



October 22, 2019

Ms. Cathy Ritchie, Clerk
City of Kawartha Lakes
P.O. Box 9000, 26 Francis Street,
Lindsay, ON, K9V 5R8

Sent via email to: critchie@kawarthalakes.ca

Re: Notice of Requirement for Council Resolution related to proposed Amendments to the Trent Source Protection Plan and Assessment Report as per Section 34 of the *Clean Water Act*

Dear Ms. Ritchie,

The City of Kawartha Lakes has recently received correspondence from the Trent Conservation Coalition inviting your municipality to provide feedback on the Summary of Proposed Amendments to the Trent Source Protection Plan and Assessment Report as a result of recent upgrades to the Pinewood Municipal Drinking Water System.

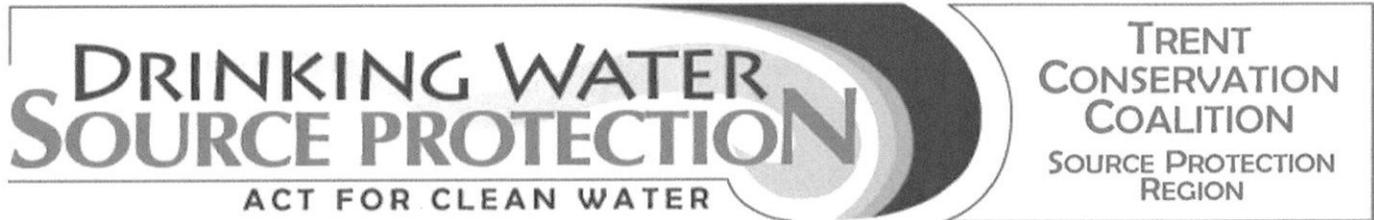
The upgrades to the Pinewood Municipal Drinking Water System are limited to a new well configuration and have resulted in changes to the delineation and vulnerability of the Wellhead Protection Area. No changes are proposed to policies in the Source Protection Plan.

This letter is to provide notice, as per Section 34(3) of the *Clean Water Act, 2006*, that a council resolution will be required from the City of Kawartha Lakes to endorse the proposed amendments to the Trent Source Protection Plan and Assessment Report. This resolution is required prior to the initiation of a prescribed 35-day public consultation period planned to commence in November 2019.

Sincerely,

Dan Marinigh
CAO/Secretary-Treasurer
Otonabee Conservation

Cc: Ron Taylor, Chief Administrative Officer, City of Kawartha Lakes
Nafiur Rahman, Sr. Eng. Tech. Engineering & Corporate Assets, City of Kawartha Lakes



October 21, 2019

Attention: Trent Source Protection Plan Implementing Bodies and Stakeholders

Re: Notice of Proposed Updates to Trent Source Protection Plan as a result of upgrades to Pinewood Municipal Well System

Your input is being sought on the attached document "Summary of Proposed Trent Assessment Report and Source Protection Plan Amendments". These amendments are based on upgrades to the Pinewood Municipal Well System and are limited to a new well configuration which has resulted in changes to the delineation and vulnerability of the Wellhead Protection Area. No changes are proposed to policies in the Source Protection Plan.

Please provide your feedback on the proposed amendments to Keith Taylor, Source Protection Program Coordinator (keith.taylor@ltc.on.ca) by November 10, 2019.

At a later date, you will be notified of the opportunity to provide formal comments on the proposed amendments during the 35-day period which is planned to commence in November 2019.

Sincerely,

Keith Taylor
Source Protection Program Coordinator
Trent Conservation Coalition Source Protection Region

Cc: Jim Hunt, Trent Conservation Coalition
Rhonda Bateman, CAO, Lower Trent Conservation
Mary Wooding, Ministry of the Environment, Conservation and Parks, Liaison Officer

*C/O LOWER TRENT CONSERVATION
714 Murray St, R.R. #1, Trenton, Ont. K8V 5P4*

**Summary of Proposed Amendments to the
Trent Source Protection Plan and Assessment Report**

Pursuant to Section 34 of Ontario Regulation 287/07 of the Clean Water Act

October 21, 2019

The City of Kawartha Lakes is upgrading the Pinewood Municipal Well System which will include the decommissioning of two wells and the installation of one new well. These upgrades have resulted in the Proposed Amendments to the Trent Source Protection Plan (SPP) and Assessment Report (AR) (last updated and approved August 20, 2019) listed below and summarized and highlighted in yellow on the following pages. The new municipal well configuration is as follows:

1. Well #1: Decommissioned
2. Well #2 To be decommissioned by end of November 2019
3. Well #3: To be decommissioned by end of November 2019
4. Well #4: Primary production well currently; to be backup well when Well #5 is in service
5. Well #5: New well to serve as Primary Production well

List of Proposed Amendments

SPP

1. Summary of Amendments (second page of SPP): Updated
2. Appendix 2: Updated SPP Policy Applicability Map
3. Appendix 5: Updated to include consultation activities for the Proposed Amendments
4. Explanatory Document to be updated

AR: Volume 1

5. Table 5.1-2: Added Wells #4 and #5 and removed Wells #1, #2 and #3.
6. Table 5.1-3: Added footnote to explain that does not include Well #5.
7. Section 5.2: Added 2019 technical report for Pinewood to list of background reports.
8. Section 5.2.2.2: Updated well counts.
9. Section 5.2.2.2, Wellhead Protection Area Delineation: Added paragraph titled "Pinewood (2019 Wellhead Protection Studies Updates)".
10. Section 5.2.2.2, Groundwater Vulnerability Assessment: Added paragraph titled "Pinewood (2019 Wellhead Protection Studies Updates)".
11. Table 5.2-2: Removed Wells #2 and #3 and added Well #5.
12. Table 5.2-3: Removed Wells #2, #3 and #4 and added data for All Wells (Well #4 and #5).
13. Table 5.2-4: Updated uncertainty ratings to represent Wells #4 and #5.
14. Table 5.3-1: Added footnote.
15. Table 5.3-16: Added footnote.
16. Table 5.4-3: Updated threats enumeration.

AR: Volume 2

17. Appendix F, Groundwater Systems: Water Quality Risk Assessment, Vulnerability Assessment:
Updated list of background reports

AR: Volume 3

18. Map 5-7a, Map 5-7b, Map 5-7c: Updated

Amendment 1: TCC to update Summary of Amendments to include reference to Pinewood

Amendment 2: TCC to input SPP Policy Applicability Map *in* Appendix 2

Amendment 3: TCC to update Appendix 5 to include consultation activities for the Proposed Amendments

Amendment 4: TCC to update Explanatory Document

Amendment 5

Table 5.1-2 (cont.) Summary of Wells and Water Treatment Systems for Existing Municipal Residential Groundwater Systems in the Trent SPAs

System Name	Well(s)							Water Treatment System		
	Location	No. Wells	Depths (m)					GUDI Status	Disinfection	Other Available Treatment Details
			1	2	3	4	5			
Otonabee-Peterborough Source Protection Area										
Alpine Village	East of Bobcaygeon	2	82	100	NA	NA	NA	No	Sodium hypochlorite	2 µm cartridge filtration
Birch Point Estates	Birch Point	2	18.3	19.8	NA	NA	NA	No	Sodium hypochlorite	1 µm cartridge filtration
Buckhorn Lake Estates	Buckhorn	1	16.8	NA	NA	NA	NA	Yes	Sodium hypochlorite	Chemically assisted filtration (Kinetic Macrolite system)
Crystal Springs	Elgeti	2	19.8	26.5	NA	NA	NA	Yes ²	UV irradiation Sodium hypochlorite	
Keene Heights	Keene	2	20.9	26.5	NA	NA	NA	No	Sodium hypochlorite	Sodium silicate (iron sequestration)
Millbrook	Millbrook	3	30	30	31	NA	NA	No	Sodium hypochlorite	
Norwood	Norwood	4	25	21.3	30.5	30.5	NA	No	Sodium hypochlorite	Sodium hydroxide & sodium silicate
Pinewood	Pinewood	2	107	118	NA	NA	NA	No	Sodium hypochlorite	
Crowe Valley Source Protection Area										
Cardiff	Cardiff	1	13.4	NA	NA	NA	NA	Yes	Sodium hypochlorite	2 µm cartridge filter for iron removal
Dyno Estates	Dyno Estates	1	11.8	NA	NA	NA	NA	No	Sodium hypochlorite	
Havelock	Northeast side of Havelock	3	15.2	13.7	15	NA	NA	Yes	Wells 1&4: UV irradiation; Chlorine; Sodium hypochlorite Well 3: Chlorine; Sodium hypochlorite; UV irradiation	Well 3: Dual media filtration
Lower Trent Source Protection Area										
Grafton	Grafton	2	78	78	NA	NA	NA	No	Sodium hypochlorite	Sodium silicate (iron sequestration)
Brighton	Brighton	3	40	40	40	NA	NA	No	Gaseous chlorine	
Colborne	Colborne	2	72	72	NA	NA	NA	No	Sodium hypochlorite	Sodium silicate (iron sequestration)

Stirling	Stirling	45	126.4	13.1	10,716.1	6,113.2	NA13.2	Yes	UV irradiation; Sodium hypochlorite	
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Amendment 6 Table 5.1-3: Pumping Rates for Existing Municipal Residential Groundwater Systems in the Trent Source Protection Areas

System Name	Monthly Average Pumping Rates (m ³ /day) ¹												Average Annual Pumping Rate (m ³ /day)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Kawartha-Haliburton Source Protection Area													
Canadiana Shores	58	66	63	64	77	68	72	64	56	52	52	58	62
Janetville	37	43	38	39	42	46	44	43	40	38	36	37	40
King's Bay	24	20	21	20	33	40	37	38	35	25	20	27	28
Manorview	19	17	17	19	23	27	19	20	21	18	15	15	19
Mariposa Estates	28	26	23	26	31	35	35	32	38	31	24	26	30
Victoria Glen	38	40	32	34	36	38	32	43	35	33	36	39	36
Pleasant Point	54	54	54	62	76	82	73	70	62	59	65	62	64
Sonya	26	25	26	28	33	40	39	39	29	28	27	27	31
Woods of Manilla	47	46	46	47	60	75	66	59	51	45	44	46	53
Woodfield	13	14	13	14	16	18	17	16	14	11	11	14	14
Victoria Place	85	80	78	92	95	93	95	89	90	85	81	85	87
Blackstock	104	105	103	106	122	138	115	114	108	108	103	102	111
Greenbank	134	136	126	125	143	156	144	138	131	127	124	127	134
Port Perry	2408	2323	2305	2411	2814	3255	3064	2955	2662	2511	2501	2421	2636
Minden	428	435	421	427	479	514	571	554	477	447	408	399	428
Lutterworth Pines ⁴	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Otonabee-Peterborough Source Protection Area²													
Alpine Village	158	133	135	145	163	156	175	175	148	160	164	165	156
Birch Point Estates	89	101	93	90	90	92	103	109	107	124	93	83	98
Buckhorn Lake Estates	88	75	74	75	82	92	105	112	107	89	86	98	90
Crystal Springs	99	93	96	105	129	147	129	122	112	114	110	116	114
Keene Heights ⁵	27	25	25	28	31	35	33	31	30	29	26	28	29
Millbrook	538	520	505	516	614	760	673	641	598	567	569	587	591
Norwood ⁶	994	1074	1035	872	872	943	930	871	861	835	819	863	914
Pinewood ⁷	142	146	141	145	180	185	168	166	149	151	142	149	155
Crowe Valley Source Protection Area³													
Cardiff	158	157	169	180	181	185	190	203	157	142	148	150	169
Dyno Estates	14	11	12	12	13	13	14	15	12	11	9	10	12
Havelock	542	576	569	547	584	604	639	627	575	517	544	576	594
Lower Trent Source Protection Area													
Grafton	157	160	157	171	205	254	209	196	180	170	160	170	183
Brighton	2333	2337	2296	2423	2854	3215	3022	3140	2795	2336	2289	2238	2628
Colborne	864	884	819	818	939	1118	1169	1112	1041	958	890	840	954
Stirling	940	898	874	814	897	989	949	1015	910	884	835	895	912

