



Clair-Maltby

Transform. Connect. Community.

Information Session:

Comprehensive Environmental Impact Study (CEIS)
Phase 1 and 2 Characterization Report

September 26, 2018



September 26, 2018

CEIS Phase 1 and 2 Characterization Report

1. Introductions
2. Secondary Plan Process Update
3. CEIS Overview / MESP Integration
4. CEIS Phase 1 and 2 Characterization Report
 - Hydrogeology;
 - Surface Water;
 - Natural Heritage; and
 - Significant Landform
5. MESP Overview
6. Next Steps / Timing – Schedule
 - CEIS Impact Assessment
 - MESP
 - Secondary Plan



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1. Introductions

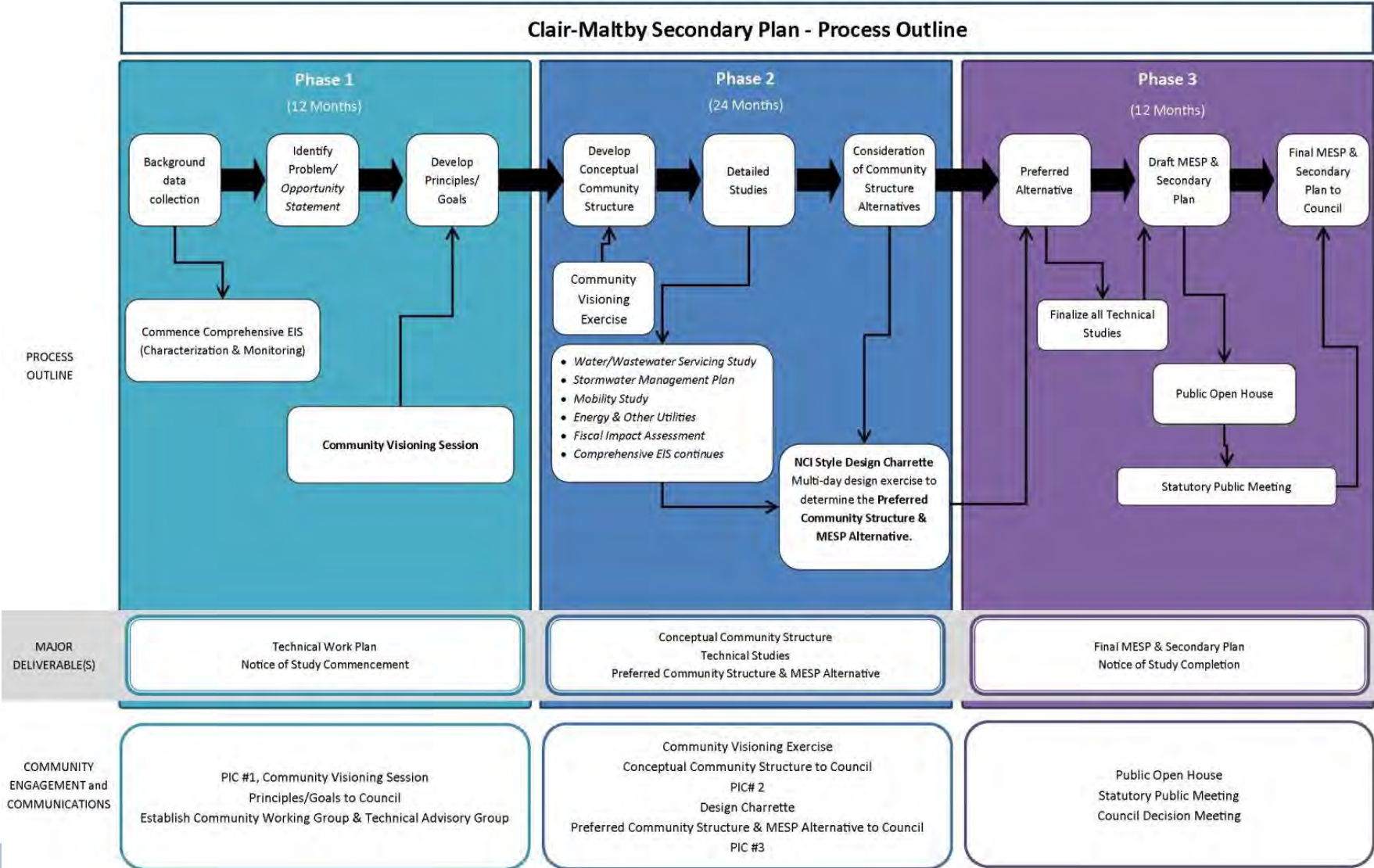


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2. Secondary Plan Process Update

2. Secondary Plan Process Update: Study Components



2. Secondary Plan Process Update

April 3-6 & 9, 2018	Planning & Design Charrette
June 2018	Council approval of the Preferred Community Structure (as the basis for Ph3)
September 2018	Ph 1 and 2 Characterization Report Information Session
Q4 2018 – Q3 2018	Phase 3 Project Work



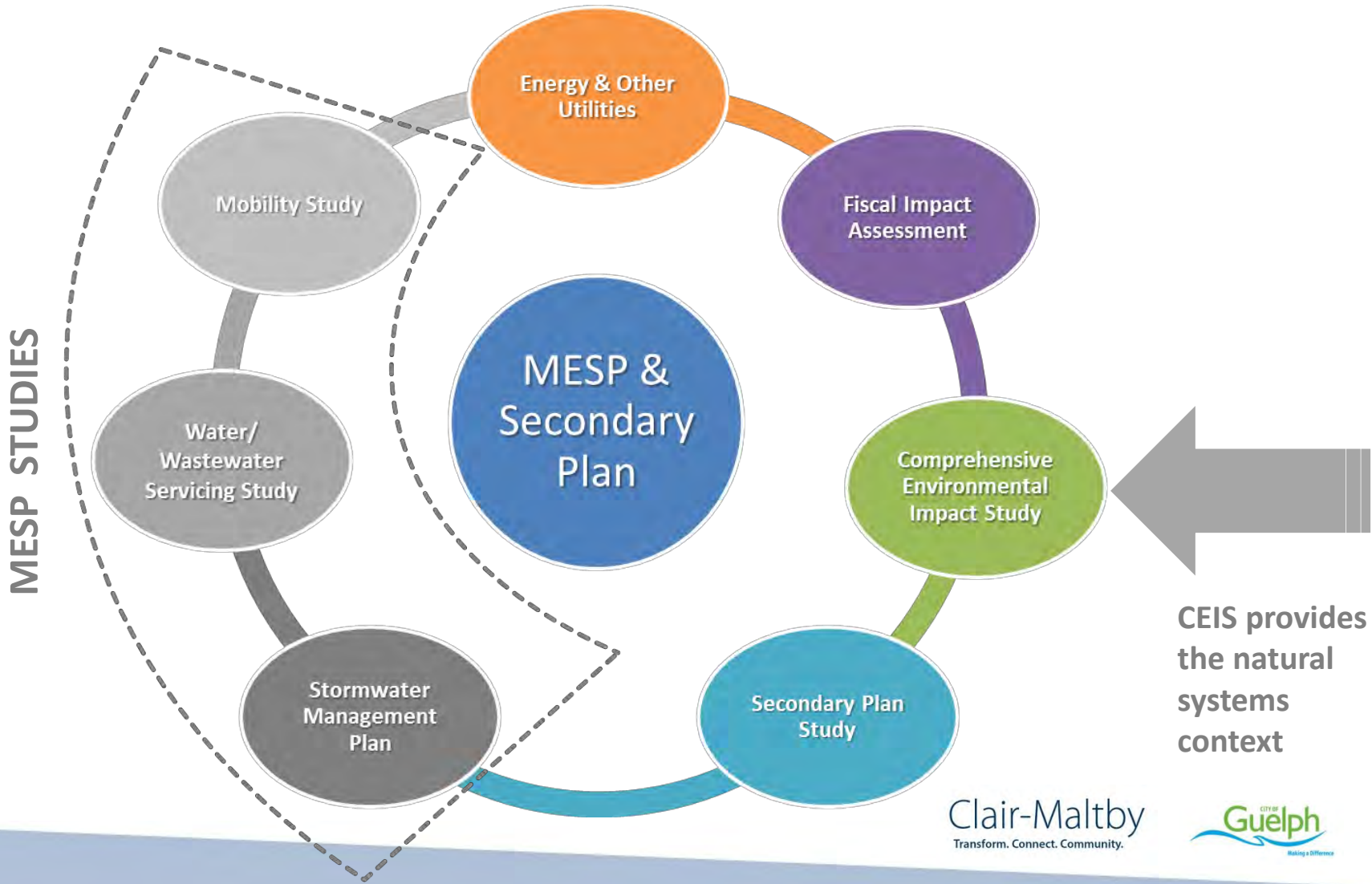


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3. CEIS Overview / MESP Integration

3. CEIS Overview / MESP Integration: Study Components

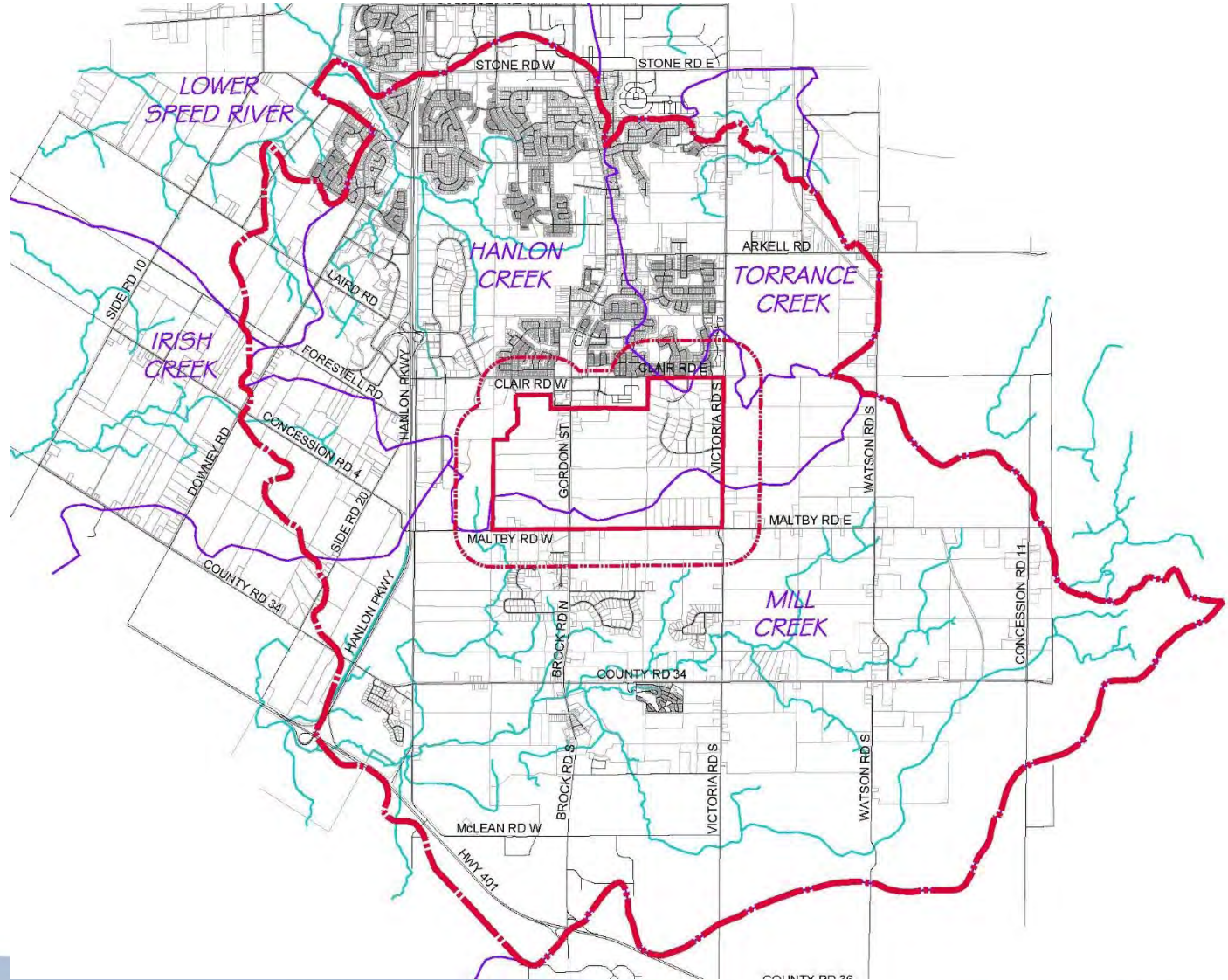


3. CEIS Overview / MESP Integration: CEIS Study Area

Secondary
Plan Area
(SPA)

Primary
Study
Area
(PSA)

Secondary
Study
Area
(SSA)



3. CEIS Overview / MESP Integration: Key CEIS Tasks

- Phases 1 and 2:
 - Verification / refinement / assessment of environmental features and functions
 - Assessment of the role of water in the study areas to support natural systems (groundwater/surface water)
 - Constraints and opportunities definition
- Phase 3:
 - Assessment of impacts associated with different community structure options
 - Establishment of integrated management strategies

3. CEIS Overview / MESP Integration: CEIS Approach

- Review of background information
- Multi-year monitoring and field studies
 - 2016, 2017, 2018 (ongoing)
- Modelling of surface and groundwater
- Refinement / Update of Natural Heritage System
 - Building on existing NHS approved in 2014
- Agency and stakeholder consultation

3. CEIS Overview / MESP Integration: Existing Natural Heritage System (NHS)



2001 Official Plan, September 2014 Consolidation

3. CEIS Overview / MESP Integration: CEIS Disciplines Involved

- Groundwater (Hydrogeology)
- Surface water (Hydrology / Hydraulics)
- Natural Heritage
 - Landform (Geology)
 - Terrestrial
 - Aquatic



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4. CEIS Phase 1/2 Characterization Report

4. CEIS Phase 1 / 2 Characterization Report: Discipline by Discipline Summary of:

- Objective / Purpose
- 2016 / 2017 Field Work
- Ongoing 2018 Field Work
- Summary of Findings
- Input to Community Structure alternatives
- Integration considerations

4. CEIS Phase 1/2 Characterization Report:

Hydrogeology: Objective / Purpose

Hydrogeological characterization to establish baseline conditions within the SPA and PSA

Field program contributes to water balance, helps identify constraints and opportunities, and establishes ongoing monitoring locations

Integrated modelling to quantify components of the existing and future conditions water budgets, assess impacts to surface and groundwater, and assess alternative management options

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Project Specific Field Work

17 boreholes/wells
(9 locations)

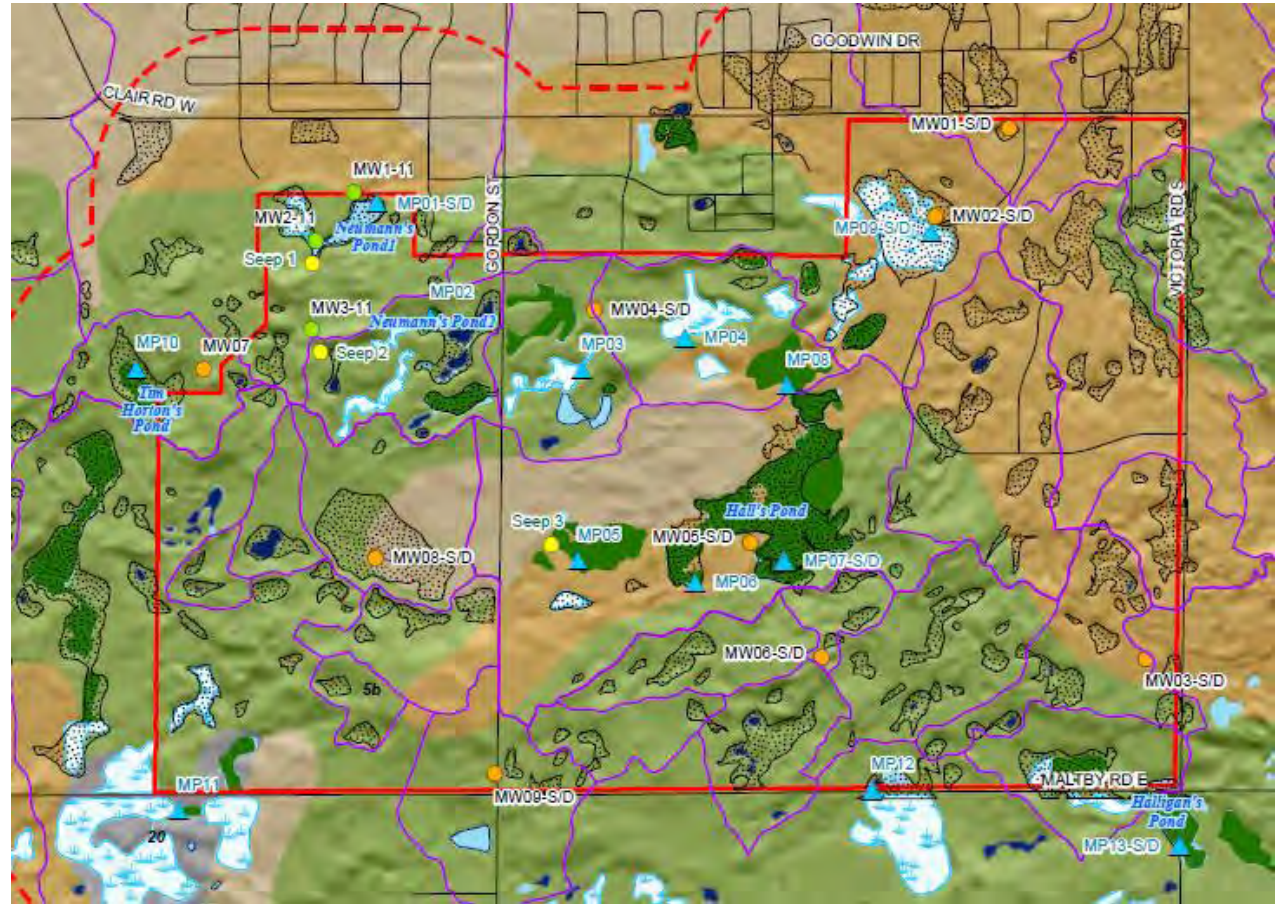
18 drivepoint wells
(14 locations)

Groundwater levels
(continuous/manual)

Water quality
(3 events)

Baseflow
(27 locations)

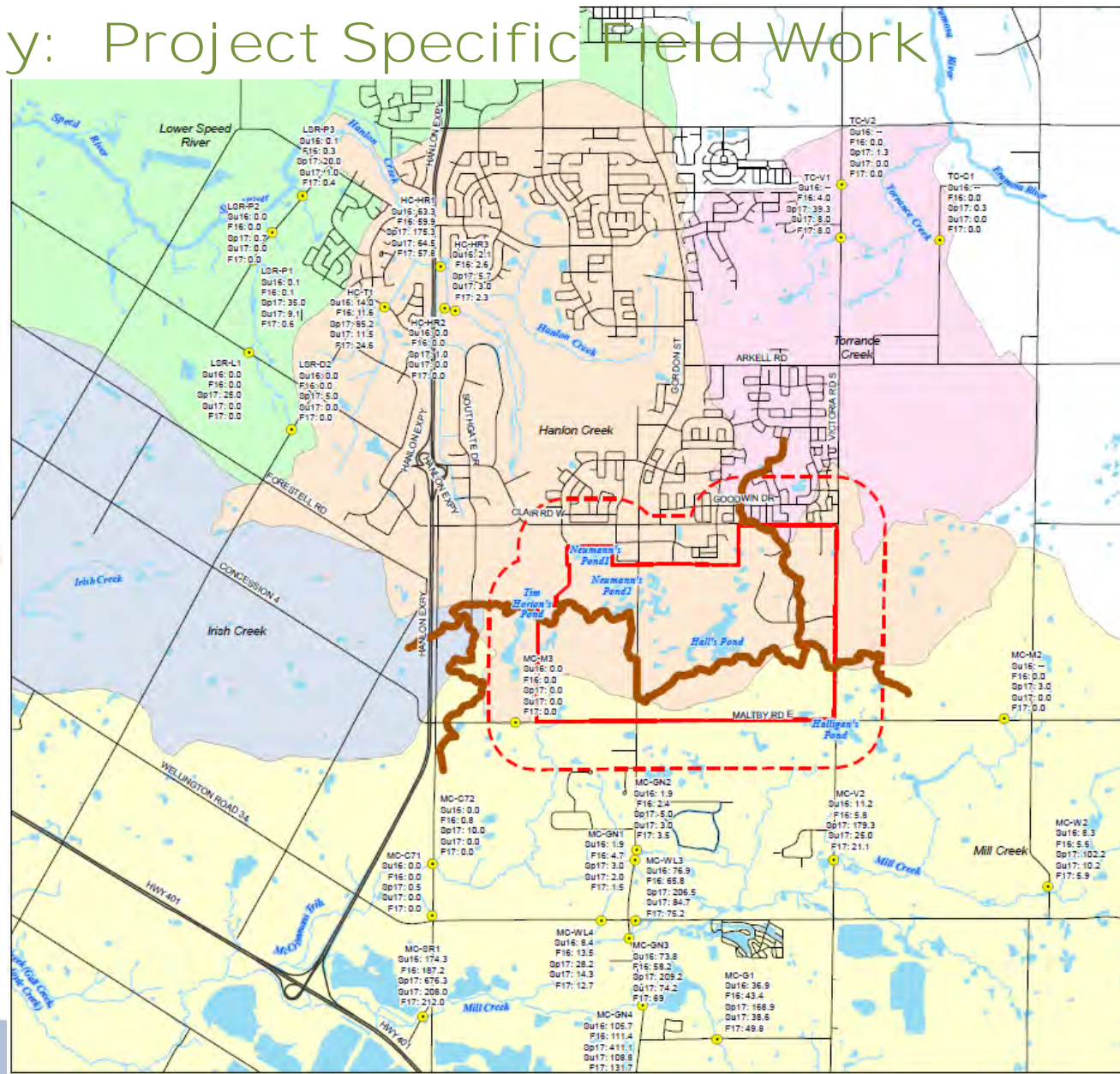
Seeps and springs



4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Project Specific Field Work

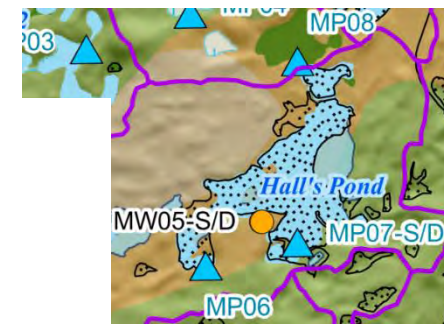
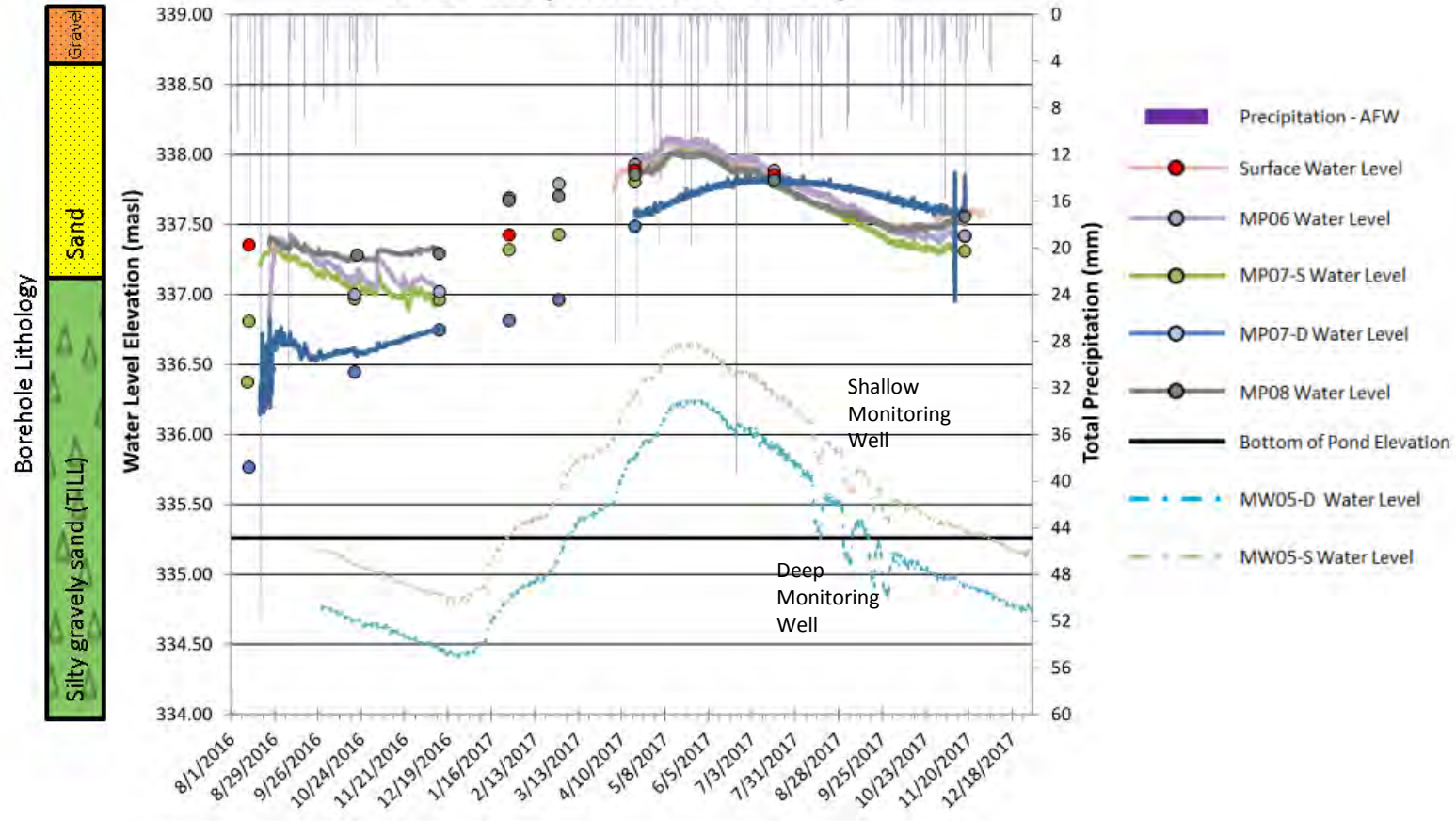
- Primary Study Area Boundary
- Secondary Plan Area Boundary
- Water Body
- Watercourse
- Updated Subwatershed Boundary (Wood PLC, 2018)
- Highway
- Road
- Spot Flow Location
- Subwatershed**
 - Hanlon Creek
 - Irish Creek
 - Lower Speed River
 - Mill Creek
 - Torrance Creek

HC-D2	Spot Flow Location
Su16:0	Summer 2016 (Aug.30/31, Sept. 1) Flow Rate (L/s)
F16:0	Fall (Nov.9/10) Flow Rate (L/s)
Sp17:0	Spring 2017 (May 10/11) Flow Rate (L/s)
Su17:0	Summer 2017 (Aug.16) Flow Rate (L/s)
F17:0	Fall (Nov. 29) Flow Rate (L/s)



4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings

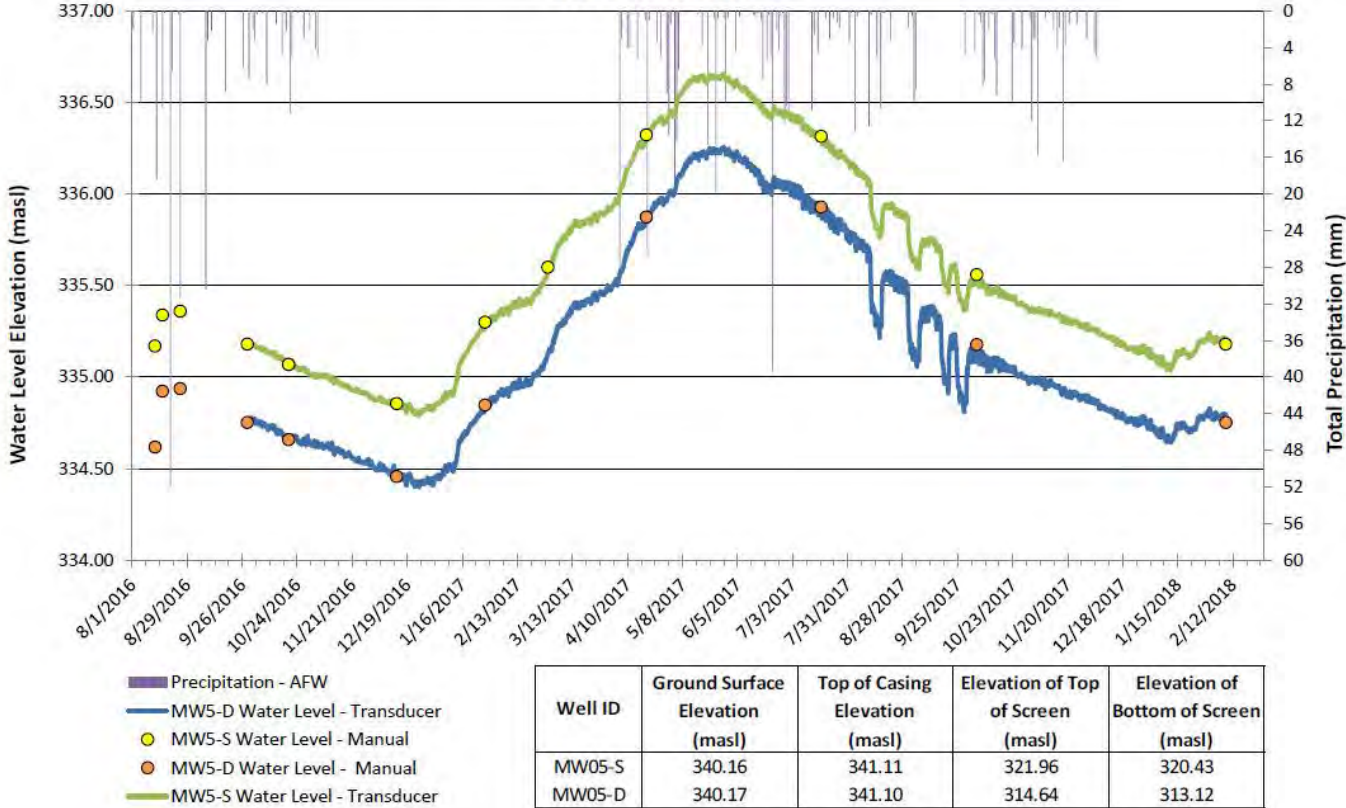
**Clair-Maltby Secondary Plan
Long Term Water Level Monitoring
Hall's Pond (Stations Combined)**



Precipitation - AFW: Data set from rain gauge installed by AMEC Foster-Wheeler at 500 Maltby Rd. E.

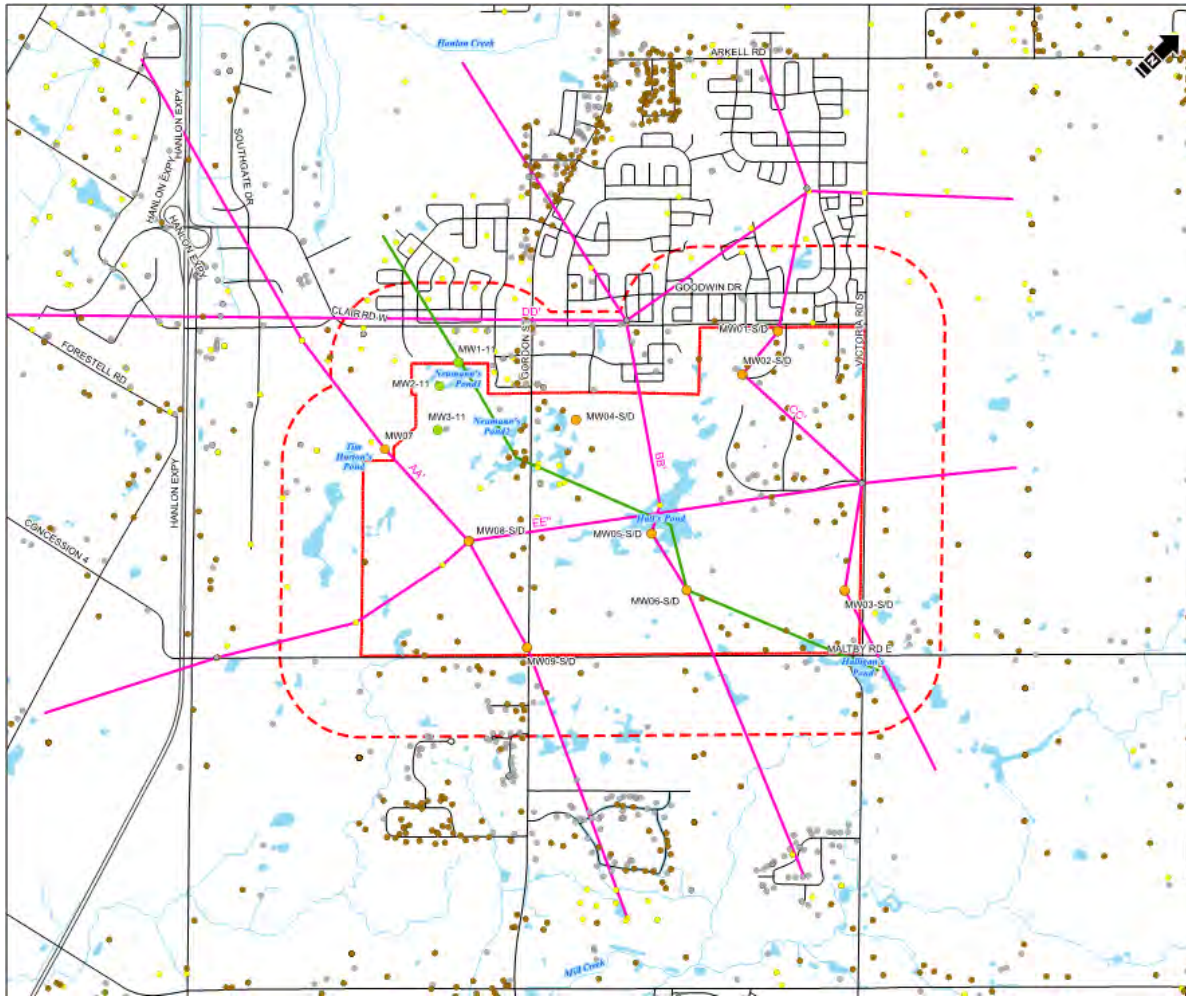
4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings

**Clair-Maltby Secondary Plan
Long Term Groundwater Level Monitoring
MW5-D & MW5-S**



Precipitation - AFW: Data set from rain gauge installed by AMEC Foster-Wheeler at 500 Maltby Rd. E.

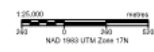
4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



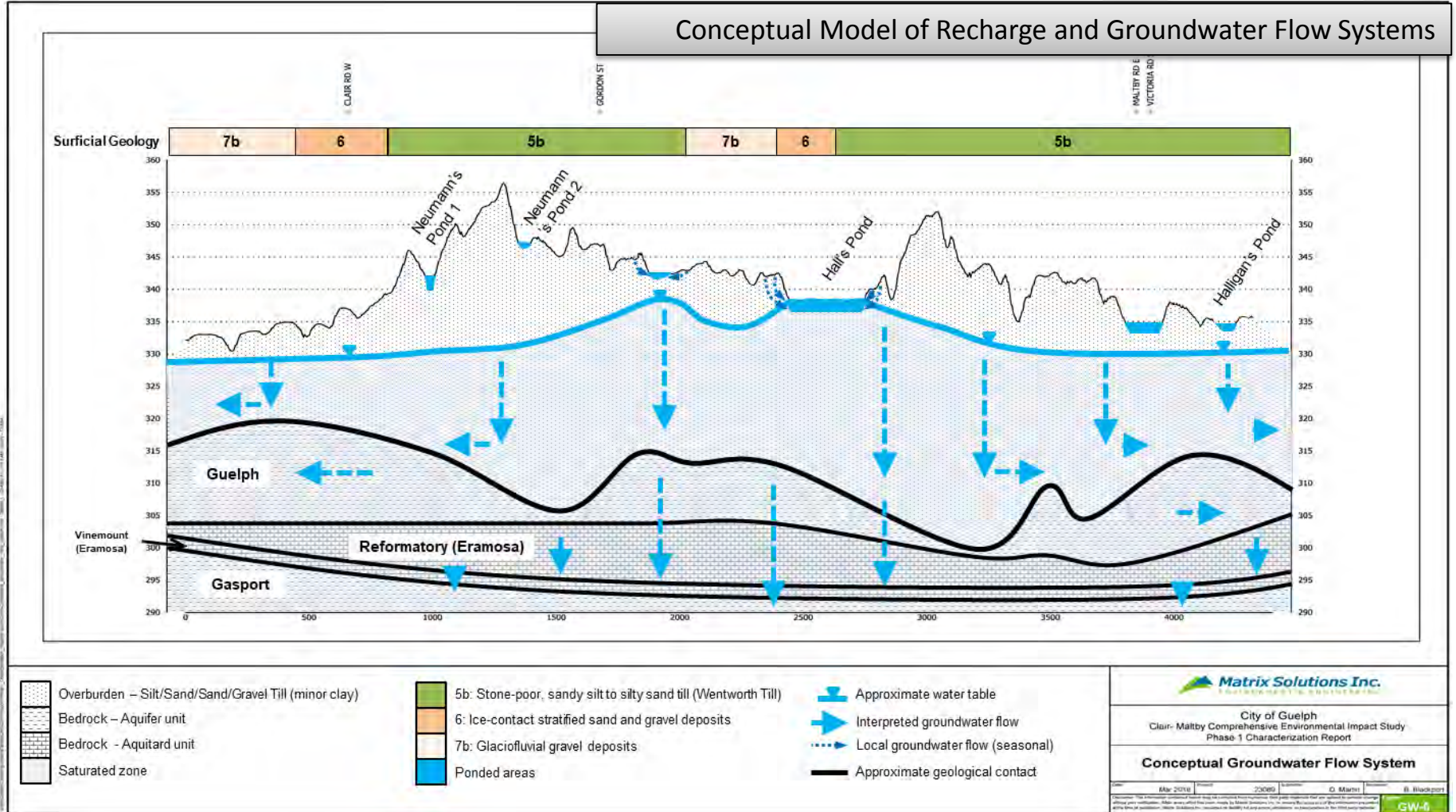
All Available Borehole Information

- Primary Study Area Boundary
- Secondary Plan Area Boundary
- Water Body
- Watercourse
- Highway
- Road
- Geological Cross Section Location
- Conceptual Groundwater Flow System Cross Section
- Monitoring Well (Matrix)
- Monitoring Well (132 Clair Rd)
- Municipal Well
- Consultant Well
- GPW Well
- WWIS Well

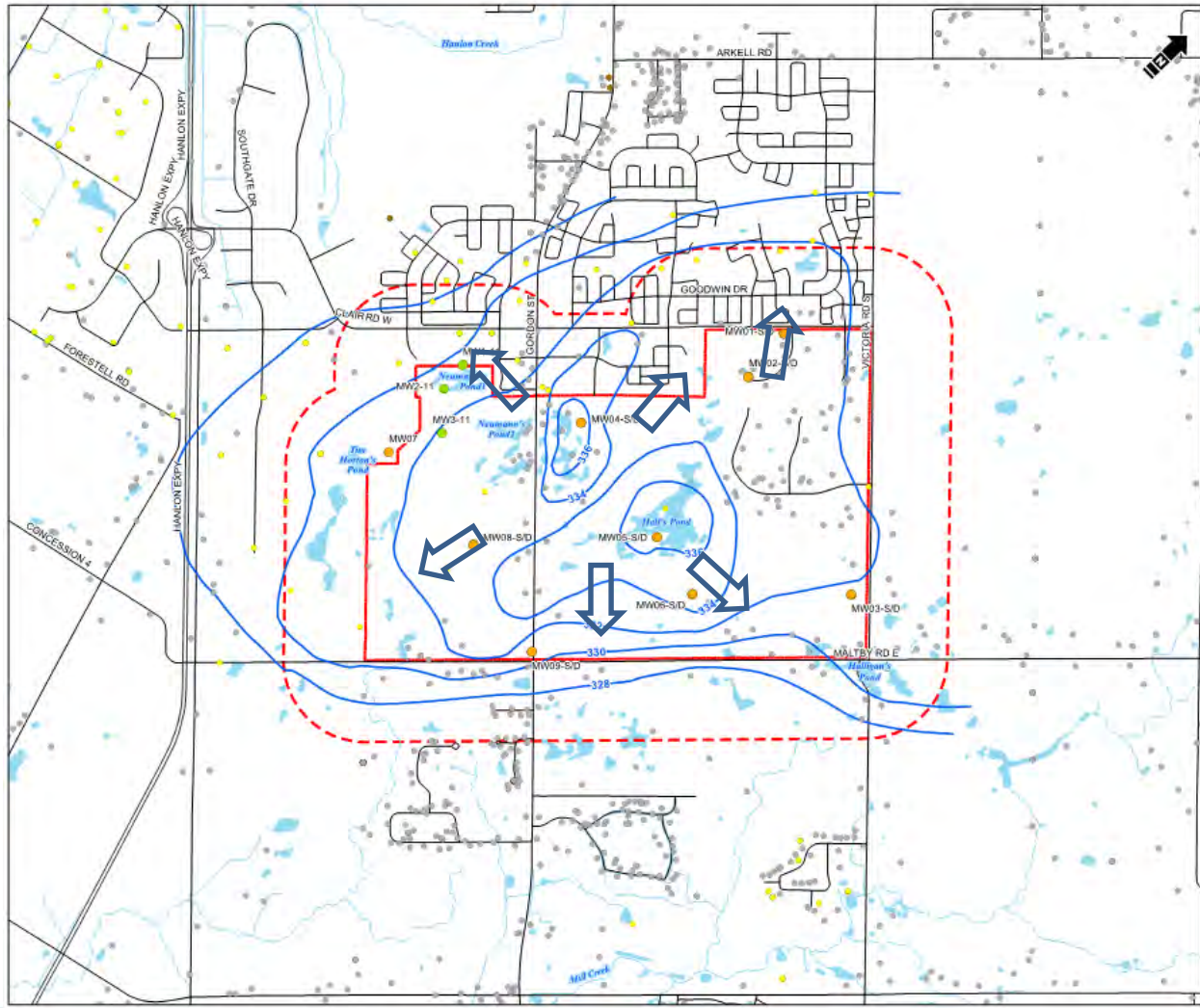
Source: This map is based on the City of Guelph, Gas Density and Porosity of the Soil and Groundwater, Spatial Analysis of Southern Ontario, Ontario, and the National Hydrological Information System (NHIS) data.



4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



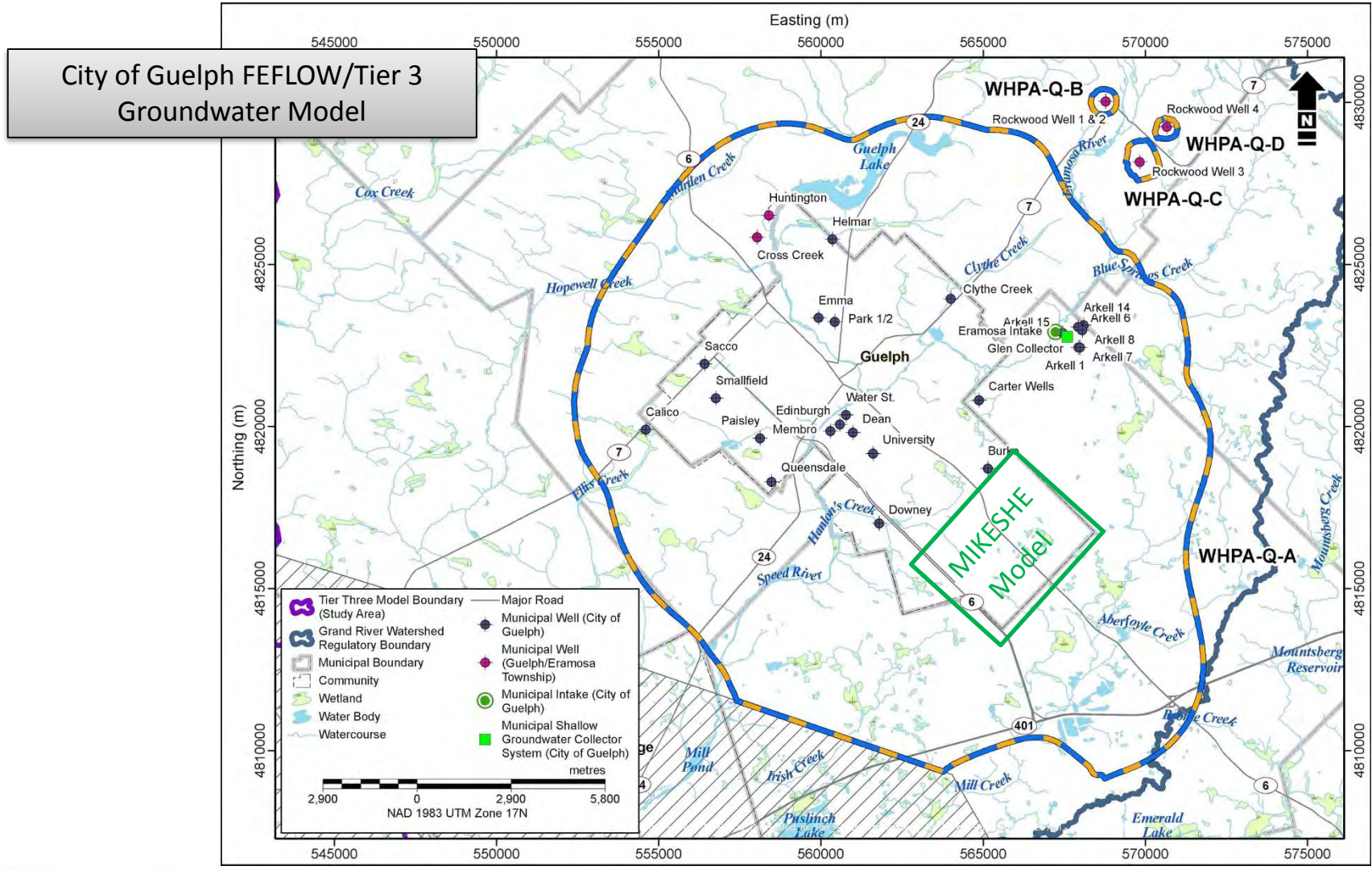
4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



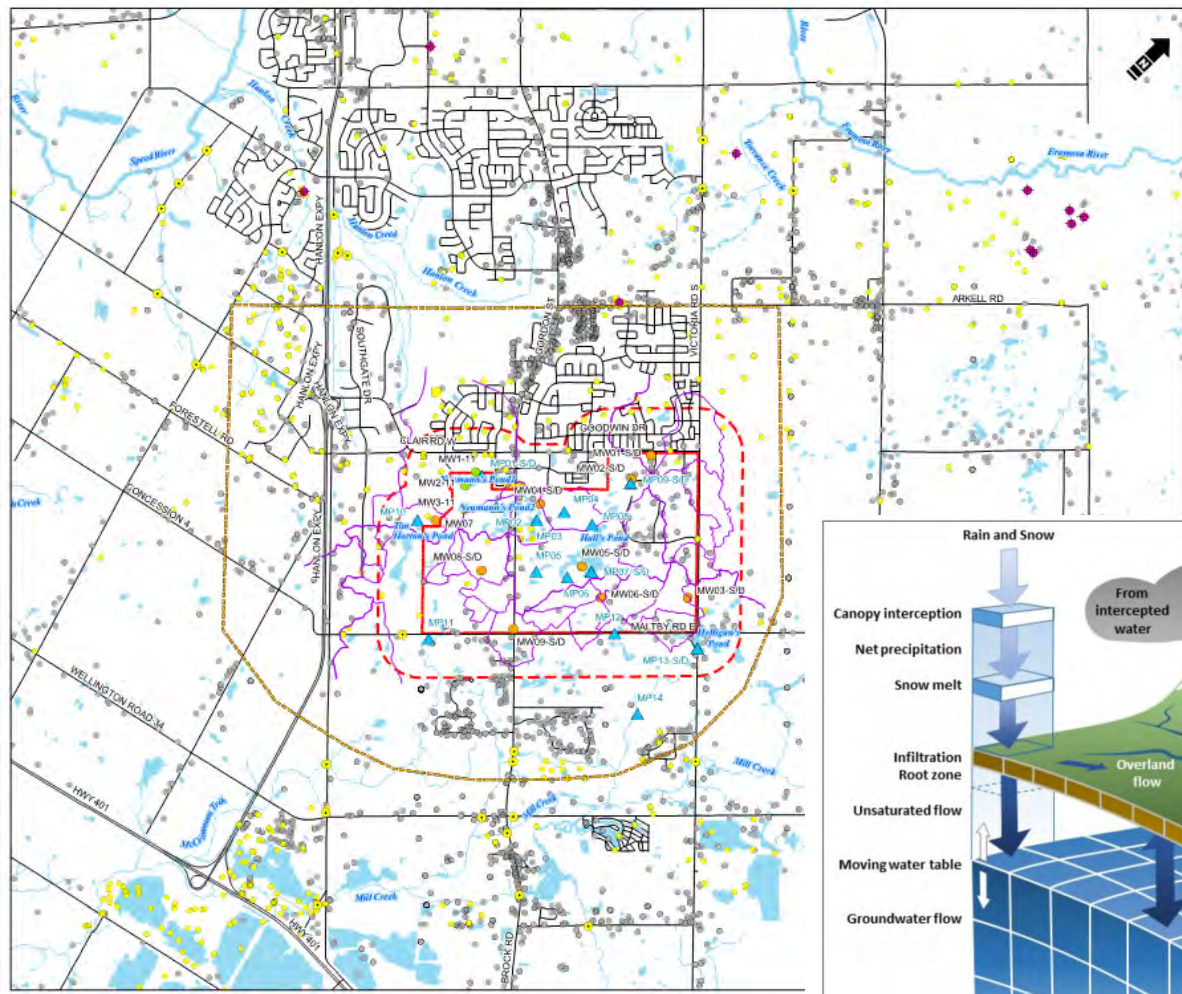
Interpreted Water Table and Generalized Groundwater Flow Directions

- Primary Study Area Boundary
 - Secondary Plan Area Boundary
 - Water Body
 - Watercourse
 - Water Table Elevation Contour (2m)
 - Highway
 - Road
 - Monitoring Well (Matrix)
 - Monitoring Well (132 Clair Rd.)
 - Consultant Well
 - GPW Well
 - WWIS Well
- General groundwater flow direction

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings Tier 3 Model



4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



Integrated Surface Water-Groundwater Model Domain

- Secondary Plan Area Boundary
- Primary Study Area Boundary
- MIKE SHE Model Domain
- Subcatchment
- Water Body
- Watercourse
- Highway
- Road
- Mini Piezometer
- Spot Flow Location
- Monitoring Well (Matrix)
- Monitoring Well (132 Clair R/L)
- Surface Water Flow (Beacon)
- Municipal Well
- Consultant Well
- WWIS Well

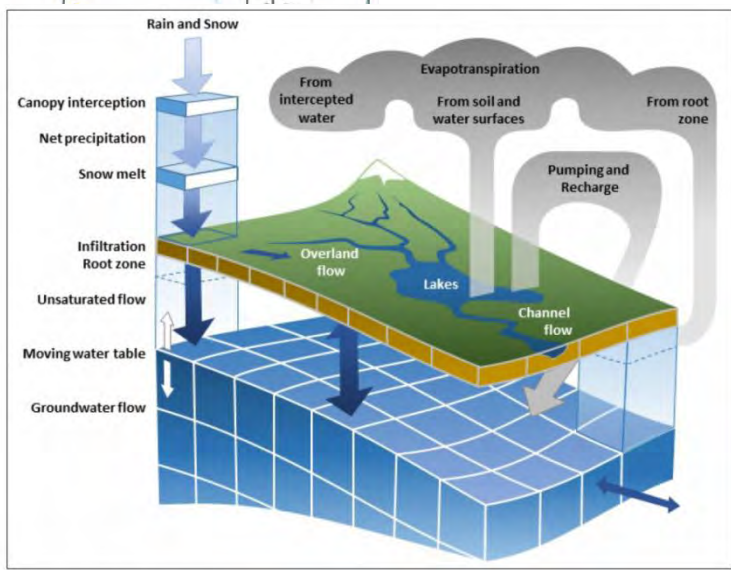
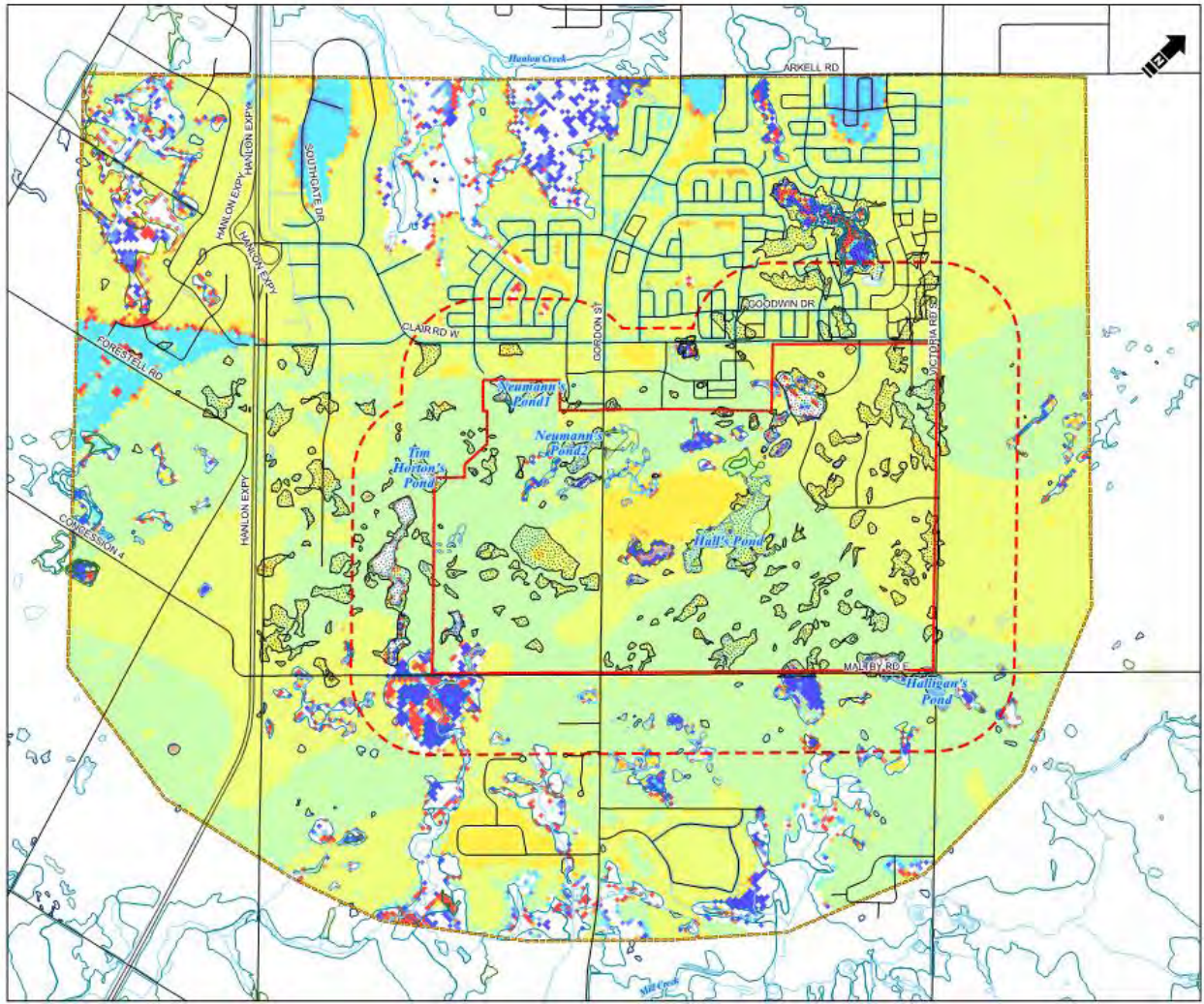


