

**Stage 1 Archaeological Assessment  
Cambridge Mill Hotel Condo  
130 Water Street North  
City of Cambridge  
Regional Municipality of Waterloo  
Part of Lot 1 East of the Grand River, Concession 11  
Geographic Township of North Dumfries  
Former Waterloo County, Ontario**

Prepared for  
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**05/10/2020**

**Original Report**

## EXECUTIVE SUMMARY

Under a contract awarded in June 2020, Archaeological Research Associates Ltd. carried out a Stage 1 assessment of lands to be impacted by the proposed Cambridge Mill Hotel Condo complex at 130 Water Street North in the City of Cambridge, Regional Municipality of Waterloo, Ontario. The assessment was carried out in support of an Official Plan and Zoning By-law Amendment application and was triggered by the requirements set out in Section 2.6 of the Provincial Policy Statement, 2020 issued under Section 3 of the *Planning Act*. This report documents the background research and potential modelling involved in the investigation, and presents conclusions and recommendations pertaining to archaeological concerns.

The Stage 1 assessment was conducted in June 2020 under Project Information Form #P007-1111-2020. The investigation encompassed the entirety of the application boundary. The study area was not subject to a property inspection; accordingly, legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was not required. At the time of assessment, the study area comprised part of a paved parking lot used to support the existing Cambridge Mill Restaurant and adjacent grassed and treed areas.

The Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential and areas of no archaeological potential. Grading and major landscaping associated with the establishment of the parking lot have resulted in the removal of archaeological potential from all of the upper layers. Deep land alterations, including previous construction and demolition activities, the establishment of fills and the installation of various utilities, have similarly removed potential from the majority of the lower layers. One area in the east and two areas in the south were determined to have potential for deeply buried archaeological resources associated with the earliest occupation of the property.

It is recommended that the identified areas of archaeological potential be subject to Stage 2 archaeological monitoring in accordance with Section 2.1.7 Standard 4 of the 2011 *Standards and Guidelines for Consultant Archaeologists*. Deeply buried survey using mechanical trenching is not warranted due to the extent of the previous deep land alterations. The borehole results show substantial disturbed layers, and mechanical trenching would be an ineffective method of identifying any remains at the depths involved. Furthermore, the chances of any substantial archaeological remains are minimal due to the evidence of disturbance shown in the borehole and ground penetrating radar results, the repeated uses and scouring floods in the area, and the impacts associated with the installation of various sewers. Potential soil contamination and toxicity resulting from the Galt Gas Co. were also important factors in the decision to recommend archaeological monitoring.

Prior to the commencement of construction and archaeological monitoring, detailed documentary research must be carried out for the property as set out in Section 3.1 of the 2011 *S&Gs*. This information will assist in determining the cultural heritage value or interest of any deeply buried archaeological resources. These recommendations were informed by the results of a request for advice to the Ministry of Heritage, Sport, Tourism and Culture Industries. The identified areas of no archaeological potential do not require any additional assessment.

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## **GLOSSARY OF ABBREVIATIONS**

ARA – Archaeological Research Associates Ltd.  
CHVI – Cultural Heritage Value or Interest  
ESA – Environmental Site Assessment  
GPR – Ground Penetrating Radar  
MHSTCI – Ministry of Heritage Tourism, Sport and Culture Industries  
PIF – Project Information Form  
S&Gs – Standards and Guidelines for Consultant Archaeologists

## **PERSONNEL**

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## **1.0 PROJECT CONTEXT**

### **1.1 Development Context**

Under a contract awarded in June 2020, ARA carried out a Stage 1 assessment of lands to be impacted by the proposed Cambridge Mill Hotel Condo complex at 130 Water Street North in the City of Cambridge, Regional Municipality of Waterloo, Ontario. The assessment was carried out in support of an Official Plan and Zoning By-law Amendment application and was triggered by the requirements set out in Section 2.6 of the Provincial Policy Statement, 2020 issued under Section 3 of the *Planning Act*. This report documents the background research and potential modelling involved in the assessment, and presents conclusions and recommendations pertaining to archaeological concerns within the property.

The subject study area consists of an irregularly-shaped parcel of land with a total area of 0.63 ha (Map 1). This parcel is generally bounded by a condominium to the north, Water Street North to the east, the existing Cambridge Mill Restaurant to the south and a walking trail along the banks of the Grand River to the west. In legal terms, the study area falls on part of Lot 1 East of the Grand River, Concession 11 in the Geographic Township of North Dumfries, Waterloo County.

The Stage 1 assessment was conducted in June 2020 under PIF #P007-1111-2020. The investigation encompassed the entirety of the application boundary. The study area was not subject to a property inspection; accordingly, legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was not required. In compliance with the objectives set out in Section 1.0 of the 2011 *S&Gs*, this investigation was carried out in order to:

- Provide information concerning the geography, history and current land condition of the study area;
- Determine the presence of known archaeological sites in the study area;
- Present strategies to mitigate project impacts to such sites, if they are located;
- Evaluate in detail the archaeological potential of the study area; and
- Recommend appropriate strategies for Stage 2 archaeological assessment, if some or all of the study area has archaeological potential.

The MHSTCI is asked to review the results and recommendations presented herein and enter the report into the Ontario Public Register of Archaeological Reports. ARA did not engage with any Indigenous groups over the course of the subject investigation.

### **1.2 Historical Context**

After a century of archaeological work in southern Ontario, scholarly understanding of the historic usage of the area has become very well-developed. With occupation beginning in the Palaeo period approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Indigenous and Euro-Canadian histories. Section 1.2.1 summarizes the region's settlement history, whereas Section 1.2.2 documents the study area's past and present land uses. No previous archaeological reports containing relevant background information were obtained during the research component of the study.

## 1.2.1 Settlement History

### 1.2.1.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

**Table 1: Pre-Contact Settlement History**  
 (Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted projectiles
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted projectiles
Early Archaic	7500–6000 BC	Side-notched, Corner-notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton side- and corner-notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Saugeen tradition; Stamped ceramics appear; Saugeen projectile points; Cobble spall scrapers; Seasonal settlements and resource utilization; Post holes, hearths, middens, cemeteries and rectangular structures identified
Middle/Late Woodland Transition	AD 600–900	Princess Point tradition; Cord roughening, impressed lines and punctate designs on pottery; Adoption of maize horticulture at the western end of Lake Ontario; Oval houses and ‘incipient’ longhouses; First palisades; Villages with 75 people
Late Woodland (Early)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements
Late Woodland (Middle)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late)	AD 1400–1600	Pre-Contact Neutral tradition; Larger villages (1.7 ha); Examples up to 5 ha with 2,500 people; Extensive croplands; