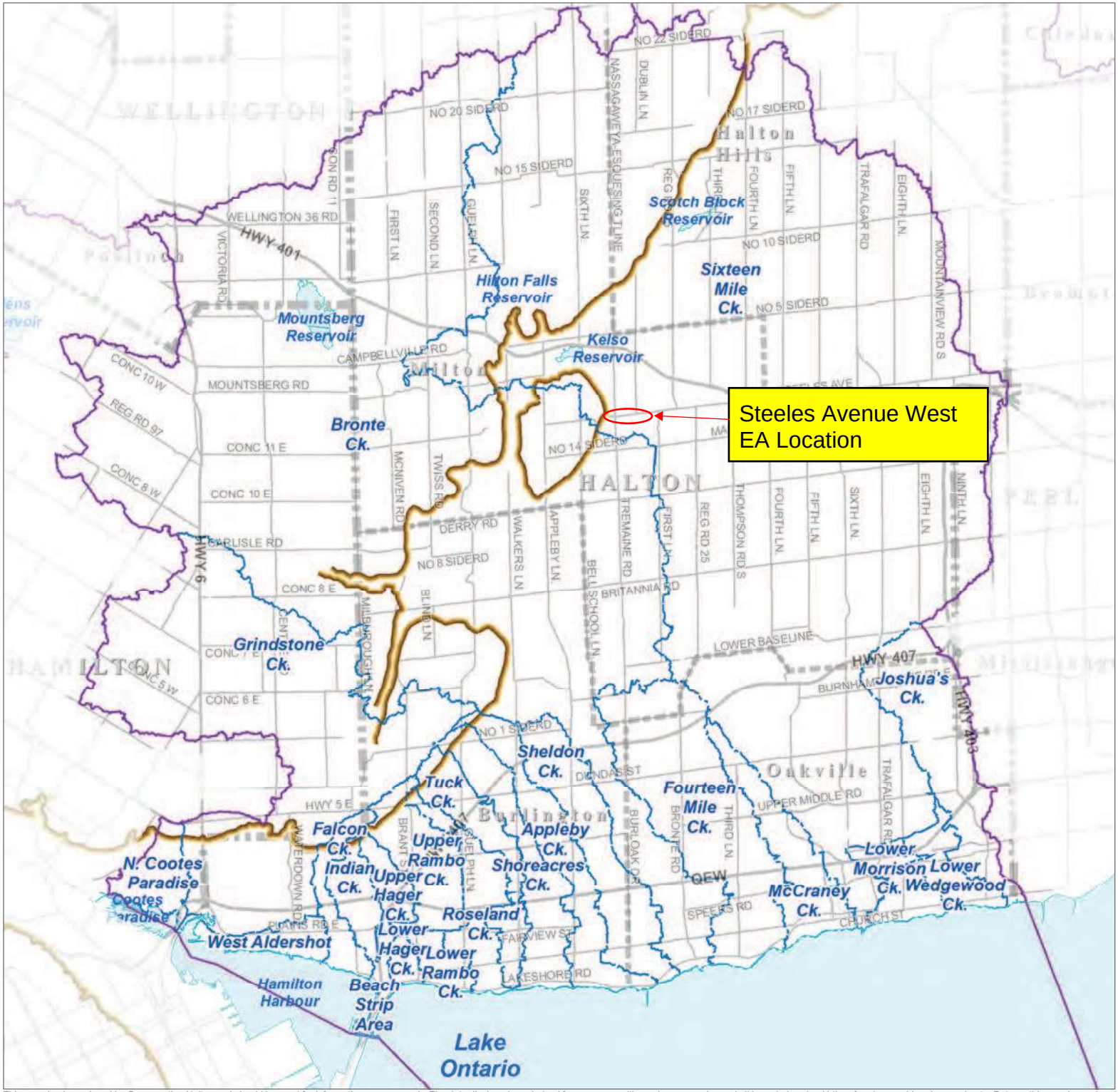


Ontario

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Prepared on behalf of the Halton-Hamilton Source Protection Committee

July, 2015



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 2.1

Halton Region Source Protection Area

Legend

- Source Protection Area
- Watersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment

Roads

- Highway
- Regional

- Waterbody

Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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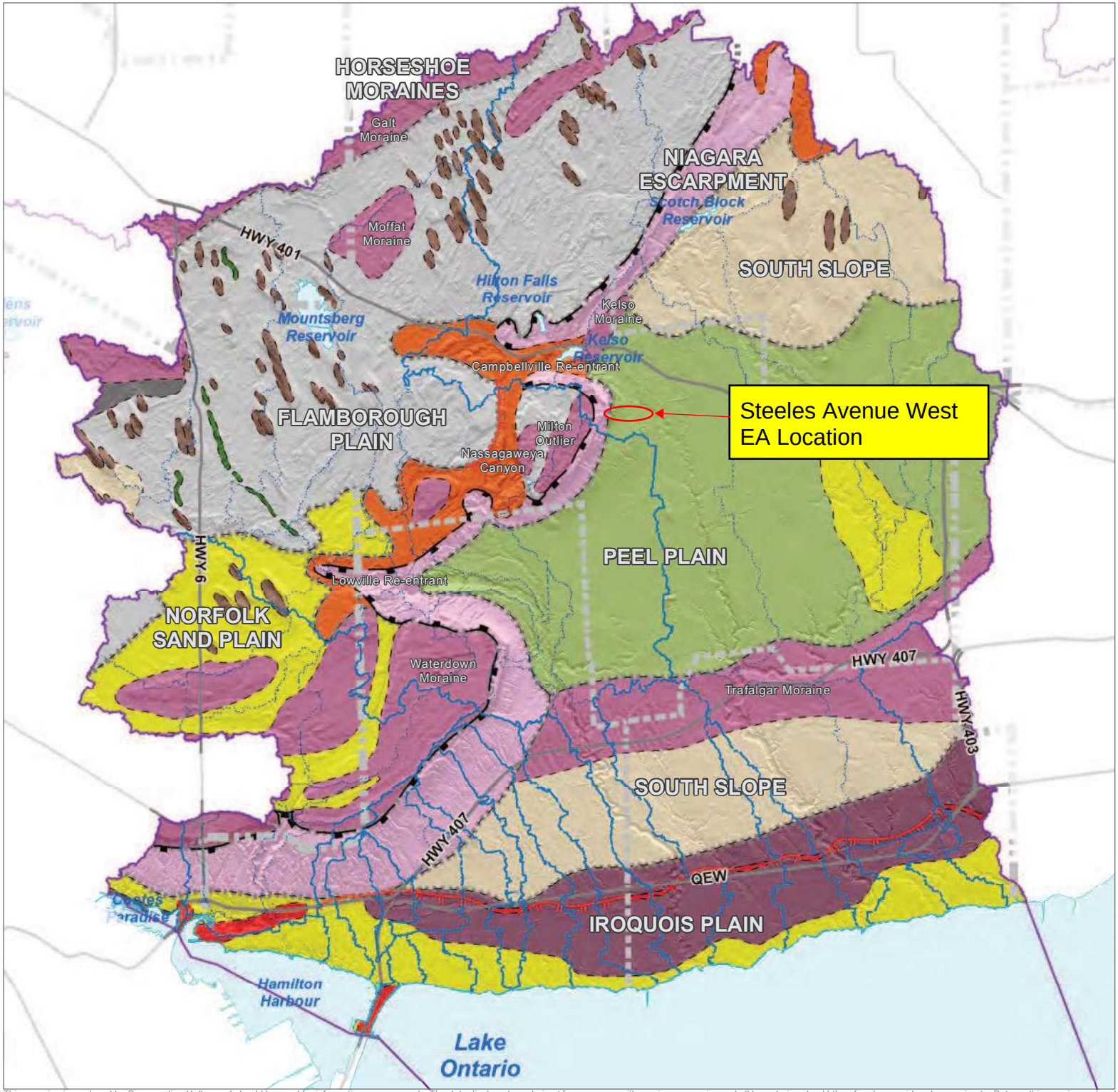

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 2.2

Physiography

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Highway
- Waterbody

Physiography

- Contact
- Escarpment
- Shorecliff

Physiographic Region

- 1: Escarpments
- 2: Till Moraines
- 3: Spillways
- 6: Till Plains (Drumlinized)
- 7: Drumlins
- 8: Bevelled Till Plains
- 9: Limestone Plains
- 10: Shale Plains
- 11: Sand Plains
- 13: Eskers
- 14: Beaches
- 17: Peat And Muck