¹ Expressed as a total of all wells in the system using the last 5 years of available data (unless otherwise noted) Data sources: operating authorities (see Table 1)

² Calculated from 2004-2008 data except Alpine/Pirates Glen (2005-2008); Buckhorn Lake Estates (2005-2008); and Birch Point Estates (2006-2008)

³ Calculated last 2 years of available data

⁴Because this system is so new, the actual taking data is not available

⁵ Calculated for the former primary well (well #4) because the current primary well (well #1) is so new (2012), the actual taking data is not available

⁶For Wells #1, 2 and 3

⁷For Wells #2, #3 and #4 (data not available for Well #5)

Amendment 7

5.2 WELLHEAD PROTECTION AREAS: DELINEATION & VULNERABILITY

One objective of source protection planning is to minimize the potential that land-based activities could contaminate groundwater resources that are used as sources of drinking water. The delineation of wellhead protection areas (WHPAs) and the assessment of groundwater vulnerability together describe how vulnerable water in a well is to contamination from these types of activities. This section is a description of the delineation of WHPAs and the assessment of vulnerability for the 32 groundwater systems identified in the Terms of Reference for the Trent source protection areas. This work was completed under several separate studies that are documented in the following background reports:

- Assessment of Drinking Water Threats – Havelock Water Supply, Township of Havelock-Belmont- Methuen (GENIVAR Consultants, April 2010)
- Assessment of Drinking Water Threats – Creighton Heights and Camborne Municipal Wellfields, Township of Hamilton (GENIVAR Consultants, June 2010)
- Assessment of Drinking Water Threats – Municipal Residential Groundwater Supplies – The City of Kawartha Lakes (3 Volumes) (GENIVAR Consultants, August 2010)
- Assessment of Drinking Water Threats – Municipal Groundwater Supplies – The Regional Municipality of Durham (August 2010)
- Vulnerability, Issues and Threats for Fourteen Groundwater Sourced Municipal Drinking Water Systems in the Trent Conservation Coalition Source Protection Region (XCG Consultants, July 2010)
 - Appendix 1: Updated Wellfield Vulnerability analysis for the Keene Heights Wells (Earthfx Incorporated, November 2013)
- Vulnerability, Issues and Threats for One Planned Groundwater Sourced Municipal Drinking Water System in the Trent Conservation Coalition Source Protection Region (XCG Consultants, July 2010)
- Vulnerability, Issues and Threats for the new Lutterworth Pines Municipal Groundwater Sourced Drinking Water System (XCG Consultants, January 2011)
- Norwood Municipal Wells Updated Modelling (D.M. Wills Associates Limited, October 2018)
- Technical Memorandum re: Groundwater Vulnerability Assessment – Section 34 Update, (Azimuth Environmental Consulting, April 25, 2019)

Amendment 8

5.2.2.2 CITY OF KAWARTHA LAKES MUNICIPAL RESIDENTIAL WELL SYSTEMS

The City of Kawartha Lakes operates the following 13 municipal residential well systems in the Trent source protection areas:

- Birch Point
- Canadiana Shores
- Janetville
- King's Bay
- Manorview
- Mariposa Estates
- Pinewood
- Pleasant Point
- Sonya
- Victoria Glen
- Victoria Place
- Woodfield
- Woods of Manilla

Water is obtained for these systems from a total of 6 bedrock wells and 25 overburden wells. In this area, 7 of the 31 wells are deemed to be GUDI. These systems are summarized in Table 5.2-2 along with the groundwater flow models used to delineate each WHPA.

Amendment 9

Wellhead Protection Area Delineation

A consistent WHPA delineation methodology was used for the groundwater systems in the City of Kawartha Lakes. Each WHPA was delineated using a three-dimensional groundwater flow model based on the MODFLOW 2000 simulation code. Six regional groundwater models were developed to delineate WHPAs for these municipal systems; these models are summarized in **Error! Reference source not found..**

Table 5.2-1: Summary of Regional Groundwater Models for City of Kawartha Lakes Systems

Regional Model	Municipal Well System(s)	Data Source
Woodville / Woods of Manilla	Woods of Manilla	CAMC-YPDT Version 2 (8 layer)
Southwest	Sonya Mariposa Estates King's Bay Pleasant Point Canadiana Shores	CAMC-YPDT Version 2.1 (12 layer)
South	Janetville Pinewood Woodfield Manorview	CAMC-YPDT Version 2 (8 layer)
East	Victoria Place Birch Point	CAMC-YPDT Version 2 (8 layer)
Victoria Glen	Victoria Glen	CAMC-YPDT Version 2 (8 layer)

Where a sub-regional model was developed for more than one municipal well system, model refinements made to improve the calibration at each municipal well system were incorporated into the sub-regional model. The data source for the sub-regional models was either Version 2 (8 layer) or Version 2.1 (12 layer) of the CAMC-YPDT hydrostratigraphic model. No modifications to the models were made.