Figure B1 MIKE SHE Hydrologic Process Diagram

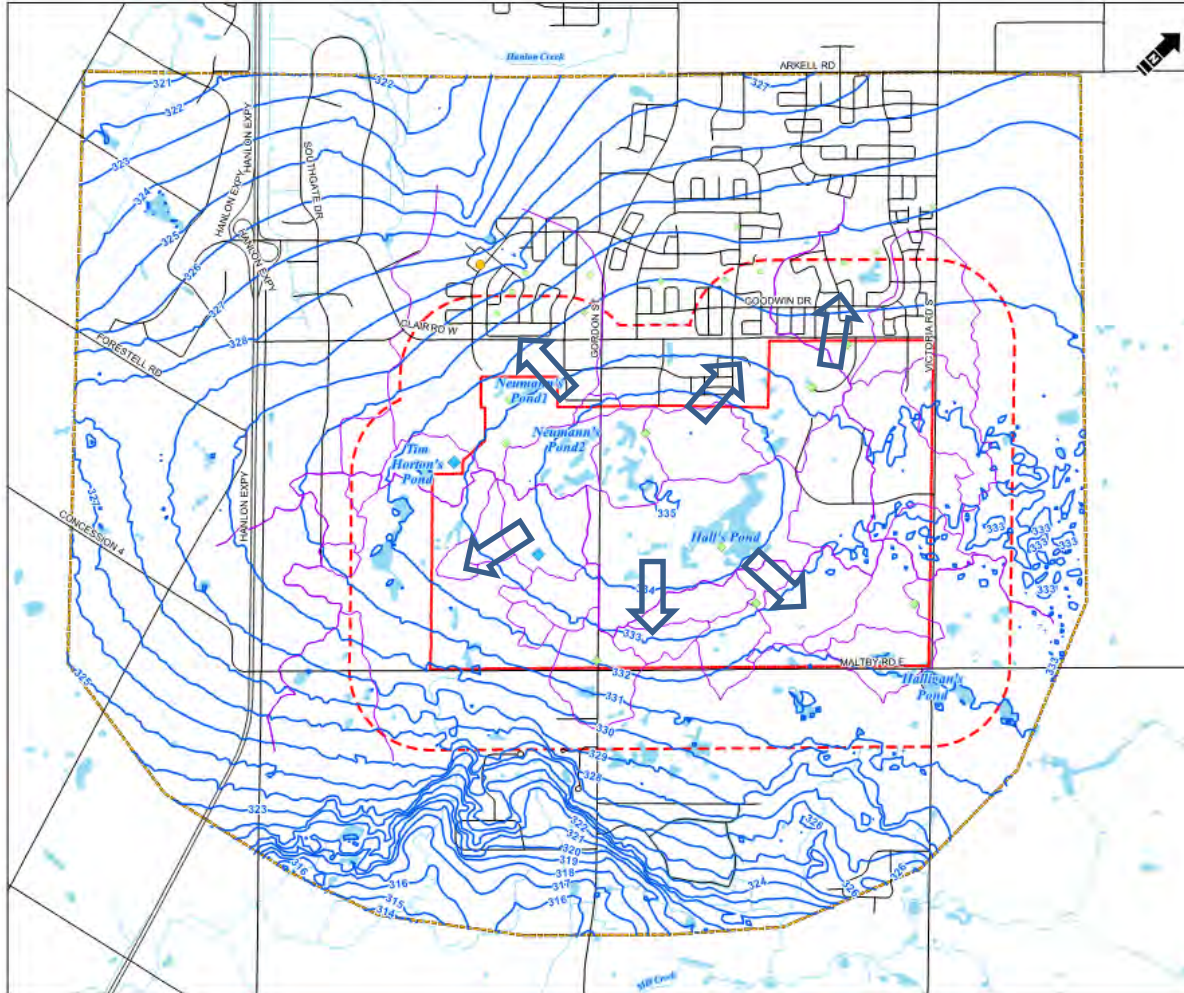
4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



Simulated Average Annual Recharge

- Primary Study Area Boundary
 - Secondary Plan Area Boundary
 - MIKE SHE Model Domain
 - Closed Depression
 - Fen
 - Bog
 - Swamp
 - Marsh
 - Open Water
 - Unknown Wetland
 - Water Body
 - Watercourse
 - Highway
 - Road
- Groundwater Recharge (mm/year)**
- 0 - 50
 - 50 - 100
 - 100 - 150
 - 150 - 200
 - 200 - 250
 - 250 - 300
 - 300 - 350
 - 350 - 400
 - 400 - 450
 - 450 - 500
 - > 500

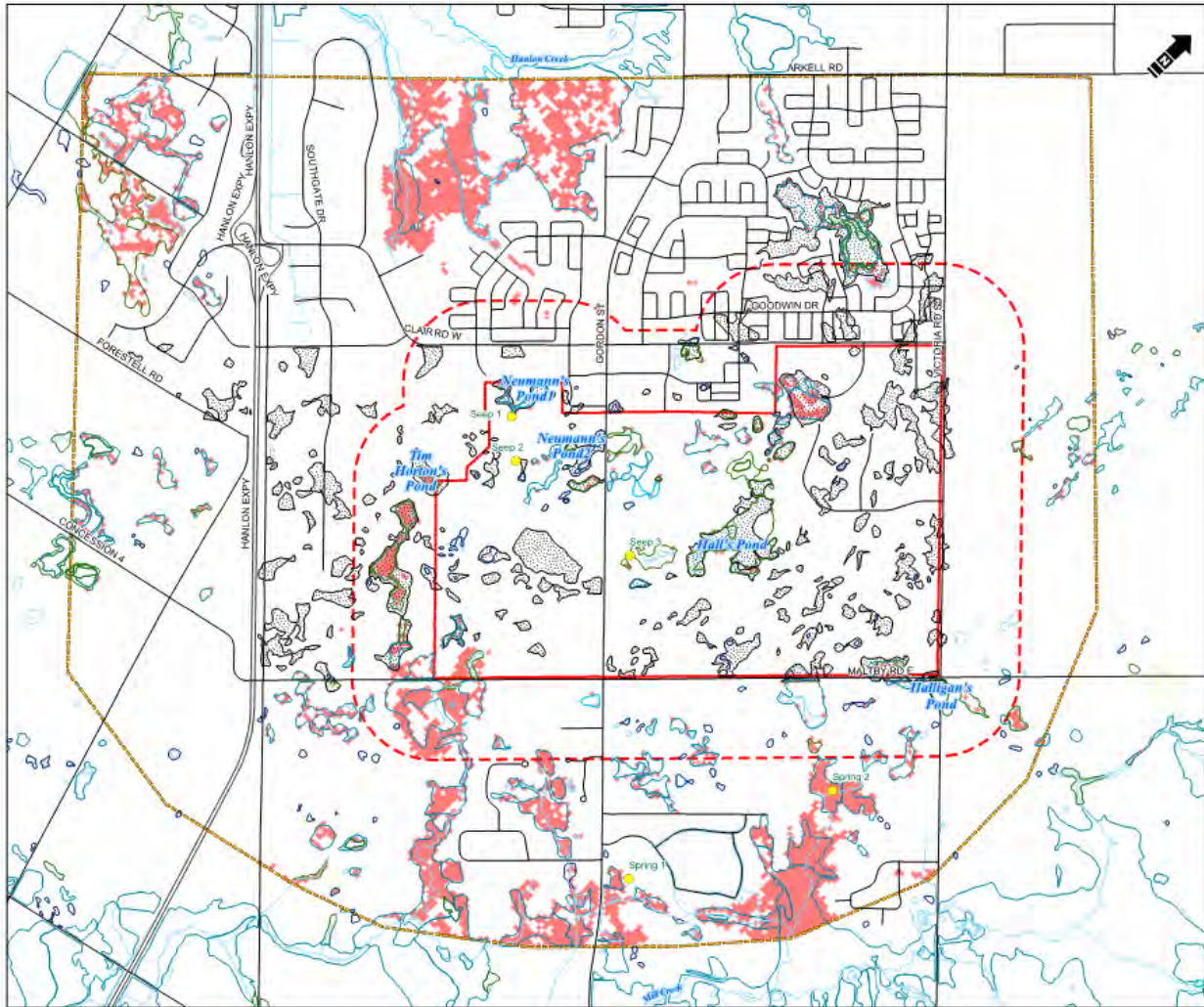
4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



Simulated Water Table & General
Flow Directions

↙
General simulated
groundwater flow
direction

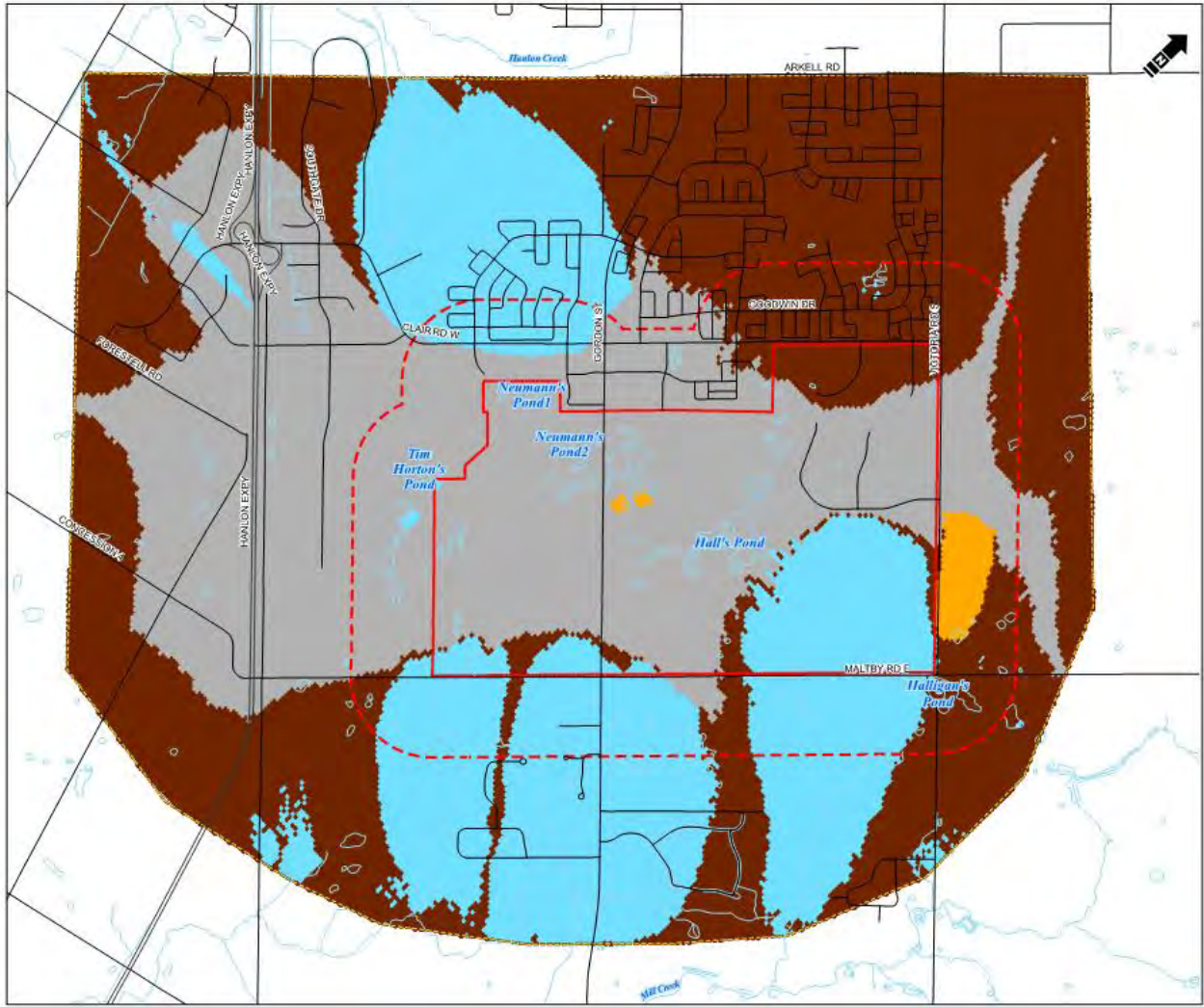
4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



Simulated Average Annual Discharge to Surface Water

- Primary Study Area Boundary
- Secondary Plan Area Boundary
- MIKE SHE Model Domain
- Closed Depression
- Groundwater Discharge
- Fen
- Bog
- Swamp
- Marsh
- Open Water
- Unknown Wetland
- Water Body
- Watercourse
- Highway
- Road
- Observed Seep and Spring

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



Simulated Recharge – Discharge Linkage – Where does recharge go?

- Primary Study Area Boundary
- Secondary Plan Area Boundary
- MIKE SHE Model Domain
- Water Body
- Watercourse
- Highway
- Road
- Particle Track**
 - Vertical Groundwater Flow Out (Across Vinemount Formation)
 - Lateral Groundwater Flow Out (Overburden and Bedrock)
 - Captured by Pumping Well
 - Discharge to Streams and Water Bodies

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings

Simulated Water Budget 2003-2017

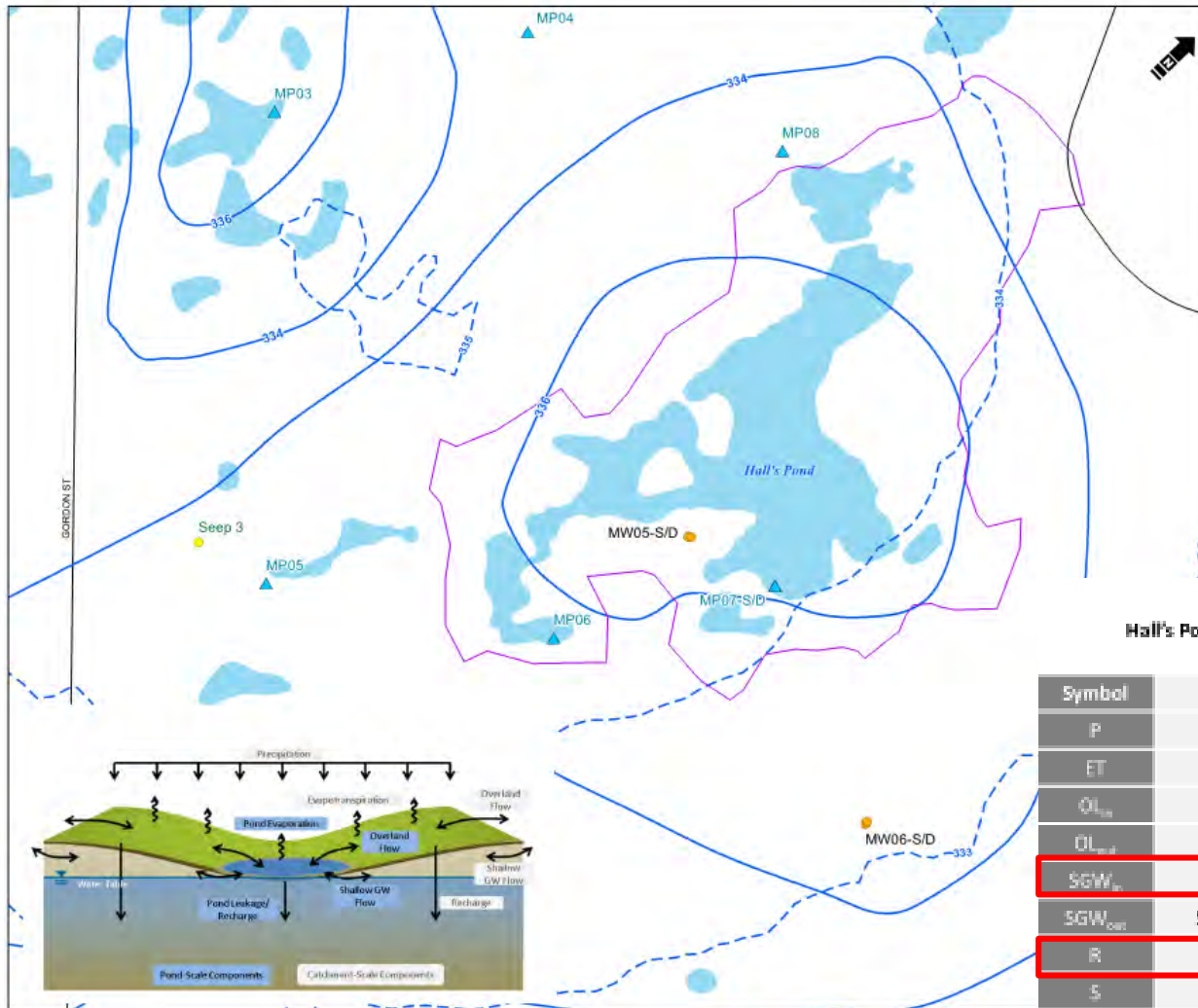
Table 4.2.4 Average Annual Water Budget (2003-2017, mm-year)

Area/Catchment	Precipitation	Evapotranspiration	Overland Flow In	Overland Flow Out	Lateral Groundwater Flow				Vertical Groundwater Flow		Pumping	Change in Storage
					Overburden		Bedrock Above Vinemount		Regional Bedrock Aquifer			
					Inflow	Outflow	Inflow	Outflow	Inflow	Outflow		
SSA Model Domain	-801	480	0	108	-35	126	-17	44	0	99	2	-7
Mill Creek	-801	498	-1	188	-41	36	-140	194	-1	66	7	-6
Hanlon Creek	-801	472	0	86	-19	60	-42	186	0	64	0	-7
Torrance Creek	-801	450	0	60	-48	95	-233	421	0	58	0	-4

Table 4.2.5 Average Annual Groundwater Recharge (2003-2017)

Area/Catchment	Groundwater Recharge (mm/year)
SSA Model Domain	325
Mill Creek	338
Hanlon Creek	326
Torrance Creek	302

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings



Hall's Pond Water Balance

- Hall's Pond Subcatchment
- Water Body
- Water Table Elevation Contour (2m)
- Simulated Head Contour (1m)
- Road
- Mini Piezometer
- Monitoring Well (Matrix)
- Monitoring Well (132 Clair Rd.)
- Observed Seep and Spring

Hall's Pond Average Annual Simulated Water Balance (2003-2017)
 $P - ET + (OL_{in} - OL_{out}) + (SGW_{in} - SGW_{out}) - R = S$

Symbol	Subcatchment-Scale		Pond-Scale	
P	Precipitation	801	Precipitation	801
ET	Evapotranspiration	509	Evaporation	543
OL _{in}	Overland Flow (In)	3	Overland Flow (In)	71
OL _{out}	Overland Flow (Out)	1	Overland Flow (Out)	52
SGW _{in}	Shallow GW Flow (In)	3	Shallow GW Flow (In)	4
SGW _{out}	Shallow GW Flow (Out)	3	Shallow GW Flow (Out)	1
R	Recharge	299	Recharge	286
S	Storage Change	-5	Storage Change	-6

*All values reported in mm.

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Summary of Findings

Existing Groundwater Quality

- Consistent Ca-Mg Carbonate Groundwater Similar Age
- Groundwater Isotopes gw age less than 50 years old
- Elevated chloride and nitrate, typical of road salt and agricultural practices

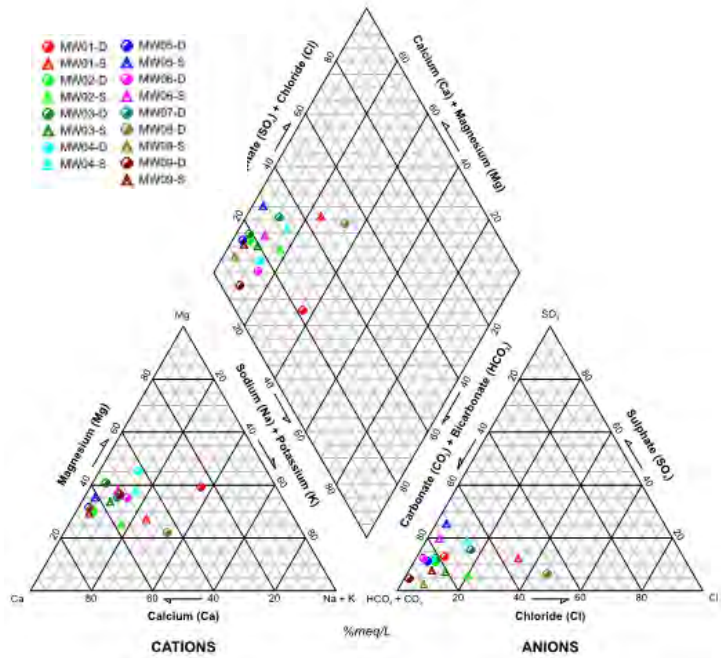


TABLE C2

Groundwater Quality Results - Routine Parameters

City of Guelph
Clair - Maltby Master Environmental Servicing Plan (MESP) and Secondary Plan (SP)

Monitoring Well	Sample Date	MSI Sample Number	Lab pH	Lab EC µS/cm	Temp at lab °C	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Fe mg/L	Mn mg/L	Cl mg/L	SO ₄ mg/L	NO ₃ -N mg/L	NO ₂ -N mg/L	TKN mg/L	Alkalinity-T mg/L	HCO ₃ mg/L	Hardness-T mg/L	TDS mg/L
MW06-S	19-Oct-16	23089161019005	7.53	602	8.7	69.2	29.7	13	2.2	0.012	0.0453	9.21	55.6	<0.010	<0.020	0.28	282	282	295	351
MW06-S	19-Apr-17	23089170419011	8.08	616	2.4	99.5	39.5	5.2	1.78	0.79	0.121	8.23	70.5	<0.010	<0.020	<1.5	316	316	411	404
MW06-S	04-Oct-17	23089171004009	8.01	625	3.3	73.3	31	10.6	1.45	0.589	0.0452	11.4	76.4	<0.010	<0.020	<0.15	271	271	311	400
MW07-D	19-Oct-16	23089161019001	7.44	696	8.7	79.3	30.7	17.1	1.55	0.024	0.0787	39.6	47.4	0.028	0.318	<0.15	276	276	325	386
MW07-D	19-Apr-17	23089170419015	7.99	682	2.4	77.7	27.9	13.2	1.4	0.021	0.0654	32.4	42.1	0.012	0.125	<0.15	281	281	309	413
MW07-D	10-Oct-17	23089171010001	8.12	701	4.7	76.4	29	18	1.65	0.028	0.0696	40.4	41.2	<0.010	0.578	0.19	285	285	310	416
MW08-D	19-Oct-16	23089161019002	7.23	1180	8.7	105	30.5	88.3	3.18	<0.010	0.0434	189	32	<0.050	1.49	0.51	336	336	388	639
MW08-D	19-Apr-17	23089170419014	7.88	1180	2.4	100	28.8	85.2	3.37	<0.010	0.0191	167	29.5	0.015	1.51	<1.5	354	354	369	718
MW08-D	05-Oct-17	23089171005004	8.09	1180	3.3	101	29.3	88.6	3.42	<0.010	0.021	170	29.9	0.014	1.31	<0.15	321	321	374	663
MW08-S	19-Oct-16	23089161019003	7.25	569	8.7	77.7	22.8	1.7	1.29	<0.010	0.00707	14.4	4.79	<0.010	1.04	0.76	288	288	288	295
MW08-S	19-Apr-17	23089170419013	7.78	664	2.4	92	24.2	3.74	0.87	<0.010	0.0013	13.5	5.89	<0.010	1.81	<1.5	354	354	329	385
MW08-S	05-Oct-17	23089171005005	7.93	656	3.3	95.1	24.6	3.25	0.744	<0.010	0.00133	15.9	4.95	<0.010	1.19	0.15	321	321	339	352
MW09-D	21-Oct-16	23089161021001	7.56	445	12	54.4	22.3	12.1	1.08	0.024	0.0367	2.79	7.88	<0.010	<0.020	0.48	237	237	228	272
MW09-D	19-Apr-17	23089170419017	8.12	469	2.4	53.9	20.8	10.1	0.997	0.06	0.0581	3.06	4.98	<0.010	<0.020	0.84	294	294	220	312
MW09-D	04-Oct-17	23089171004008	7.98	466	3.3	59.8	21.8	7.31	0.99	0.084	0.0581	2.56	4.55	<0.010	<0.020	0.29	264	264	239	278
MW09-S	21-Oct-16	23089161021002	7.28	583	12	89.3	23.4	4.69	3.34	<0.010	0.00469	14.1	16.9	<0.010	7	1.91	260	260	319	346
MW09-S	19-Apr-17	23089170419016	7.96	659	2.4	89.1	23.5	5.71	3.63	<0.010	0.00068	19.9	15	<0.010	7.17	1.16	338	338	319	430
MW09-S	04-Oct-17	23089171004007	7.88	620	3.3	87.2	23.9	5.41	4.35	0.109	0.00058	14.7	17	<0.010	7.09	<1.5	283	283	316	376

TABLE C3

Groundwater Quality Results - Dissolved Metals

City of Guelph
Clair - Maltby Master Environmental Servicing Plan (MESP) and Secondary Plan (SP)

Monitoring Well	Sample Date	MSI Sample Number	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Cs mg/L	Cr mg/L	Co mg/L	Cu mg/L	Pb mg/L	Li mg/L	Mn mg/L	Ni mg/L	P mg/L
MW01-D	20-Oct-16	23089161020003	0.007	0.00024	0.00763	0.0345	<0.0010	<0.00050	0.078	<0.00010	<0.00010	<0.00050	0.00022	0.00059	<0.00050	0.002	0.00453	0.00152	<0.050
MW01-D	19-Apr-17	23089170419003	<0.0050	0.00015	0.0127	0.049	<0.0010	<0.00050	0.072	<0.00010	<0.00010	<0.00050	0.00042	0.00069	<0.00050	0.002	0.00312	0.00245	<0.050
MW01-D	04-Oct-17	23089171004003	<0.0050	0.00017	0.00876	0.044	<0.0010	<0.00050	0.065	<0.00011	<0.00010	<0.00050	0.00072	0.00104	<0.00050	0.005	0.00293	0.00291	<0.050
MW01-S	20-Oct-16	23089161020004	<0.0050	<0.00010	0.00012	0.0573	<0.0010	<0.00050	0.021	0.000195	<0.00010	<0.00050	<0.00010	0.000129	0.00018	0.002	0.000284	0.00082	<0.050
MW01-S	19-Apr-17	23089170419004	<0.0050	<0.00010	0.00011	0.056	<0.0010	<0.00050	0.019	0.000183	<0.00010	<0.00050	<0.00010	0.00143	0.00026	0.002	0.000425	0.00069	<0.050
MW01-S	04-Oct-17	23089171004004	<0.0050	<0.00010	0.00014	0.0609	<0.0010	<0.00050	0.021	0.000192	<0.00010	<0.00050	<0.00010	0.000191	0.000214	0.002	0.000578	0.00157	<0.050
MW02-D	20-Oct-16	23089161020002	<0.0050	0.00046	0.0194	0.0901	<0.0010	<0.00050	0.015	<0.00010	<0.00010	<0.00050	0.000137	0.00056	0.000163	0.002	0.00136	0.00619	<0.050
MW02-D	19-Apr-17	23089170419002	<0.0050	<0.00010	0.0049	0.0885	<0.0010	<0.00050	<0.010	<0.00010	<0.00010	<0.00050	0.00059	<0.00020	0.000281	0.002	0.000484	0.003	<0.050
MW02-D	04-Oct-17	23089171004001	<0.0050	<0.00010	0.00358	0.0906	<0.0010	<0.00050	<0.010	<0.00010	<0.00010	<0.00050	0.00028	0.0004	0.000126	0.002	0.000396	0.00154	<0.050
MW02-S	20-Oct-16	23089161020001	0.0064	0.00049	0.023	0.0647	<0.0010	<0.00050	0.028	<0.00010	<0.00010	<0.00050	0.003	0.00056	0.000266	0.001	0.00192	0.0126	<0.050
MW02-S	19-Apr-17	23089170419001	0.0052	0.00013	0.0315	0.0482	<0.0010	<0.00050	0.019	<0.00010	<0.00010	<0.00050	0.00182	0.00023	0.000366	0.002	0.000928	0.00841	<0.050
MW02-S	04-Oct-17	23089171004002	0.0093	0.00011	0.0197	0.0471	<0.0010	<0.00050	0.02	<0.00010	<0.00010	<0.00050	0.00101	0.00063	0.000366	0.002	0.000921	0.00491	<0.050
MW03-D	20-Oct-16	23089161020005	<0.0050	<0.00010	0.00238	0.0806	<0.0010	<0.00050	<0.010	<0.00010	<0.00010	<0.00050	0.00013	0.00032	<0.00050	0.002	0.000905	<0.0050	<0.050
MW03-D	19-Apr-17	23089170419006	<0.0050	<0.00010	0.00244	0.0778	<0.0010	<0.00050	<0.010	<0.00010	<0.00010	<0.00050	<0.00010	0.00082	<0.00050	0.002	0.000864	<0.0050	<0.050
MW03-D	10-Oct-17	23089171010003	<0.0050	<0.00010	0.00233	0.0787	<0.0010	<0.00050	<0.010	<0.00010	<0.00010	<0.00050	<0.00010	0.00042	<0.00050	0.003	0.000909	<0.0050	<0.050

4. CEI S Phase 1/2 Characterization Report: Hydrogeology: Input to Community Structure Alternatives

- Wetlands and Ponds supported primarily by runoff from areas within existing NHS adjacent to the features
- Wetlands and Ponds provide recharge to the groundwater flow system. Many are perched but Halls Pond is an example of a feature which is in contact with water table but recharges groundwater system
- Groundwater discharge to wetlands is small to negligible
- Groundwater recharge primarily through vertical infiltration in SPA
- Most Closed depression areas have higher than average infiltration and recharge
- Most areas in SPA have moderate to high permeability and large depth to water table provides good opportunity for infiltration of stormwater
- Closed depressions represent existing opportunity for stormwater infiltration

4. CEIS Phase 1/2 Characterization Report:

Hydrogeology: Integration Considerations

- Conceptual Model provides functional context and linkages between surface water, groundwater and NHS
 - Key Characteristics
 - Thick unsaturated zone away from wetlands
 - Moderate to High Permeability
 - Moderate to High Infiltration Capacity
 - Key Functions
 - Groundwater discharge to creeks (regionally)
 - Wetland recharge to groundwater system
 - Recharge to bedrock production aquifer

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Integration Considerations

- Infiltration: should be maintained to provide existing recharge and the opportunity to enhance infiltration without unacceptable increases to groundwater levels that would impact wetland areas or surface water consideration
- Groundwater flow: maintain flow divide in SPA to maintain contributions to discharge areas and bedrock production aquifer
- Closed Depressions: maintain above average infiltration of these areas and opportunity for stormwater management based on existing function
- Wetlands/Ponds: maintain overall hydrologic function (runoff from adjacent areas) within local subcatchments to preserve range and timing of water levels associated with these features.

4. CEIS Phase 1/2 Characterization Report: Hydrogeology: Integration Considerations

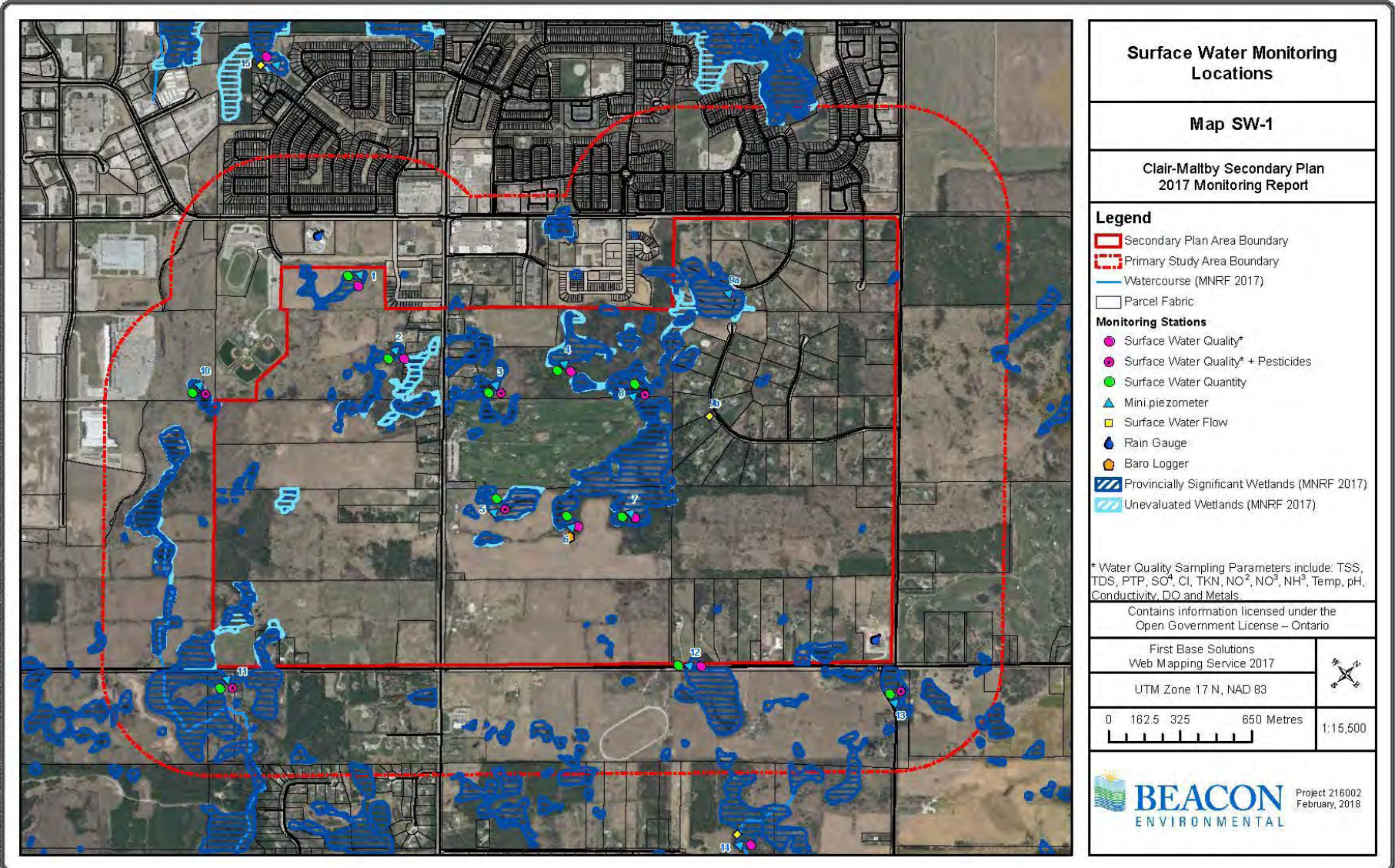
- Infrastructure trenches: should be designed to minimize water table lowering and redirection of shallow flows in areas of shallow water table depth
- Recharge Water Quality: best management practices for infiltration water should be implemented to maintain existing groundwater quality

4. CEIS Phase 1/2 Characterization Report: Surface Water: Objective / Purpose

- Need to define runoff characteristics (peak, volume) in the study area
 - Headwaters of Mill, Hanlon and Torrance Creeks
- Assist in the definition of the role of water in supporting natural systems functionality
- Fundamental component of Stormwater Management Plan development



4. CEIS Phase 1/2 Characterization Report: Surface Water: Field Work



4. CEIS Phase 1 / 2 Characterization Report: Surface Water: Summary of Findings (Rainfall)

Monthly Precipitation Totals for 2016 and 2017 and Climate Normals (mm)

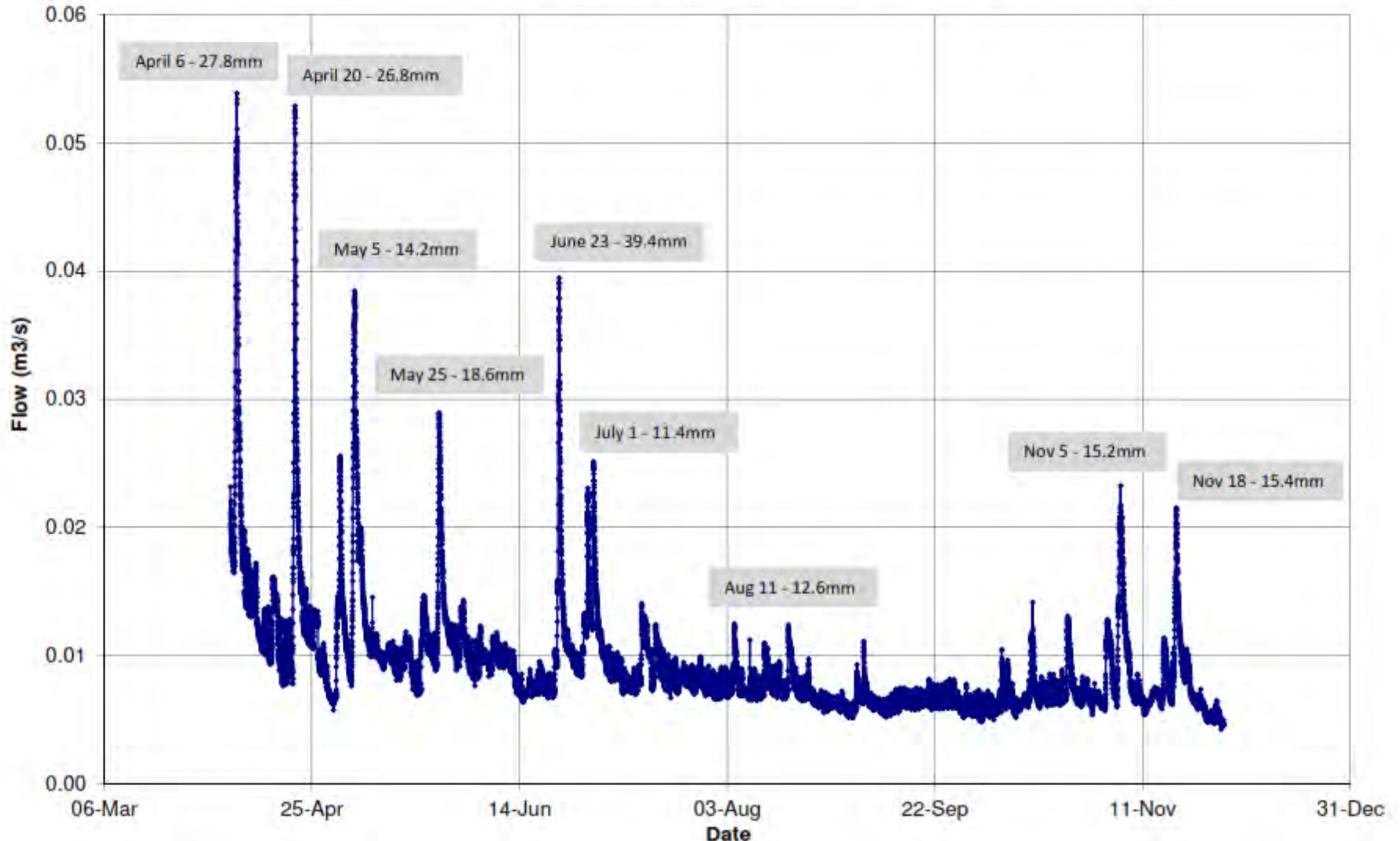
Month	2016 & 2017 Total ²	1981-2010 Climate Normal ¹	Percent Difference ²
2016			
April	57.8 (NA)	74.5	-22.42% (NA)
May	57.3 (NA)	82.3	-30.38% (NA)
June	53.0 (NA)	82.4	-35.68% (NA)
July	102.4 (NA)	98.6	+3.85% (NA)
August	152.6 (134.4)	83.9	+81.88% (+60.19%)
September	77.1 (58.2)	87.8	-12.19% (-33.71%)
October	85.8 (43.8)	67.4	+27.30% (-35.01%)
November	55.6 (40)	87.1	-36.17% (-54.08%)
December	90.1 (NA)	71.2	+26.54% (NA)
TOTAL	731.7 (NA)	735.2	-0.48% (NA)
April	57.8 (NA)	74.5	-22.42% (NA)
2017			
April	92.0 (NA)	74.5	+23% (NA)
May	120.5 (107.2)	82.3	+46% (+30%)
June	117.8 (94.6)	82.4	+43% (+15%)
July	35.5 (37.4)	98.6	-64% (-62%)
August	68.1 (51.6)	83.9	-19% (-38%)
September	55.5 (23.8)	87.8	-37% (-73%)
October	85.8 (56.2)	67.4	+27% (-17%)
November	96.1 (69.8)	87.1	+10% (-20%)
December	55.6 (NA)	71.2	-22% (NA)
TOTAL	726.9 (NA)	735.2	-1% (NA)

1. From Environment Canada Waterloo Wellington Airport

2. First value is based on Environment Canada's Elora RCS gauge, value in brackets is based on Clair Maltby Project gauge

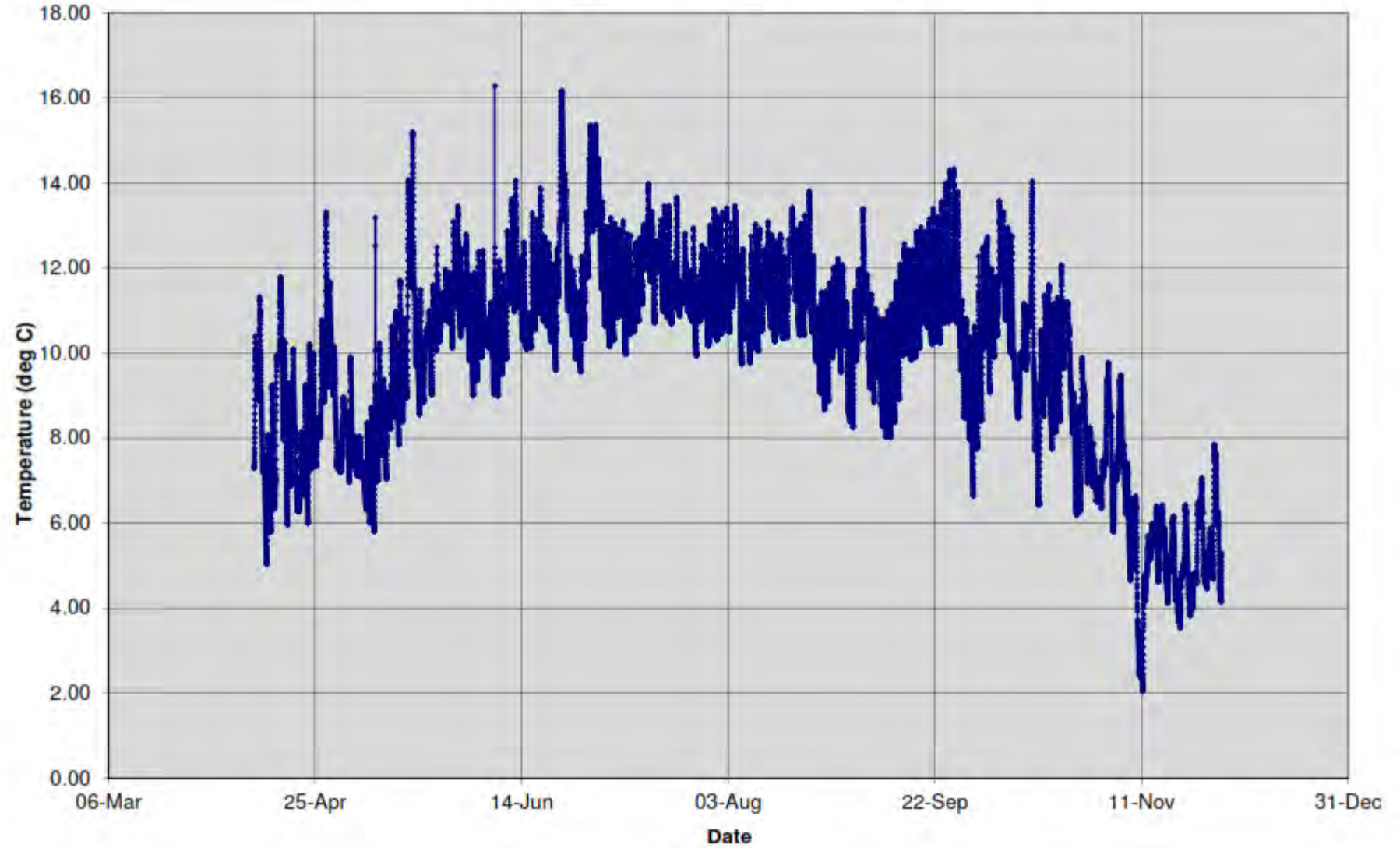
4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings – Surface Flow

Station 14 (Hammersley) Estimated Flows for 2017



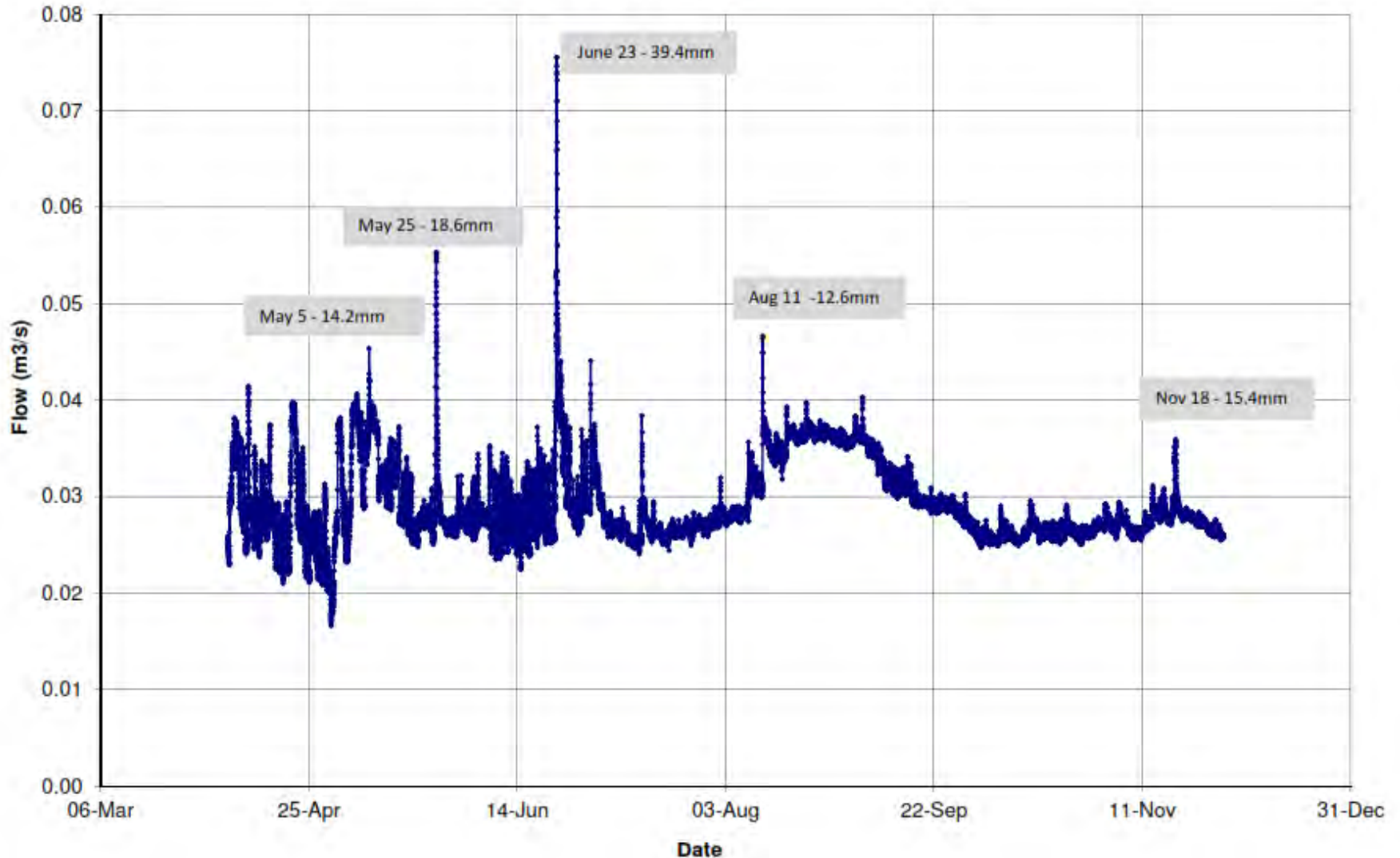
4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings – Temperature

Station 14 (Hammersley) Recorded Temperature for 2017



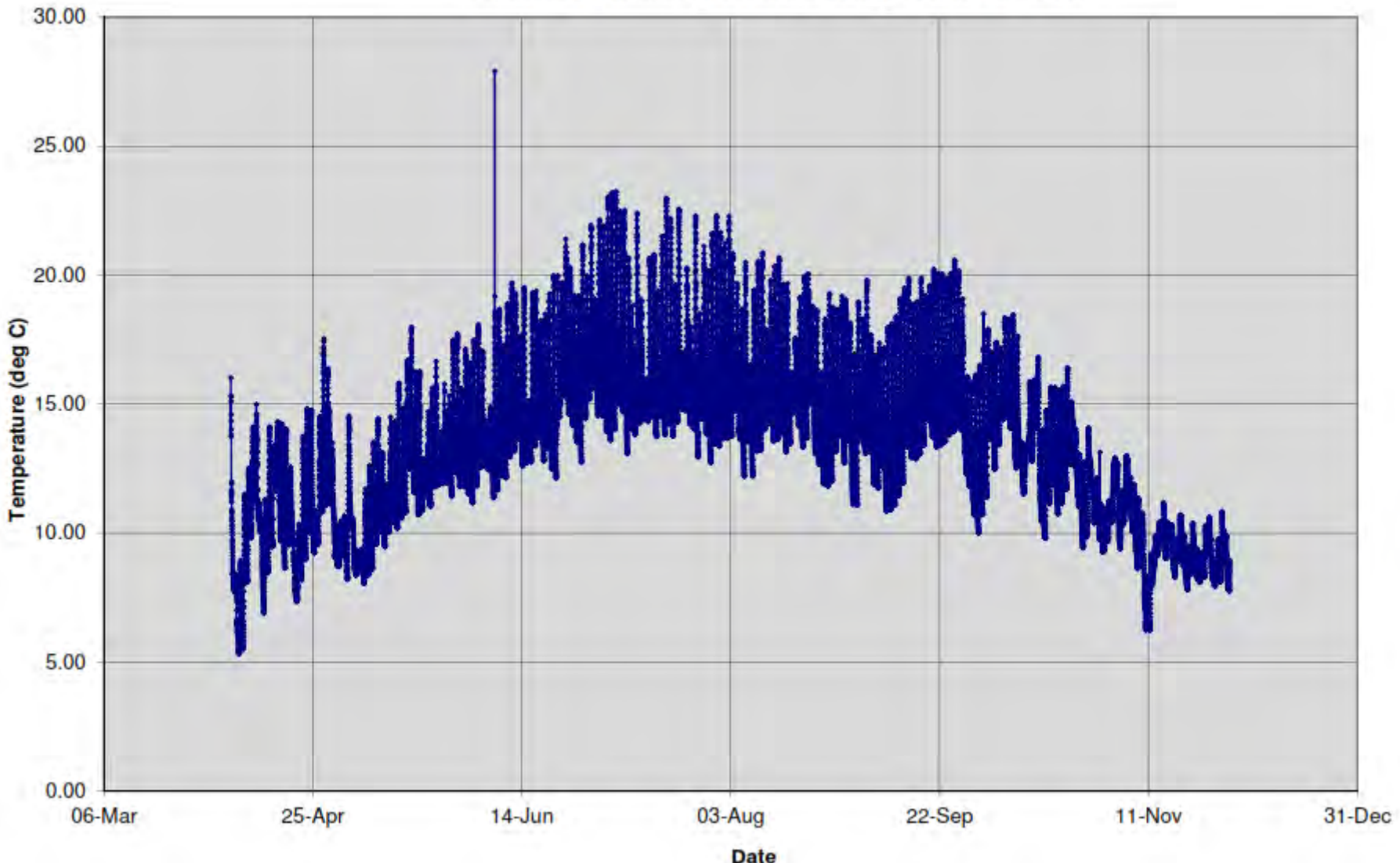
4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings – Surface Flow

Station 15 (Hanlon) Estimated Flows for 2017



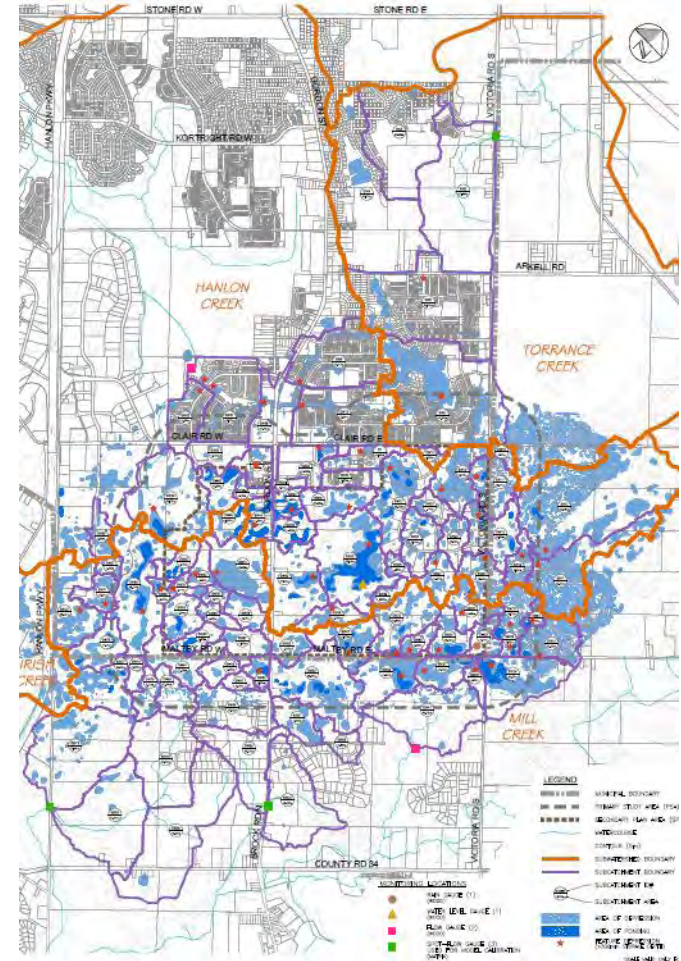
4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings – Temperature