Source : Physiography (2007), Ontario Geological Survey, Chapman & Putnam.
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
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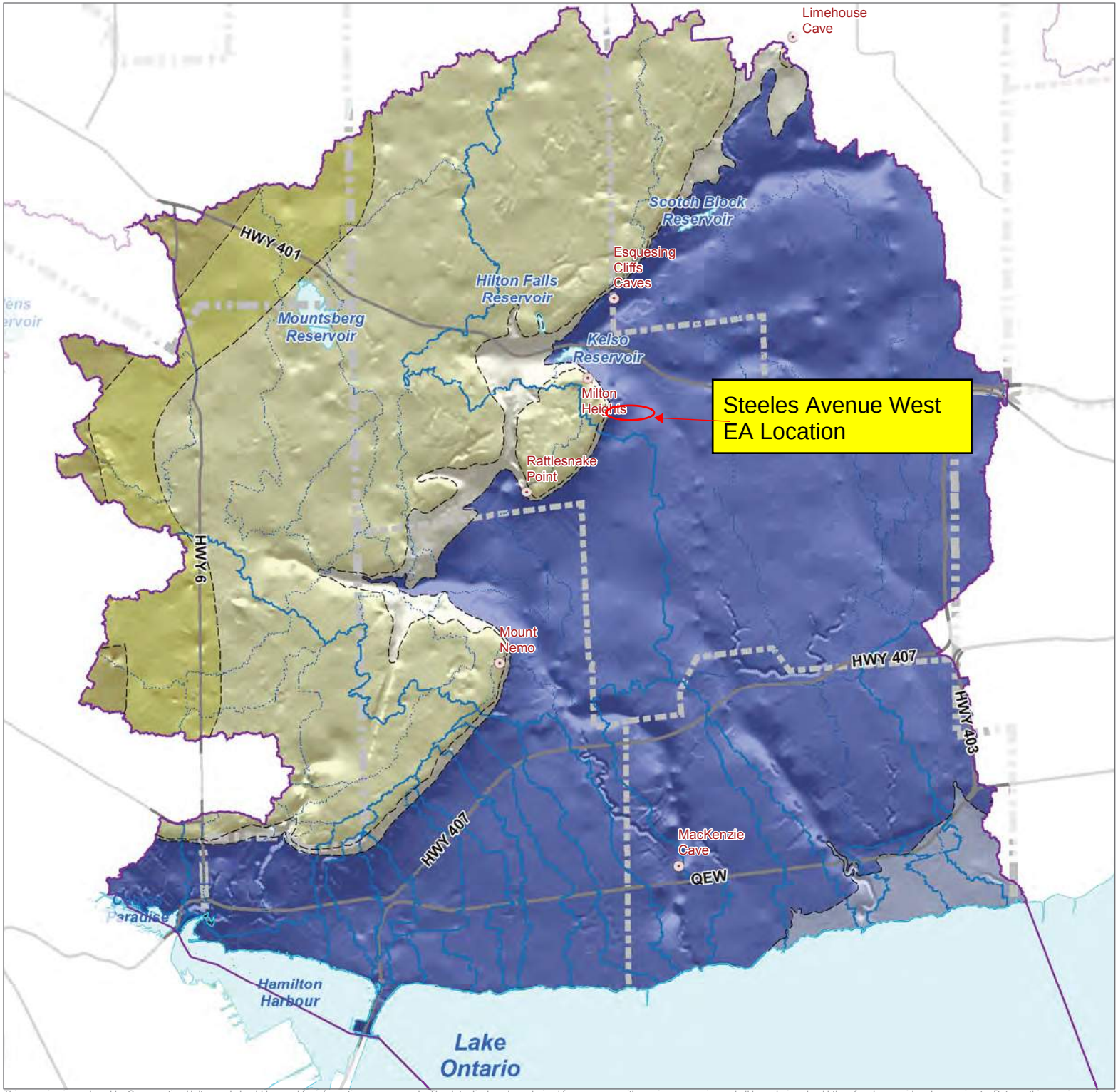

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 2.5

Bedrock Geology

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Highway
- Waterbody
- Karst Sites
- Karst Areas

Bedrock Formation / Member

- Georgian Bay
- Queenston
- Cataract - Clinton
- Gasport - Goat Island
- Eramosa
- Guelph

Source : Paleozoic Geology for Southern Ontario, Ministry of Northern Development & Mines (2007), modified based on Brunton (2009). Brunton, F.R. & Dodge, J.E.P. Karst Map of Southern Ontario, OGS GRS005 (2008). Bedrock Topography hillshade from Halton Region / Earthfx (2009).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6

Kilometers

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DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 2.9

Watersheds & Subwatersheds

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Railway
- Waterbody

Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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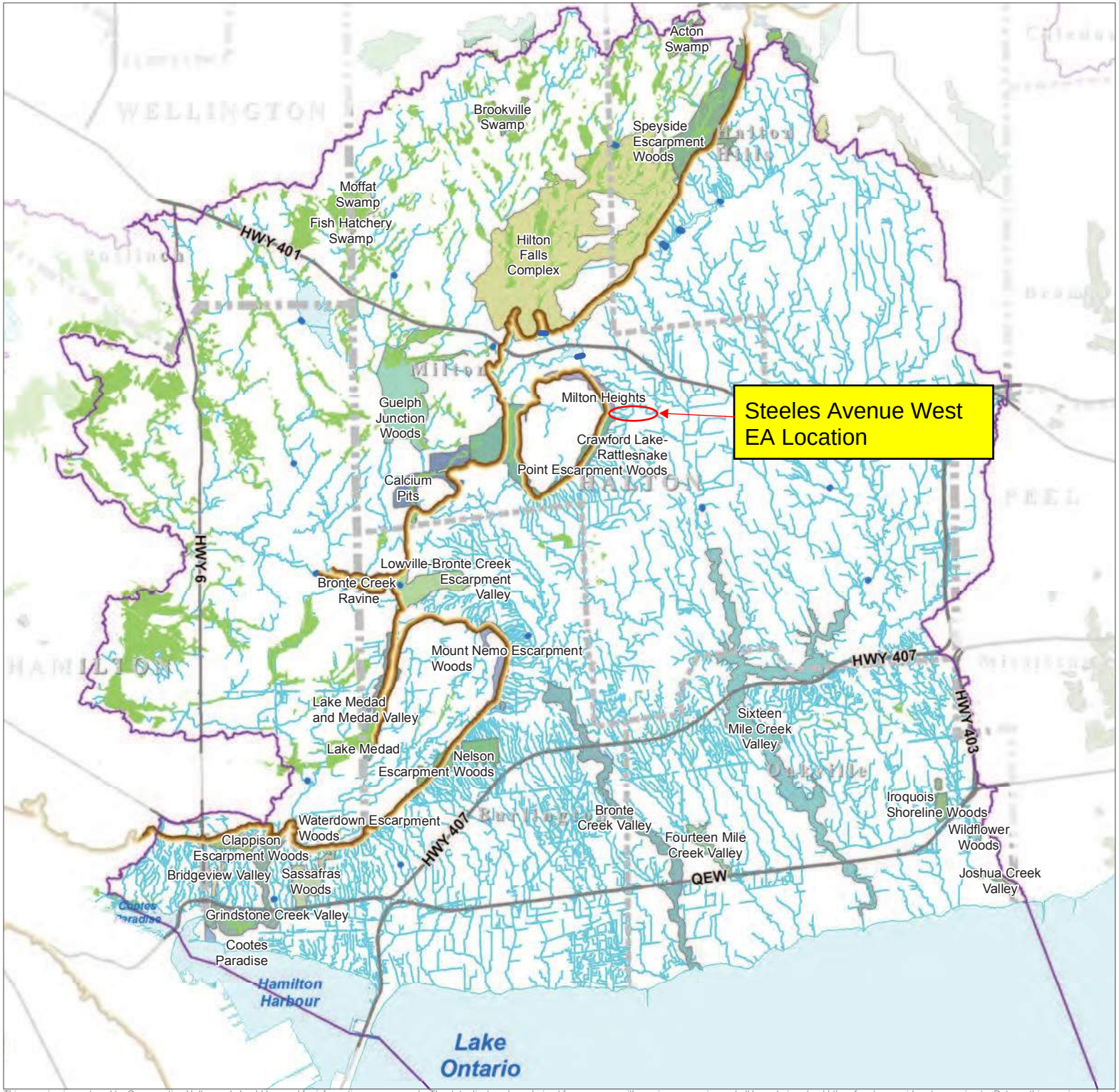

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 3.1

Hydrology and Sensitive Areas

Legend

- Source Protection Area
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Dams
- Hydrography
- Waterbody
- Provincially Significant Wetlands (PSW)

Environmentally Sensitive Areas

- Bronte Creek Valley (as labeled on map)

Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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Tuck Creek Watershed

Many tributaries are associated with the headwaters of Tuck Creek. One branch drains the escarpment edge from Fisher's Pond, located at the base of the southernmost ridge of the Waterdown Moraine. Most others drain the escarpment slope through the Escarpment Woods ESA. The tributaries quickly converge to form one branch that drains the watershed into Lake Ontario. Land use within the watershed changes from agricultural or undeveloped north of Highway 407 to residential or industrial/commercial to the south.

Shoreacres Creek Watershed

Many headwater tributaries of Shoreacres Creek drain the escarpment edge and slope, and converge into one channel below. Tributaries flow through the Nelson Escarpment Woods ESA. Along its main branch, the creek decreases in elevation approximately 200 metres over its 10.5 kilometre length. Due to urban development south of Highway 407, the channelization or enclosure of a few reaches has modified the stream valley at numerous locations.

Appleby Creek Watershed

Appleby Creek is the longest watershed within the Halton Source Protection Area, originating at the eastern face of the escarpment. It is located entirely within the City of Burlington and flows through agricultural lands, residential areas, and golf courses. The 11.5 kilometre long watershed is typically only 1.5 kilometres wide and expands to 3.2 kilometres at the Lake Ontario shoreline. The watershed is mainly undeveloped within the upper reaches and heavily urbanized near the lake. Appleby Creek is predominantly a grass-lined channel with little riparian vegetation. The main branch of the creek decreases about 200 metres in elevation as it flows from the headwater area to Lake Ontario, and more than half of the decrease occurs in the upper 2.5 kilometres of the watershed. Many tributaries drain the escarpment edge and converge into one eastern branch of the creek. A western branch originates at the base of the escarpment slope and joins the eastern branch south of the QEW. One creek and storm sewers drain the lower watershed.

Sheldon Creek Watershed

Sheldon Creek originates at the base of the Niagara Escarpment slope and drains southeast to Lake Ontario. The watershed is about 10 kilometres long, up to 2.5 kilometres wide, and drained by two main branches of the creek. The headwater tributaries converge to form the western branch, and a second eastern branch originates at the base of the Trafalgar Moraine. The branches converge about 900 metres upstream from the discharge point at Lake Ontario. Sheldon Creek watershed originates in the rural area north of Highway 407 but is primarily developed for urban uses.

3.4. Bronte Creek Watershed

The Bronte Creek watershed extends across portions of the City of Burlington, Town of Oakville, Town of Milton, the City of Hamilton, and Puslinch Township (Wellington County). Much of the watershed remains undeveloped or used for agriculture. Settlement concentrates in Oakville, near the mouth of the watercourse, and in rural settlement areas. The main branch of Bronte Creek is approximately 48 kilometres long, and the watershed's width ranges between 23 kilometres at its widest point and about 1 kilometre near its mouth. Bronte Creek is the second largest watershed in the Source Protection Area and drains approximately 317 square kilometres. The Bronte Creek watershed subdivides into the 11 subwatersheds described below.