The WHPAs delineated for the municipal systems in the City of Kawartha Lakes are shown on Maps 5-1a through 5-13a (for WHPA A-D). For systems with GUDI wells, the WHPA-E is shown on the following maps: 5-2d (Canadiana Shores), 5-5d (Manorview), and 5-8d (Pleasant Point). Note that although Well #3 in Sonya is considered to be GUDI, there is no surface water feature nearby to short-circuit

contaminants to the relevant well. Therefore, in accordance with Technical Rule 49(3), this condition would preclude the use of WHPA-E for the Sonya well system.

Pinewood (2019 Wellhead Protection Studies Updates)

The original groundwater model applied a maximum pumping rate (587,520 L/day) to Well #4 which yielded set of concentric rings emanating from the wellhead that represented the wellhead protection for the well. With the addition of Well #5 to the municipal well system and the removal of Wells #2 and #3, the wellhead protection areas were reassessed. Both of the remaining wells, Wells #4 and #5, are screened within the deep aquifer known as the Thornccliffe Aquifer Complex (TAC). The wellhead protection areas for Well #5 were determined based on the assumption that pumping tests conducted under the same conditions as was modelled for Well #4, would yield the same pattern of concentric rings that had been generated for Well #4. Utilizing the Principle of Superposition, the resultant composite wellhead protection area for Wells #4 and #5 represents the maximum extent of groundwater capture, whether pumping occurs from Well #4 or Well #5.

Amendment 10

Groundwater Vulnerability Assessment

An aquifer vulnerability index method was used to determine groundwater vulnerability for each of the 13 municipal systems in the City of Kawartha Lakes. Each of the 8 or 12 model layers was categorized as either an aquifer or an aquitard according to the designations developed for the Conservation Authorities Moraine Coalition in 2006. The aquifer vulnerability index was calculated as a sum of the thickness of each layer multiplied by a K-Factor of either 1 for an aquifer or 4 for an aquitard.

The presence of transport pathways identified in the WHPAs resulted in modifications to the vulnerability assignments of most of the municipal systems. The majority of the transport pathways identified in the City of Kawartha Lakes systems were private water wells. Transport pathways associated with aggregate extraction were identified in the WHPA for Mariposa Estates. Two criteria were used to trigger an increase in vulnerability rating. If a water well penetrated to within 3 metres of the aquifer, then the vulnerability of the area within 30 metres of the well was increased by one level. Or, if there was a cluster of 6 wells or more within a 100-metre radius, then the vulnerability of the cluster was increased by one level.

The results of the groundwater vulnerability assessments for municipal well systems in the City of Kawartha Lakes are shown on Maps 5-1a through 5-13a. The range of groundwater vulnerability ratings in the WHPAs delineated for these systems is given in.

Pinewood (2019 Wellhead Protection Studies Updates)

As per the original study (Genivar, March 2010), groundwater (vertical) vulnerability was assessed by calculating Aquifer Vulnerability Index (AVI) based on the CAMC/YPDT regional hydrostratigraphic interpretations..

Amendment 11

Table 5.2-2: Summary of City of Kawartha Lakes Municipal Well Systems

System	Well	Aquifer Type	Geology	GUDI Status	Groundwater Flow Model
Birch Point	Well #3	confined to semi-confined	overburden	non-GUDI	East Sub-Regional
	Well #4	confined to semi-confined	overburden	non-GUDI	
Canadiana Shores	Well #1	unconfined to semi-confined	overburden	GUDI	Southwest Sub-Regional
	Well #2	unconfined to semi-confined	overburden	GUDI	
	Well #3	unconfined to semi-confined	overburden	GUDI	
Janetville	Well #3	confined	overburden	non-GUDI	South Sub-Regional
	Well #4	confined	overburden	non-GUDI	
	Well #5	confined	overburden	non-GUDI	
King's Bay	Well #1	confined to semi-confined	overburden	non-GUDI	Southwest Sub-Regional
	Well #2	confined to semi-confined	overburden	non-GUDI	
	Well #3	confined to semi-confined	overburden	non-GUDI	
Manorview	Well #1	semi-confined	overburden	GUDI	South Sub-Regional
	Well #2	semi-confined	overburden	GUDI	
Mariposa Estates	Well #2	confined to semi-confined	overburden	non-GUDI	Southwest Sub-Regional
	TW1-03	confined to semi-confined	overburden	non-GUDI	
Victoria Glen	Well #1	confined	overburden	non-GUDI	Victoria Glen
	Well #2	confined	overburden	non-GUDI	
Pleasant Point	Well #1	confined	overburden	GUDI	Southwest Sub-Regional
	Well #2	confined	overburden	GUDI	
Pinewood	Well #4	confined	overburden	non-GUDI	Principle of Superposition
	Well #5	confined	overburden	Non-GUDI	
Sonya	Well #1	confined to semi-confined	overburden	non-GUDI	Southwest Sub-Regional
	Well #3	confined to semi-confined	overburden	GUDI	
Victoria Place	Well #1	semi-confined	bedrock	non-GUDI	East Sub-Regional
	Well #2	semi-confined	bedrock	non-GUDI	
	Well #3	semi-confined	bedrock	non-GUDI	
	Well #7	semi-confined to confined	bedrock	non-GUDI	
Woodfield	Well #1	Confined	bedrock	non-GUDI	South Sub-Regional
	Well #2	confined	bedrock	non-GUDI	
Woods of Manilla	Well #1	confined	overburden	non-GUDI	Woodville/Woods of Manilla
	Well #2	confined	overburden	non-GUDI	

Amendment 12 Table 5.2-3: Vulnerability Scores for City of Kawartha Lakes Municipal Residential Well Systems

