Updated Assessment of Drinking Water Threats

Alliston Well Water Supply System

Presentation to:

South Georgian Bay Lake Simcoe Source Protection Committee

December 11, 2025 1:00 PM to 4:00 PM

On-Line/Virtual Meeting

Lloyd Lemon, M.Sc., P.Geo.
Lloyd Lemon Geoscience Consulting

On Behalf of:

The Town of New Tecumseth; RV Anderson Associates Limited; GAMAN Consultants Inc; S.S. Papadopulos & Associates., Inc.

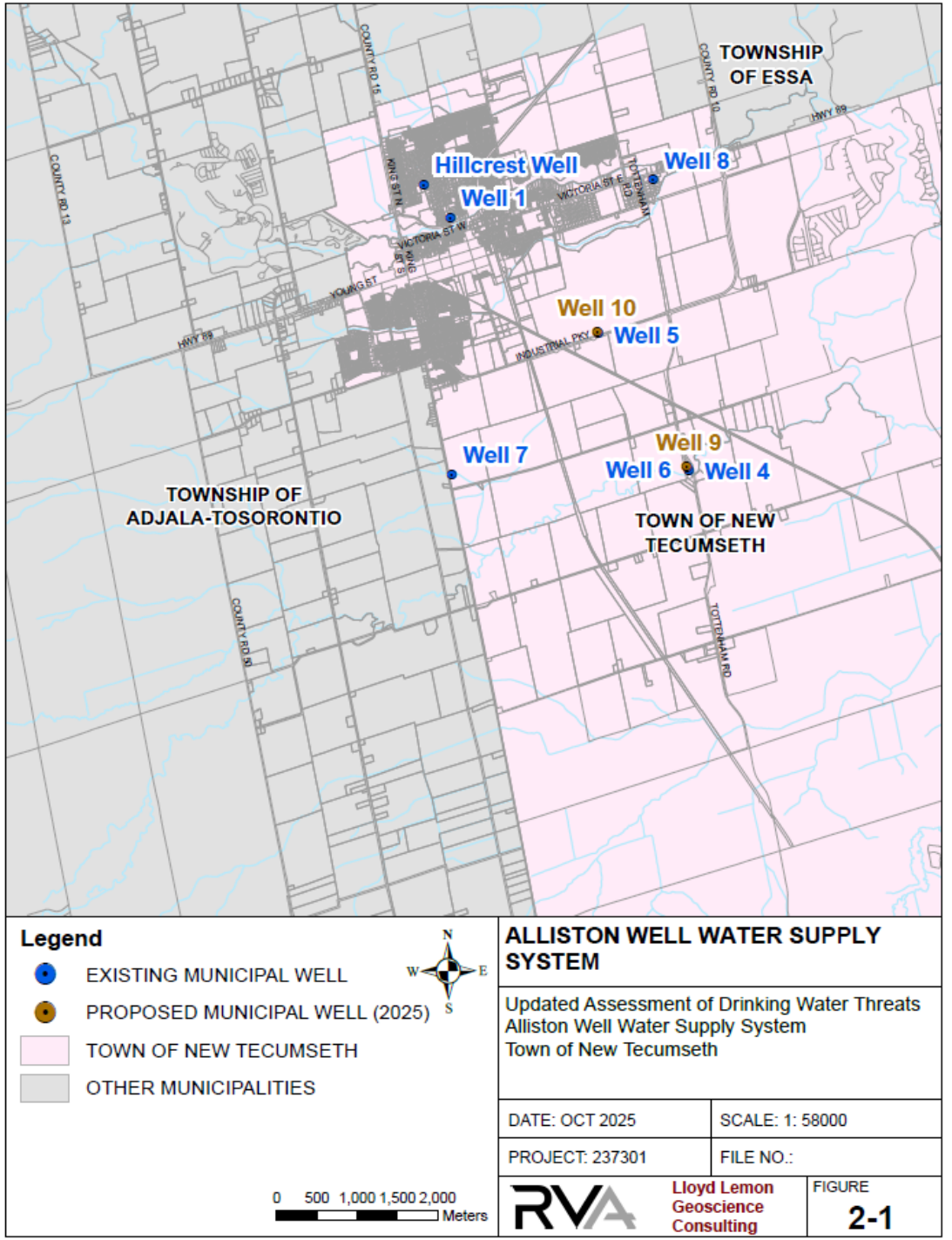
1. Presentation Outline

1. Presentation Outline
2. AWWSS/Approved Assessment Report
3. Project Background/Objectives
4. Requirement for Section 34 Update
5. Work Performed for Section 34 Update
6. Updated Assessment of Drinking Water Threats
7. Summary

2. Alliston Well Water Supply System

Well	Permitted Rate (m^3/day)	Permitted Rate (L/sec)	Source Aquifer
Well 1	1,642	19.0	Lower Aquifer (A4) or Scarborough Aquifer Complex (SAC)
Well 4	2,938	34.0	Lower Aquifer (A4) or SAC
Well 5	2,938	34.0	Lower Aquifer (A4) or SAC
Well 6	2,938	34.0	Lower Aquifer (A4) or SAC
Well 7	1,964	22.73	Intermediate Aquifer (A3) or Thorncliffe Aquifer Complex (TAC)
Well 8	1,964	22.73	Lower Aquifer (A4) or SAC
Hillcrest Well	821	9.5	Bedrock Aquifer

Source: Permit To Take Water P-300-4247188476; Expires May 1, 2026.



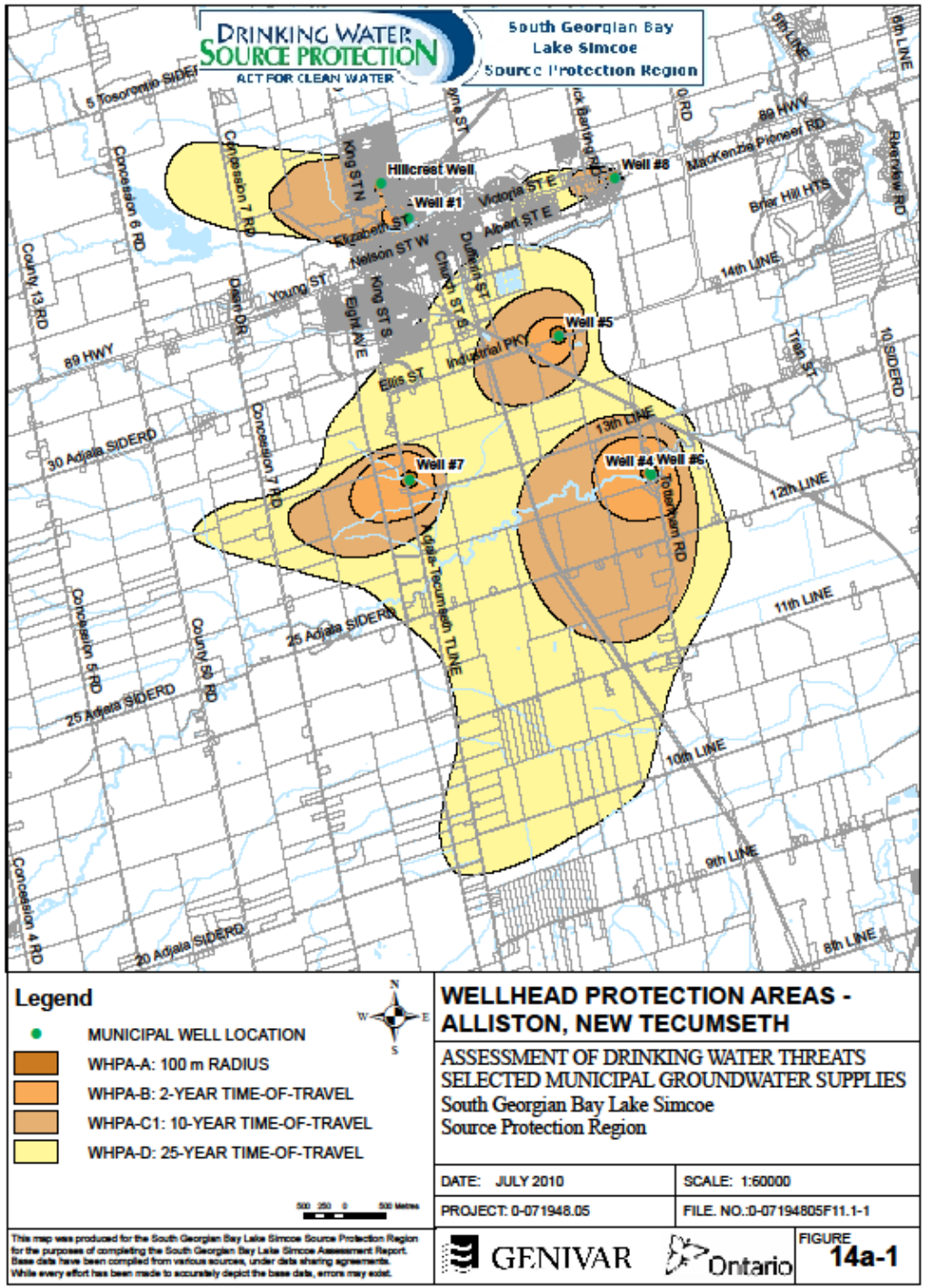
2. Approved Assessment Report

- 2010 – GENIVAR prepared technical studies incorporated into Approved Assessment Report (Approved in 2015 and amended to 2024)
  - Vulnerability Assessment
    - Capture Zones/Wellhead Protection Areas
    - Vulnerability Rating
    - Transport Pathways
    - Vulnerability Scores
  - Issues Evaluation
  - Enumeration of Drinking Water Threats

2. Approved Assessment Report

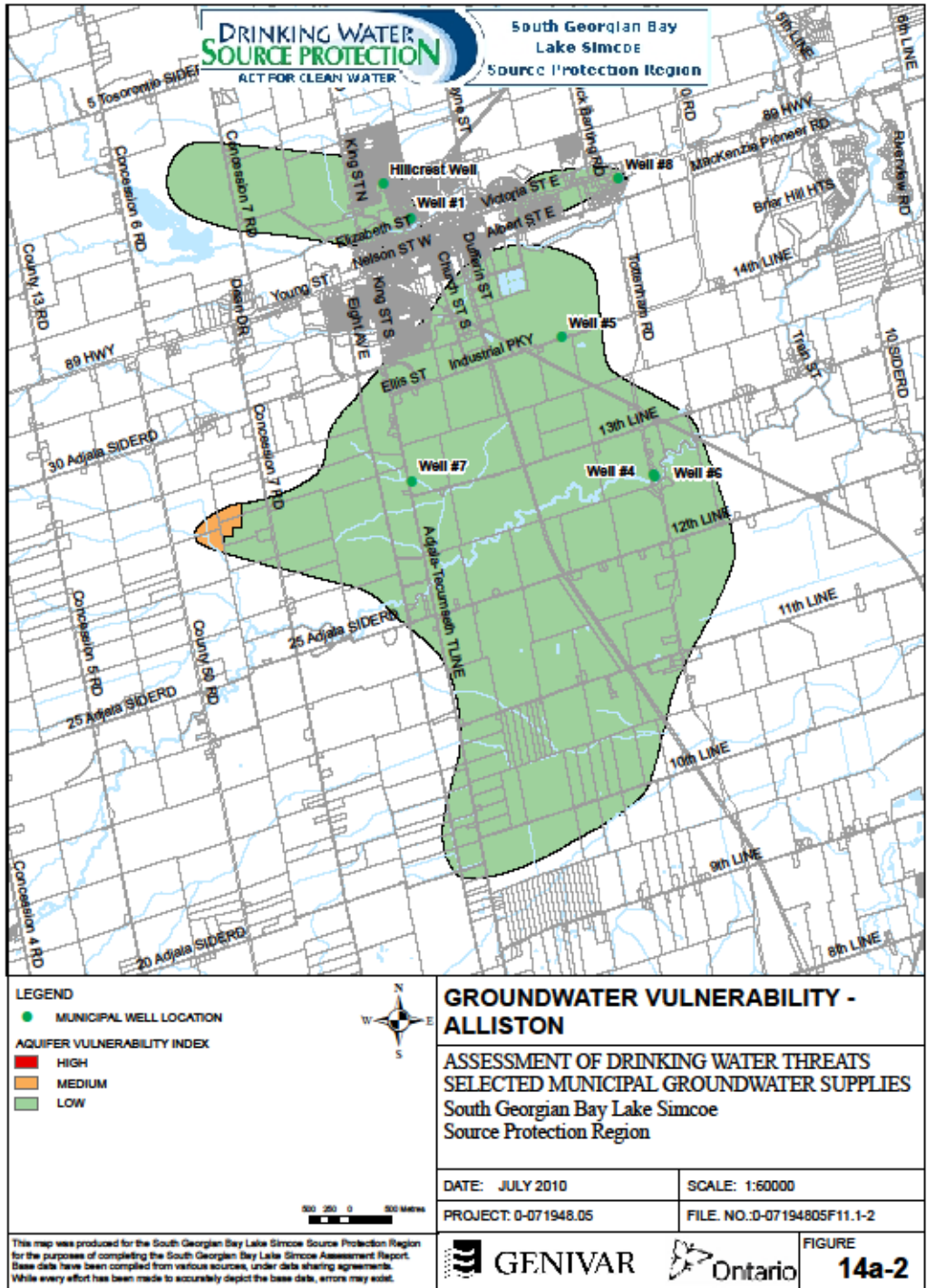
- Approved wellhead protection area (WHPA) (2010)
- Produced from Numerical Model (Golder/WHI 2004)
- Pumping Rates reflect average rates in 2001
- 10-year Time of Travel (TOT) used in place of 5-year TOT (WHPA-C)

	Well 1	Well 4	Well 5	Well 6	Well 7	Well 8	Hillcrest Well
Modelled Rate (m^3/day)	821	1,964	2,291	1,469	982	216	410
Permitted Rate (m^3/day)	1,642	2,938	2,938	2,938	1,964	1,964	821



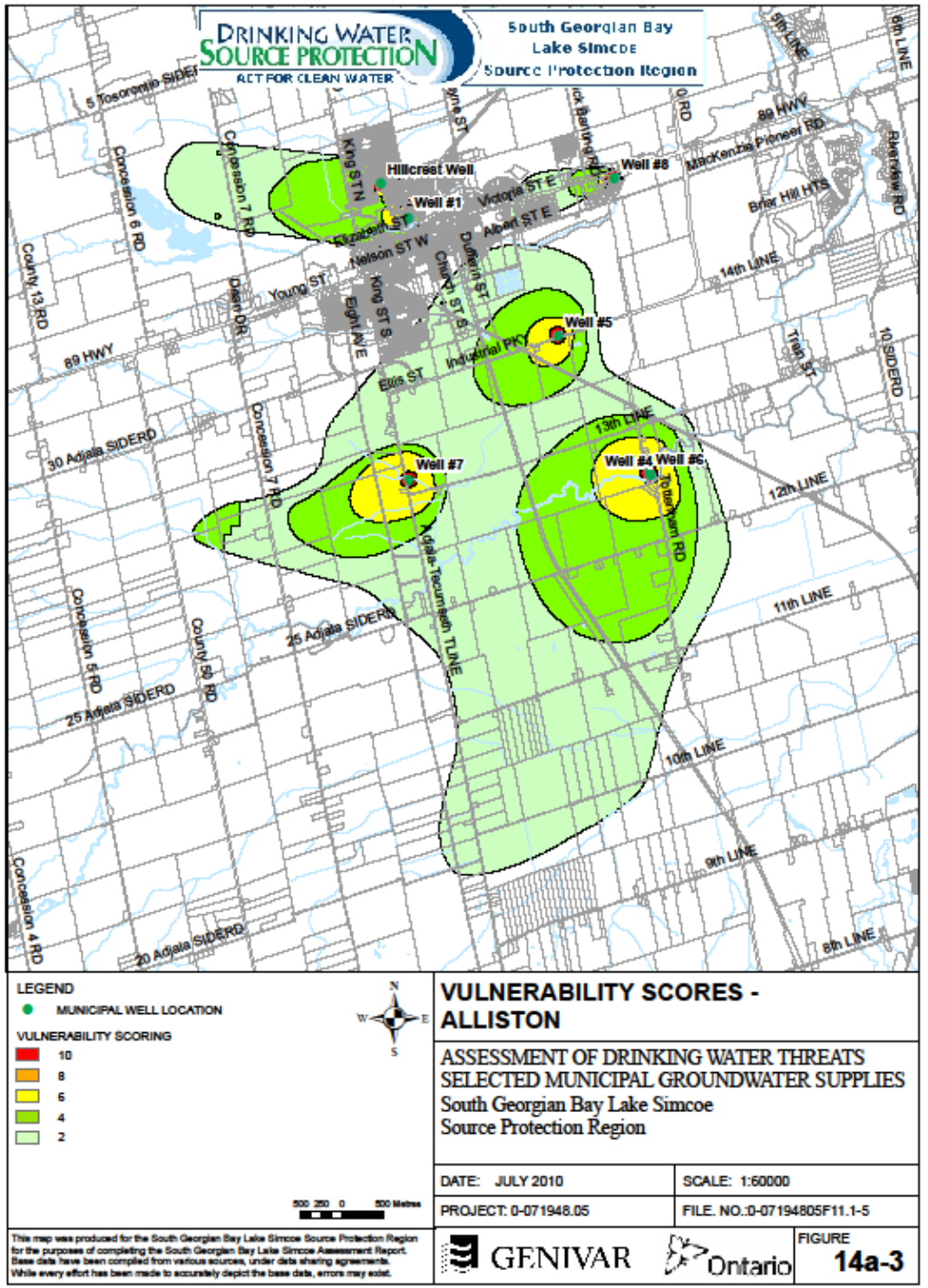
2. Approved Assessment Report

- Approved Groundwater Vulnerability (2010)
- Used this mapping source for update.



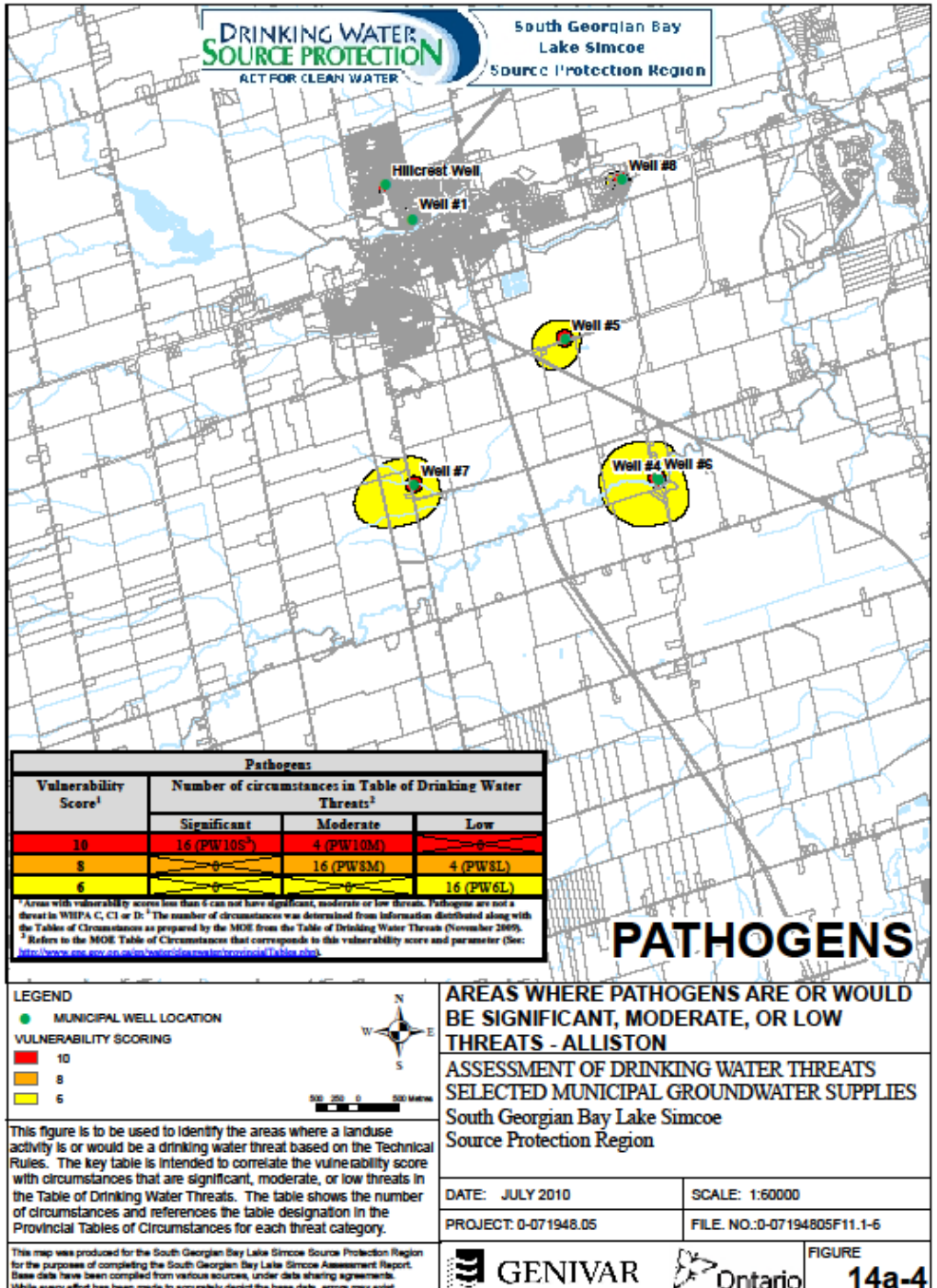
2. Approved Assessment Report

- Approved Vulnerability Scores (2010)
- Includes Vulnerability Increases for Transport Pathways for private wells that intersect supply aquifer.