Upper Main Branch Subwatershed

The Niagara Escarpment divides the main branch of Bronte Creek into upper and lower subwatersheds. The headwaters of the creek originate in Puslinch Township, at the base of the Galt Moraine. The creek flows through the Lower Mountsberg Creek Wetland Complex and the Beverly Swamp Complex, and its path is somewhat controlled by the drumlins within the subwatershed. Agriculture is a typical land use within this subwatershed, which also includes conservation areas.

Significant groundwater inputs maintain cold water conditions within the headwaters area and downstream through Carlisle to Lowville. Online ponds, sparse riparian vegetation, and channel modifications warm the stream water in sections between the cold water areas.

Subwatersheds emptying within this reach include Strabane, Mountsberg, and Flamboro. The Upper Bronte Creek subwatershed ends at the Progreston dam and the head of the Lowville re-entrant. Progreston dam is a privately owned concrete weir, retrofitted with a turbine for the production of electricity.

Strabane Creek Subwatershed

Strabane Creek originates within the Beverly Swamp Complex that lies at the base of the Moffat Moraine. Land use within the subwatershed is typically agricultural.

Mountsberg Creek Subwatershed

The headwaters of Mountsberg Creek begin within the Badenoch-Moffat Swamp Complex and the Halton Escarpment Provincially Significant Wetlands at the base of the Galt Moraine. Groundwater discharge maintains cold water stream conditions in this reach of the creek. The tributaries of Mountsberg Creek also drain two ESAs: Moffat Swamp and Fish Hatchery Swamp. The creek flows around drumlins located in the upper reach and through the Mountsberg Reservoir Provincially Significant Wetland before it empties into Mountsberg Reservoir. Upstream of the reservoir, the flows typically are permanent, but may be intermittent during periods of drought.

Mountsberg Reservoir

Conservation Halton operates the dam at Mountsberg, constructed in 1966. Mountsberg is a flood control structure also used for low flow augmentation. The 187 hectare reservoir, with a capacity of 3.6 million cubic metres, provides a large expanse of shallow, open marsh habitat that is unique within the watershed. The marsh associated with the reservoir is a designated provincially significant waterfowl staging area and a regionally significant waterfowl breeding area. It also acts as a significant migratory stopover area and supports a warmwater fish community.

South of the reservoir, Mountsberg Creek flows through the Lower Mountsberg Creek Swamp Complex Provincially Significant Wetland and the Carlisle Wetland Complex before discharging to the Upper Main Branch of Bronte Creek. Within the subwatershed, land use is primarily rural and agricultural.

Flamboro Creek Subwatershed

Flamboro Creek headwaters originate from a series of wetlands associated with the Lower Mountsberg Creek Swamp Complex and the North Progreston Swamp. The watercourse flows through a large, online pond on the Carlisle Golf and Country Club property and then through a deeply incised valley. It empties into Bronte Creek at the head of the Lowville re-entrant and downstream of the Progreston dam.

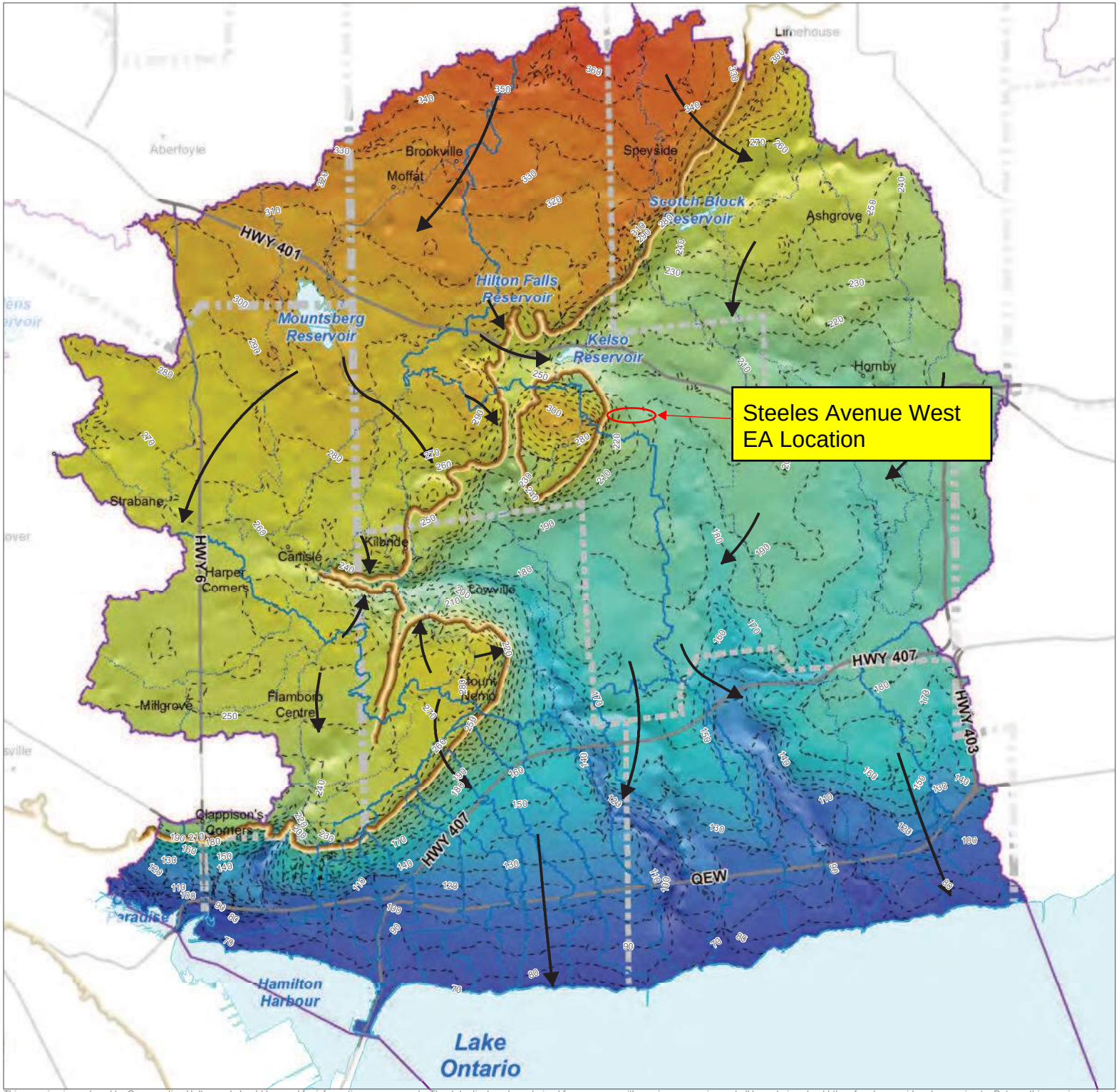
A portion of the settlement area of Carlisle is located within this subwatershed, as are agricultural and rural residential properties. In addition, a transportation corridor of the Canadian Pacific Railway runs through the subwatershed.

Lower Main Branch Subwatershed

Bronte Creek plunges over the Niagara Escarpment at Progreston Falls, which lies at the head of the Lowville re-entrant. Significant groundwater discharge from the bedrock valley walls increases the stream flows below. The Lowville-Bronte Creek Escarpment Valley ESA lies within the re-entrant, while Flamboro, Kilbride, Willoughby, and Limestone Creeks discharge into this reach of Bronte Creek. Dakota Mills, Cedar Springs, and Lowville dams are all located in this subwatershed. Each is a privately owned, top draw overflow structure that does not provide for significant storage due to the small size of the pond areas. The valley contains mature, native vegetation and one residential community.

Downstream of the Lowville re-entrant, Bronte Creek flows within an incised bedrock valley which is up to 35 metres deep. The Bronte Valley ESA extends along the creek for most of the Lower Main Branch subwatershed. North of the QEW, the creek flows through Bronte Creek Provincial Park, a 6.4 square kilometre recreational park with camping facilities. The park is located at the western edge of Oakville. South of the QEW, Bronte Creek flows past former petroleum refinery sites and a series of municipal, urban parks before flowing through Bronte marsh and discharging into Lake Ontario at Bronte Harbour. In the spring and fall, the lower reaches of Bronte Creek are an important corridor for

Mouth of Bronte Creek and Bronte Harbour (photo credit: Halton Region)



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 4.5

Water Table Elevation & Inferred Groundwater Flow

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody

Water Table Elevation

- Inferred Groundwater Flow
- Contours (10 metre interval)

Water Table (m amsl)

365
265
165
65

Note : (m amsl) : metres above mean sea level

Source : Conservation Halton / Ontario Geological Survey, Groundwater Resources Improvement Program Study (2006).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6
Kilometers

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4.4 Groundwater / Surface Water Interactions

Interactions between groundwater and surface water occur in areas where groundwater discharges to surface or where surface water bodies recharge groundwater.

Discharge occurs as baseflow to streams, seeps, and springs. Discharge of cold groundwater to streams has a significant influence on moderating stream temperatures, thereby providing suitable habitat for temperature sensitive fish species. Cool water tributaries have an average, daily maximum temperature of approximately 18 degrees Celsius, while cold water streams average approximately 14 degrees Celsius. The main channels of Sixteen Mile, Bronte and Grindstone Creeks, and their headwater tributaries receive their permanent flow or baseflow from groundwater. Groundwater seepage within the deeply incised bedrock valleys contributes to good fishery in the Source Protection Area. Creeks receiving groundwater are shown as cold on Figure 4.6. The coloured lines represent the stream temperature classification of Conservation Halton. The field stations indicate where Halton-Hamilton Source Protection staff have stream temperature records and the interpreted stream classification at that point. The field data set will be used to improve the stream temperature mapping.

Above the escarpment, the tributaries of Sixteen Mile and Bronte Creeks are generally shallow, slow moving, and rarely incised into the bedrock surface. Despite this, groundwater contributes significant flow to these tributaries, providing cool or cold water habitat to sustain viable fish populations in the creeks, even during periods of drought. Contrary to this, the poorly drained areas have resulted in the formation of extensive wetlands that hold warm water that in turn warms the creek waters.