System	Well(s)	Method ¹	Transport Pathways by WHPA ²					Range of Groundwater Vulnerability Ratings by WHPA					Range of Vulnerability Scores by WHPA				
			A	B	C	D	E	A	B	C	D	A	B	C	D	E	
Birch Point	All	AVI	-	-	-	-	N/A	High	High	High	High	10	10	8	6	N/A	
Canadiana Shores	All	AVI	-	-	-	W	-	Med-high	Low-high	Low-high	Low-high	10	6-10	4-8	2-6	5.6	
Janetville	All	AVI	-	-	-	-	N/A	Low	Low	Low	Low	10	6	4	2	N/A	
King's Bay	All	AVI	-	-	-	-	N/A	Med-high	Med-high	Med-high	Med-high	10	8-10	6-8	4-6	N/A	
Manorview	All	AVI	-	-	-	-	-	Med-high	Med-high	Med-high	Low-high	10	10	4-8	2-6	5.6	
Mariposa Estates	Well #2 TW1-03	AVI	-	-	-	-	N/A	Med-high	Med-high	Med-high	Low-med	10	8-10	6-8	2-4	N/A	
							W/Q	N/A	Med-high	Med-high	Med-high	Med-high	10	10	6-8	4-6	N/A
Victoria Glen	All	AVI	-	W	W	W	N/A	High	Med-high	Med-high	Med-high	10	8-10	6-8	4-6	N/A	
Pleasant Point	Well #1	AVI	-	-	-	W	SUC	Med	Low-med	Low-med	Low-med	10	6-8	4-6	2-4	5.6	
	Well #2	AVI	-	-	-	W	D	Med	Low-med	Low-med	Low-med	10	6-8	4-6	2-4	5.6	
Pinewood	All	AVI	-	-	-	-	N/A	Low	Low	Low	Low	10	6	4	2	N/A	
Sonya	All	AVI	-	-	W	W	N/A	Med-high	Medium	Med-high	Med-high	10	8	6-8	4-6	N/A	
Victoria Place	All	AVI	-	-	-	-	N/A	High	High	High	High	10	10	8	6	N/A	
Woodfield	All	AVI	-	W	-	W	N/A	Low	Low-med	Low	Low-med	10	6-8	4	2-4	N/A	
Woods of Manilla	All	AVI	-	-	-	W	N/A	Low	Low	Low	Low-med	10	6	4	2-4	N/A	

Amendment 13 Table 5.2-4: Uncertainty Ratings for City of Kawartha Lakes Municipal Residential Well Systems

Groundwater System	Method ¹	Uncertainty Ratings for WHPA Delineation					Uncertainty Ratings for Assignment of Vulnerability					Final Uncertainty Rating				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Birch Point	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Canadiana Shores	AVI	Low	High	High	High	High	Low	High	High	High	High	Low	High	High	High	High
Janetville	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
King's Bay	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Manorview	AVI	Low	High	High	High	Low	Low	High	High	High	Low	Low	High	High	High	Low
Mariposa Estates	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Victoria Glen	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Pleasant Point	AVI	Low	High	High	High	Low	Low	High	High	High	Low	Low	High	High	High	Low
Pinewood	AVI	Low	High	High	High	N/A	Low	Low	Low	Low	N/A	Low	High	High	High	N/A
Sonya	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Victoria Place	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Woodfield	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A
Woods of Manilla	AVI	Low	High	High	High	N/A	Low	High	High	High	N/A	Low	High	High	High	N/A

Amendment 14 Table 5.3-1: Data Sources Used for Assessment of Drinking Water Issues (GENIVAR)

Data Source	Water Type	Woods of Manilla	Sonya	Mariposa Estates	King's Bay	Pleasant Point	Canadiana Shores	Janetville	Woodfield	Manorview Estates	Victoria Glen	Victoria Place	Birch Point	Pinewood ¹	Blackstock	Greenbank	Port Perry	Havelock
Annual Reports	Raw & Treated	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	04-08	04-07	04-07	05-08
SWIP Data (MOECC's Drinking Water Inspection/Compliance Program)	Raw & Treated	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				06
Trent Coalition Conservation Aquifer Characterization Reports																		05-06
Well 1 and 2 Effective In-Situ Treatment Investigation (Jagger Hims Ltd.)																		02
Township of Havelock-Belmont-Methuen Municipal Groundwater Study Report (Morrison Environmental Ltd.)																		04
Permit to Take Water Study, Well 1 and Well 4 (Jagger Hims Ltd.)																		03
Supplementary Hydraulic Testing, Well 1 and Well 4 (Jagger Hims Ltd.)																		03
Production Wells 1 and 4 In-Situ Filtration Assessment Reports (Jagger Hims Ltd.)																		08-09
Havelock Wells 1 and 4 remedial Work Status (Jagger Hims Ltd.)																		08
Community of Port Perry Wellhead Protection Program Numerical Model Development Report																	03	
Kawartha Conservation Watershed Characterization Report		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Municipal Raw Water Quality Data															91-01		91-01	
Municipal Water Supply Water Quality Data		03-07													02-08	02-08	02-08	
Municipal Water Supply Treated Water Quality Data		03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07	03-07				
Municipal Servicing Study			✓	✓		✓	✓		✓	✓	✓	✓		✓	✓			

¹Data not available for Well #5; data shown is for Wells #2, #3 and #4.

Amendment 15

Table 5.3-16: Pinewood Water Quality Standards Exceedances

Parameter	Water Type ¹	Years on Record ²	Benchmark Exceedances			Standard		Extrapolation		Drinking Water Issue	Rationale
			Exceeds ODWQS	Above detection limit	Above local background level	Value	Type ³	Trend	Exceed within 50 years		
Schedule 1											
Coliforms	Raw	2003/2007	Yes			0 cfu/100mL	MAC	–	No	No	<ul style="list-style-type: none"> • Rare exceedances in low numbers • Adequate treatment
Coliforms	Treated	2003/2007	Yes			0 cfu/100mL	MAC	–	No	No	<ul style="list-style-type: none"> • Adequate treatment
E. coli	Raw	2003/2007	Yes			0 cfu/100mL	MAC	–	No	No	<ul style="list-style-type: none"> • Rare exceedances in low numbers • Adequate treatment
Schedule 2 & Table 4											
Sodium	Treated	2003/2007		Yes		200 mg/L	AO	↑	No	No	<ul style="list-style-type: none"> • No exceedance of standard in 50 years
Turbidity	Treated	2003/2007	Yes			5 NTU	OG	–	No	No	<ul style="list-style-type: none"> • Occasional exceedance of standard

¹Indicates if the data on record is for raw (untreated) or treated water

²1 Data not available for Well #5; data shown is for Wells #2, #3 and #4.

³Standard types: MAC=Maximum Acceptable Concentration; AO=Aesthetic Objective; OG=Operational Guideline

Amendment 16 Table 5.4-3: Summary of Significant Threats for Groundwater Systems in the Trent Source Protection Areas (Listed by System)

Drinking Water Threats		Minden	Lutterworth Pines	Cardiff	Dyno Estates	Alpine Village	Buckhorn Lake	Norwood	Blackstock	Greenbank	Port Perry	Havelock	Grafton	Colborne	Brighton	Crystal Springs	Keene Heights	Millbrook	Stirling	Fraserville	Birch Point	Canadiana Shores	Janetville	Kings Bay	Manorview	Mariposa Estates	Victoria Glen	Pleasant Point	Pinewood	Sonya	Victoria Place	Woodfield	Woods of Manilla	TOTAL	
No.	Prescribed Drinking Water Threats																																		
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the <i>Environmental Protection Act</i>	1					1					1																							3
2	The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage	1	13	2	7	52	21	10	43	16	3	14	1	2	4	4	18	1		3	41	29	15	2	34	21		20	17	15	29	15	5	458	
3	The application of agricultural source material to land					3	2	1	5			1			2	2			39	1			1	2		10	3		1		1	1	1	76	
4	The storage of agricultural source material						2	1	1							1			7				1	2								1		16	
5	The management of agricultural source material																																		0
6	The application of non-agricultural source material to land								1																										1
7	The handling and storage of non-agricultural source material																																		0
8	The application of commercial fertilizer to land								32	5													1								8			46	
9	The handling and storage of commercial fertilizer																							2											2
10	The application of pesticide to land					2		1	5		2				2	3			1				1	4	1	2	3		1		1	1	1	31	
11	The handling and storage of pesticide						1	1																2											4
12	The application of road salt																																		0
13	The handling and storage of road salt																																		0
14	The storage of snow																																		0
15	The handling and storage of fuel	5	1	1	7	33	8	17	14	2	14					3	2	11	23		32	27		21	29	19		19		14	12	14	328		
16	The handling and storage of a dense non-aqueous phase liquid						2	2				9																			1			14	
17	The handling and storage of an organic solvent	1																																	1
18	The management of runoff that contains chemicals used in the de-icing of aircraft																																		0
21	The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard						2	1	1				1			2			34	1			1	2			1			1	1			48	
	Total No. Significant Prescribed Drinking Water Threats	8	14	3	14	90	21	28	98	47	5	41	1	3	8	15	20	12	104	5	73	56	20	37	64	52	7	39	19	37	44	34	7	1026	
	Total No. Parcels Affected by Significant Prescribed Drinking Water Threats	6	13	2	7	54	21	22	33	21	3	28	1	2	6	7	18	12	62	4	41	29	15	23	35	31	3	20	18	15	30	16	6	604	
Local Drinking Water Threats																																			
	None																																		0
TOTAL (All Significant Drinking Water Threats)																																			
	Total No. Significant Drinking Water Threats	8	14	3	14	90	21	28	98	47	5	41	1	3	8	15	20	12	104	5	73	56	20	37	64	52	7	39	19	37	44	34	7	1026	
	Total No. Parcels Affected by Significant Drinking Water Threats	6	13	2	7	54	21	22	33	21	3	28	1	2	6	7	18	12	62	4	41	29	15	23	35	31	3	20	18	15	30	16	6	604	

Note: the total number of affected parcels may be less than the total number of drinking water threats because more than one threat may occur on some parcels

Amendment 17

VULNERABILITY ASSESSMENT

Assessment of Drinking Water Threats – Havelock Water Supply, Township of Havelock-Belmont-Methuen (GENIVAR Consultants, April 2010)

Assessment of Drinking Water Threats – Creighton Heights and Camborne Municipal Wellfields, Township of Hamilton (GENIVAR Consultants, June 2010)

Assessment of Drinking Water Threats – Municipal Residential Groundwater Supplies – The City of Kawartha Lakes (3 Volumes) (GENIVAR Consultants, August 2010)

Assessment of Drinking Water Threats – Municipal Groundwater Supplies – The Regional Municipality of Durham (August 2010)

Vulnerability, Issues and Threats for Fourteen Groundwater Sourced Municipal Drinking Water Systems in the Trent Conservation Coalition Source Protection Region (XCG Consultants, July 2010)