Station 15 (Hanlon) Recorded Temperature for 2017

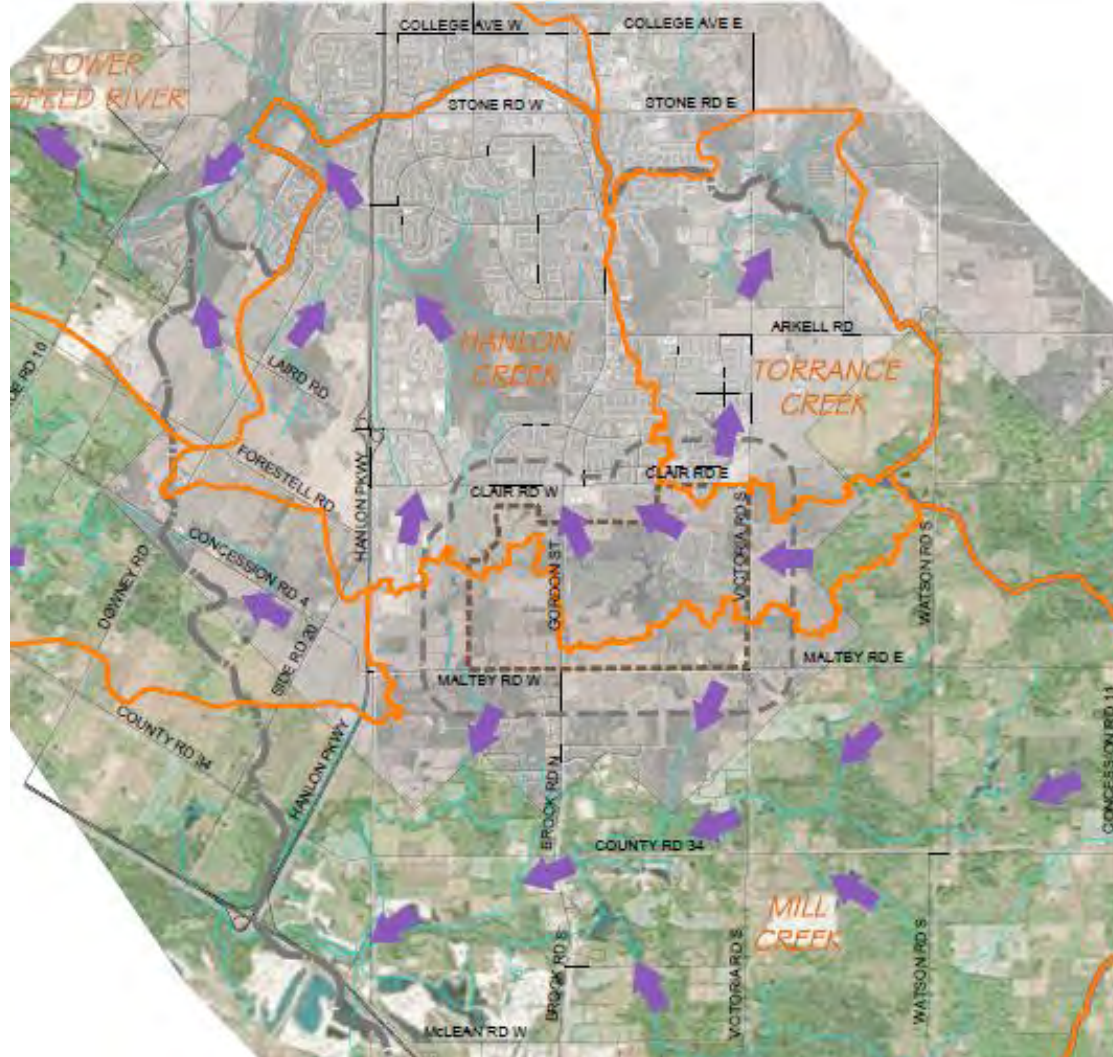


4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology

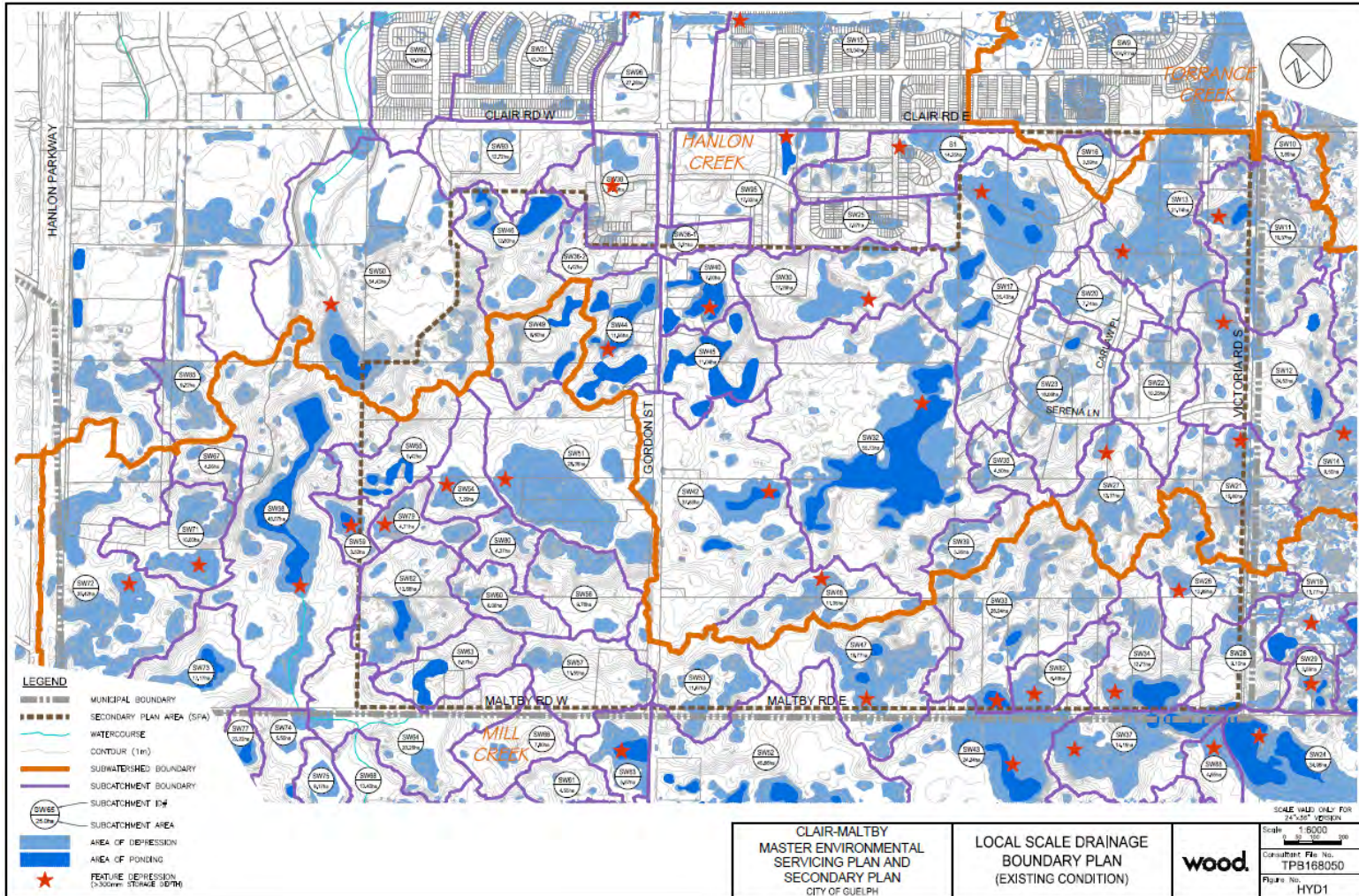
- PCSWMM hydrologic model built on 2012 digital elevation model
- Subcatchments developed to Hanlon Creek, Mill Creek and Torrance Creek to the monitoring locations
- Depressional features (<300mm capture) incorporated into subcatchment depression storage; (>300 mm capture) used storage elements with overflow.
- Model validation to the 2016 to 2017 monitoring period results, requiring changes to baseflow, impervious coverages and increased infiltration in greenways



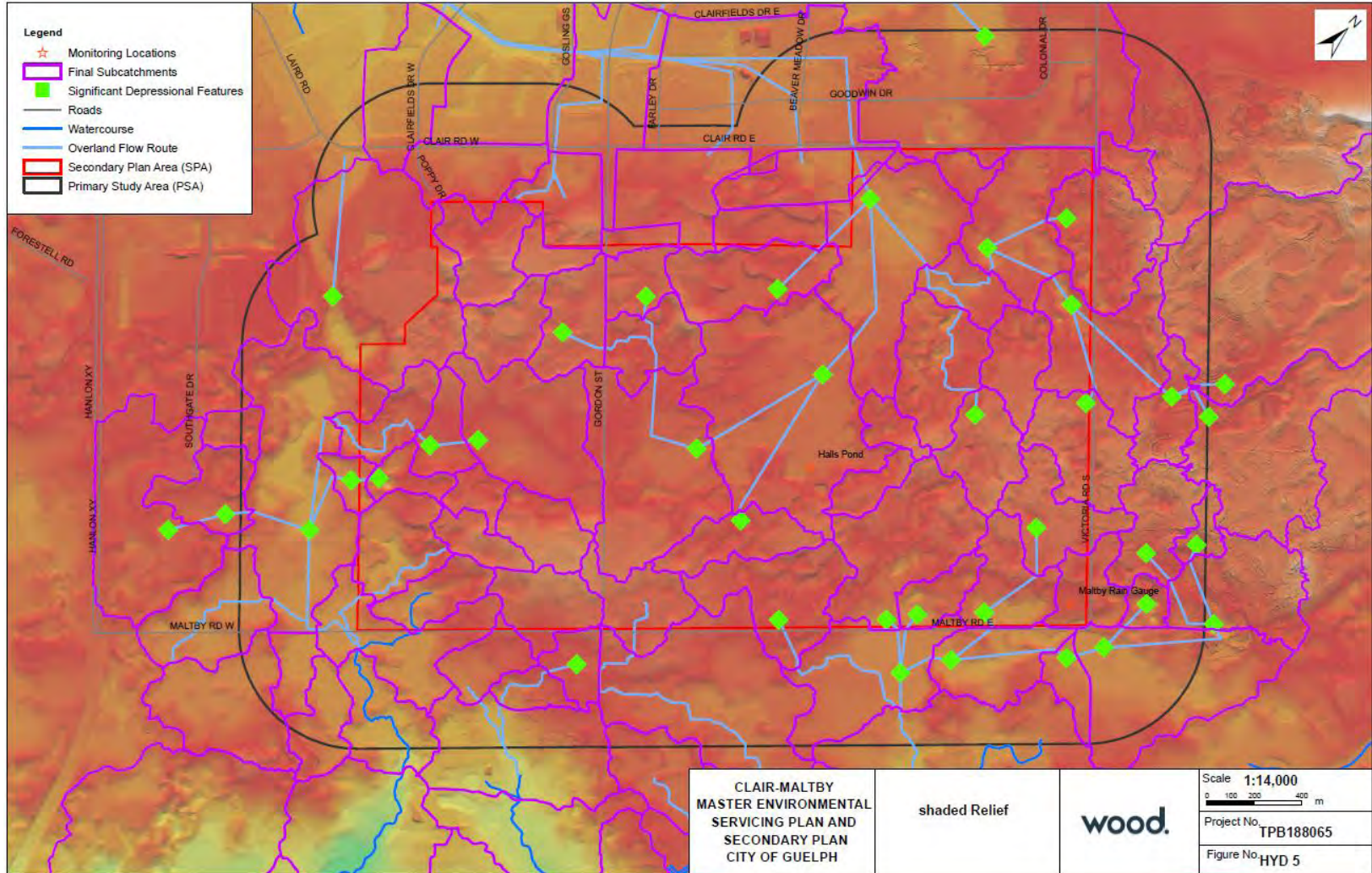
4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology



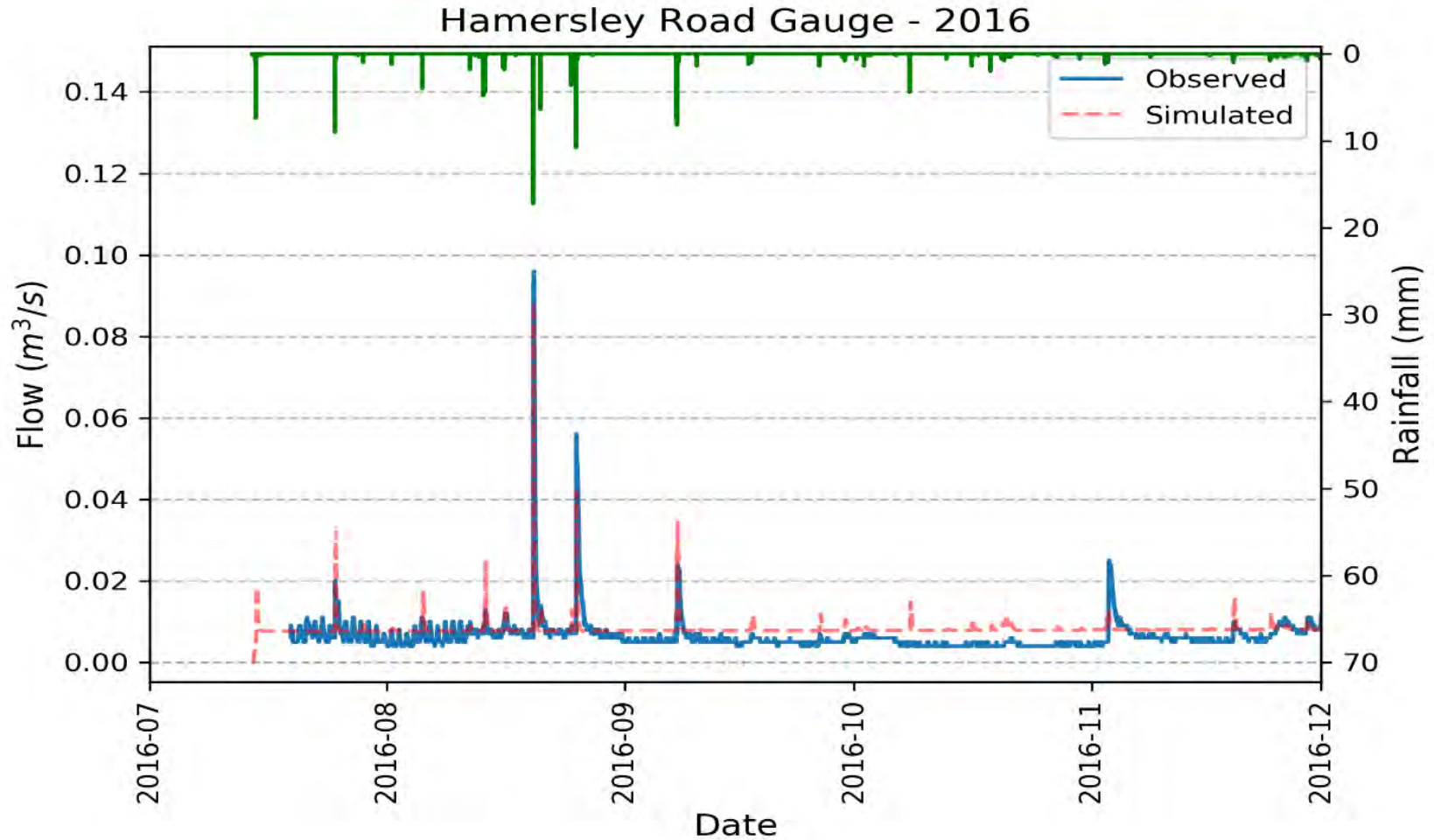
4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology



4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology

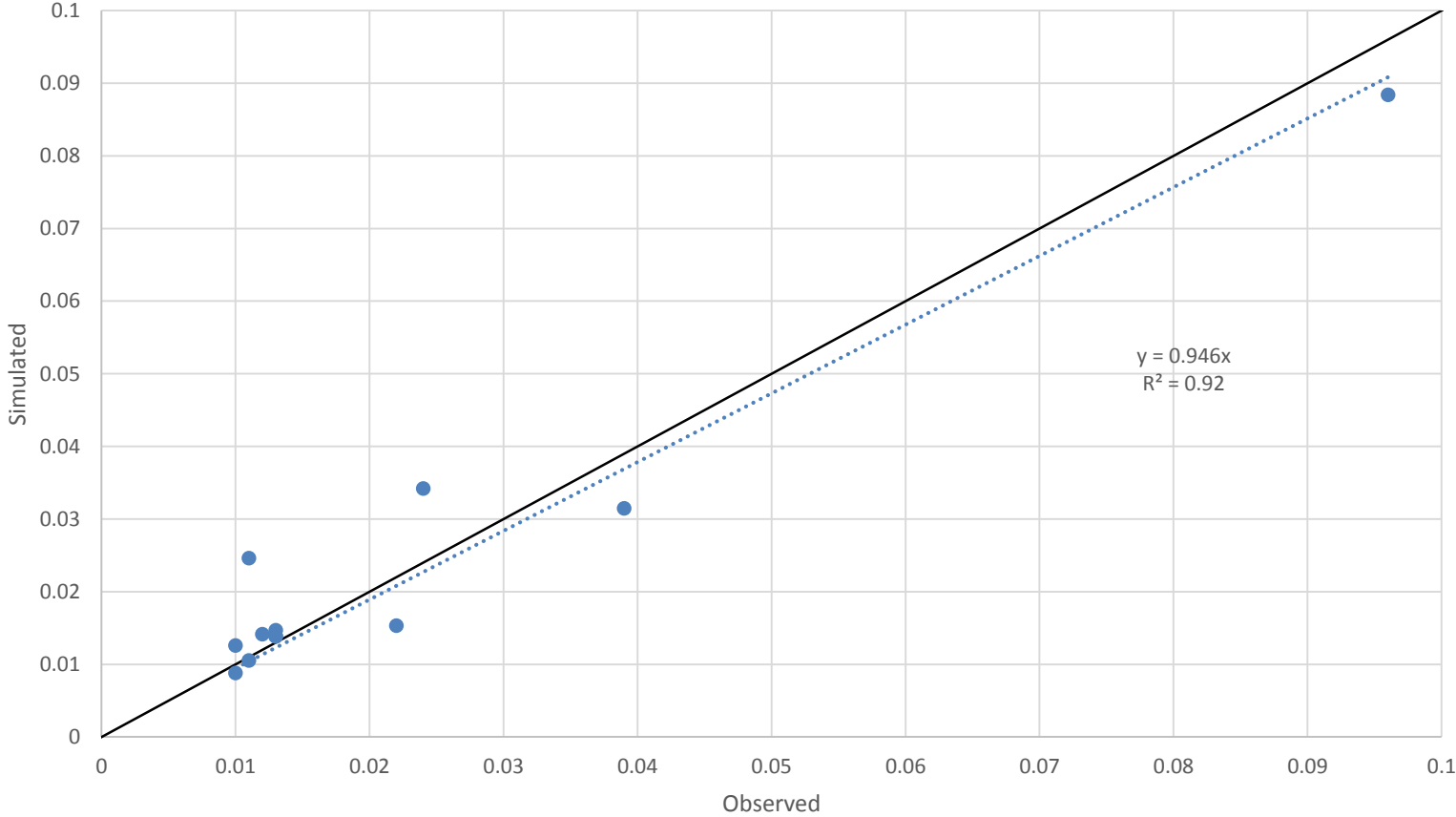


4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology



4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology

Hamersley Road Gauge - Maximum Flow (m³/s)



4. CEIS Phase 1/2 Characterization Report: Surface Water: Summary of Findings - Hydrology

- Validated PCSWMM hydrologic model used to determine:
 - Design and frequency peak flows and water balance (surface based)
 - 100 Year frequency flows 1.55 m³/s and 0.48 m³/s for Hanlon Creek and Mill Creek monitoring sites (flows are extremely low)
 - Flows within Hanlon and Mill Creek are low, but have baseflow from contributing groundwater discharge
 - 93% to 97% precipitation either infiltrates or evaporates
 - 95% +/- infiltration within depressional features
 - Only 7 out of 47 significant depressional features (>300 mm capture) exhibited a discharge over 67 years of simulation period

4. CEIS Phase 1/2 Characterization Report: Surface Water: Input to Community Structure Alternatives

- There are 47 significant depressional features with over 300 mm of storage
- Depressional features (dry, ponds, wooded areas and wetlands) infiltrate most precipitation
- Surface water contributions to wetlands are significant, with groundwater contributions being minor (see Hydrogeology Section)
- Significant depressional features discharge for only infrequent and significant storm events
- Mill Creek and Hanlon Creek have low frequency flows
- Baseflow relies on groundwater discharge
- Most of the area has moderate to high infiltrative soils
- The depressional areas provide an opportunity for infiltration of stormwater runoff

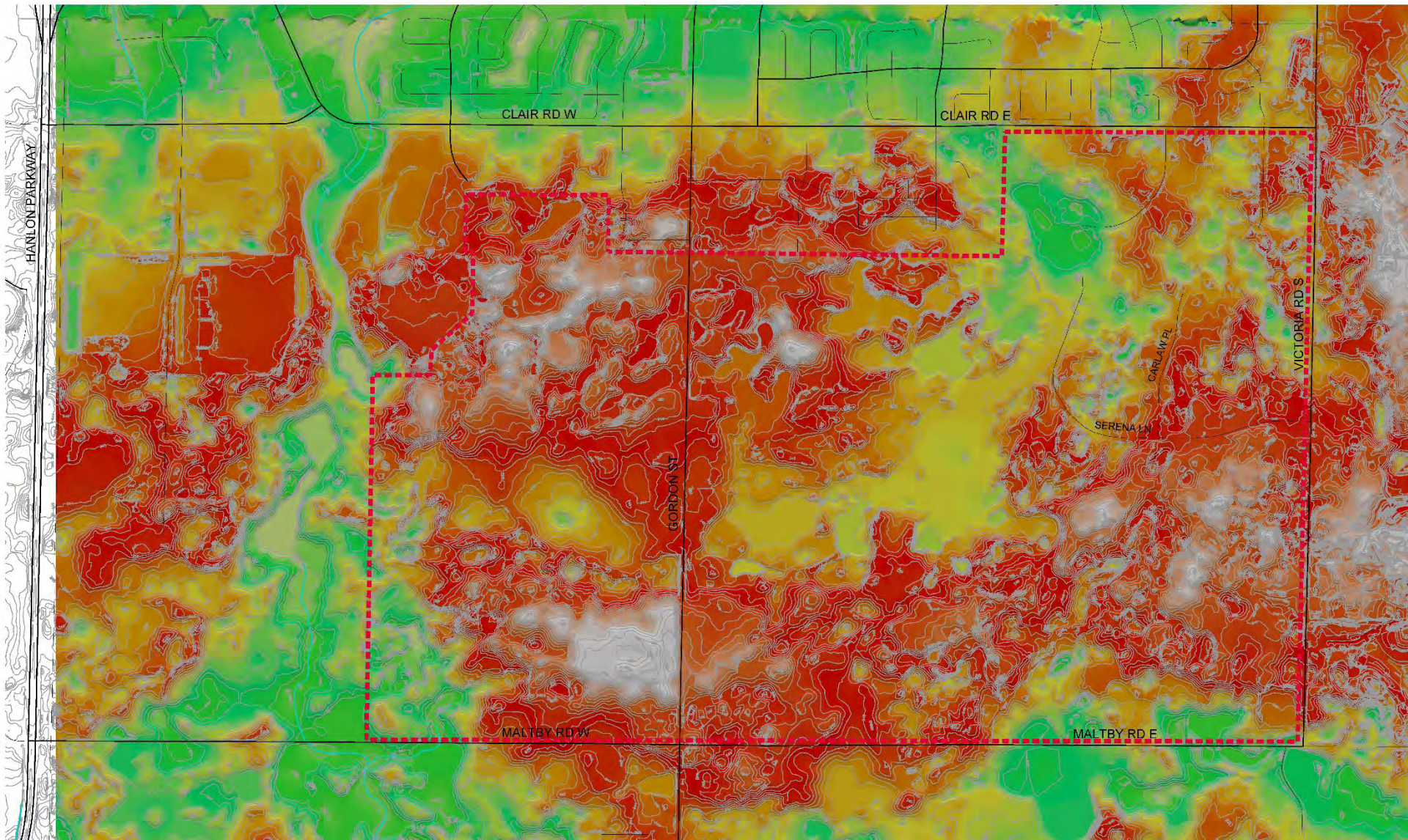
4. CEIS Phase 1/2 Characterization Report: Surface Water: Integration Considerations

- Stormwater quantity controls to be integrated with sustainable planning approach for the NHS terrestrial units, based on the existing unit water balance
- Replicate existing overland drainage to wetlands and woodlots
- Stormwater management and drainage systems to manage the increased rate and volume of runoff from future development resulting in no increase in peak flows and runoff volumes to watercourses
- As part of the stormwater management system, source, conveyance and end-of-pipe measures that promote infiltration, should be implemented

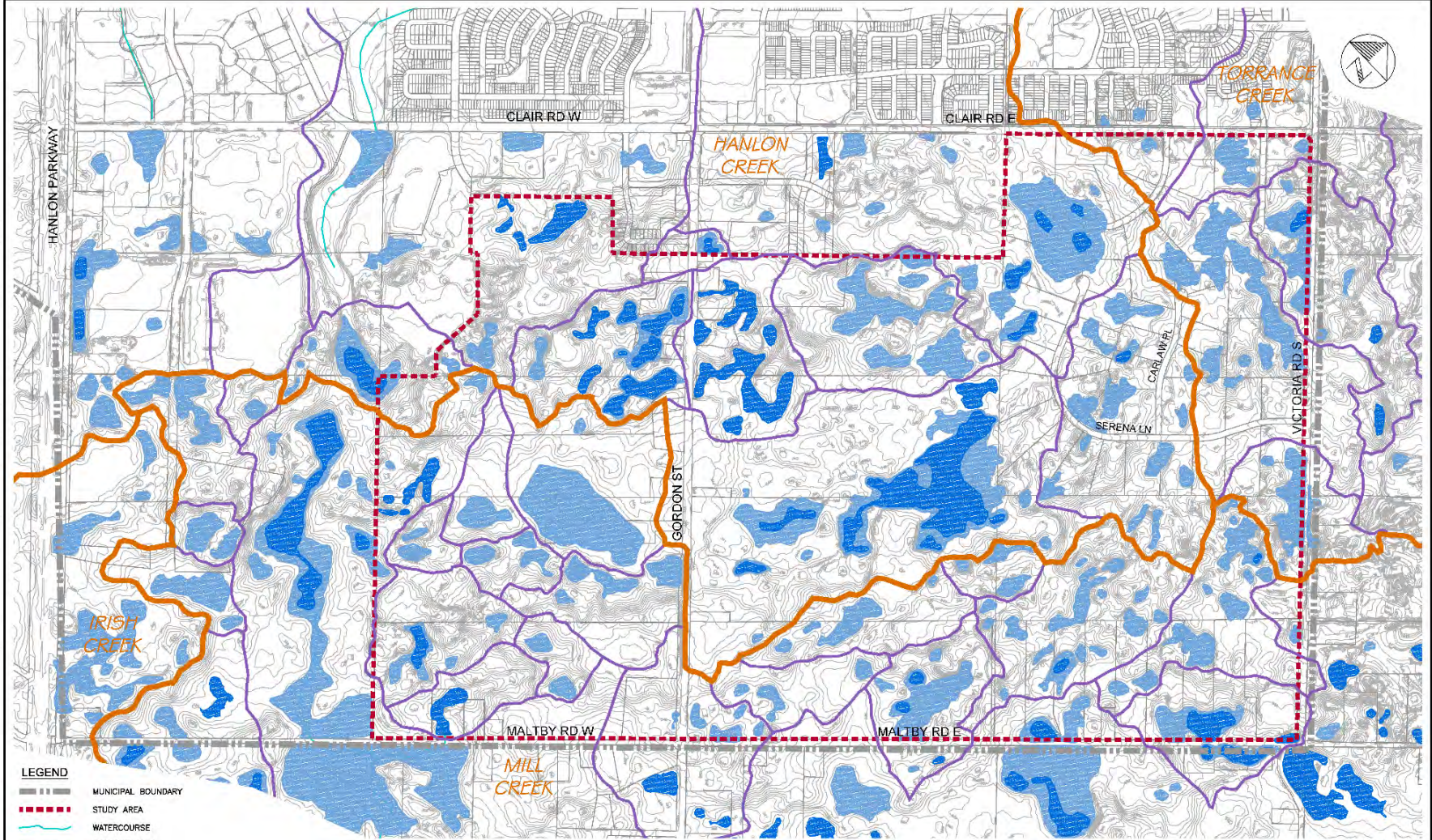
4. CEIS Phase 1/2 Characterization Report: Surface Water: Integration Considerations

- The significant infiltration function of depressional features should either be preserved or replicated within stormwater management measures
- The stormwater management system should appropriately maintain and if possible augment baseflows, and mitigate thermal impacts from future development

4. CEIS Phase 1/2 Characterization Report: Preliminary Stormwater Management Considerations



4. CEIS Phase 1/2 Characterization Report: Preliminary Stormwater Management Considerations



LEGEND

	MUNICIPAL BOUNDARY
	STUDY AREA
	WATERCOURSE
	CONTOUR (1m)
	WATERSHED BOUNDARY
	SUBCATCHMENT BOUNDARY
	AREA OF DEPRESSION
	AREA OF PONDING