One of the most important discharge areas in the Source Protection Area is along the face and slope of the Niagara Escarpment. Bedrock aquifers discharge at the escarpment face and, due to the low permeability soils and bedrock below, a significant number of headwater creeks are formed.

The interaction of groundwater and surface water also takes place where surface water recharges the water table. The water table and surface water levels can rise and fall seasonally and from year to year because of changes in precipitation received. The relative difference in water pressures between two points will influence the direction and rate of water flow. The upward movement of groundwater to a creek results in discharge, and the creek gains water. When the water table drops and surface water infiltrates into the underlying sediment, the creek loses water. Creeks under these conditions are called gaining streams and losing streams. These conditions can change and a creek may be both gaining and losing at different times of the year.

Groundwater discharge zone

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 4.6

Stream Temperature Conditions

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway

Thermal Field Stations

- Cold Water
- Cool Water
- Warm Water
- Waterbody

Stream Temperature

- Cold
- Warm

Source : Stream Temperature - Conservation Halton 2010, Field Stations 2007-2008, Source Protection Program

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6

Kilometers

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4.5 Water Use

Throughout history, people have settled where there is an available and sustainable supply of clean water. This continues today, with limits placed on the growth of an area dependent on finding additional water resources. Municipal water supplies are used for many purposes including industrial, commercial, institutional and recreational activities, and for fire protection. Outside the municipal urban areas, private water supplies consist of wells, surface water systems, and cisterns. Private well systems and the natural environment use the same sources of water that, under the *Clean Water Act*, the government seeks to protect for municipal supply. In this way, maintaining a sustainable supply of clean water within the aquifers of Halton Region Source Protection Area and in Lake Ontario will benefit all residents and business operators.

The Ministry of the Environment and Climate Change's Permit to Take Water Database provides an insight into the uses of water within the Source Protection Area. This database comprises details of all water users that take more than 50,000 litres of groundwater or surface water each day and have obtained a permit. Exemptions to the requirement to obtain a permit exist for ordinary water taking for household and farm use, direct watering of livestock, and firefighting. The permit database utilized for this study was current to August 2006, and updates have been made through to January 2009. In total, 81 permits were active in the Halton Region Source Protection Area at this time. Table 4.1 details the purpose of their water taking.

Agricultural uses of water requiring a permit include the activities carried out on a farm, nursery or greenhouse operation, such as the washing of animals, barns and equipment, irrigation, pesticide mixing, and frost protection. Commercial water use permits exist for bottled water production, the irrigation of golf courses, and aquaculture. Typically, aggregate extraction operations carry out dewatering while industrial water use permits are for manufacturing.

Table 4.1 Summary of Permit to Take Water Takings (current to January 2009)

Source	Agriculture	Commercial	Dewatering	Industrial	Remediation	Water Supply	Miscellaneous	Total
Surface Water	15	11		1			2	29
Groundwater	18	4	4	1	2	15		44
Surface Water and Groundwater	1	7						8
Total	**34**	**22**	**4**	**2**	**2**	**15**	**2**	**81**

4.5.1 Municipal Water Supply Systems

The Halton Region Source Protection Area municipal drinking water systems comprise one combined Lake Ontario and well-based system and three well-based systems (see Table 4.2 and Figure 4.7). One municipal system draws water from Lake Ontario to supply water to the urban areas of Oakville, Burlington, and about 60 percent of the urban area of Milton, and is connected to the groundwater wells that provide water to the remaining 40 percent of Milton. The two Milton water systems are operated independently at the request of its residents, although the systems are connected and the water supplies could be mixed, if circumstances required it. This South Halton drinking water system comprises four water purification plants. Municipal groundwater systems that pump water from wells supply water to portions of Carlisle, Freelton, and Campbellville.

The South Halton distribution system connects the water supplied by Burlington, Burloak, and Oakville Lake Ontario intakes. Connection is also possible with the Milton wells and the neighbouring, lake-based South Peel water system. The Woodward distribution system in Hamilton supplies a portion of Waterdown and some areas on the western edge of Burlington (see Figure 4.8).

Milton Water Tower (photo credit: Halton Region)

The municipal water systems operate under the requirements of Ontario's *Safe Drinking Water Act, 2002*, its regulations, and the specific requirements of their licences and permits. The *Safe Drinking Water Act* was enacted to regulate the treatment and distribution of water. The *Drinking Water Systems Regulation* (O.Reg. 170/03) sets out treatment and testing requirements, which are beyond the scope of this study, to understand and protect the water supplied to consumers.

Lake-based Municipal Water Systems

Halton Region is licensed to operate three water purification plants that draw water from Lake Ontario. As summarized in Table 4.3, the operating intake pipes extend between 750 and 1,350 metres into Lake Ontario and draw water from depths of between 5.5 and 17 metres. Water is pumped to the corresponding treatment plants and undergoes treatment and water quality testing before being distributed to the area's communities.

Treatment at the Oakville and Burlington Plants includes high rate sand ballasted sedimentation, filtration, ozonation, and chlorination to produce clean, safe drinking water. The Burloak Plant's treatment process includes coagulation, ozonation, membrane filtration, ultraviolet radiation, and chlorination. All of the intakes have zebra mussel control at the intake crib, consisting of chlorination to discourage the mussels from attaching to and clogging the pipe opening.

The depths of the intakes as listed in Table 4.3 refer to below the average elevation (74.8 metres) between the operational target minimum and maximum levels of 74.2 and 75.4 metres (IGLD, 1985) of Lake Ontario. As discussed in Section 4.2.1, historical levels of Lake Ontario have dropped below this value. The lowest average monthly lake elevation was 73.83 metres recorded in January 1965, one metre lower than the average target value. A short-term drop in water levels of several hours may also occur due to wind action and changes in atmospheric pressure.

Table 4.2 Municipal Water Systems of the Halton Region Source Protection Area

	Name of Water Treatment Plant / Well Field									
	Burlington	**Burloak**	**Oakville**	**Kelso**	**Walkers Line**	**Campbell-ville**	**Carlisle FEC01 and FDC02**	**Carlisle FDC03R and FDC05**	**Freelton FDF01**	**Freelton FDF03**
Operating Municipality	Halton Region						City of Hamilton			
Source of Water	Lake Ontario			Groundwater			Groundwater			
Drinking Water System Class	1	1	1	2	2	2	1	1	1	1
Water System Type	I	I	I	I	I	I	I	I	I	I
Intake Class	A	A	A							
System Licence	004-104 South Halton Drinking Water System					004-103	005-104		005-102	
Treatment Plant Rated Capacity [m^3/day]	263,000	55,000	109,000	22,670	5,240	523.73	851	3,456	873	1,607
Estimated number of users	360,000			21,000		140	1,800		780	

Notes: Drinking Water System Class 1 = Large municipal residential system
Drinking Water System Class 2 = Small municipal residential system
Water System Type I = existing municipal drinking water system serving a major residential development
Intake Class A = Great Lakes intake

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 4.7

Drinking Water Systems

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment

Roads

- Highway
- Regional

- Waterbody
- Municipal Intake
- Private Water Well

Drinking Water System

- 1 Large Municipal Residential
- 2 Small Municipal Residential
- 3 Large Municipal Non-Residential
- 4 Small Municipal Non-Residential
- 5 Non-Municipal Year-Round Residential
- 6 Non-Municipal Seasonal Residential
- 7 Large Non-Municipal Non-Residential
- 8 Small Non-Municipal Non-Residential
- Unknown

- Water mains

Source : Ministry of Environment Domestic Water Supply Wells with UTM accuracy <= 300 metres (2006), and Municipal Health Departments (2009).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6

Kilometers

1:200,000

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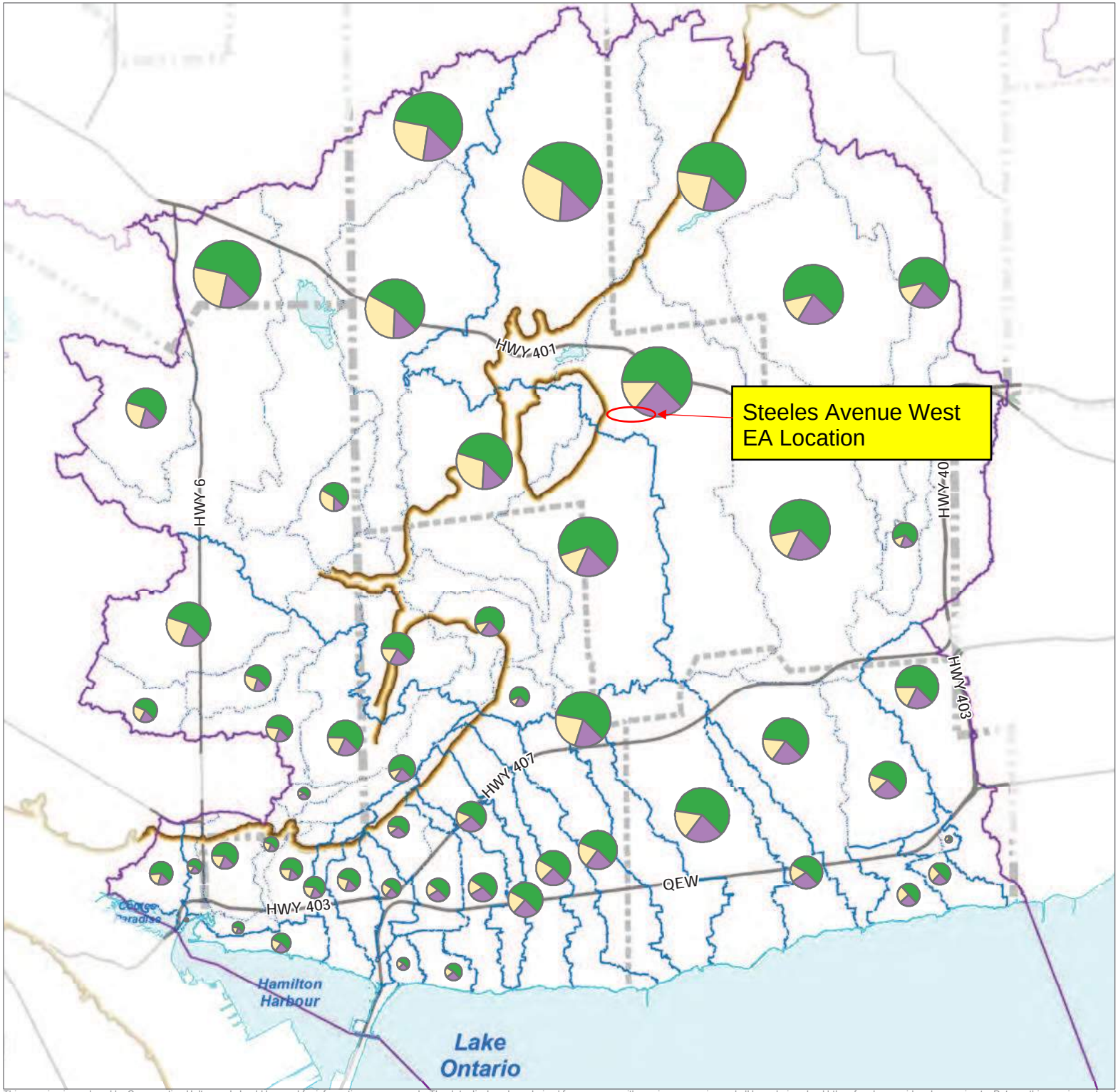