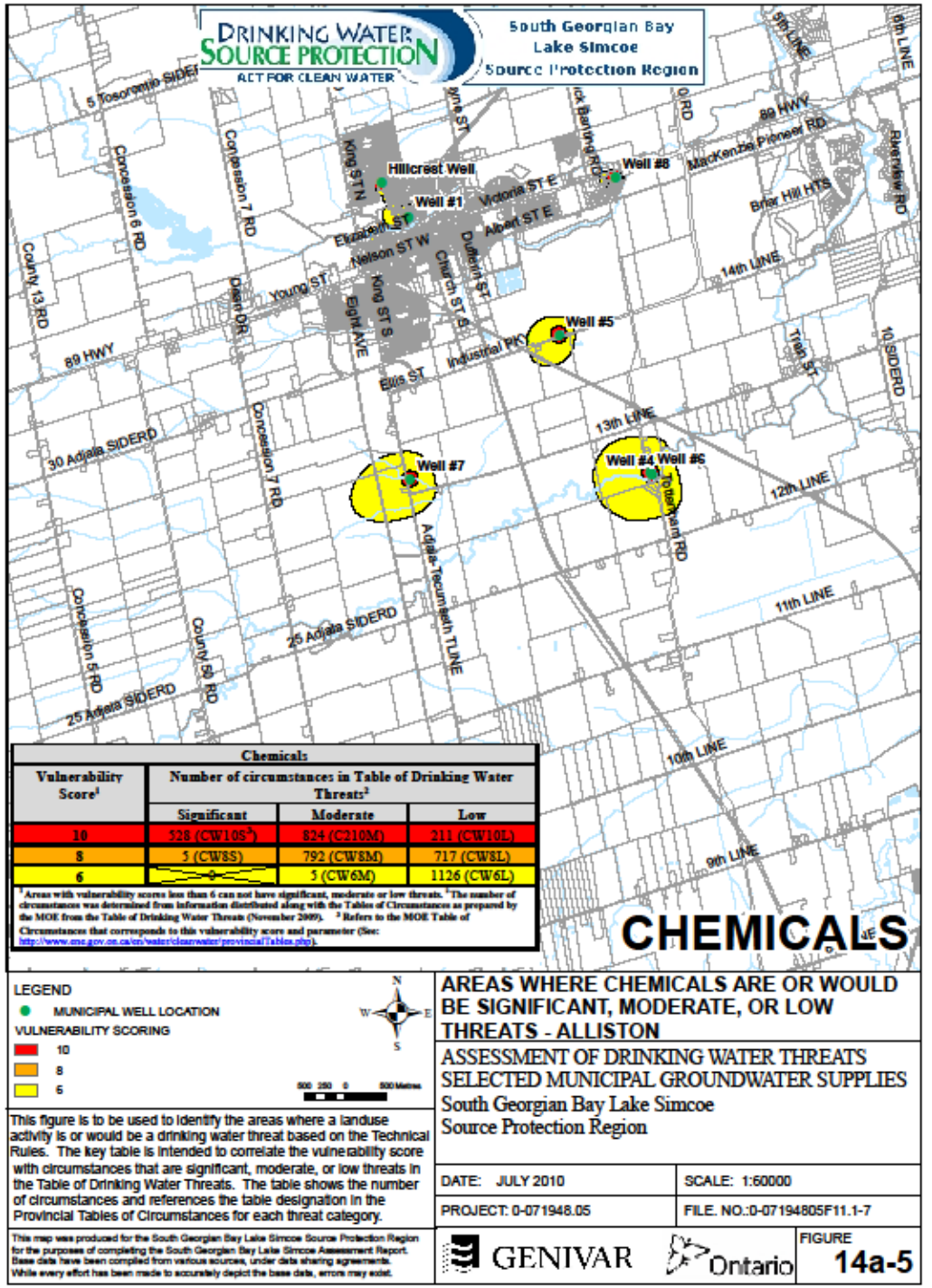
2. Approved Assessment Report

- Maps of Where Pathogens are or would be significant, moderate or low threat
- Reporting style for these figures has changed.



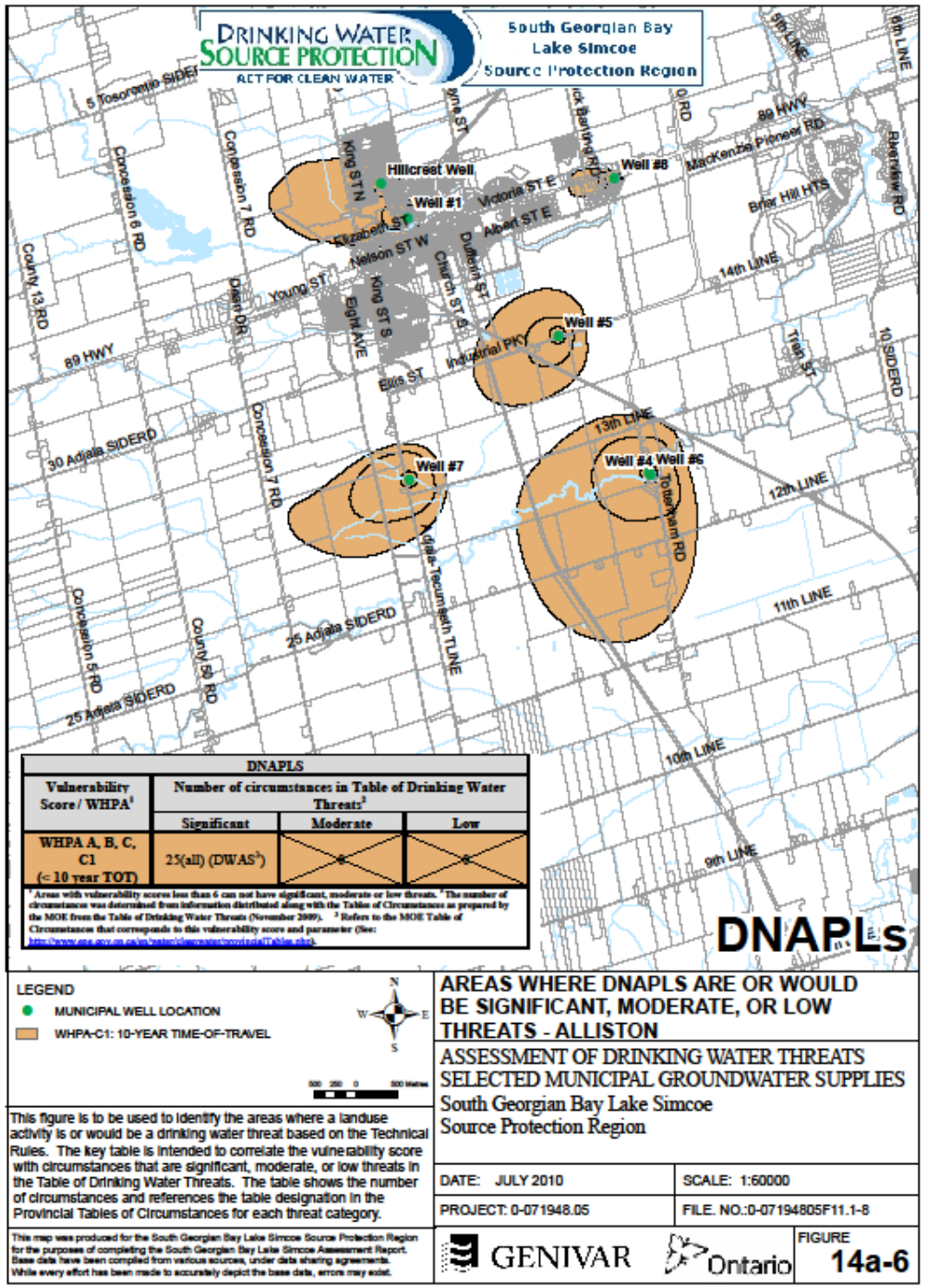
2. Approved Assessment Report

- Maps of Where Chemicals are or would be significant, moderate or low threat
- Reporting style for these figures has changed



2. Approved Assessment Report

- Maps of Where DNAPLs are or would be a significant threat (WHPA-C1)
- Reporting style for these figures has changed



3. Project Background/Objectives

- 2016 – Town finalized Water Supply, Distribution and Storage Master Plan – Concluded that the combined capacity of the Alliston Well Water Supply System and the pipeline supply from the Town of Collingwood would have a shortfall of 3,900 m^3/day to meet the projected demands for 2031.

3. Project Background/Objectives

- 2017 - 2021 – CIMA+ conducted a Class Environmental Assessment (EA) Study to identify the preferred water supply servicing solution to meet projected demands
  - A groundwater exploration program investigated more than 11 locations and did not identify a suitable water supply source
  - Additional testing also carried out at the Hillcrest Well and a second test site but did not identify a suitable water supply source

3. Project Background/Objectives

- 2022 – Town retained team of R.V. Anderson (RVA), International Water Supply Ltd. (IWS), and GAMAN Consultants Inc. (GAMAN) to carry out a Groundwater Well Optimization and Expansion Study
  - 2022/23 – GAMAN oversaw a 72-hour pumping test of Well 1, Well 4, Well 5, Well 6 and Well 8
  - 2022/2023 – GAMAN oversaw a 32-day pumping test of Well 1, Well 4, Well 5, Well 6 and Well 8

3. Project Background/Objectives

- 2023 – RVA prepared an Implementation Plan for the Alliston Groundwater Optimization Study:
  - Town to continue maintenance program
  - Increase Permitted Capacity at Well 7 to 2,160 m^3/day
  - Replace Pump at Well 5 to restore permitted capacity
  - Construct new stand by wells adjacent to Well 4 and Well 6 (Well 9) and adjacent to Well 5 (Well 10).
  - Investigate opportunities to restore pumping rates at Well 1, Well 8 and Hillcrest Well

3. Project Background/Objectives

- 2024/25 – RVA/IWS/GAMAN Team oversaw
  - Assessment of Well 7 Construction and testing of Well 9 (Adjacent to Well 4 / Well 6)
  - Construction and testing of Well 10 (Adjacent to Well 5)
  - Well 10 did not achieve the planned capacity
  - Additional testing of potential to increase pumping rates at Well 6 and Well 9 for up to 45 days per year to achieve firm capacity
  - Establishment of water taking rates to achieve firm capacity

4. Requirement for S.34 Update

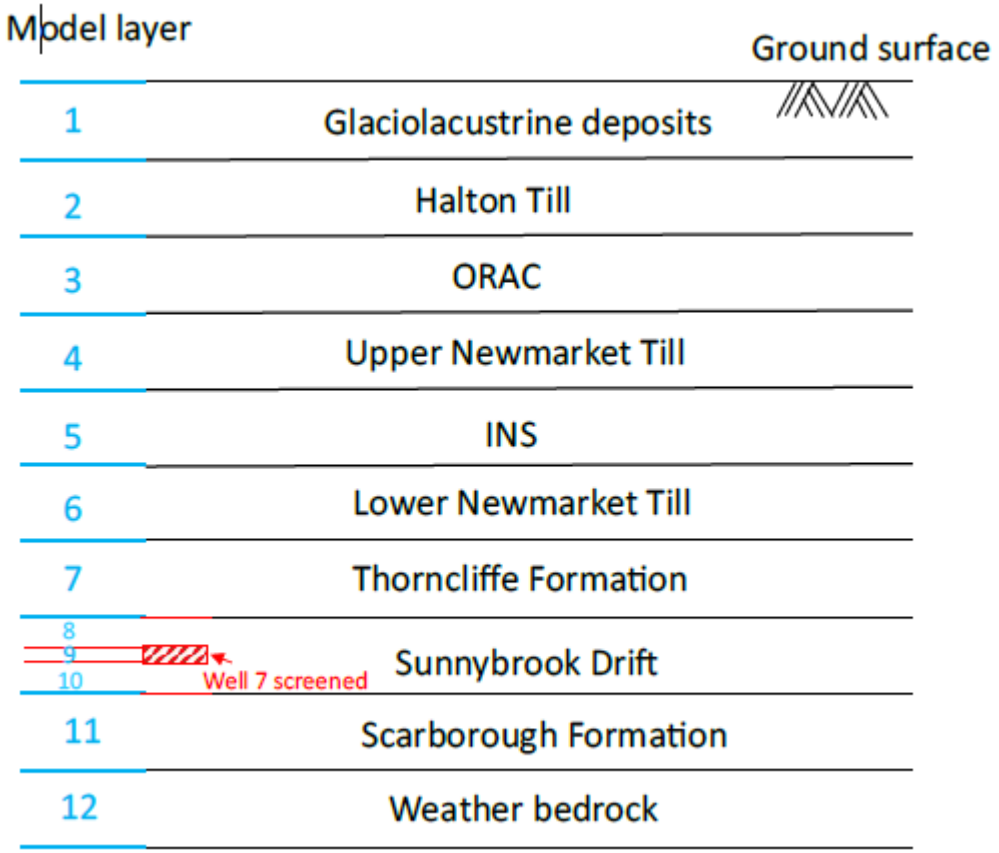
- Section 34 Update required due to:
  - Application to increase pumping rate at Well 7.
  - Application to add Well 9 and Well 10 to Alliston Well Water Supply System
  - Application to increase pumping rate at Well 6 and Well 9 on a seasonal basis to provide firm capacity

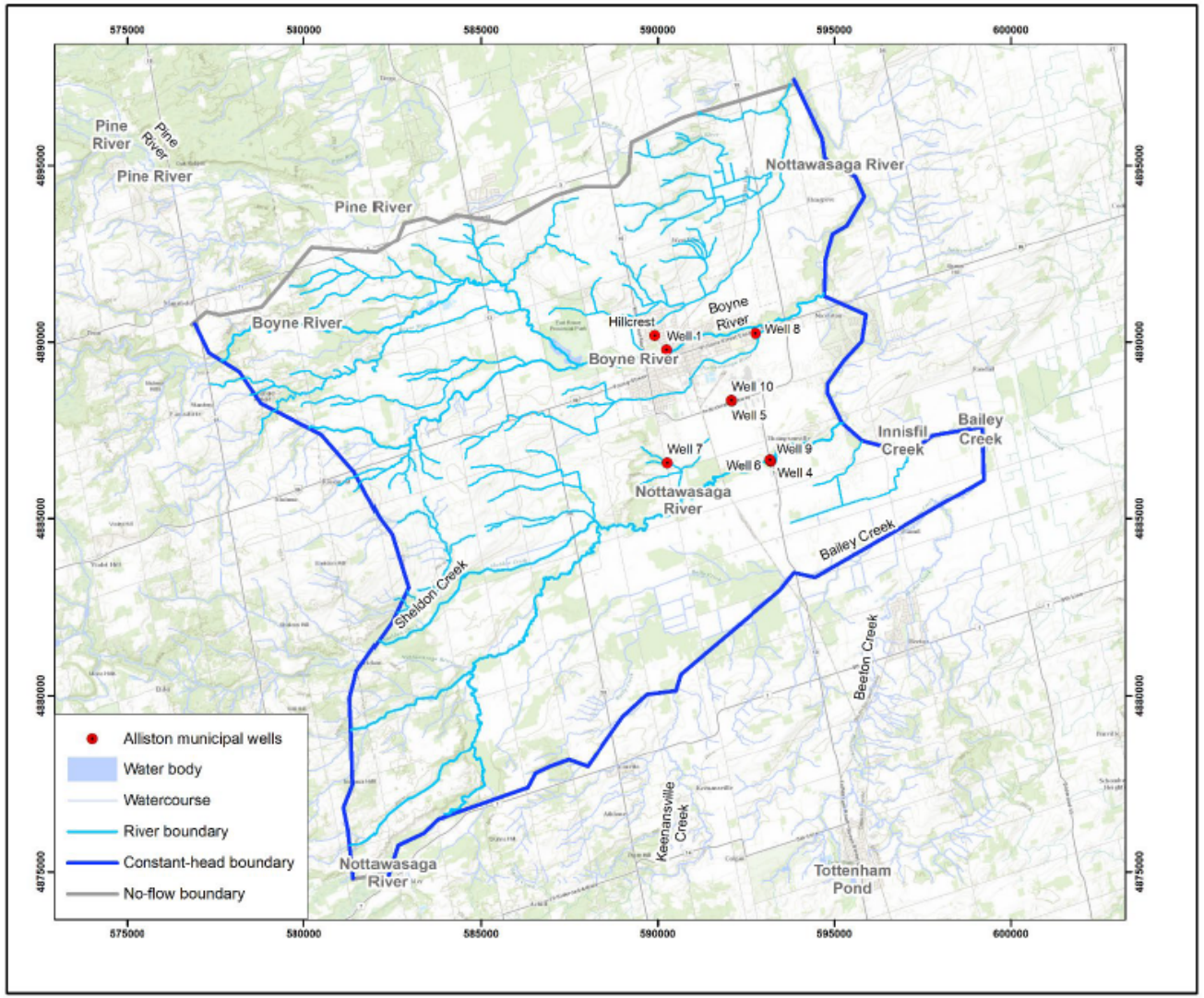
5. Work Performed for S.34 Update

- S.S. Papadapolous & Associates contracted to:
  - Construct 3-Dimensional Finite Element Groundwater Flow Model (MODFLOW) to reproduce 2004 model, calibrate and apply numerical groundwater flow model to update capture zones for Proposed WHPA
- LLGC contracted to oversee technical work to update Assessment Report information for the Alliston Well Water Supply System:

5. Model Construction

- Grid Spacing – 20 m (200 m outside of focus area)





5. Model Calibration

- Static Groundwater Elevations
- Groundwater elevations from 72 and 32-hour pumping tests (2022/2023)
- Layer properties adjusted to improve match between targets and predictions

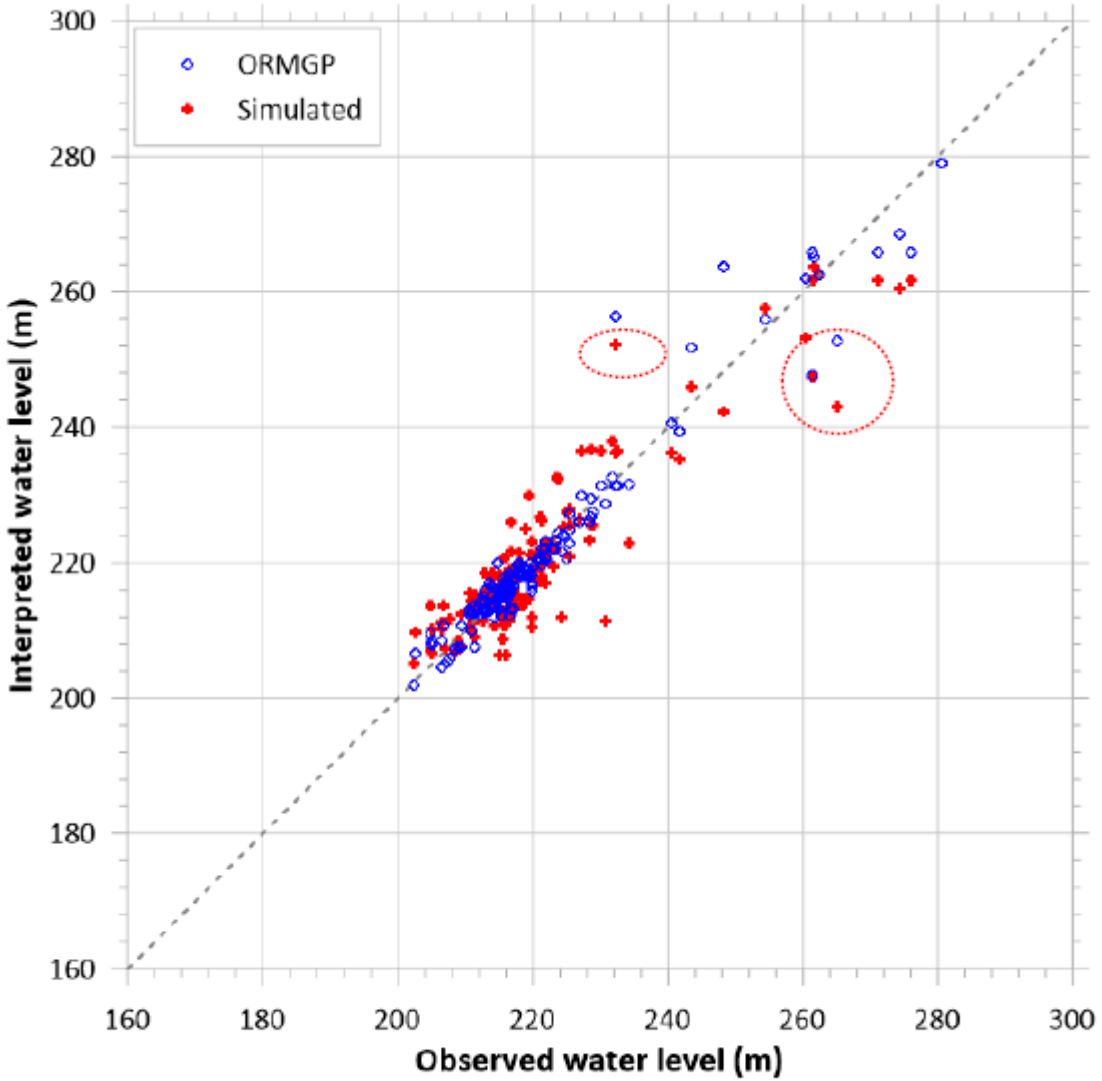


Figure 28. Comparison of WWIS targets and simulated regional-scale water lev

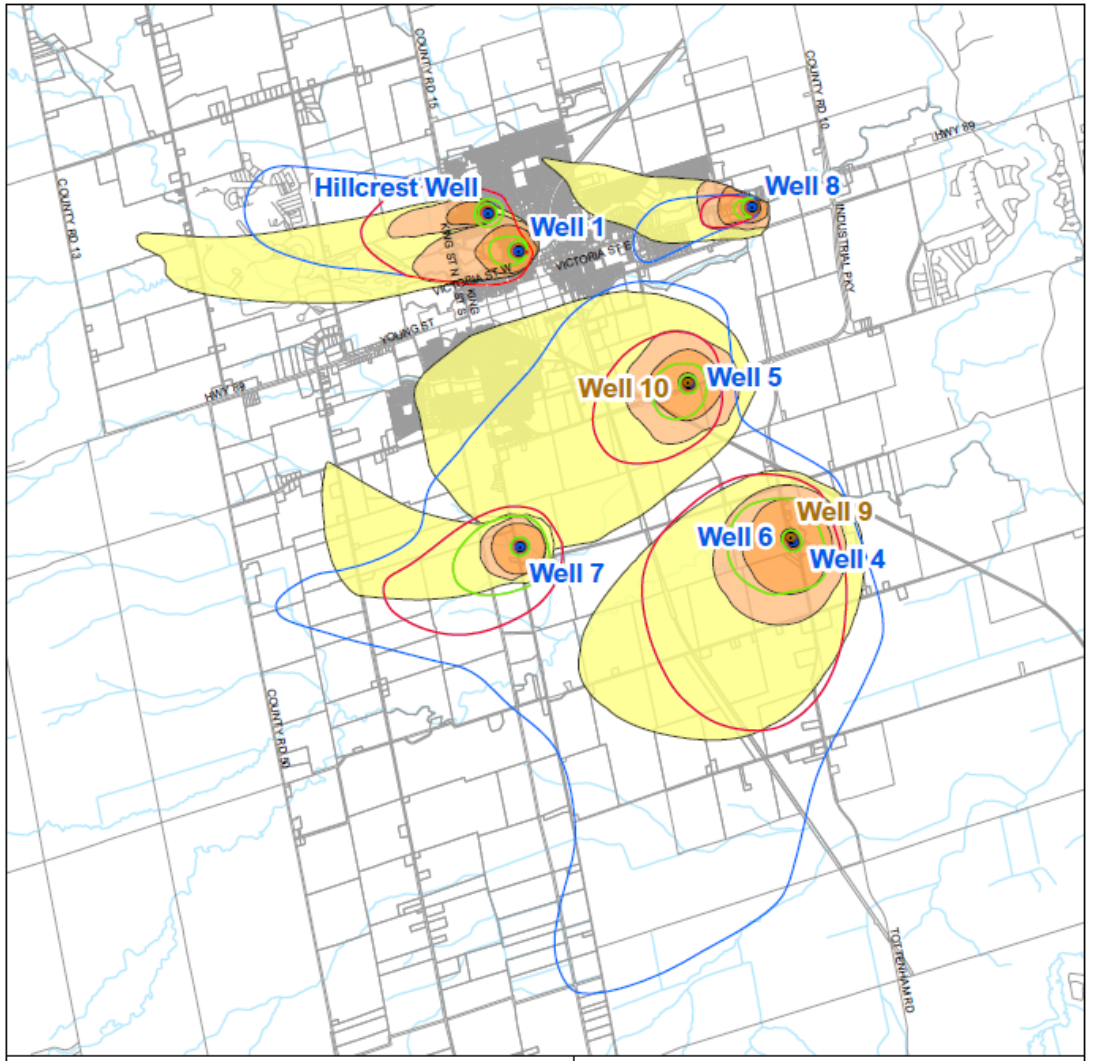
5. Modelled Capture Zone Scenarios

Well	Case 1 Golder (2024) Pumping Rate (m^3/day)	Case 2 Proposed Permitted Rate (m^3/day)	Case 3 Future Average Rate (m^3/day)	Case 4 Conservative Permitted Pumping Rate				Case 5 Increased Steady State Rate at Well 6 to reflect Additional Annual Volume from Conditional Operations
				A (m^3/day)	B (m^3/day)	C (m^3/day)	D (m^3/day)	
Well 1	821	1642	977	1642	1642	1642	1642	1642
Well 4	1964	2938	1964	2938	2938	0	0	2938
Well 5	2291	2938	2291	2938	2938	2938	2938	2938
Well 6	1469	2938	1749	3716	0	2938	3716	3034
Well 7	982	2106	2160	2160	2160	2160	2160	2160
Well 8	216	1964	1169	1964	1964	1964	1964	1964
Hillcrest Well	410	820	489	820	820	820	820	820
Well 9 (?)	-	Back-Up Only	Back-Up Only	0	3716	3716	2938	Back-Up Only
Well 10 (?)	-	Back-Up Only	Back-Up Only	Back-Up Only	Back-Up Only	Back-Up Only	Back-Up Only	Back-Up Only

5. Capture Zone Simulations

Case 1: 2010 Pumping Rates (Golder/WHI, 2004)

Well	Modelled Rate (m^3/day)	Permitted Rate (m^3/day)
Well 1	821	1,642
Well 4	1,964	2,938
Well 5	2,291	2,938
Well 6	1,469	2,938
Well 7	982	1,964
Well 8	216	1,964
Hillcrest Well	410	821



Legend

- EXISTING MUNICIPAL WELL
- PROPOSED MUNICIPAL WELL (2025)
- CAPTURE ZONE A: 100 M RADIUS
- CAPTURE ZONE B: 2-YEAR TIME-OF-TRAVEL
- CAPTURE ZONE C: 5-YEAR TIME-OF-TRAVEL
- CAPTURE ZONE D: 25-YEAR TIME-OF-TRAVEL
- APPROVED WHPA-B
- APPROVED WHPA-C
- APPROVED WHPA-D

N W E S

0 500 1,000 1,500 2,000 Meters

CAPTURE ZONES FOR CASE 1: 2010 PUMPING RATES (SSP&A, 2025)

Groundwater Vulnerability Assessment (2025)
Updated Assessment of Drinking Water Threats
Alliston Well Water Supply System
Town of New Tecumseth

DATE: OCT 2025	SCALE: 1: 58000
PROJECT: 237301	FILE NO.:

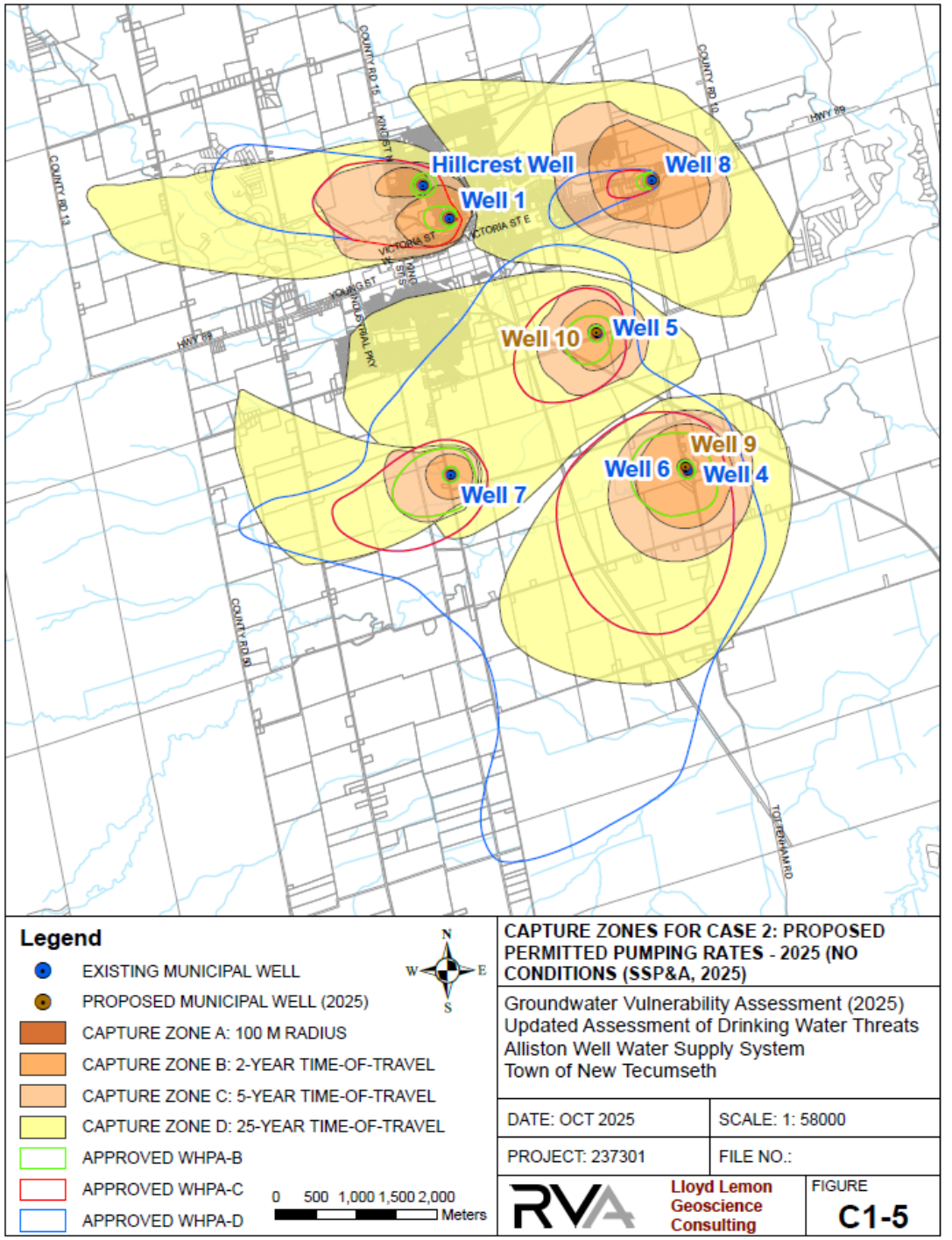
RVA Lloyd Lemon Geoscience Consulting

FIGURE C1-4

5. Capture Zone Simulations

Case 2: Proposed Permitted Pumping Rates (2025)

Well	Modelled Rate (m^3/day)	Permitted Rate (m^3/day)
Well 1	1,642	1,642
Well 4	2,938	2,938
Well 5	2,938	2,938
Well 6	2,938	2,938
Well 7	2,160	1,964
Well 8	1,964	1,964
Hillcrest Well	821	821

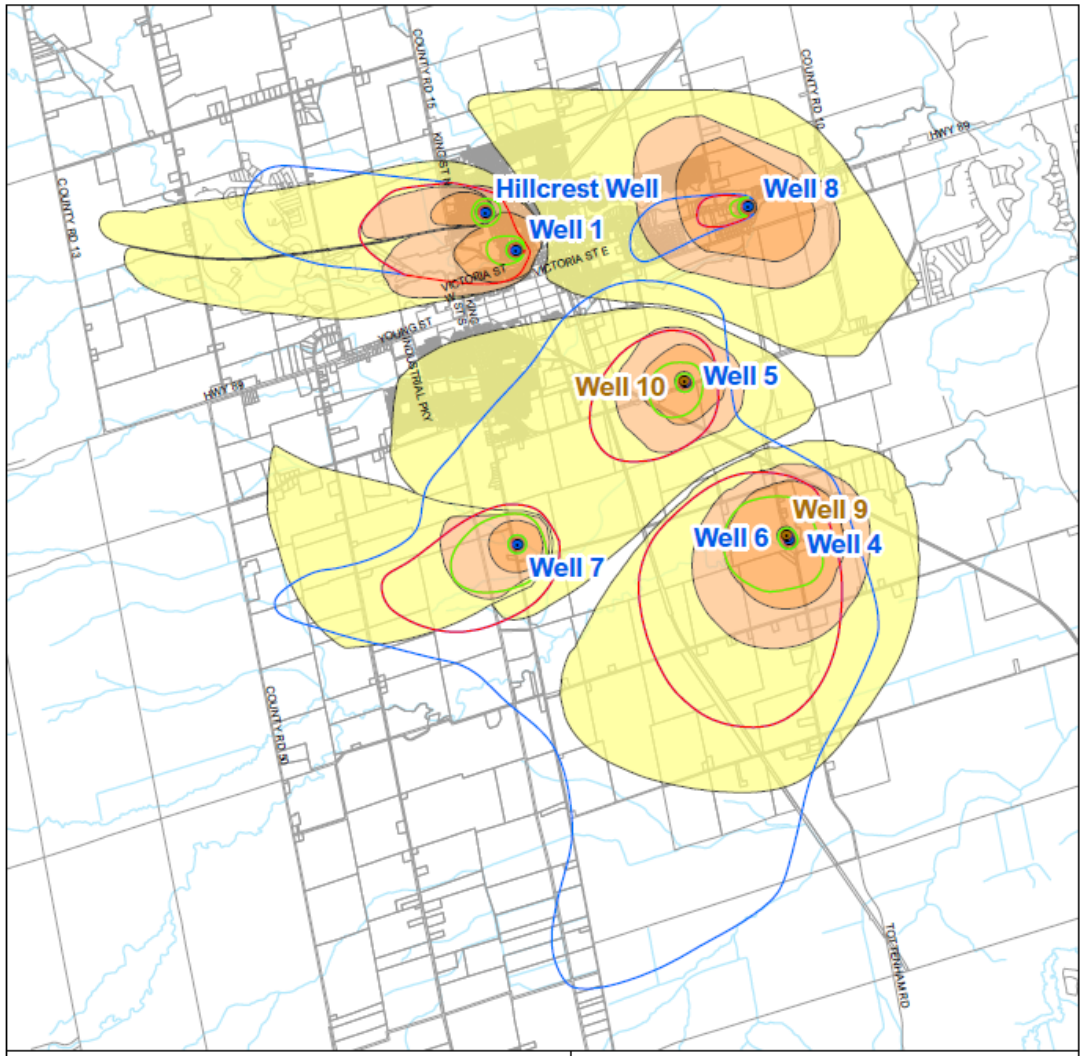


5. Capture Zone Simulations

Case 4E: Proposed Permitted Pumping Rates (2025)

Alternated Pumping Rates for Well 4 Well 6 and Well 9 with 2 wells operating and either Well 6 or Well 9 operating at 3,716 m^3/day

Maximum footprint of 4 model simulations shown



Legend

- EXISTING MUNICIPAL WELL
- PROPOSED MUNICIPAL WELL (2025)
- CAPTURE ZONE A: 100 M RADIUS
- CAPTURE ZONE B: 2-YEAR TIME-OF-TRAVEL
- CAPTURE ZONE C: 5-YEAR TIME-OF-TRAVEL
- CAPTURE ZONE D: 25-YEAR TIME-OF-TRAVEL
- APPROVED WHPA-B
- APPROVED WHPA-C
- APPROVED WHPA-D

N W E S

0 500 1,000 1,500 2,000 Meters

CAPTURE ZONES FOR CASE 4E: MAXIMUM AREAS AFFECTED BY CASE 4A TO 4D

Groundwater Vulnerability Assessment (2025)
Updated Assessment of Drinking Water Threats
Alliston Well Water Supply System
Town of New Tecumseth

DATE: OCT 2025	SCALE: 1: 58000
PROJECT: 237301	FILE NO.:

RVA Lloyd Lemon Geoscience Consulting

FIGURE C1-12

5. Proposed WHPA

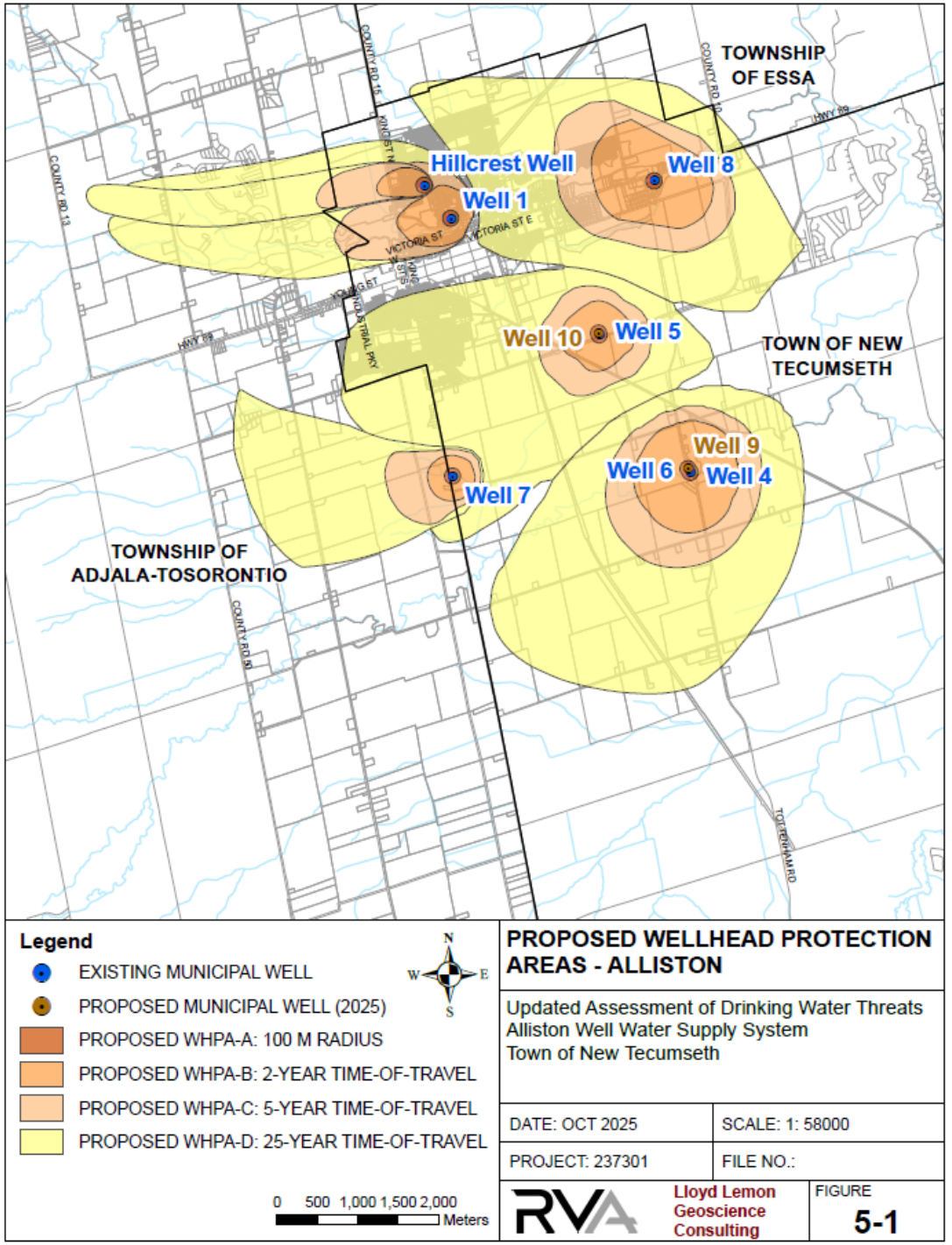
- Case 4E: Combine 4A to 4D
- Merge WHPA-D Between Well 5/10 & Well 4/6/9
- Merge WHPA-D Between Well 5/10 & Well 8

6. Updated Assessment of Drinking Water Threats (Report)

- Report Contents
  - Introduction
  - Alliston Drinking Water Supply System
  - Summary of Work Since 2010 (EA, RVA, GAMAN, SSPAI)
  - Technical Rules Requirements
  - Updated Assessment of Drinking Water Threats
  - Next Steps
  - Acknowledgements
  - References

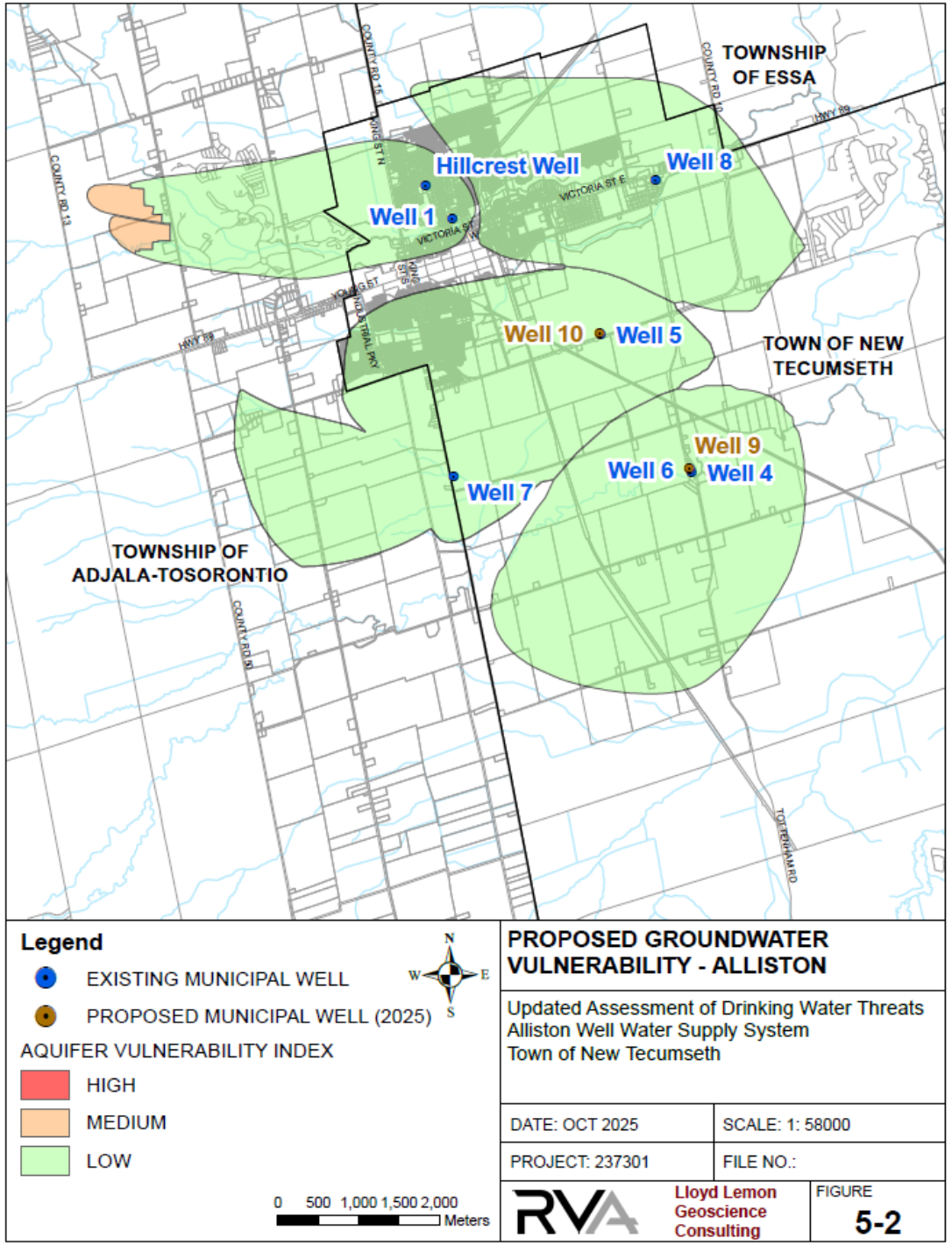
6. Assessment Report Update

- Proposed WHPA (2025)
  - WHPA for Well 8
    - WHPA-A – no change.
    - WHPA-B – D much larger
    - WHPA-C – Larger
    - WHPA-D – Extends into Township of Essa
  - WHPA for other Wells
    - WHPA-D changes
    - Some minor changes to WHPA-C (DNAPL Policies Apply)



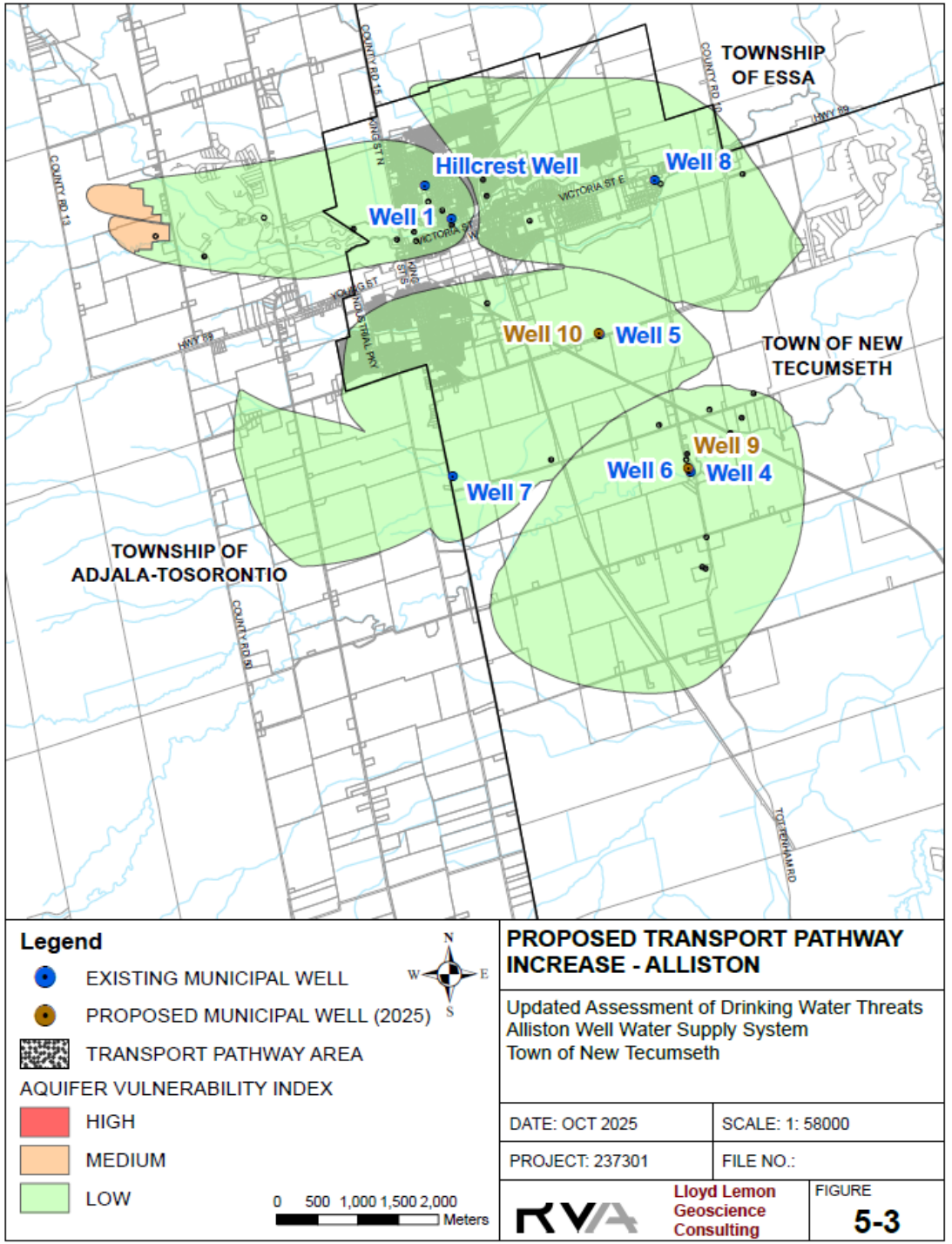
6. Assessment Report Update

- Proposed Groundwater Vulnerability (2025)
  - Typically Low
  - Small area of Medium on western edge of capture zone for Well 1/Hillcrest Well
  - Consistent with previous



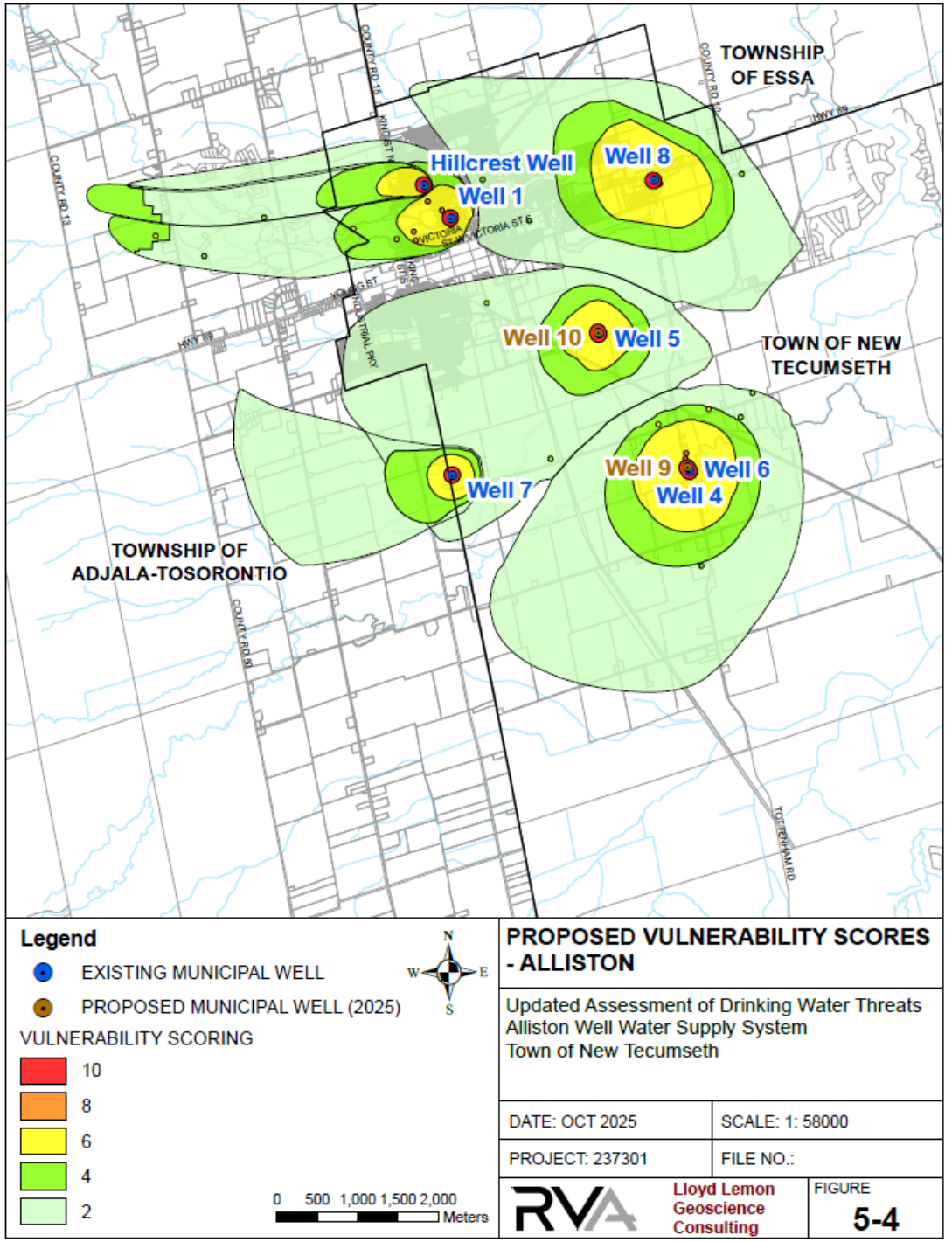
6. Assessment Report Update

- Proposed Transport Pathway Increase (2025)
  - 30 m zone around private wells that intersect water supply aquifer
  - Well Information obtained from Oak Ridges Moraine Groundwater Management Program dataset
  - Similar to previous



6. Assessment Report Update

- Proposed Vulnerability Scores (2025)
  - Applied as per Technical Rules
  - Increased vulnerability shown for Transport Pathways

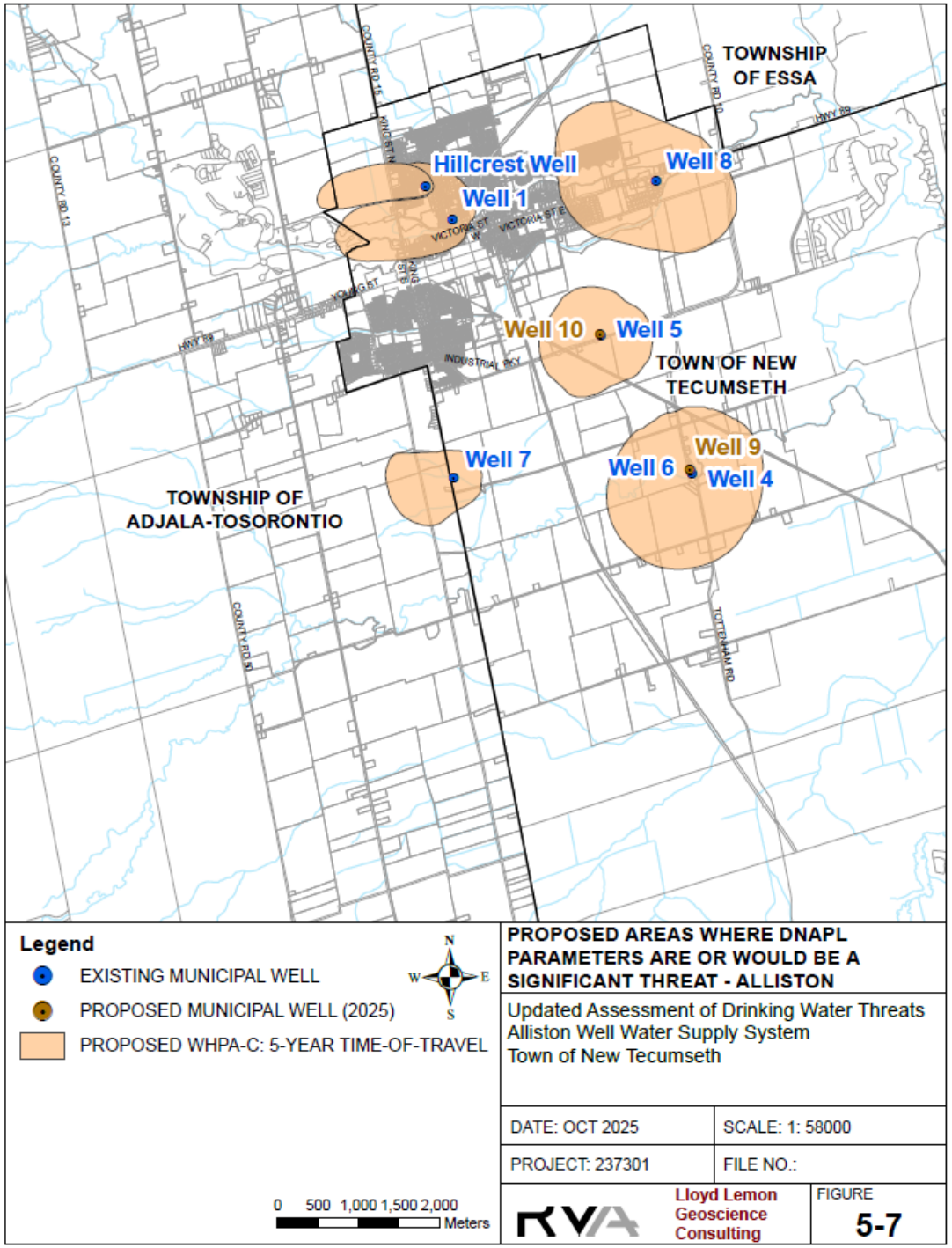


6. Assessment Report Update

- **Managed Lands**, **Livestock Density** re-calculated for WHPA where Vulnerability Score > 6 (WHPA-B plus Transport Pathways)
- **Impervious Surfaces** re-calculated as per 2021 Technical Rules – results in some additional threats for application and storage of road salt (Well 5/10); Well 8) [Inside WHPA-B)
- **Pathogens** & **Chemicals** would Be Significant Threats in WHPA-A (Only changes in 100 m radius of Well 9 and Well 10)

6. Assessment Report Update

- Areas where **Dense Non-Aqueous Phase Chemicals (DNAPLs)** would Be Significant Threats
  - Applied as per Technical Rules
  - Limited to WHPA-C
  - Larger area for Well 8
  - Larger area for Well 1/Hillcrest
  - Minor changes to areas for Well 5, Well 4/ Well 6/ Well 9 and for Well 7



6. Updated Threat Enumeration

- All Previous Significant Threats Addressed by RMO
- Well 1/Hillcrest - 4 New Handling & Storage of DNAPL
- Well 4/Well 6/Well 9 – 1 New Handling & Storage of DNAPL
- Well 5/10 – 4 New Application of Road Salt
- Well 7 – No new activities
- Well 8 (much larger WHPA-C):
  - 9 New Handling & Storage of DNAPL
  - 2 New Activities for Private Sewage (Addressed by Policy)
  - 17 New Activities related to Application of Road Salt

7. Summary

- Vulnerable areas for Alliston Water Well Supply System updated to reflect addition of Well 9 and Well 10 and new proposed pumping rates to meet firm capacity needs
- Changes to WHPA are Effectively Minor – Except for Well 8
- Majority of Threat Activities already cleared by RMO
- Changes to Technical Rules (2021) result in Additional Threats for Road Salt
- Additional Activities related to change of WHPA at Well 8 and Hillcrest.
- Well 7 and Well 1/Hillcrest WHPA extend into Adjala- Tosorontio
- WHPA-D for Well 8 extends into Township of Essa

Thank You!!

- Prepared with support and assistance from:
  - Rika Law, Michael Jung and Kenny Wong of RV Anderson Associates Limited
  - Gary Hendy of GAMAN Consultants Inc.
  - Chris Neville of S.S. Papadopulous & Associates Inc.
  - Ian Todhunter and Dylan Patterson of Town of New Tecumseth
  - Ian Ockenden (NVCA) and Bill Thompson (LSRCA)
- Data provided by NVCA, Town of New Tecumseth, Simcoe County, ORMGP