



MTE Consultants

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MTE File No.: C45188-100

Ms. Tammy Middleton
Regional Municipality of Waterloo
150 Frederick Street
Kitchener, Ontario N2G 4J3
Email: TMiddleton@regionofwaterloo.ca

Dear Ms. Middleton:

**RE: Source Water Protection Contamination Study (SWPCS) –
840 Main St. (Taylor Lands), Cambridge, Ontario**

MTE Consultants Inc. (MTE) was retained by Reid's Heritage Homes Ltd. (RHH) to review and comment on the City of Cambridge pre-consultation meeting outcomes (D09-20) for 840 Main Street (Subject Land). Specifically, this letter report relates to addressing the need to complete a Source Water Protection Contamination Study (SWPCS) to the satisfaction of the Region of Waterloo (ROW) as part of a complete application¹ for re-developing the Subject Land for residential purposes. A SWPCS is required due to the adjacent high threats identified by the ROW in the Source Water Protection Urban Threats Inventory Database (TID).

The Subject Land consists of four contiguous properties (~25 hectares (ha)) located northeast of the intersection of Main Street East and Franklin Boulevard in Cambridge, Ontario. The Subject Land is currently surrounded by mixed residential, agricultural, commercial and industrial land uses and is assembled into four (4) registered land holdings comprising the following legal descriptions, municipal addresses (where applicable) and Property Identification Numbers (PINs)²:

- **Parcel A:** Concession 11, part lots 5 and 28 (no municipal address, PIN 0382-60206);
- **Parcel B:** Concession 11, part lots 5 and 28 (no municipal address, PIN 0382-60470);
- **Parcel C:** Concession 11, part lots 4, 5, 28 and 49 (840 Main Street East, PIN 0382-60192); and
- **Parcel D:** Concession 11, part lots 4 and 49, PI 1135 (940 Main Street East, PIN 0382-60195).

In order to facilitate readability and use of this letter, the SWPCS is divided into sections that will provide a baseline assessment of the hydrogeologic and geochemical conditions of the Subject Land.

¹ City of Cambridge, D09-20, 2020, pp. 19.

² MTE, 2021a, pp. 2.

Background Review

MTE reviewed a number of documents in completing the SWPCS that included:

- Published Ontario Geological Survey (OGS) geological maps and reporting^{3,4};
- Grand River Information Network website⁵;
- Region of Waterloo Policy Mapping Tool⁶;
- Source Water Protection Assessment and Tier 3 reporting⁷;
- Stantec draft report documents; and
- MTE interim Phase One and Phase Two documents.

MTE is currently engaged in a Phase Two Environmental Site Assessment (ESA) study for the Subject Land and the available field data results are included in this SWPCS assessment. The completed Phase One work included an environmental records review, site reconnaissance, and interview with representatives familiar with the Subject Land. The Phase One ESA identified several Potentially Contaminating Activities (PCAs) associated with the Subject Land and surrounding properties⁸, resulting in Areas of Potential Environmental Concern (APEC)⁹ at the Subject Land.

Source Water Protection Review

The Clean Water Act (CWA)¹⁰, passed by the Ontario legislature, established a source protection planning process that includes the identification and assessment of groundwater based vulnerable areas, using science based criteria and methods to protect drinking water at its source throughout Ontario. The task of developing Source Protection Plans (SPP) within the Grand River watershed was completed through the Lake Erie Source Protection Committee (LERSPC) to establish appropriate policies to protect municipal source water in the ROW. The goal of a SPP is to manage or eliminate activities that are, or could become, significant threats to source water supplies in terms of water quality and/or quantity. A SPP is a list of policies and programs to protect current and future sources of municipal drinking water in the ROW from contamination and overuse.

The Subject Land is located within a low to medium intrinsic vulnerability or Intrinsic Susceptibility Index (ISI). Each Wellhead Protection Area (WHPA) was overlain on the ISI map for the corresponding municipal well and vulnerability scores were assigned to the WHPAs according to the technical rules. As a result, the WHPA vulnerability identified for this area is scored between two (2) and six (6), which represents a low to medium aquifer vulnerability to contamination. The closest municipal well(s) to the Subject Land is found approximately one

³ Karrow, 1987.

⁴ Bajc and Shirota, 2007.

⁵ Grand River Information Network: <https://maps.grandriver.ca/web-gis/public>

⁶ Lake Erie Source Protection Region Policy Mapping Tool: <https://maps.grandriver.ca/swp-policymapping/>

⁷ LERSPC, 2021.