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.2

Water Budget Components

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody

Water Budget Components

- Actual Evapotranspiration
- Recharge
- Runoff

Source : PRMS Model, EarthFX, 2008
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.3

Permit To Take Water (PTTW) by Purpose - Surface Water

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment

Roads

- Highway
- Regional

- Hydrography
- Waterbody

Permit Purpose

- Municipal Water Supply
- Agricultural
- Commercial
- Industrial
- Miscellaneous

- Water Treatment Plant

Source : Ministry of Environment, Permit To Take Water Database (2006), with updates (2008).
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.4

Permit To Take Water (PTTW) by Purpose - Groundwater

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment

Roads

- Highway
- Regional

- Hydrography
- Waterbody

Permit Purpose

- Agricultural
- Commercial
- Dewatering
- Industrial
- Remediation
- Water Supply
- Municipal Water Supply

Source : Ministry of Environment, Permit To Take Water Database (2006), with updates (2008).
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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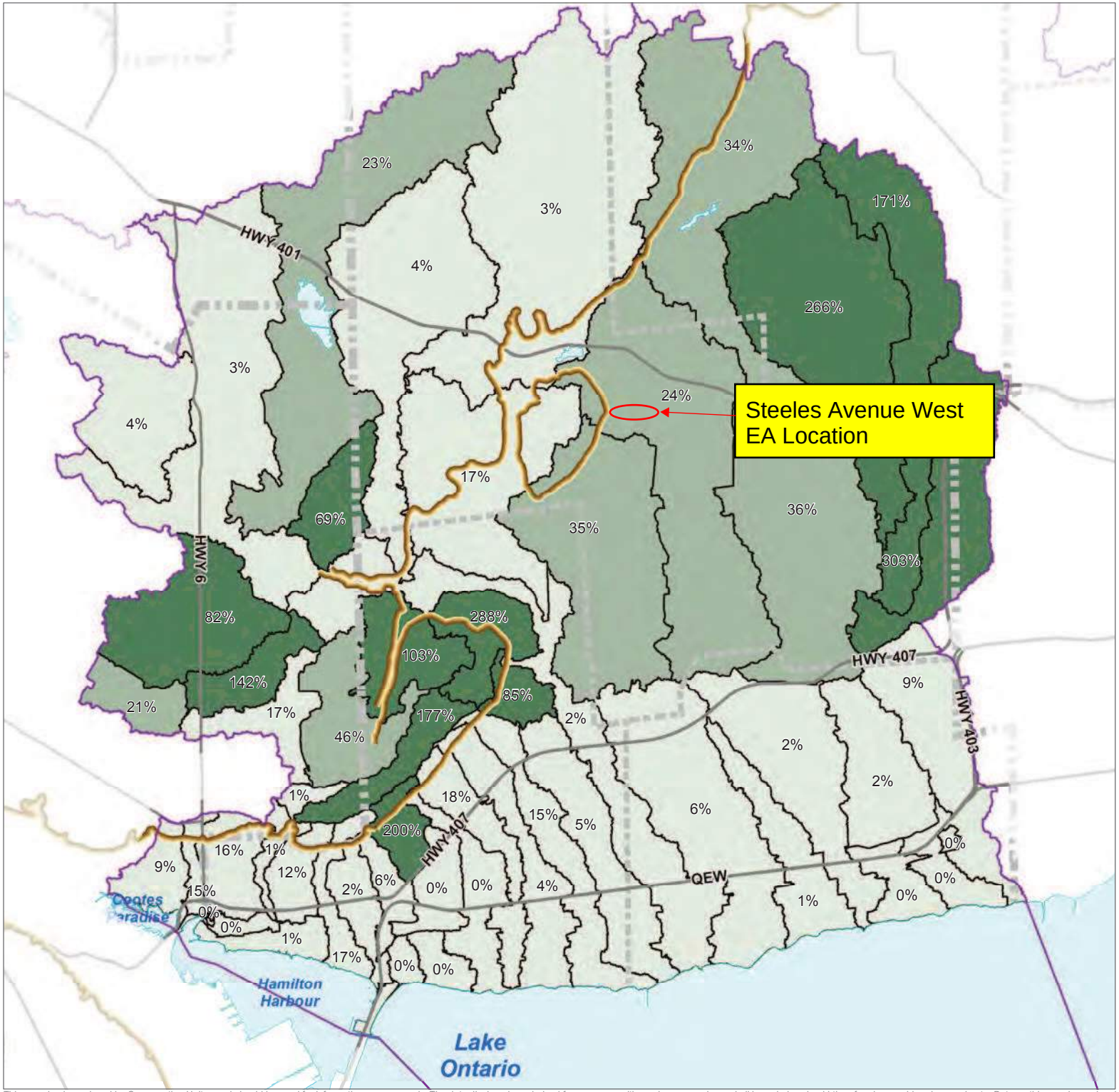

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.8

Surface Water Monthly Stresses

Legend

- Source Protection Area
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody

Monthly Surface Water Stress

- Significant
- Moderate
- Low

Label indicates the Percent Water Demand for the entire Subwatershed.

Source : Halton - Hamilton Source Protection
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.9

Groundwater Annual Stresses Existing Conditions

Legend

- Source Protection Area
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody

Annual Groundwater Stress

- Moderate
- Low

Label indicates the Percent Water Demand for the entire Subwatershed.

Note: Existing Conditions for the Study Year - 2007

Source : Halton - Hamilton Source Protection
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.10

Groundwater Monthly Stresses Existing Conditions

Legend

- Source Protection Area
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody

Monthly Groundwater Stress

- Moderate
- Low

Label indicates the Percent Water Demand for the entire Subwatershed.

Note: Existing Conditions for the Study Year - 2007

Source : Halton - Hamilton Source Protection
Projection : UTM NAD 83 Zone 17
Date : November 2014

0 1 2 4 6
Kilometers
1:200,000

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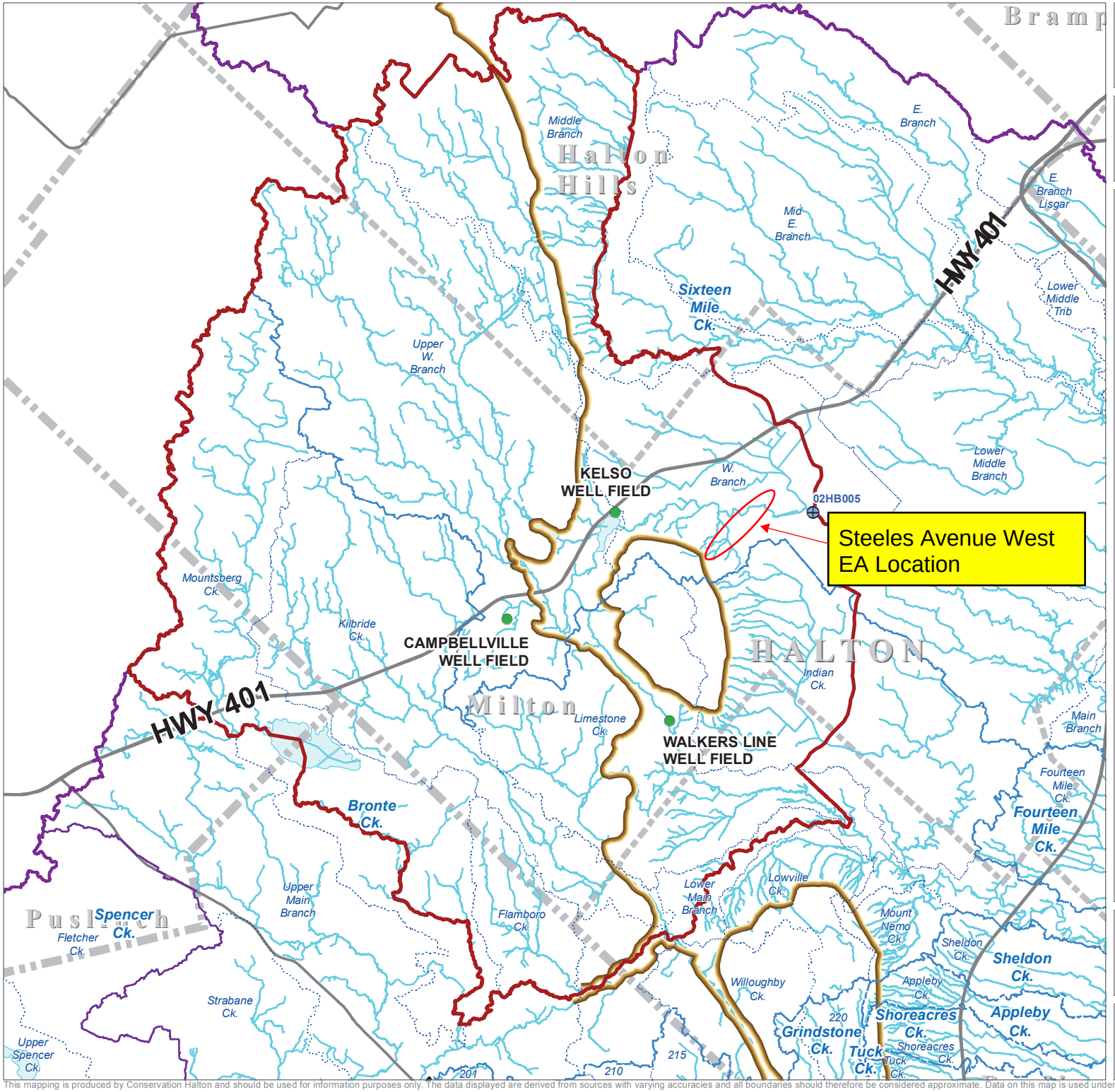

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 5.11

Kelso-Campbellville Tier 3 Study Area

Legend

- Source Protection Region
- Source Protection Area
- Tier 3 Study Area
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Hydrography
- Municipal Well
- Watersheds
- Subwatersheds
- Streamflow / Water Level Gauge (HYDAT)
- Waterbody

Projection : UTM NAD 83 Zone 17
Date : October 2014

N W E S

0 0.5 1 2 3
Kilometers

1:140,000

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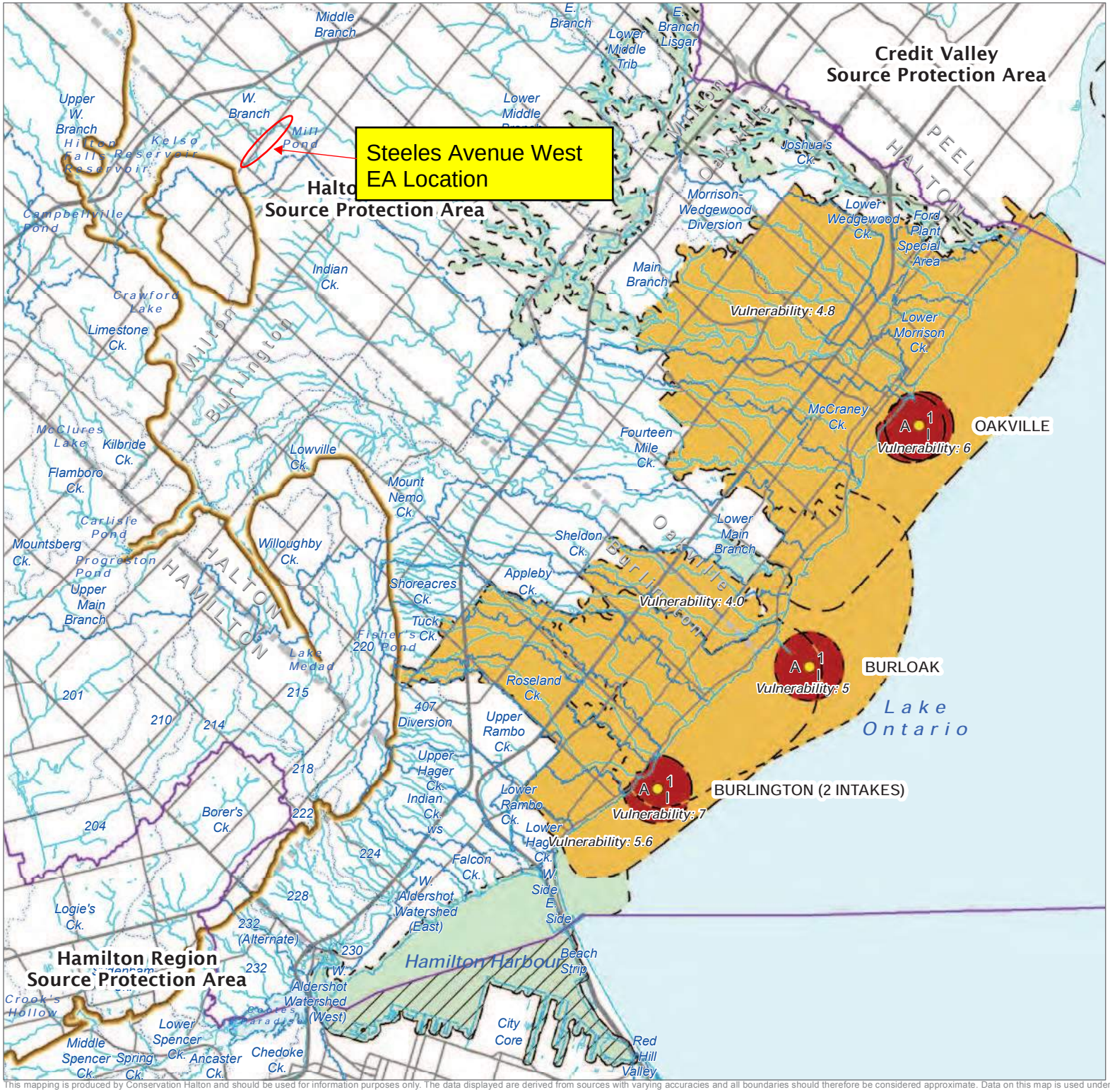

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 6.1

Halton Region
Intake Protection Zones

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment

Roads
- Highway
- Regional

- Hydrography
- Waterbody

Municipal Intake
- Operational

Intake Protection Zones (IPZs)
- IPZ-1
- IPZ-2
- IPZ-3
- Area of IPZ-3 extending into Hamilton SPA

Intake Class 1 - Drinking Water System Class
I - Water System Type

Source : Halton Region / Lake Ontario Collaborative / Stantec Consulting Inc. as amended 2010.

Projection : UTM NAD 83 Zone 17
Date : July 2015

N W E S

0 0.75 1.5 3 4.5
Kilometers

1:160,000

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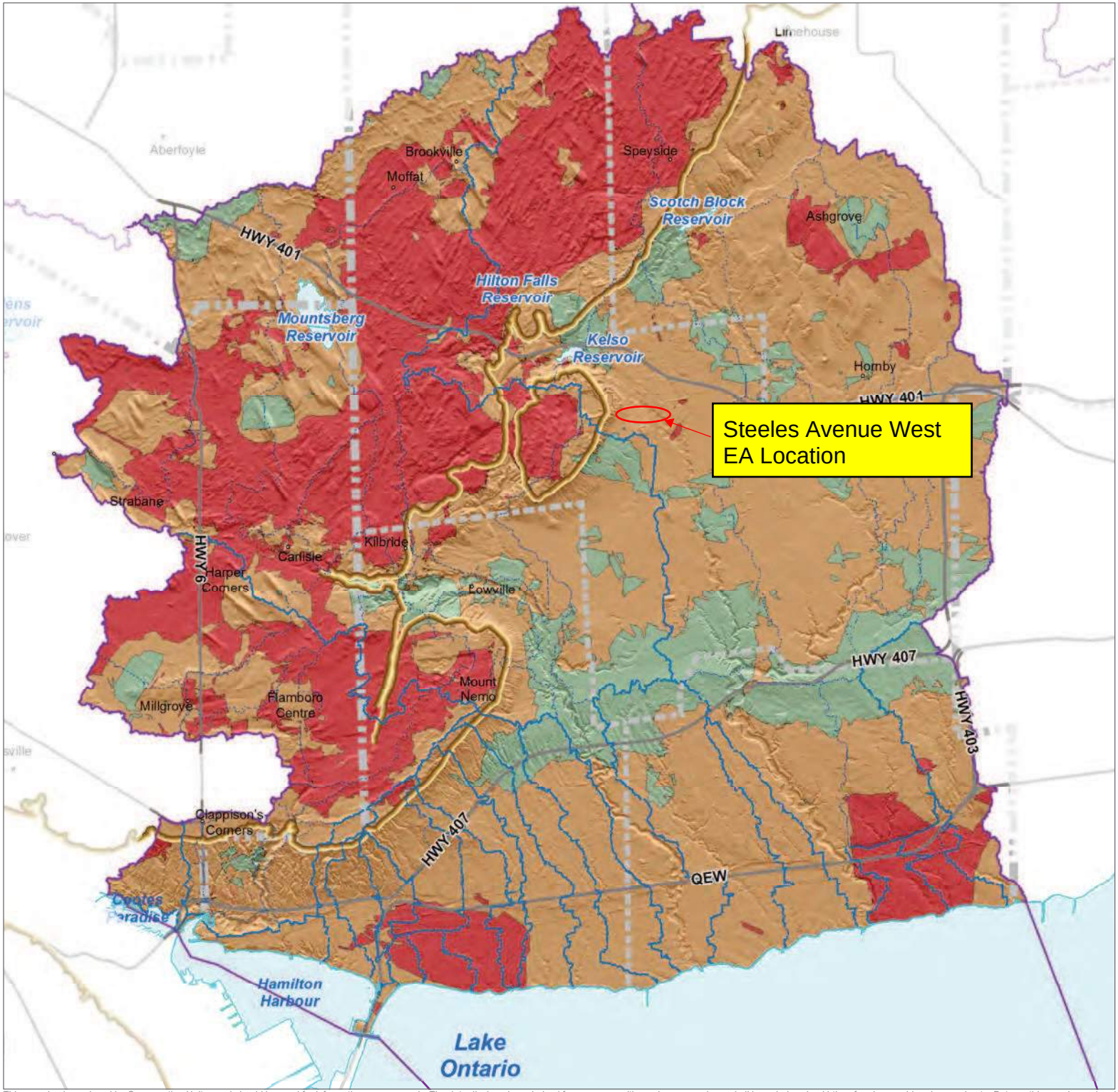

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 6.9

Intrinsic Groundwater Susceptibility

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody

Intrinsic Susceptibility Index (ISI)

- High
- Medium
- Low

Source : Conservation Halton / Ontario Geological Survey, Groundwater Resources Improvement Project (2006).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6

Kilometers

1:200,000

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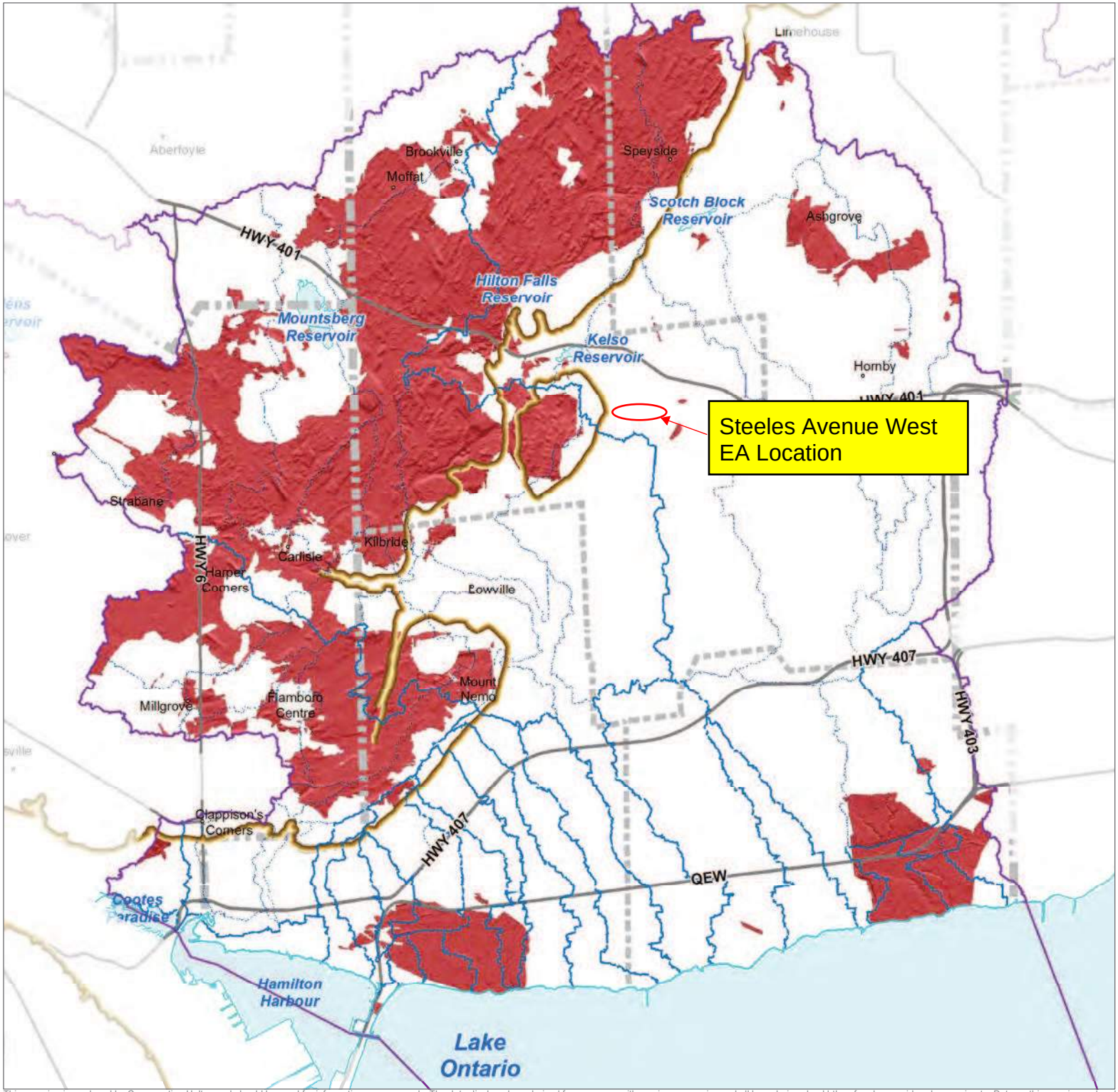

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 6.10

Highly Vulnerable Aquifers (HVA)

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody
- Highly Vulnerable Aquifer (Vulnerability = 6)

Source : Conservation Halton / Ontario Geological Survey, Groundwater Resources Improvement Project (2006).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6
Kilometers

1:200,000

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Due to geology, recharge within the Halton Region Source Protection Area varies significantly, above and below the Niagara Escarpment and along the lakeshore. Typically, the till and shale units below the escarpment limit infiltration. This causes a higher percentage of precipitation received to leave the watershed as runoff. Within the Iroquois Plain, along the Lake Ontario shoreline, sand deposits at the surface of the ground increases infiltration. This area is entirely developed, the sand deposits are covered by impervious surfaces, and it is drained by municipal storm sewer systems.

Figure 6.11 Significant Groundwater Recharge Areas - analysis areas. Urban area – grey; below escarpment – green; above escarpment – blue.

Above the escarpment, the sandier soils and fractured dolostone increase the likelihood that recharge will occur. Accordingly, the Source Protection Area was divided into three areas for evaluation: above and below the escarpment and the urban area (see Figure 6.11). The urban area was not considered in the assessment of significant groundwater recharge areas because the area does not use groundwater as a drinking water source. Also, much of the precipitation that falls in this area is directed to the storm sewer network or to the many incised creek valleys.

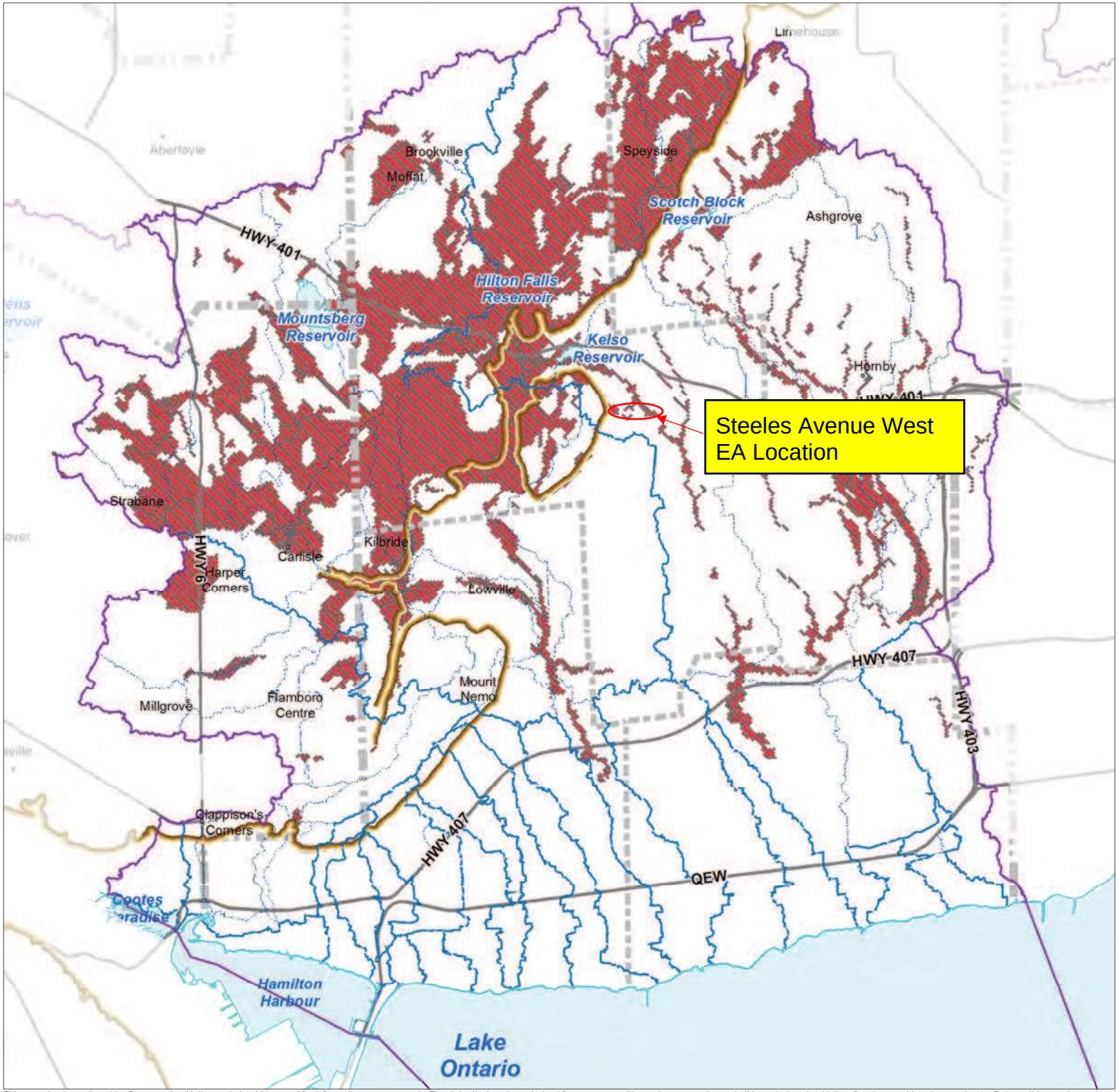
Dividing the Source Protection Area into three sections provides for a better assessment of the significance of the recharge occurring.

Recharge areas were deemed to be significant when the annual recharge rate in the area was greater than the average across its assessment area, i.e., the area above or below the escarpment, excluding the urban area, by fifteen percent or more (Technical Rule 44(1)). Thus, the calculated significant recharge rates are greater than 302 millimetres per year and greater than 155 millimetres per year, for above and below the escarpment, respectively.

The Technical Rules require that a hydrological link exist between a significant groundwater recharge area and an aquifer that acts as a drinking water source. Based on the extensive coverage of water wells in the Source Protection Area, the mapped areas are considered to supply a drinking water system and no delineated areas were removed for this reason. To complete the mapping, small, isolated delineated areas (0.03 square kilometres or less) were removed, and small holes in the larger delineated areas were filled in. The mapped areas of significant recharge are shown on Figure 6.12.