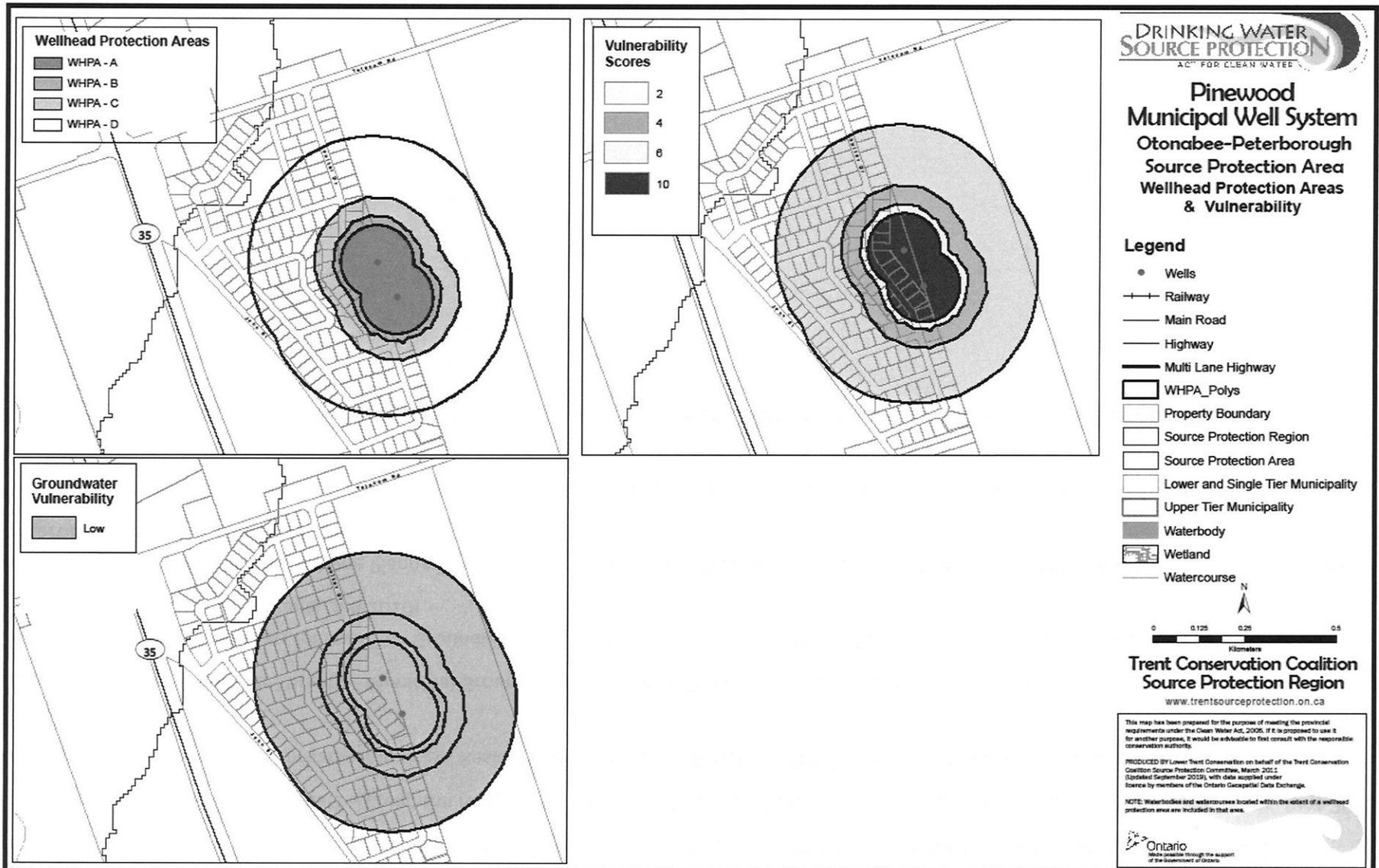
Vulnerability, Issues and Threats for One Planned Groundwater Sourced Municipal Drinking Water System in the Trent Conservation Coalition Source Protection Region (XCG Consultants, July 2010)

Vulnerability, Issues and Threats for the new Lutterworth Pines Municipal Groundwater Sourced Drinking Water System (XCG Consultants Ltd., January 2011)

Technical Memorandum re: Groundwater Vulnerability Assessment – Section 34 Update, (Azimuth Environmental Consulting, April 25, 2019)

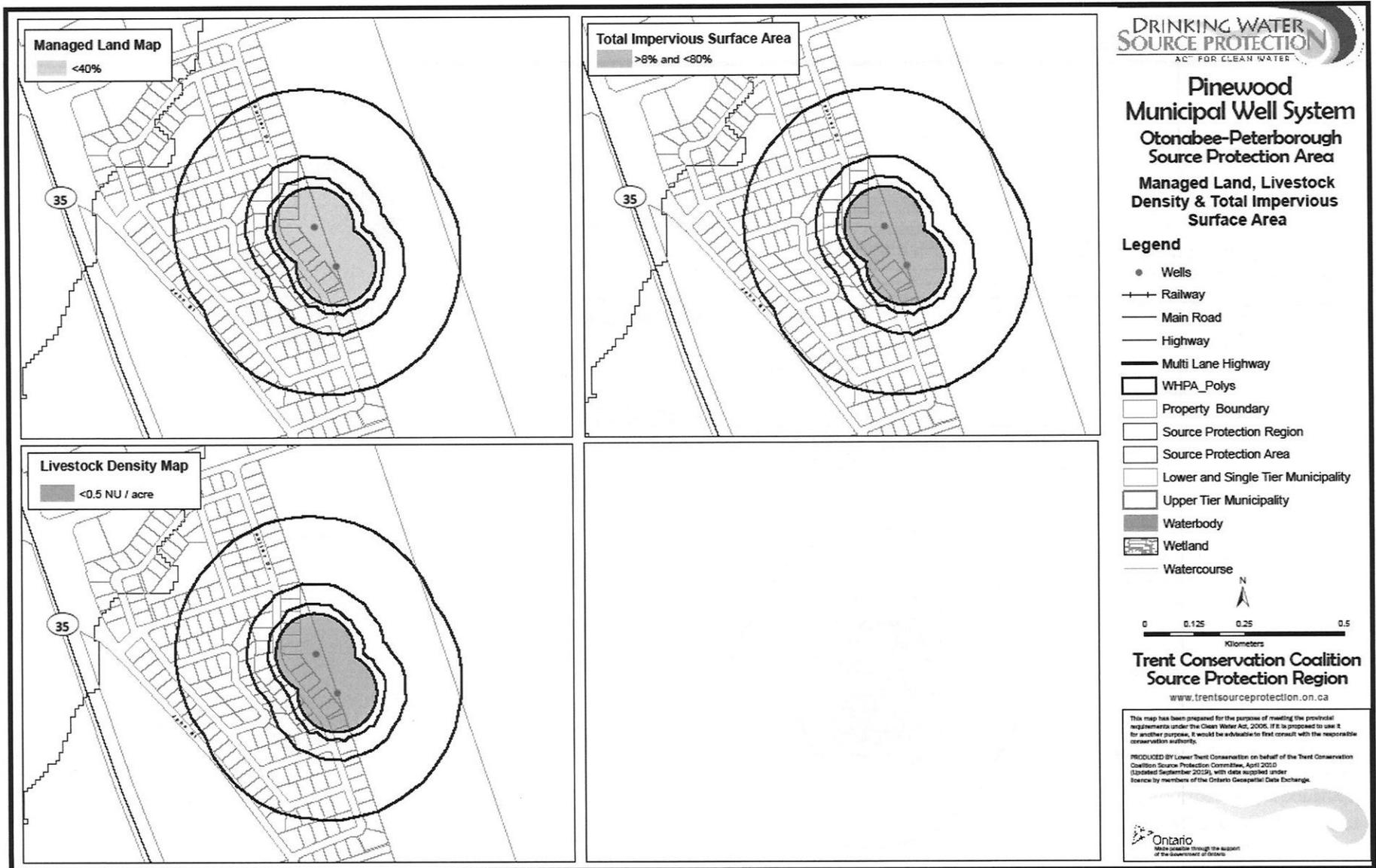
Amendment 18

Map 5-7a – Pinewood Municipal Well System: Wellhead Protection Areas & Vulnerability



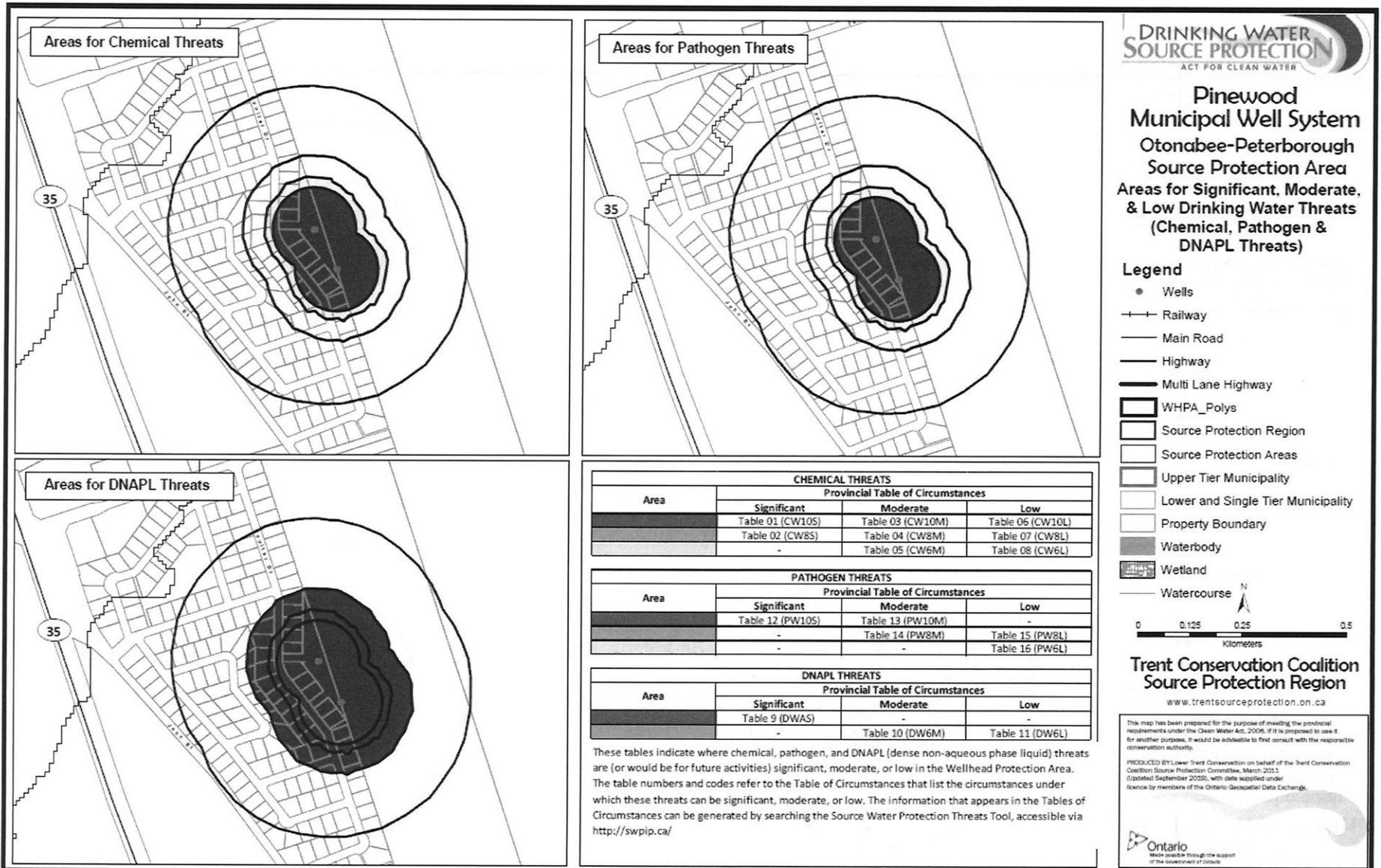
Trent Assessment Report Map 5-7a

Map 5-7b – Pinewood Municipal Well System: Managed Land, Livestock Density & Total Impervious Surface Area



Trent Assessment Report Map 5-7b

Map 5-7c – Pinewood Municipal Well System: Areas for Significant, Moderate & Low Drinking Water Threats (chemical, Pathogen & DNAPL Threats)



Trent Assessment Report Map 5-7c