⁸ MTE, 2021a, pp. 30 – 32, Appendix G

⁹ MTE, 2021a, pp. 32 – 33.

¹⁰ MECP, 2006.

kilometer (km) southwest and is identified as municipal well G9, which is located at Elgin Street. Two additional municipal wells, G7 and G8, are located approximately 1.5km northeast of the Subject Lands that are a part of the Shades Mills municipal wellfield. The Shades Mill municipal wells are shallow overburden wells, installed in 1958 and 1965, respectively, to depths of less than 18m bgs¹¹. The Subject Land is located outside the five (5) to 25-year Time-of-Travel (ToT) (WHPA-D) for the Shades Mills municipal wells and is therefore not significant within the context of this SWPCS. However, the Subject Land is within the two (2) to five (5) ToT for G9 (WHPA-C). **Table 1.1** identifies the municipal well’s approximate distance from the Subject Land and the municipal well’s screened (or open hole) interval. The municipal water supply wells are screened in either the overburden or bedrock aquifer¹².

Table 1.1: Municipal wells in proximity to the Subject Land.

	Municipal Well ID	Approximate distance from Subject Land	Screened Interval (top to bottom)	Permit To Take Water (PTTW) No. ^b	Hydrostratigraphic Unit ^c
			(m bgs)		
Elgin Street	G9	1.1km southwest	25 to 78 ^a	N/A	Guelph and Eramosa Formation
Shades Mill	G7	1.4km northeast	14.6 to 17.7 ^b	3004-A9GHYU	Outwash Deposits (AFA2)
	G8	1.6km northeast	14.5 to 17.5 ^b		

Note: a. LERSPC, 2021, pp. 8-262.

b. Golder, 2017, Table 8, pp. 30.

c. Bajc and Shirota, 2007, Table 1, pp. 14, pp. 35.

The Subject Land is mapped within an Issue Contributing Area (ICA) because issues were identified at well G9 for trichloroethylene (TCE) (or dense non-aqueous liquid (DNAPL)), Chloride (Cl⁻), and Sodium (Na⁺)¹³.

Finally, the Subject Land is located within a mapped Significant Groundwater Recharge Area (SGRA) with a vulnerability score between two (2) and four (4).

Hydrogeology

The majority of the Subject Land is within the Moffat Creek subwatershed, with northern portions of the property being located in the Mill Creek subwatershed. Several wetland features are present across the Subject Land identified with the Moffatt Creek Provincially Significant Wetland (PSW) Complex. The presence of these wetland features is supported by the rugged stony nature of Wentworth Till, which is characterized by sandy silt till, associated with the Galt Moraine¹⁴.

¹¹ Golder, 2017, pp. 28.

¹² LERSPC, 2021, Table 8-6, pp. 8-27.

¹³ LERSPC, 2021, pp. 8-285.

¹⁴ Karrow, 1987, pp. 42.

Local hydrogeological information was collected by MTE and from other consultant reports completed between 2010 and 2021^{15,16,17}. A total of 34 monitoring wells were drilled on the Subject Land to measure water levels and collect groundwater samples. In general, the sediment stratigraphy consists of underlying fill or suspected reworked native fill made up of silt, sand, gravel, and till down to a depth of approximately 1.2m bgs. The thickness of the fill material ranges between 0.15m to 1.53 m. A sandy silt to silty sand till (interpreted to be the Wentworth Till¹⁸) is found from depths of 1.2m bgs to 21.3m bgs.

Since 2019, groundwater levels measured between approximately 0.1 metre below ground surface (m bgs) to 26m bgs (approximately 304.86 metres above mean sea level (m amsl) to 273.91m amsl). The interpreted direction of the shallow groundwater flow system generally mimics the topography with a localized groundwater divide running along the ridge within the central portion of the Subject Land¹⁹. The local groundwater flow pattern differs from the regional groundwater flow pattern, which is reported to flow to the southwest beneath the Subject Land towards Moffat Creek.