In accordance with Part VII.2 of the Technical Rules, the intrinsic susceptibility index mapping was applied to the delineated significant groundwater recharge areas to assess the vulnerability of the groundwater to contamination. Vulnerability scores of 6, 4, and 2 were assigned to areas of high, medium, and low vulnerability, respectively (Figure 6.13).

The Technical Rules also require that the identification of significant groundwater recharge areas within the study area delineated during a Tier 3 water budget and water quantity risk assessment (see Section 5) be reassessed. The Tier 3 modelling work indicated that, within the study area, the average recharge rates above and below the Niagara Escarpment are 333 mm/yr and 239 mm/yr, respectively. These values are well above the 302 and 155 mm/yr thresholds used for the assignment of significance across the entire Source Protection Area. To keep the relative nature of the assessment across the entire



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 6.12

Significant Groundwater Recharge Area

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody
- Significant Groundwater Recharge Area (SGRA)

Source : Conservation Halton / Ontario Geological Survey, Groundwater Resources Improvement Project (2005). Earthfx PRMS (2010).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6
Kilometers

1:200,000

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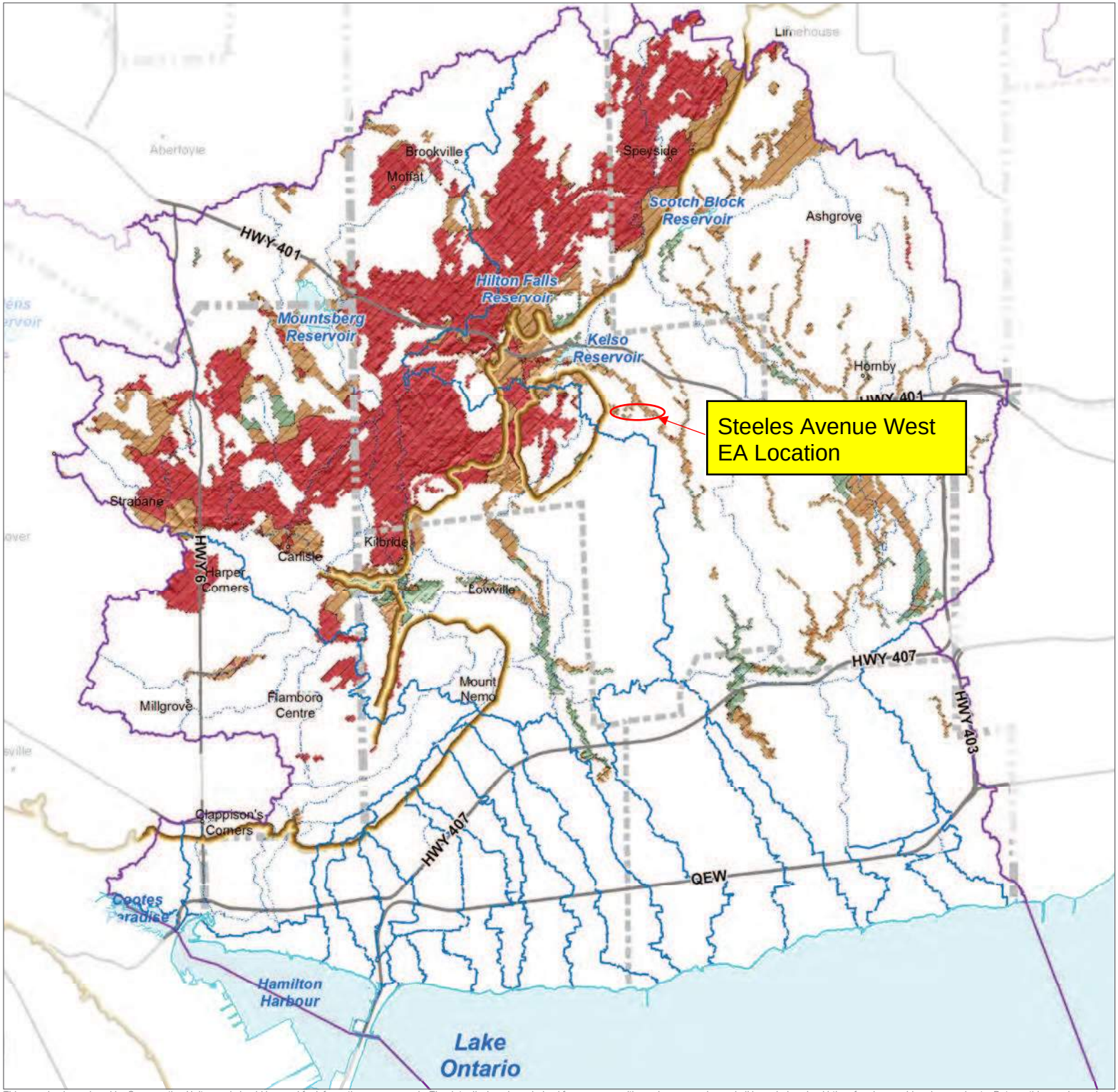

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 6.13

Significant Groundwater Recharge Area Vulnerability

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment
- Highway
- Waterbody
- Significant Groundwater Recharge Area (SGRA)

Intrinsic Susceptibility Index (ISI)

(Vulnerability)

- High (6)
- Medium (4)
- Low (2)

Source : Conservation Halton / Ontario Geological Survey, Groundwater Resources Improvement Project (2005). Earthfx PRMS (2010).

Projection : UTM NAD 83 Zone 17

Date : November 2014

0 1 2 4 6

Kilometers

1:200,000

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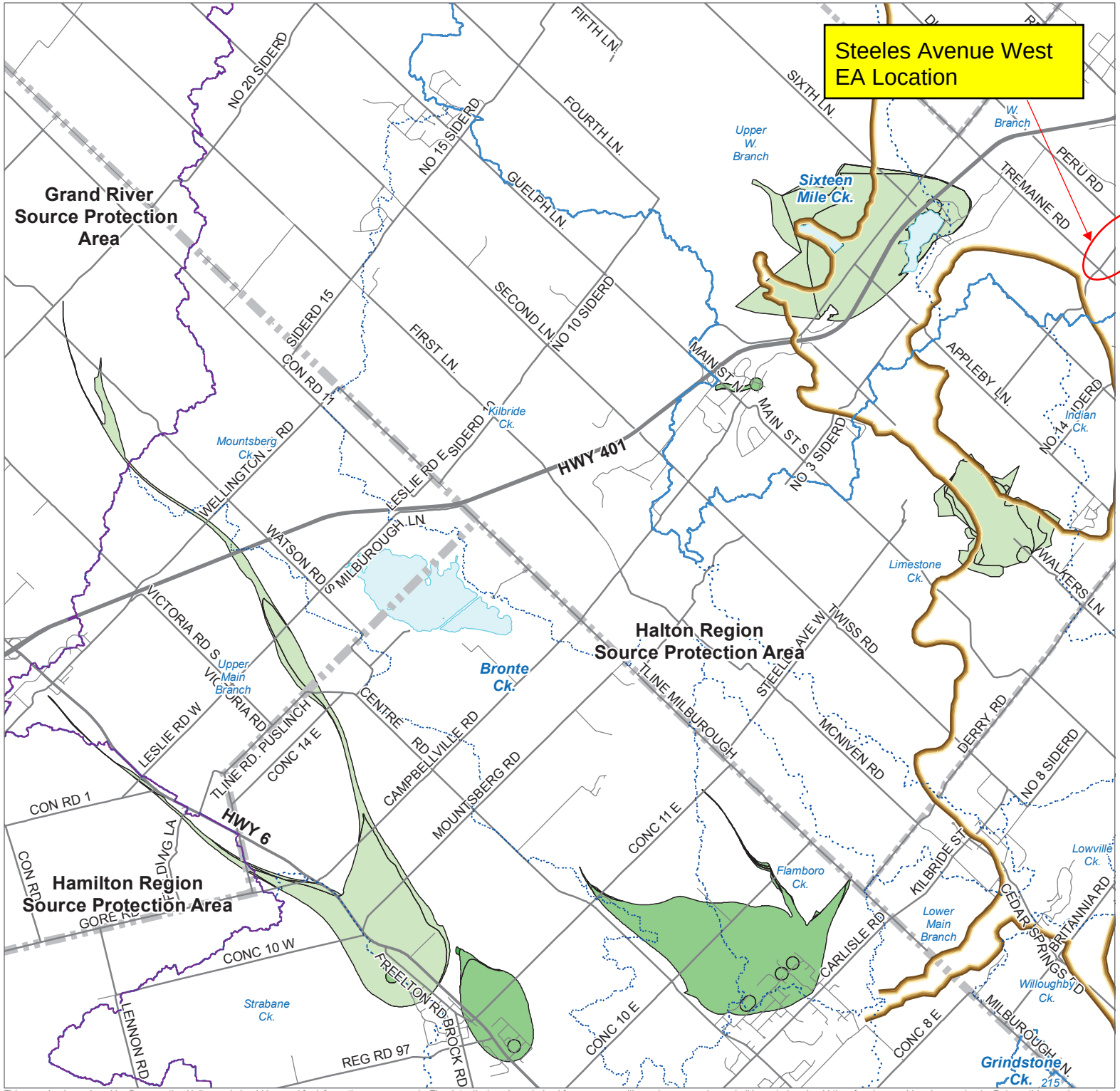

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Figure 7.1

Managed Land Map
Wellhead Protection Areas

Legend

- Source Protection Area
- Watersheds
- Subwatersheds
- Upper Tier Municipality
- Lower Tier Municipality
- Niagara Escarpment

Roads

- Highway
- Regional
- Local

- Waterbody

Percent Managed Lands

- > 80%
- 40 - 80%
- < 40%

Source : Ministry of Natural Resources, SOLRIS (2000), and Municipal Property Assessment Corporation Property Information (2007).

Projection : UTM NAD 83 Zone 17

Date : October 2014

N W E S

0 0.5 1 2 3

Kilometers

1:85,000

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