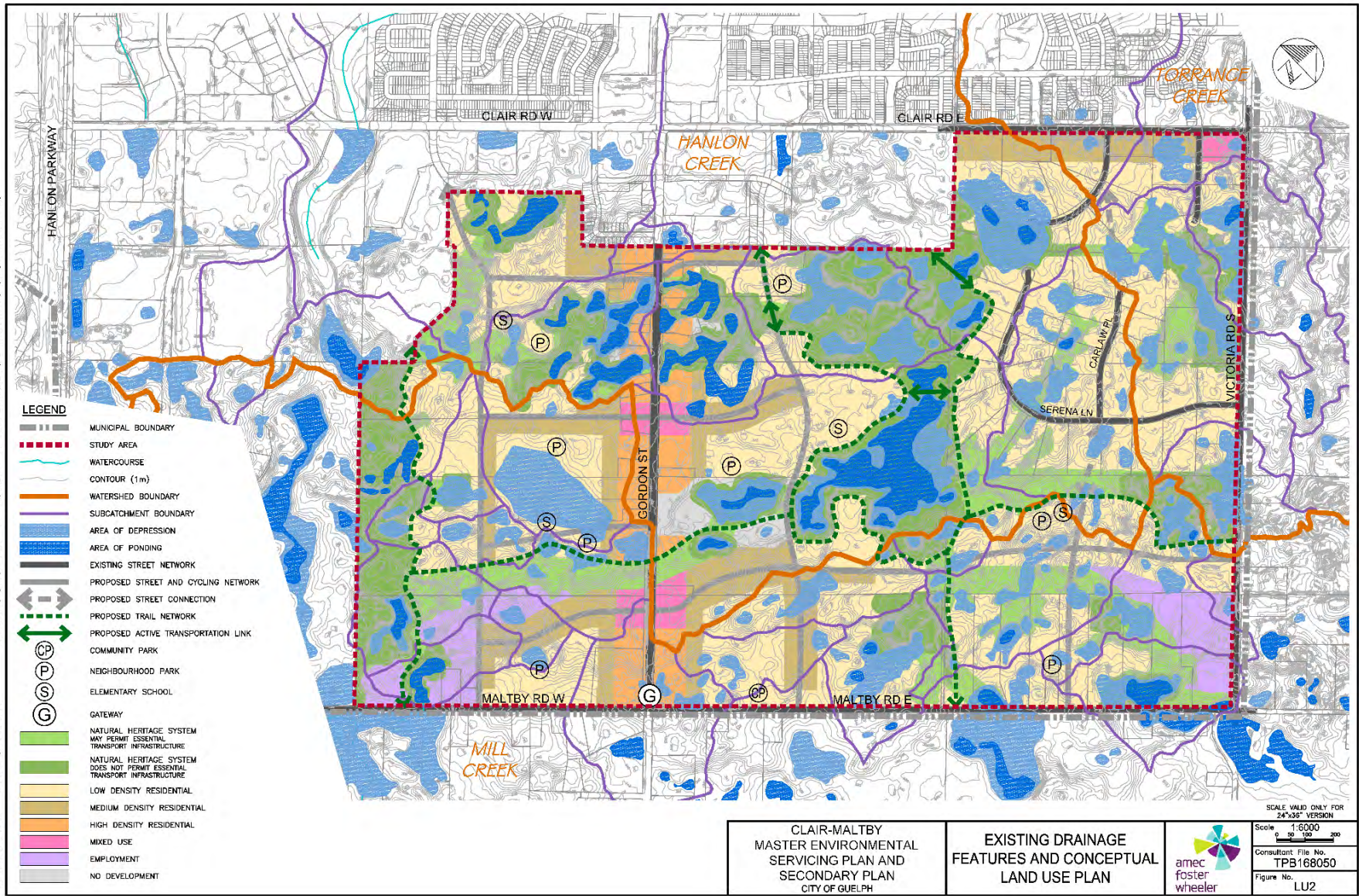
CLAIR-MALTBY
MASTER ENVIRONMENTAL
SERVICING PLAN AND
SECONDARY PLAN
CITY OF GUELPH

LOCAL SCALE
DRAINAGE BOUNDARY
PLAN



SCALE VALID ONLY FOR
24"x36" VERSION
Scale 1:6000
0 30 100 300
Consultant File No.
TPB168050
Figure No.
W1

4. CEIS Phase 1/2 Characterization Report: Preliminary Stormwater Management Considerations



4. CEIS Phase 1/2 Characterization Report: Significant Landform: Objectives / Purpose



- Significant Landform already defined **and identified as part of the City's NHS**

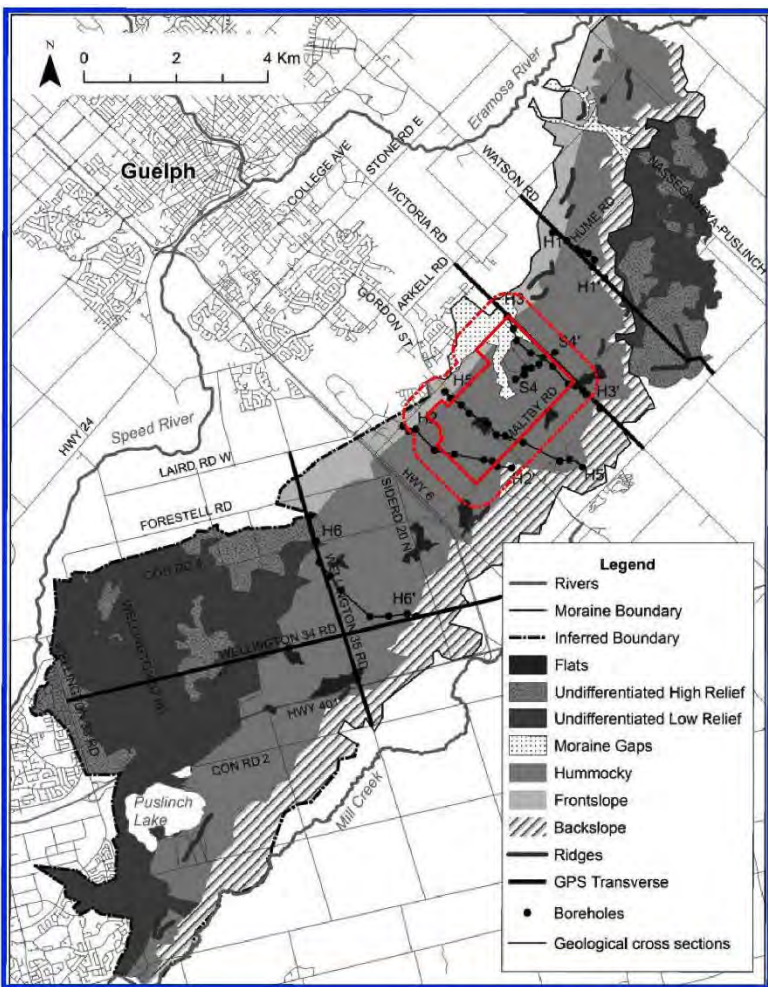
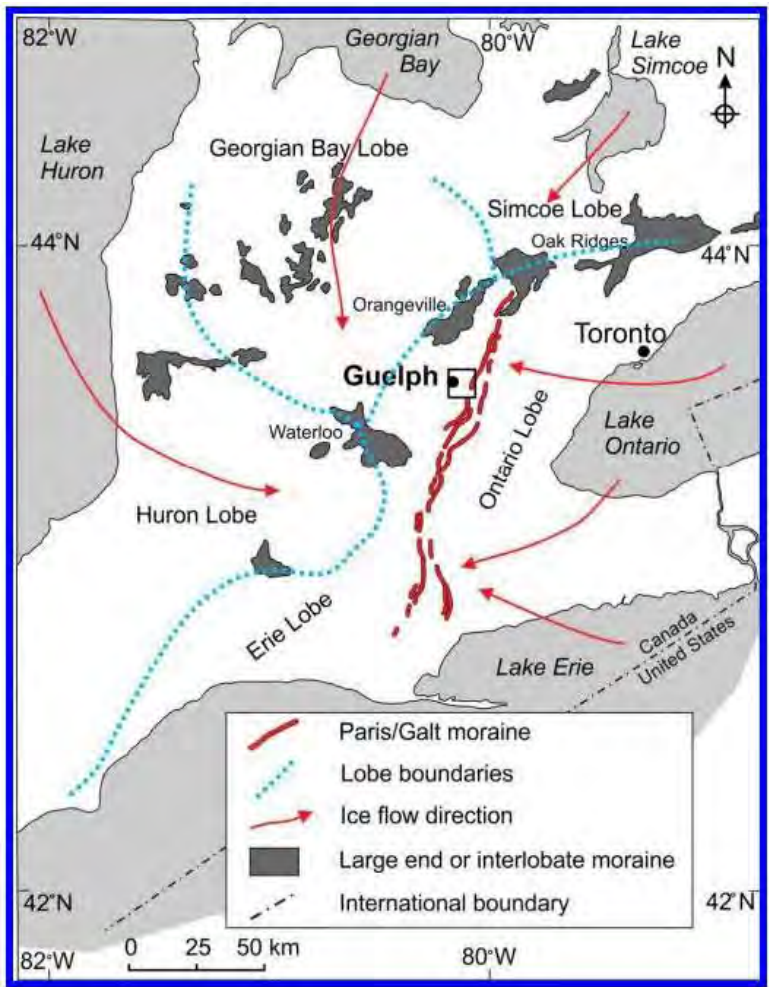


- No technical update being done to Significant Landform mapping as part of CEIS



- CEIS work to focus on approaches for integration of these features into the Secondary Plan through design and policy

4. CEIS Phase 1/2 Characterization Report: Significant Landform: Context



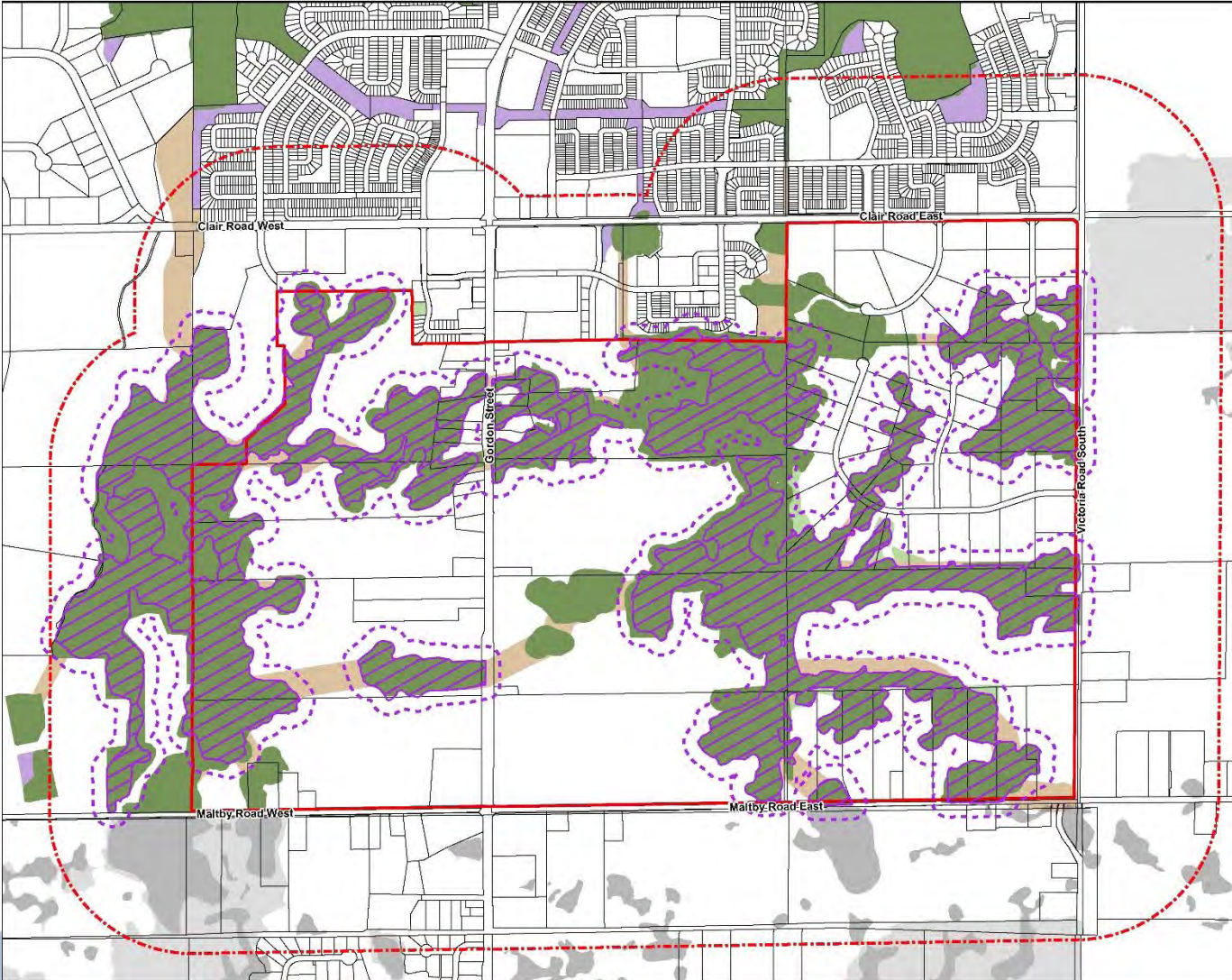
4. CEIS Phase 1/2 Characterization Report: Significant Landform: Policy

Criterion for Significant Landform Designation (City of Guelph Official Plan):

Hummocky Topography of the Paris Galt Moraine that exhibits slope concentrations where:

- the slope is 20% or greater,*
- and located in association with closed depressions identified by the GRCA, and*
- in close proximity to other Significant Natural Areas of the Natural Heritage System.*

4. CEIS Phase 1/2 Characterization Report: Significant Landform: Mapping



4. CEIS Phase 1/2 Characterization Report:

Significant Landform: Input to Community Structure Alternatives

- **ROADS AND TRAILS:** Refinements to new primary road and trail alignments with consideration for Significant Landform and the topography of the area as a whole
- **WATER BALANCE:** Recognition that closed depressions outside of the NHS present opportunities for infiltration of clean / treated water
- **CONNECTIVITY:** Recognition that the linear nature of the Significant Landform can help support both natural heritage and active transportation connections

4. CEIS Phase 1/2 Characterization Report: Significant Landform: Integration Considerations

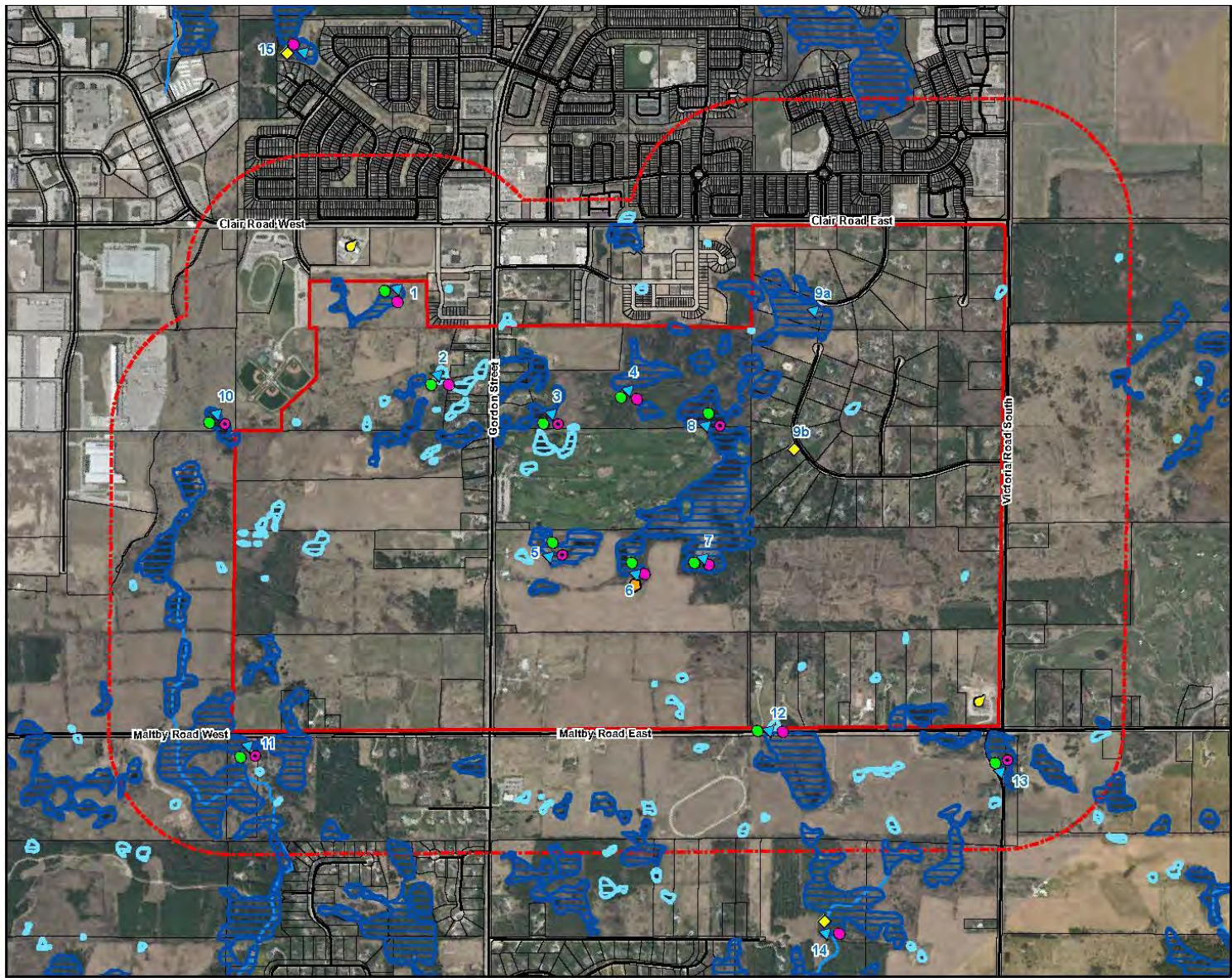
- NHS: Significant Landform is integrally tied to the NHS and therefore any refinements to other NHS components must also consider Significant Landform
- WATER MANAGEMENT: The topography, soils and surficial geology in the SPA currently determine how the area drains as well as its role in contributing baseflows to systems outside the SPA
- CONNECTIVITY: Roads, trails and other infrastructure requirements need to be sited with consideration for maintaining the character and connectivity of the NHS

4. CEIS Phase 1/2 Characterization Report: Natural Systems: Objective / Purpose

- Confirm and refine components of the Natural Heritage System (NHS), with an emphasis on Ecological Linkages and Significant Wildlife Habitat
- Develop and implement an approach for reviewing the status of wetlands in consultation with the City, GRCA and MNRF
- Work with the intergrated team to develop a better understanding of how surface and groundwater support Natural Heritage System functions



4. CEIS Phase 1/2 Characterization Report: NHS: Field Work – Wetland Water Levels & Quality



Surface Water Monitoring Locations

Map SW-1

Clair-Maltby Secondary Plan
Phase 1 and 2 Characterization Report

Legend

- Secondary Plan Area
- Primary Study Area
- Watercourse (MNRF 2017)
- Parcel Fabric

Monitoring Stations

- Surface Water Quality*
- Surface Water Quality* + Pesticides
- Surface Water Quality
- ▲ Mini-piezometer
- ◆ Surface Water Flow
- ◆ Rain Gauge
- ◆ Baro Logger
- Provincially Significant Wetlands (MNRF 2017)
- Unevaluated Wetlands (MNRF 2017)

* Water Quality Sampling Parameters include: TSS, TDS, PTP, SO⁴, Cl, TKN, NO², NO³, NH³, Temp, pH, Conductivity, DO and Metals

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Web Mapping Service 2017

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BEACON ENVIRONMENTAL

Project 216002
August, 2018

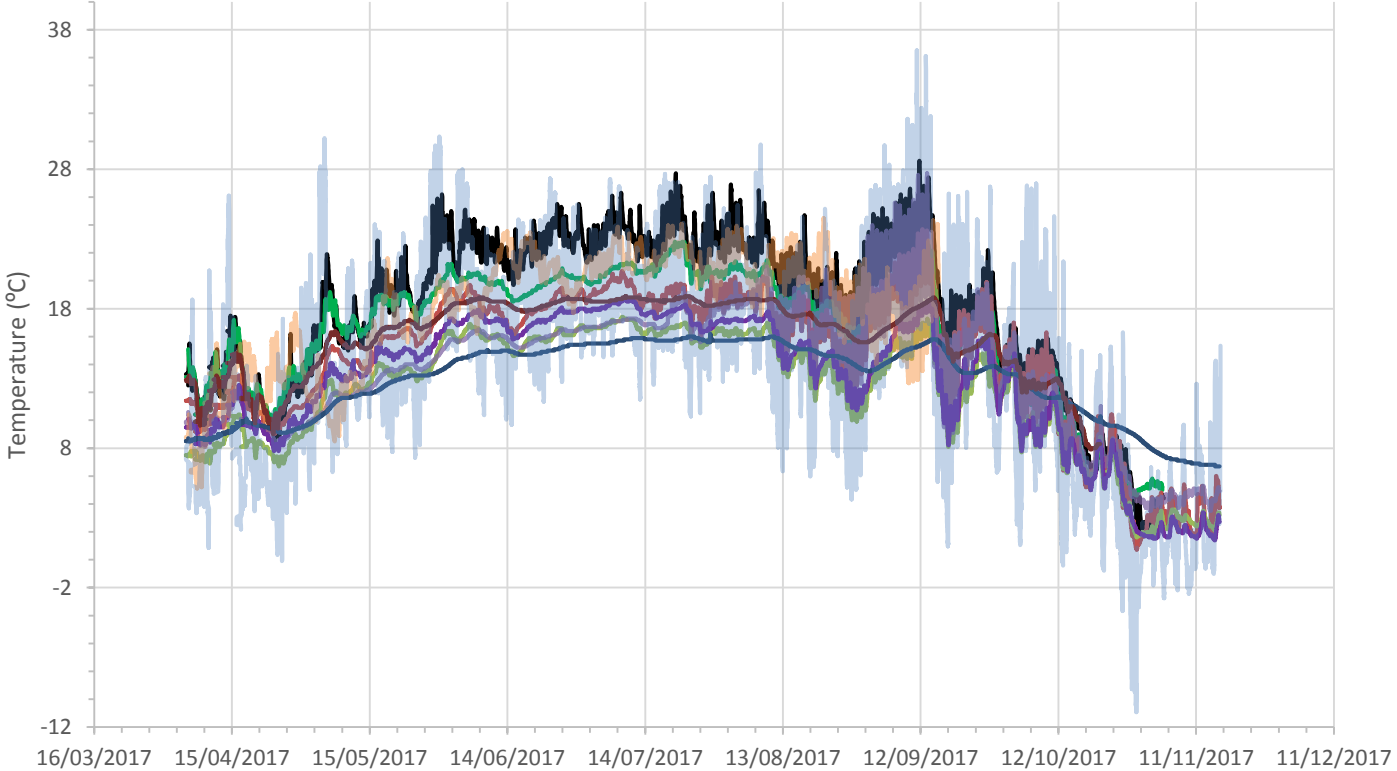
4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Wetland Water Levels & Quality



- Standing water in all wetlands sampled from April to November 2017
- Levels generally showed expected seasonal pattern: peak in spring and gradual decline over the summer with a small rebound in fall
- Lab samples screened against PWQO, CDWQ and CEQG guidelines
 - Recurring exceedances included: Ammonia, Total Phosphorus and Aluminum
 - Zinc exc. in two Mill Creek SWS Stations
 - Some Chloride exc. at stations near roads

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Wetland Temperature 2017 Hanlon Creek Watershed Stations (9)

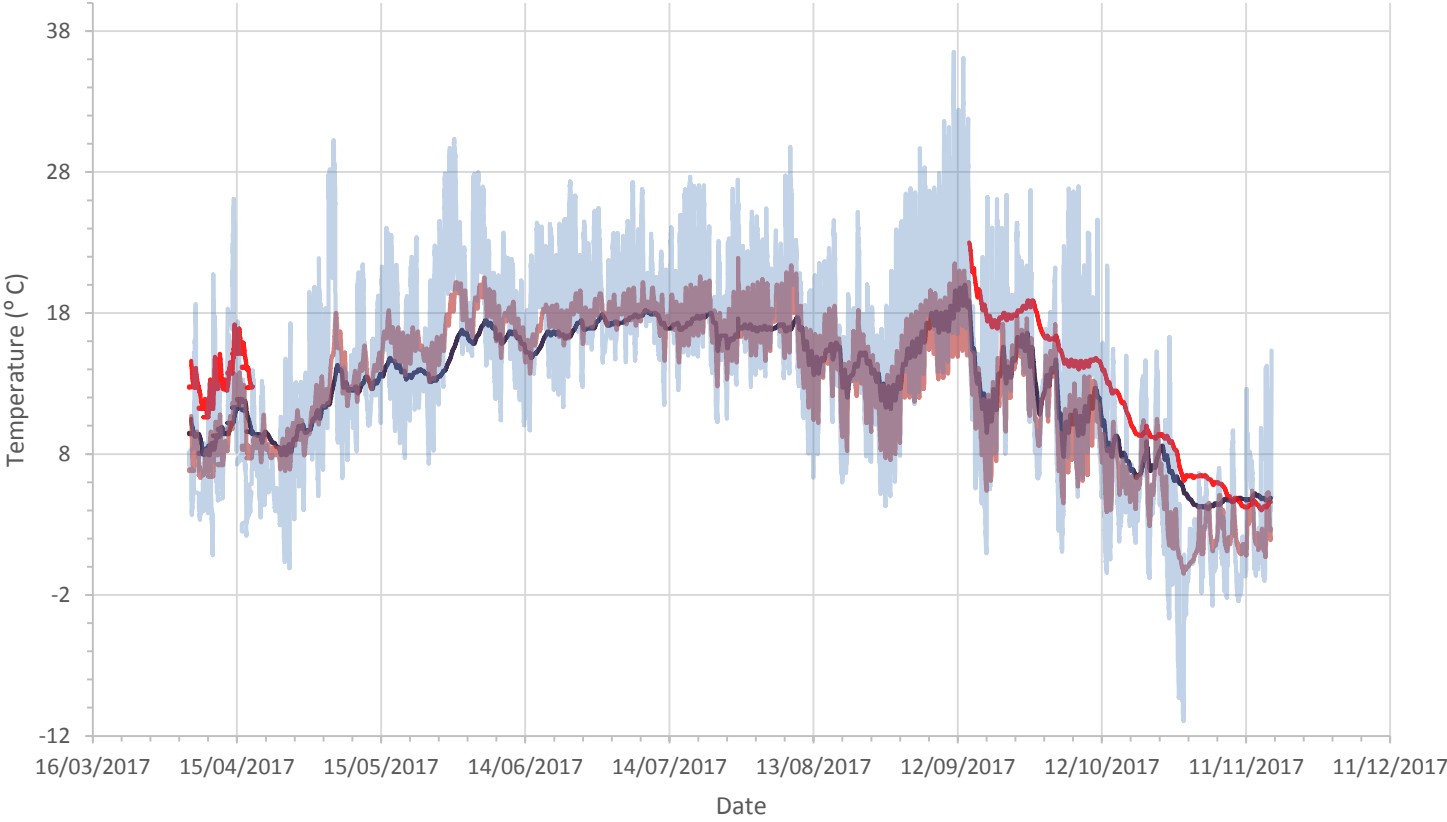
Wetland Station Surface Water Temperatures - Hanlon Creek SWS



- STN 1*
- STN 2*
- STN 3
- STN 4
- STN 5
- STN 6
- STN 7
- STN 8
- STN 10
- Air Temperature

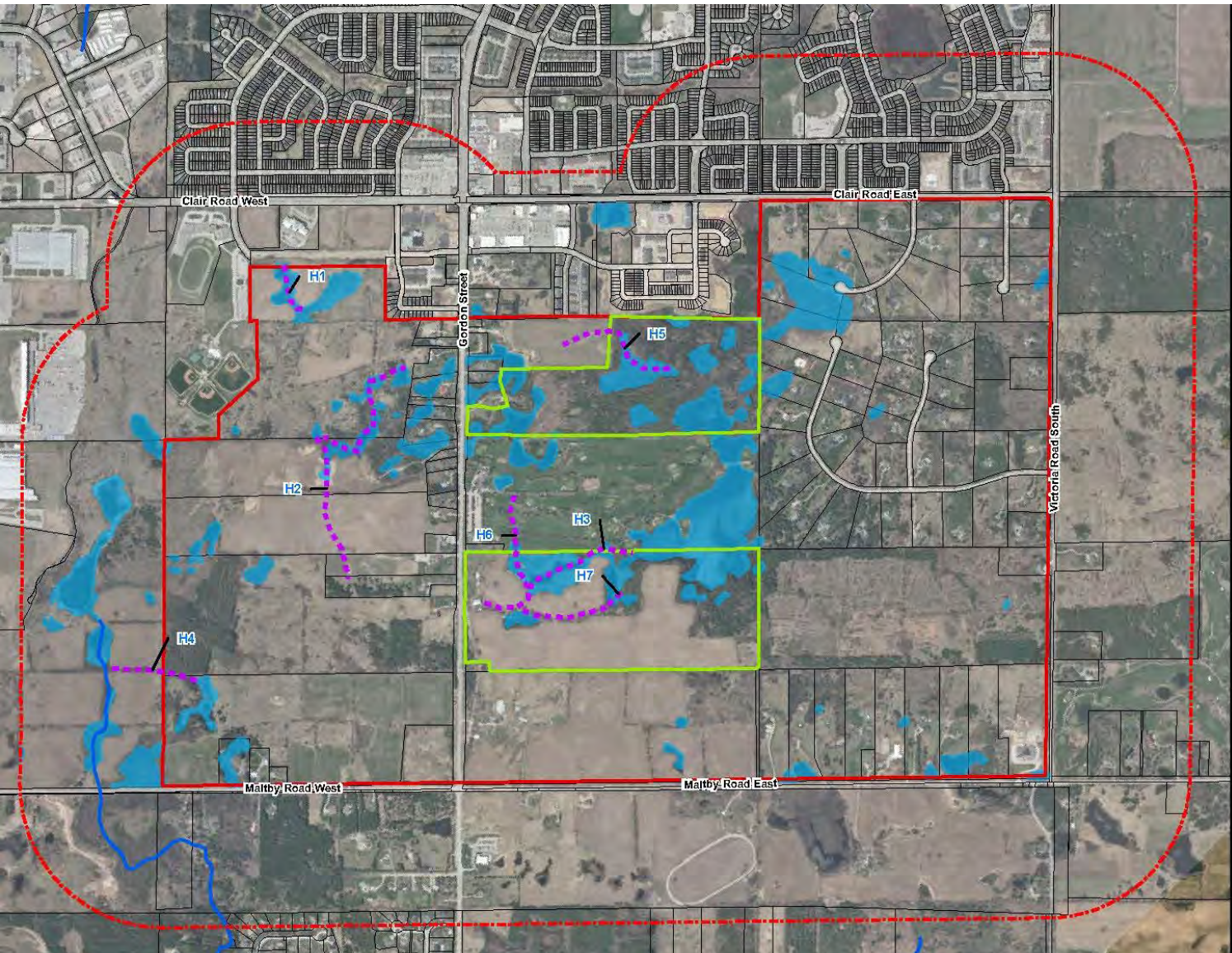
4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Wetland Temperature 2017 Mill Creek Watershed Stations (3)