ESA Characterization

As part of an ongoing Phase Two ESA underway for the Subject Lands, MTE completed a test pitting program and the advancement of several boreholes instrumented as monitoring wells to investigate soil and groundwater quality within APECs identified during the Phase One ESA. In addition, sediment and surface water samples were collected within wetlands and ponds within the Subject Land. Select soil, groundwater, sediment and surface water samples were submitted for laboratory analysis of one or more of the following: metals (including hydrides) and inorganics, petroleum hydrocarbons (PHC) fractions F1-F4, organochlorine pesticides (OCs) polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs), including benzene, toluene, ethylbenzene and xylenes (BTEX) compounds. The laboratory analytical results for soil, groundwater, and sediment were compared to the Table 1 Full Depth Generic Site Condition Standards for Residential/Parkland/Institutional/Industrial/Commercial/Community property use, in a coarse textured soil (the “2011 Table 1 SCS”). The results for surface water were compared to the MECP Aquatic Protection Values (APV) and Provincial Water Quality Objectives (PWQOs). The following environmental impacts were identified:

- Elevated concentrations of sodium and chloride were detected in groundwater above the 2011 Table 1 SCS at monitoring well BH107, located adjacent to Franklin Boulevard in the northwest portion of the Site;
- Fill material containing debris (i.e., concrete bricks, metal, wood and asphalt) in the southern portion of the wetland in the central portion of the Subject Land, and in test pits and boreholes located adjacent to the wetland. Elevated concentrations of various metals, PHCs, PAHs, and xylene were either reported above their respective 2011 Table 1 SCSs in soil, groundwater, and sediment, or detected without 2011 Table 1 sediment standards within this area; and

¹⁵ Stantec, 2010, pp. 3-1.

¹⁶ Stantec, 2011, pp. 3.1.

¹⁷ MTE, 2021b.

¹⁸ Stantec, 2011, pp. 4.1.

¹⁹ Stantec, 2010, Figure 11.

- Elevated concentrations of metals, PCBs, PHCs F3, F4, and F4G, and trichloroflouromethane were reported above their respective 2011 Table 1 SCSs in sediment or detected without 2011 Table 1 sediment standards in a pond located along the east boundary of the Subject Land.

It should be noted that there were no detected exceedances of either the APVs or PWQOs reported for the surface water samples submitted for analysis, and no parameters were detected without a standard for comparison.

Impact Assessment Considerations

A total of 12 groundwater samples (including one duplicate) were submitted by MTE for laboratory analysis for one or more of metals, OCs, PAHs, PHCs, and VOCs against the 2011 Table 1 SCS. Since the Subject Land is in an ICA, identified through the SPP for municipal well G9, the main areas of concern are related to TCE, Cl⁻, and Na⁺. These main contaminants of concern have been an issue for the ROW since at least 1991, however since 2001 higher precision data have been collected and reported on by the ROW²⁰. Thus, any additional sources of TCE, Cl⁻, and Na⁺ from the Subject Land may potentially further increase concentrations observed at G9. In regards to the TCE issue, the source(s) of TCE to well G9 are not known²¹. The Interim Phase Two ESA fieldwork program for the Subject Land did not record any elevated TCE concentrations in groundwater. In fact, reported TCE concentrations in groundwater were non-detect (i.e. below the reported detection limit of <0.20 µg/L), which is negligible when compared to the Ontario Drinking Water Quality Standards (ODWQS) of 5µg/L²² and the long-term detected average of approximately 2µg/L measured by the ROW. There is no clear long-term trend of TCE concentration over time in the raw water source²³. Therefore, the Subject Land is not considered an environmental risk as a source of DNAPL (TCE).

The Cl⁻ and Na⁺ concentrations on the Subject Land (BH107) were found to exceed the 2011 Table 1 SCS of 790mg/L and 490mg/L (1,300mg/L and 580mg/L, respectively). Likewise, these elevated values also exceed the Ontario Drinking Water Aesthetic Objective (ODW-AO) guideline of 250mg/L for Cl⁻ and 200mg/L for Na⁺. It is noted that Well G9 has shown increasing Cl⁻ and Na⁺ since at least 1973 when the ROW began monitoring²⁴. Even though municipal well G9 is screened in the deep bedrock aquifer (from 25m bgs to 78m bgs), MTE agrees that a Salt Management Plan be conducted as proposed by the City of Cambridge²⁵ due to the environmental risk posed by increased Cl⁻ and Na⁺ concentrations over time.

²⁰ LERSPC, 2021, pp. 8-285.

²¹ LERSPC, 2021, pp. 8-286.

²² MOE, 2006.

²³ LERSPC, pp. 8-287, Figure 8-21.

²⁴ LERSPC, pp. 8-287 – 8-288, Figure 8-22, Figure 8-23.

²⁵ City of Cambridge, D09-20, 2020, pp. 19.

In conclusion, the lateral and vertical delineation of groundwater is adequately characterized for the purposes of this SWPCS letter. We trust this meets with the ROW and the City of Cambridge requirements for the SWPCS. Should you have any questions please don't hesitate to contact us.

Yours truly,
MTE Consultants Inc.

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