Wetland Station Surface Water Temperatures - Mill Creek SWS



— STN 11 — STN 12 — STN 13 — Air Temperature

4. CEIS Phase 1/2 Characterization Report: NHS: Field Work – Headwater Features Assessment



Scoped Headwater Drainage Feature Assessment (Potential HDFs)

Map NH-4A

Clair-Maltby Secondary Plan
Phase 1 and 2 Characterization Report

Legend

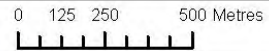
- Secondary Plan Area Boundary
- Primary Study Area Boundary
- Parcel Fabric
- Access Provided for HDF Assessment
- ELC Wetland Communities and Ponds (Beacon 2017)
- Potential Headwater Drainage Feature (HDF) (Beacon 2018)
- Watercourse (MNRF 2017)

City of Guelph: Secondary Plan Area Boundary, 2016

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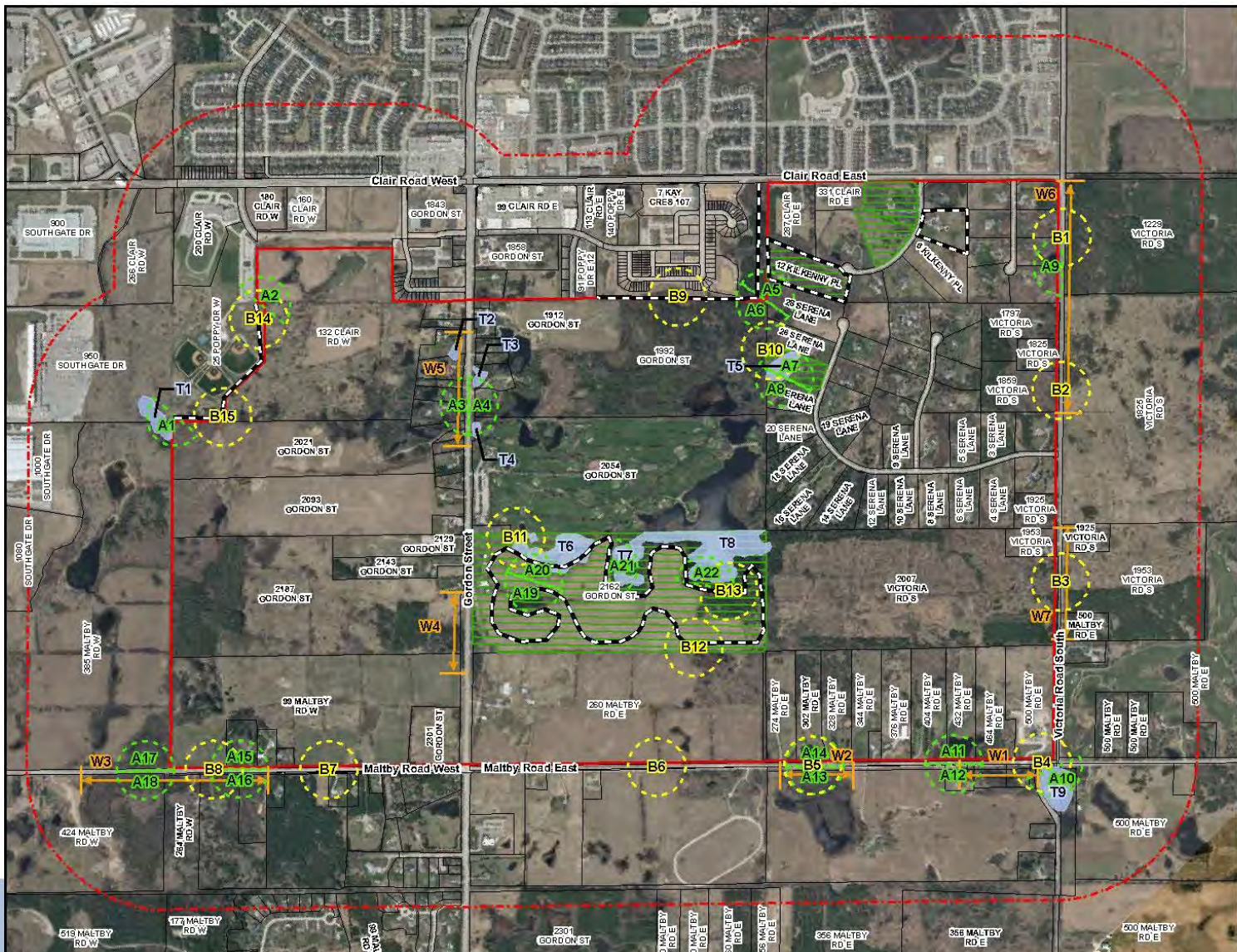


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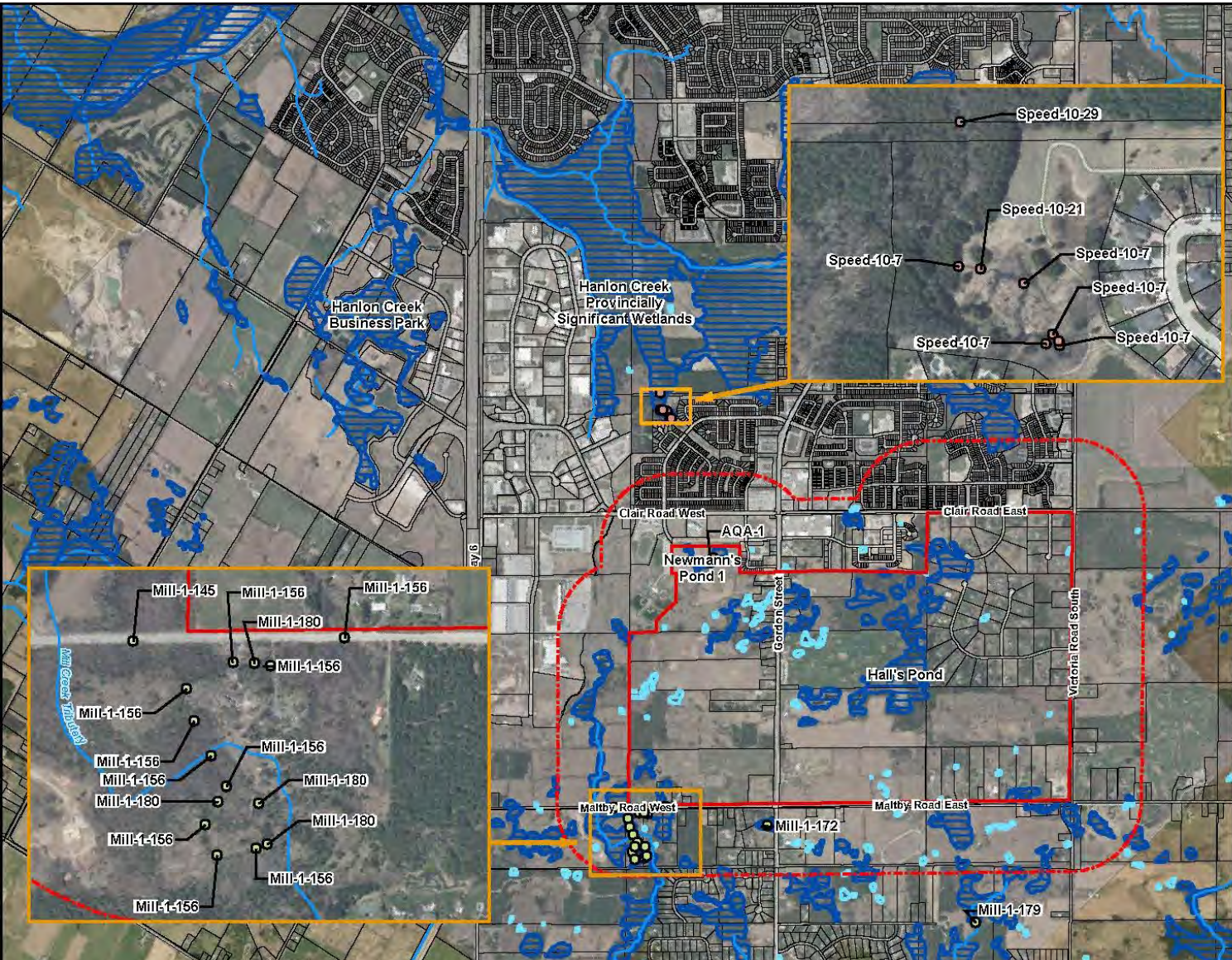
Project 216002
August, 2018

4. CEIS Phase 1/2 Characterization Report: NHS: Field Work – Terrestrial Ecology



Terrestrial Monitoring Locations	
Map NH-2	
Clair-Malby Secondary Plan 2017 Monitoring Report	
Legend	
	Secondary Plan Area Boundary
	Primary Study Area Boundary
	Site Specific Vegetation Assessments
	A1 Amphibian Monitoring Stations (22)
	B1 Breeding Bird Stations (15)
	Basking Turtle Monitoring Stations (8)
	Winter Wildlife Transects (5)
	Road Wildlife Transects (7)
<small>Beacon Environmental: Watercourse, Amphibian Monitoring Stations, Breeding Bird Stations, Basking Turtle Monitoring Stations, Winter Wildlife Transects, Wildlife Road Transects, Primary Study Area Boundary, 2016; City of Guelph: Secondary Plan Area Boundary, Parcel Fabric, 2016; Ministry of Natural Resources and Forestry: Wetland, 2016</small>	
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First Base Solutions Web Mapping Service 2017	
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Project 216002 February, 2018	

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Fisheries



Scoped Fisheries Assessment

Map NH-3

Clair-Maltby Secondary Plan Phase 1 and 2 Characterization Report

Legend

- ▬ Primary Study Area
- ▭ Secondary Plan Area
- Watercourse (MNR 2017)
- Hanlon Creek (MNR 1999)
- Mill Creek (MNR 2010-2012)
- Aquafor Beech Limited Data (2012)
- Wetlands**
- ▨ Provincially Significant Wetlands (MNR 2017)
- ▨ Unevaluated Wetlands (MNR 2017)

Beacon Environmental: Watercourse, Primary Study Area Boundary, 2016;
City of Guelph: Secondary Plan Area Boundary, Parcel Fabric, 2016;
Ministry of Natural Resources and Forestry: Hanlon Creek, Mill Creek;
Aquafor Beech Limited: Sample Data, 2011

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August, 2018

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Fisheries

Hanlon Creek Watershed

- Watercourses immediately north of the SPA historically supported, and appear to continue to support, a coolwater thermal regime

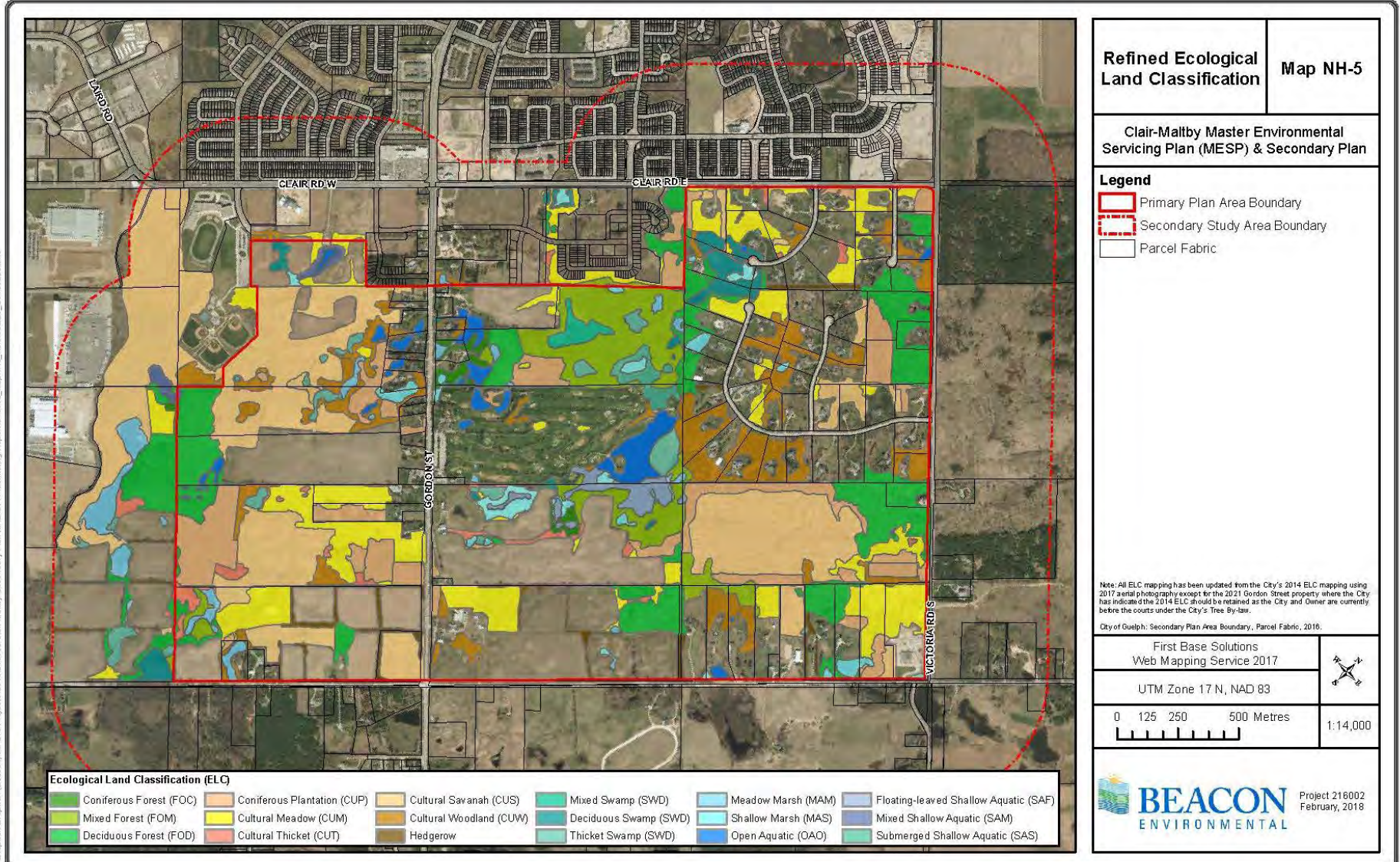
Mill Creek Watershed

- Watercourses immediately south of the SPA historically supported, and appear to continue to support, a coldwater thermal regime

Secondary Plan Area (SPA)

The Regional groundwater flow that emerges from the SPA is thought to provide for groundwater discharge to both the Hanlon and Mill Creek systems that is key to supporting baseflows and maintaining the coolwater and coldwater regimes in these systems.

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Vegetation Community Mapping



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4. CEIS Phase 1/2 Characterization Report: NHS: Analysis – Refinements to Wetland Mapping

1. Consulted with MNRF and GRCA
2. Reviewed MNRF wetland mapping, GRCA wetland mapping and City wetland mapping
3. Updates based on current vegetation mapping
4. Wetlands recommended to be added as Provincially Significant where they (a) are in the 2014 NHS and/or (b) have a surface hydrologic connection to an existing PSW
5. Other ponds / wetlands identified for future review
6. Mapping from previous OPA 42 settlements respected
7. Refinement work still in progress where access has been provided in 2018

4. CEIS Phase 1/2 Characterization Report: NHS: Analysis – Refinements to Wetlands Mapping



Refinements to City Significant Wetland Mapping	
Map NH-6	
Clair-Maltby Secondary Plan Phase 1 and 2 Characterization Report	
Legend	
<ul style="list-style-type: none"> Primary Plan Area Boundary Secondary Study Area Boundary Parcel Fabric 	
MNR Provincial Wetlands	
<ul style="list-style-type: none"> Proposed MNR Provincial Wetlands to Remain (Beacon, 2018) Proposed Additions to MNR Provincial Wetlands (Beacon, 2018) Proposed Other Wetlands >0.5 ha to MNR Provincial Wetlands (Beacon, 2018) Proposed Removals from MNR Provincial Wetlands (Beacon, 2018) 	
Other Wetlands ≤ 0.5 ha	
<ul style="list-style-type: none"> Proposed Additions from Other Wetlands ≤ 0.5 ha (Beacon, 2018) Proposed Removals from Other Wetlands ≤ 0.5 ha (Beacon, 2018) Proposed Removals from LIO Unevaluated Wetlands ≤ 0.5 ha (Beacon, 2018) 	
Wetland Buffers	
<ul style="list-style-type: none"> MNR Provincial Wetland 30 m Buffer Locally Significant / Other Wetlands 15 m Buffer 	
City of Guelph Natural Heritage System (2014)	
<ul style="list-style-type: none"> Significant Natural Areas Natural Areas Ecological Linkages Restoration Areas 	
<small>City of Guelph, Secondary Plan Area Boundary, Parcel Fabric, Existing Natural Heritage System, 2016.</small>	
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First Base Solutions Web Mapping Service 2017	
UTM Zone 17 N, NAD 83	
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4. CEIS Phase 1/2 Characterization Report: NHS: Analysis – Refinements to Woodland Mapping

1. Consulted with City
2. Reviewed current City mapping and policies for Significant Woodlands and Cultural Woodlands
3. Updates based on current vegetation mapping except where previous OPA 42 settlements needed to be respected
4. Refinement work still in progress where access has been provided in 2018

4. CEIS Phase 1/2 Characterization Report: NHS: Analysis – Refinements to Woodlands Mapping



**Refinements to
City Woodlands Mapping
and Current City NHS**

Map NH-8

Clair-Maltby Secondary Plan
Phase 1 and 2 Characterization Report

Legend

- Primary Plan Area Boundary
- Secondary Study Area Boundary
- Parcel Fabric

Proposed Additions

- Proposed Additions to Significant Woodlands (Beacon 2018)
- Proposed Additions to Cultural Woodlands (Beacon 2018)

Proposed Transition

- Proposed Transition from Cultural Woodlands to Significant Woodlands (Beacon 2018)
- Proposed Transition from Significant Woodlands to Cultural Woodlands (Beacon 2018)

Woodlands (City of Guelph 2014)

- Significant Woodlands
- Cultural Woodlands
- 10m Buffer from Existing and Proposed Woodlands

City of Guelph Natural Heritage System (2014)

- Significant Natural Areas
- Natural Areas
- Ecological Linkages
- Restoration Areas

City of Guelph: Primary Plan Area, Parcel Fabric, Natural Heritage System, 2018

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First Base Solutions Web Mapping Service 2017	
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May, 2018

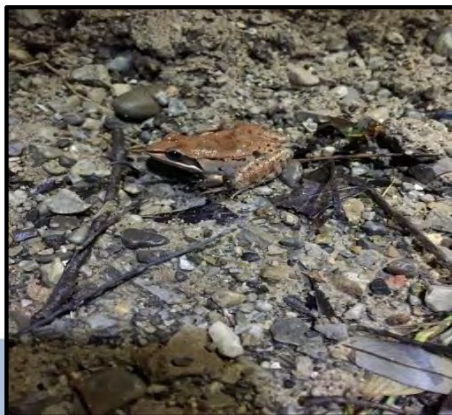
Draft #1

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Vegetation Communities & Plants



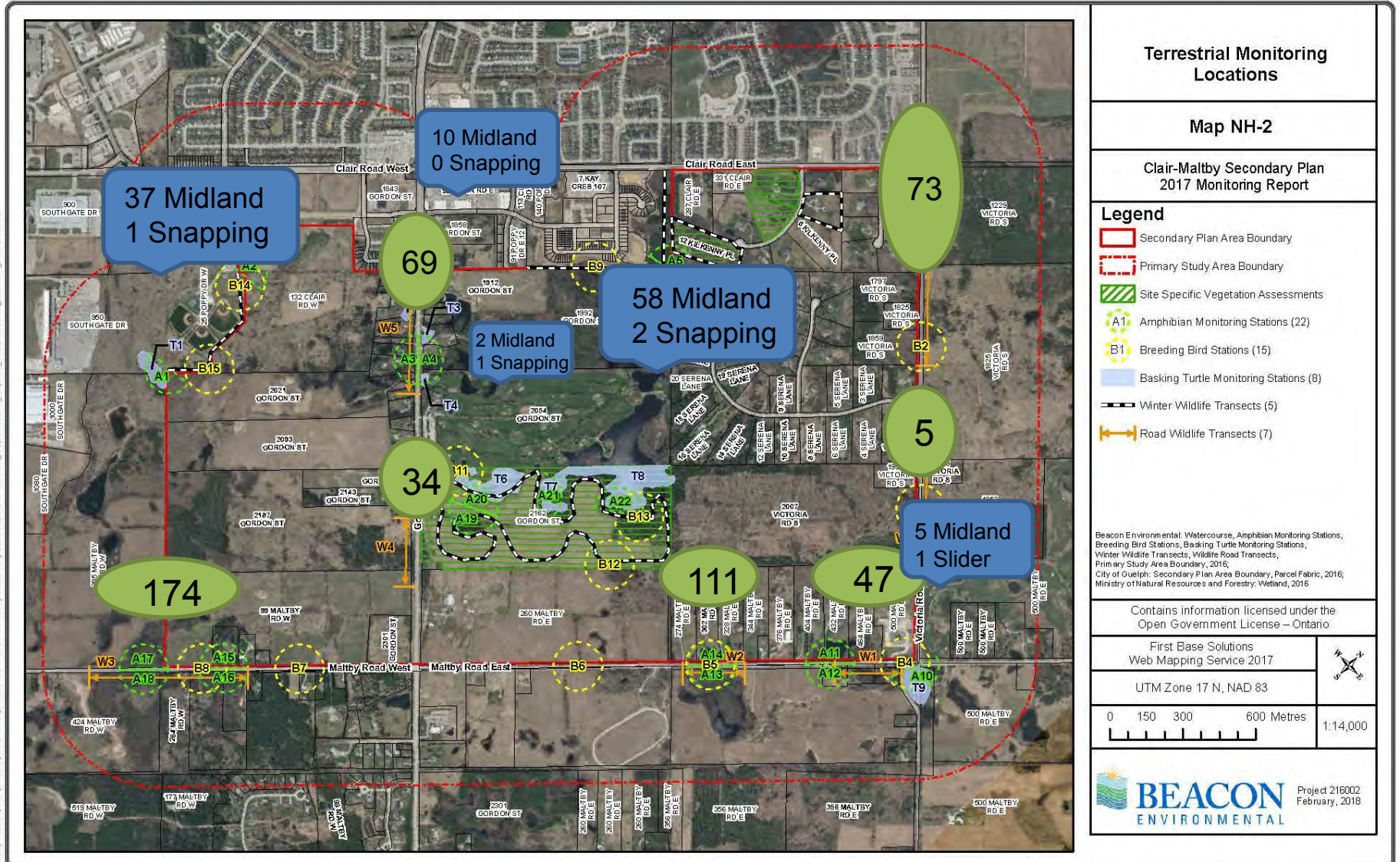
- SPA currently 72% natural and successional vegetation communities
 - 10% wetland (including swamp)
 - 16% upland forest
 - 46% cultural / successional
- 467 species of plants
 - One Species at Risk – Butternut
 - 20 locally significant plant species (County) mainly associated with the wetlands

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Wildlife



- Species reflective of mix of woodland and wetland pockets with some meadows and farmed lands
- BIRDS: 112 species
 - 6 Species at Risk and 42 species significant and/or rare in the County
- AMPHIBIANS: 10 species
 - 7 species of frog, 1 species of toad, 1 species of salamander (Blue-spotted - 2 obs), 1 newt
 - 3 species of turtle, 4 species of snake
- MAMMALS: range of common mammals including deer and coyote

4. CEIS Phase 1/2 Characterization Report: NHS: Findings – Turtle Basking & Frog Movement



Terrestrial Monitoring Locations

Map NH-2

Clair-Maltby Secondary Plan 2017 Monitoring Report

Legend

- Secondary Plan Area Boundary
- Primary Study Area Boundary
- Site Specific Vegetation Assessments
- A1 Amphibian Monitoring Stations (22)
- B1 Breeding Bird Stations (15)
- Basking Turtle Monitoring Stations (8)
- Winter Wildlife Transects (5)
- Road Wildlife Transects (7)

Beacon Environmental: Watercourse, Amphibian Monitoring Stations, Breeding Bird Stations, Basking Turtle Monitoring Stations, Winter Wildlife Transects, Wildlife Road Transects, Primary Study Area Boundary, 2016;
City of Ouellet: Secondary Plan Area Boundary, Parcel Fabric, 2016;
Ministry of Natural Resources and Forestry: Wetland, 2016

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First Base Solutions
Web Mapping Service 2017



UTM Zone 17 N, NAD 83



1:14,000



Project 216002
February, 2018

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4. CEIS Phase 1/2 Characterization Report: NHS: Analysis – Significant Wildlife Habitat (SWH)

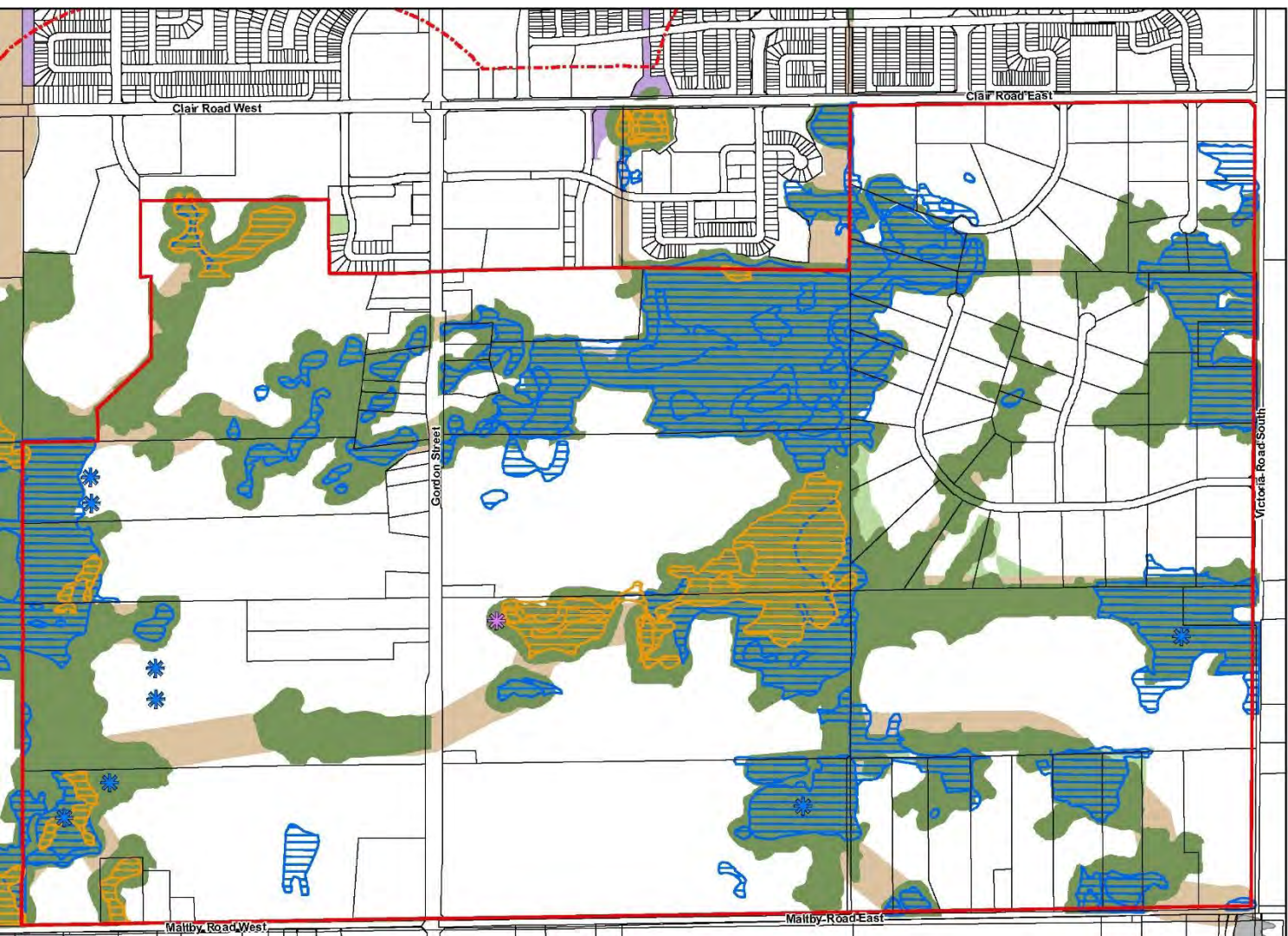
1. Updates based on current vegetation mapping combined with species data collected
2. Used current Provincial guidance – SWH Criteria for Ecoregion 6E – to identify Candidate and Confirmed SWH; still requires site-specific verification
3. SWH mapping is based on new information collected as part of this study so OPA 42 mapping does not apply to this NHS component
4. Refinement work still in progress where access has been provided in 2018

4. CEIS Phase 1/2 Characterization Report: NHS: Summary of Significant Wildlife Habitat (SWH)

<p>A. Seasonal Concentration Areas (15 types)</p>	<ul style="list-style-type: none"> • Aquatic Waterfowl Stopover & Staging Areas • Raptor Wintering Areas • Bat Maternity Colonies • Turtle Wintering Areas (Candidate and Confirmed) • <i>Reptile Hibernaculum</i> • <i>Colonially-Nesting Bird Habitat – Trees & Shrubs</i> • <i>Deer Winter Congregation Areas</i>
<p>B. Rare Vegetation Communities & Specialized Habitat for Species (15 types)</p>	<ul style="list-style-type: none"> • Other Rare Vegetation Communities (1 SWT3-4 unit) • <i>Waterfowl Nesting Area</i> • <i>Bald Eagle and Osprey Habitat</i> • <i>Turtle Nesting Areas</i> • Seeps and Springs (one Confirmed) • Amphibian Breeding Habitat - Woodland & Wetland (Candidate and Confirmed)
<p>C. Habitats of Species of Conservation Concern (5 types)</p>	<ul style="list-style-type: none"> • <i>Marsh Bird Breeding Habitat</i> • Shrub/Early Successional Bird Breeding Habitat • <i>Terrestrial Crayfish</i> • <i>Special Concern and Rare Species</i>
<p>D. Animal Movement Corridors (2 types)</p>	<ul style="list-style-type: none"> • <i>Amphibian Movement Corridors</i>

4. CEIS Phase 1/2 Characterization Report:

NHS: Analysis - SWH Mapping



Preliminary Significant Wildlife Habitat (SWH) and Current City NHS

Map NH-10

Clair-Maltby Secondary Plan Phase 1 and 2 Characterization Report

Legend

- Secondary Plan Area Boundary (SPA)
- Primary Study Area Boundary (PSA)
- Candidate Amphibian Breeding Habitat (Wetland)

Significant Wildlife Habitat

- Candidate SWH – Presence and Extent To Be Verified *
- Confirmed SWH
- Candidate SWH – Presence To Be Verified
- Confirmed SWH (based on ELC polygon(s))
- Halligan's Pond**

City of Guelph Natural Heritage System (2014)

- Significant Natural Areas
- Natural Areas
- Ecological Linkages
- Restoration Areas

* Several Candidate SWH areas are shown approximately with asterisks; site-specific study will be needed to capture the best and most representative area(s) in the SPA.

** Halligan's pond could be considered Candidate SWH for amphibian breeding, waterfowl stopover and turtle wintering but has not been mapped as such as it is outside the City of Guelph.

City of Guelph, Secondary Plan Area Boundary, Parcel Entry, 2016

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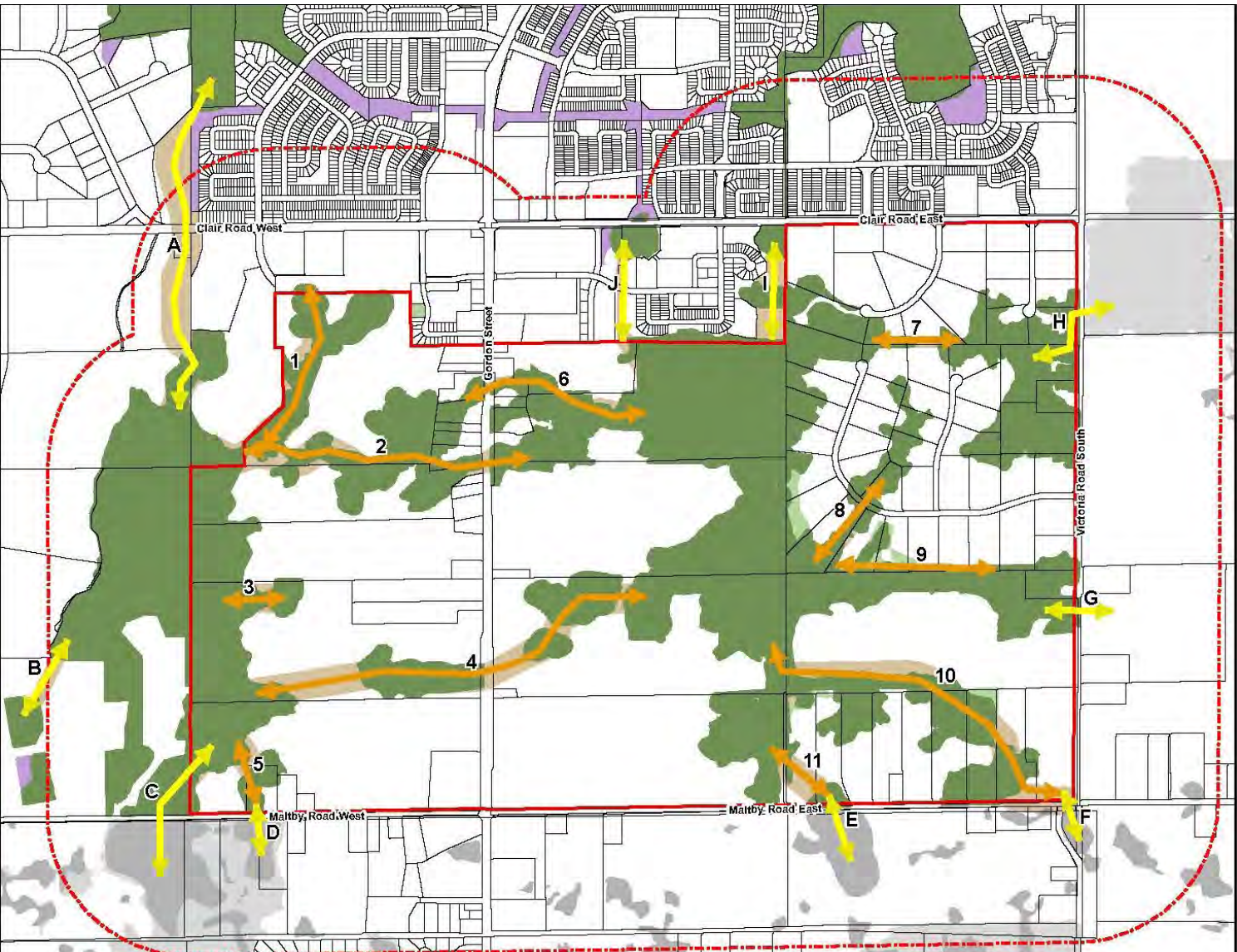
First Base Solutions
Web Mapping Service 2017

UTM Zone 17 N, NAD 83

0 100 200 400 Metres

1:10,500

4. CEIS Phase 1/2 Characterization Report: NHS: Analysis - Ecological Linkages



Ecological Linkages	
Map NH-11	
Clair-Maltby Secondary Plan Phase 1 and 2 Characterization Report	
Legend	
	Secondary Plan Area Boundary
	Primary Study Area Boundary
	Ecological Linkages within the PSA
	Ecological Linkages within the SPA
City of Guelph Natural Heritage System (2014)	
	Ecological Linkages
	Significant Natural Areas
	Natural Areas
	Restoration Areas
Wildlife Crossings	
	Amphibian Crossings
	Deer Crossings
	Other Wildlife Crossing Opportunities
<small>* Several Candidate SWH areas are shown approximately with asterisks. Site-specific study will be needed to capture the best and most representative area(s) in the SPA.</small>	
<small>** Halligan's pond could be considered Candidate SWH for amphibian breeding, waterfowl stopover and turtle wintering but has not been mapped as such as it is outside the City of Guelph.</small>	
<small>City of Guelph: Secondary Plan Area Boundary, Parcel Fabric, 2016.</small>	
<small>Contains information licensed under the Open Government License – Ontario</small>	
<small>First Base Solutions Web Mapping Service 2017</small>	
<small>UTM Zone 17 N, NAD 83</small>	
<small>0 125 250 500 Metres</small>	
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<small>Project 216002 August, 2018</small>	

4. CEIS Phase 1/2 Characterization Report: NHS: Input to Community Structure Alternatives

- NHS: As the NHS as it was approved in 2014 it already has informed the siting of roads, trails and adjacent land uses, and will continue to do so
- NHS FEATURE UPDATES AND REFINEMENTS:
 - The Ph 1/2 CEIS presented Draft 1 of the NHS feature updates and refinements.
 - Draft 2 will be further refined based on additional information from the agencies, City, landowners and stakeholders.
 - The Draft 2 NHS will form the basis for further Community Structure Alternatives

4. CEIS Phase 1/2 Characterization Report: NHS: Integration Considerations

- WETLANDS: Results from the shallow groundwater monitoring need to be considered in conjunction with results from the wetland surface water monitoring to better understand functional relationships
- CONNECTIVITY: Roads, trails and other infrastructure requirements need to be sited with consideration for maintaining the character and connectivity of the NHS
 - **Where amphibian and reptile movement “hotspots”** have been identified across existing roads, opportunities for mitigation measures should be flagged as part of road improvements



Clair-Maltby

Transform. Connect. Community.

5. MESP Overview

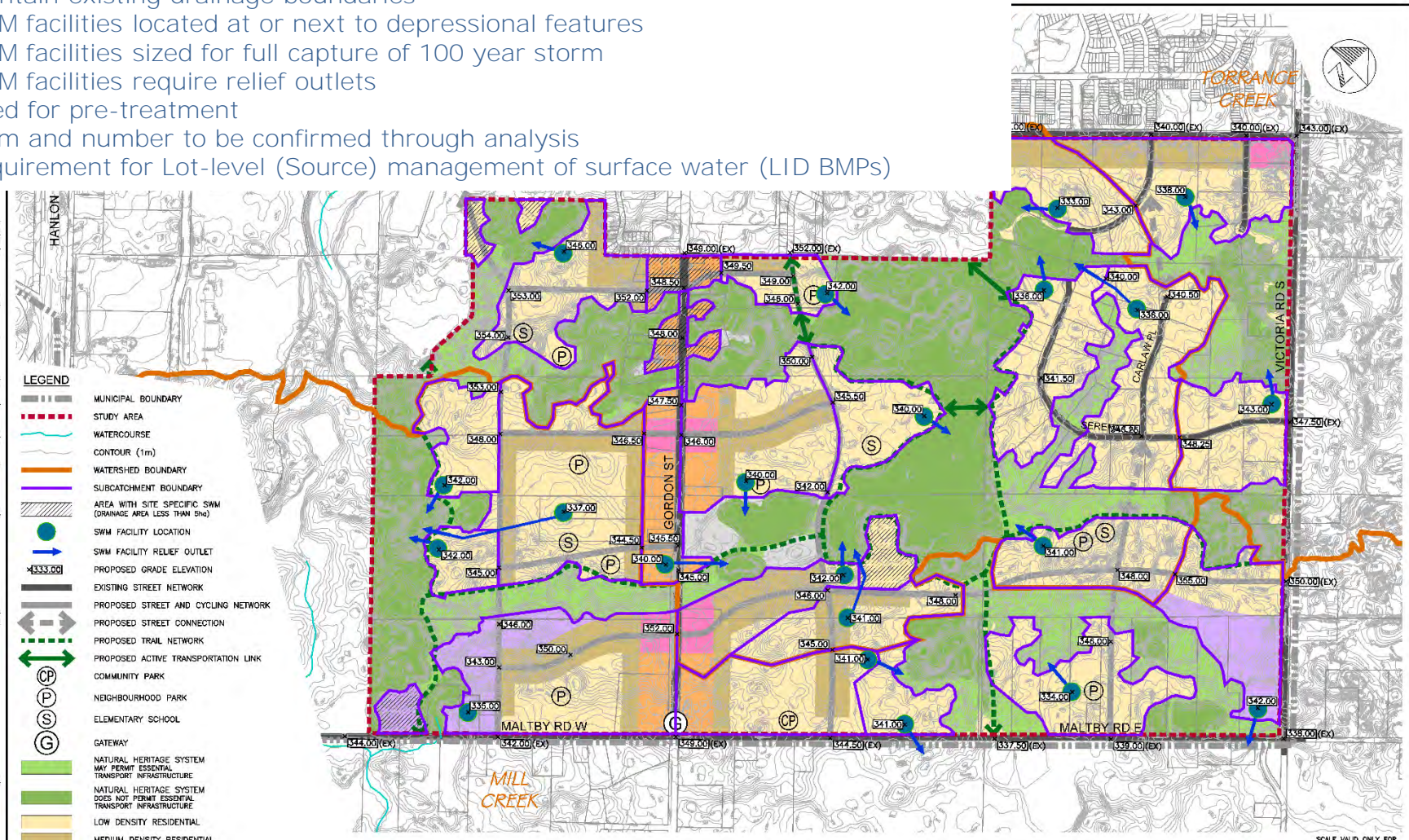
5. MESP Overview:

1. Stormwater
2. Water / Wastewater
3. Transportation / Mobility

5. MESP Overview

Stormwater Management Plan

- Maintain existing drainage boundaries
- SWM facilities located at or next to depressional features
- SWM facilities sized for full capture of 100 year storm
- SWM facilities require relief outlets
- Need for pre-treatment
- Form and number to be confirmed through analysis
- Requirement for Lot-level (Source) management of surface water (LID BMPs)



LEGEND

	MUNICIPAL BOUNDARY
	STUDY AREA
	WATERCOURSE
	CONTOUR (1m)
	WATERSHED BOUNDARY
	SUBCATCHMENT BOUNDARY
	AREA WITH SITE SPECIFIC SWM (DRAINAGE AREA LESS THAN 5ha)
	SWM FACILITY LOCATION
	SWM FACILITY RELIEF OUTLET
	PROPOSED GRADE ELEVATION
	EXISTING STREET NETWORK
	PROPOSED STREET AND CYCLING NETWORK
	PROPOSED STREET CONNECTION
	PROPOSED TRAIL NETWORK
	PROPOSED ACTIVE TRANSPORTATION LINK
	COMMUNITY PARK
	NEIGHBOURHOOD PARK
	ELEMENTARY SCHOOL
	GATEWAY
	NATURAL HERITAGE SYSTEM MAY PERMIT ESSENTIAL TRANSPORT INFRASTRUCTURE
	NATURAL HERITAGE SYSTEM DOES NOT PERMIT ESSENTIAL TRANSPORT INFRASTRUCTURE
	LOW DENSITY RESIDENTIAL
	MEDIUM DENSITY RESIDENTIAL
	HIGH DENSITY RESIDENTIAL
	MIXED USE
	EMPLOYMENT
	NO DEVELOPMENT

CLAIR-MALTBY
 MASTER ENVIRONMENTAL
 SERVICING PLAN AND
 SECONDARY PLAN
 CITY OF GUELPH

PRELIMINARY CONCEPTUAL
 STORMWATER MANAGEMENT
 AND GRADING PLAN

amec
 foster
 wheeler

Scale 1:6000
 0 50 100 200

Consultant File No.
 TPB168050

Figure No.
 W2

SCALE VALID ONLY FOR
 24"X36" VERSION

5. MESP Overview: Water

Water Servicing Concept

Extension of Zone 3 distribution with 300 mm watermains on all roads.

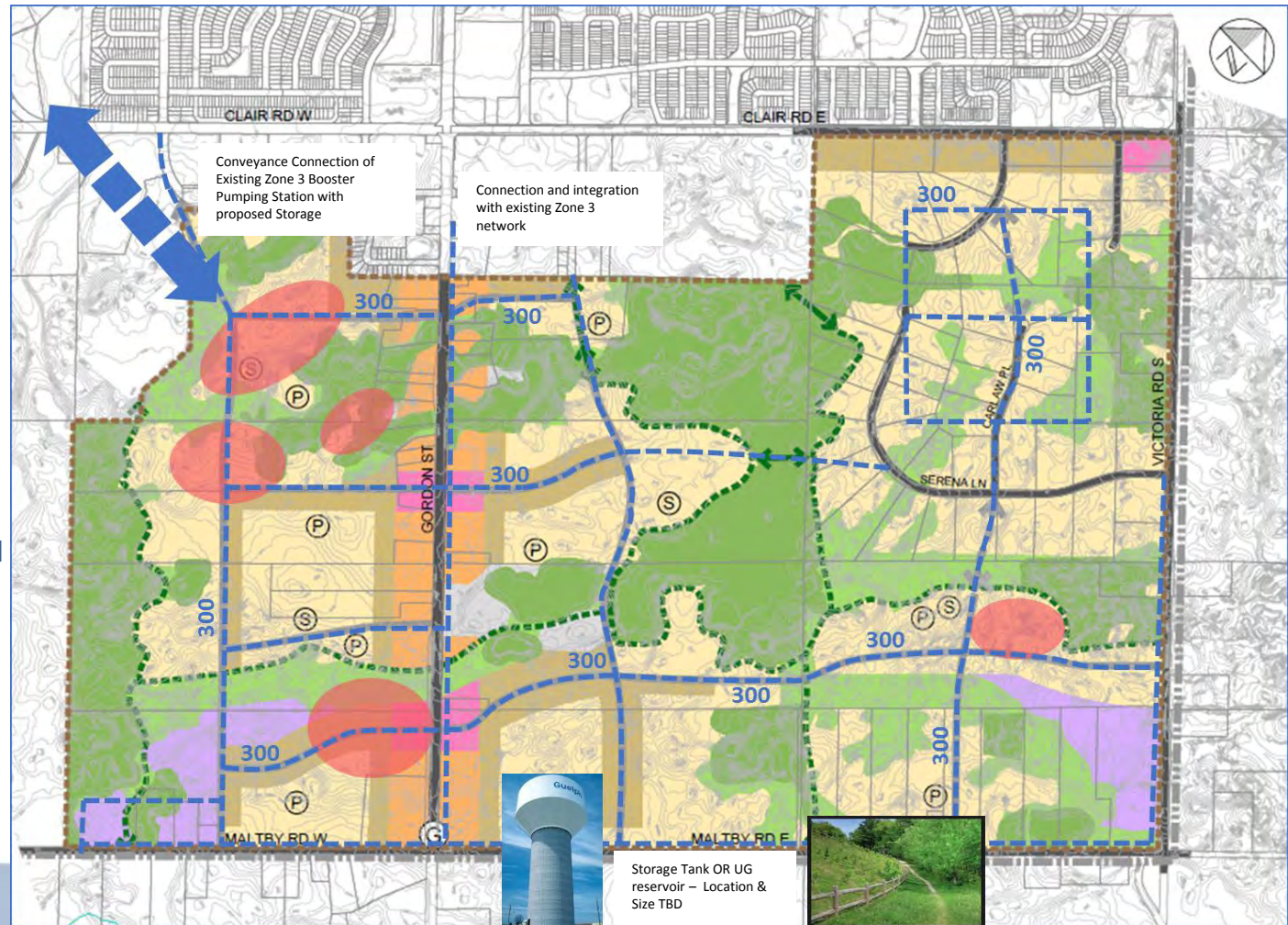
Configuration to be looped to avoid introduction of dead ends

Zone 3 Storage (Elevated or In-ground Alternatives to be Considered), preferred location in the higher ground

High ground above 350 m in parts of the development will be serviced at minimum allowable pressure (280 Kpa) rather than minimum preferred serviced pressure (350 Kpa) with current configuration of Zone 3 - HGL = 388 m

Conveyance Connection required from Existing Booster Pumping Station - 400 mm - 600 mm.

High ground above 350 m



5. MESP Overview: Wastewater

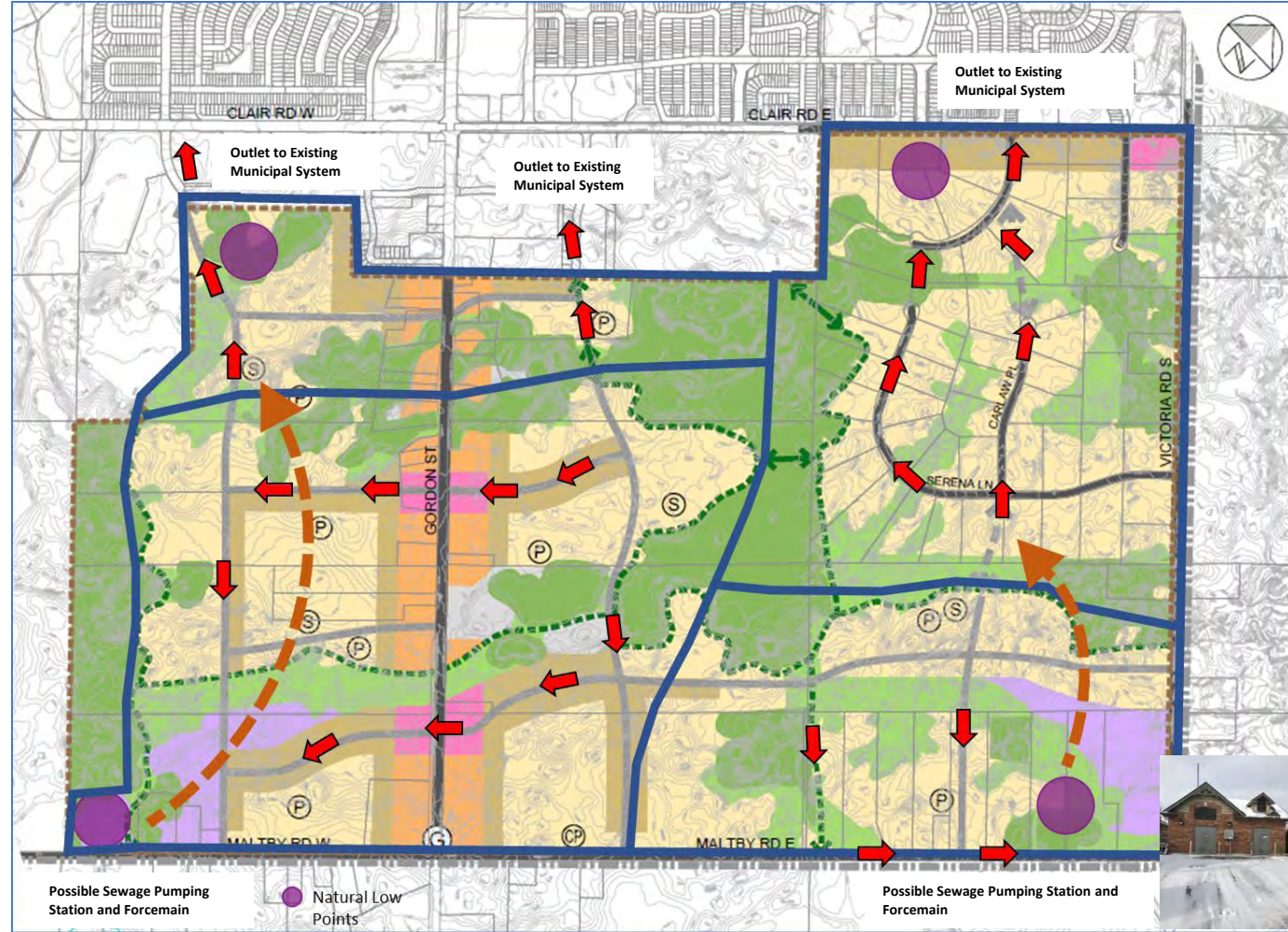
Internal Sanitary Servicing Concept

Conceptual Sewersheds shown to service proposed lands with existing topographic constraints

Sewershed Configuration may be refined with phasing and ultimate land use

One or more Sewage Pumping Stations (SPSs) will be required with the proposed land use

External Servicing Upgrades will be required to provide Capacity from CMSP lands to Guelph WWTP



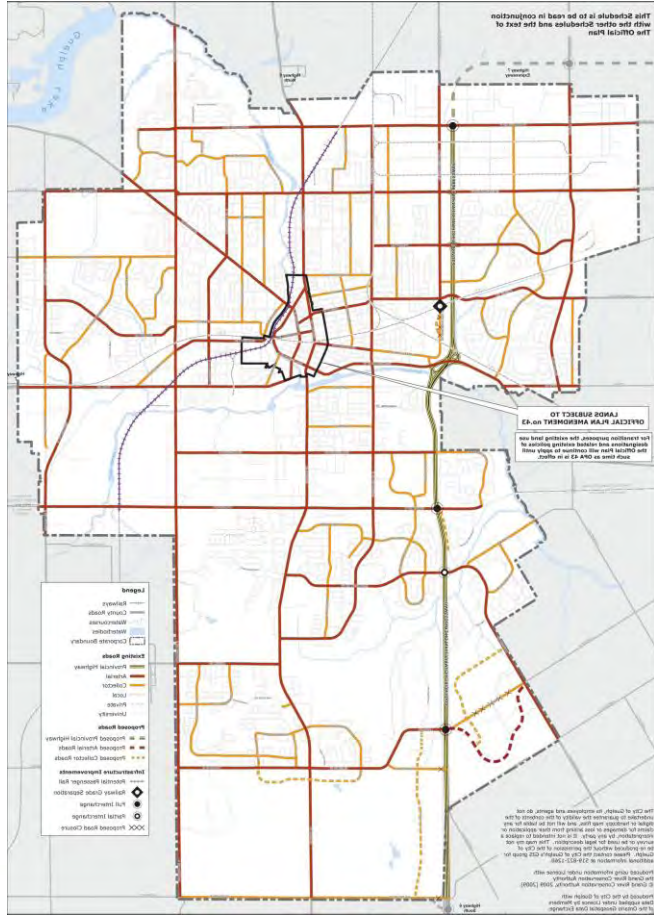
5. MESP Overview: Mobility

Transportation: Planned Road Improvements

Guelph-Wellington Transportation Study (TMP)

Key Improvements in Secondary Plan Area:

- Widening of Gordon Street from 2 to 4 lanes (approved 2001 EA) from Kortright Road to Wellington Road 34;
- Widening of Clair Road from 2 to 4 lanes (approved 2003 EA) - COMPLETE
- Southerly extension of Southgate Drive to Maltby Road; and
- Development of an internal collector road system within the Clair-Maltby Secondary Plan area connecting to Gordon Street and Maltby Road.



5. MESP Overview:

Mobility

Street Network Considerations

- Collector Street network should:
 - provide flexibility, permeability, and continuity;
 - support transit service operations;
 - support multi-modal transportation;
 - enhance connectivity for all travel modes.
- LEED ND Neighbourhood Development Street Layout Goals
 - Provide robust and frequent connectivity internal to the neighbourhood, and to adjacent neighbourhoods.

6. Next Steps / Timing - Schedule: CEIS

- Evaluate impact of proposed Community Structure Plan on
 - Surface Water
 - Groundwater
 - Natural Heritage System
 - Landforms
- Impact to land uses, servicing and management strategies
- Q3/Q4 2018

6. Next Steps / Timing - Schedule: MESP

- Develop preliminary servicing concepts
- Assess alternatives
- Fulfil Environmental Assessment Act requirements
 - Consultation
 - Reasonable range of alternatives
- Q4 2018 / Q1 2019

6. Next Steps / Timing - Schedule: Secondary Plan

Q4 2018	Public Workshops to inform policy development
Q1 2019	Prepare Draft Secondary Plan
Q2 2019	Completion of Technical Studies Public Open House & PIC #3 Statutory Public Meeting
Q3 2019	Recommended Secondary Plan & Final MESP to Council



Thank You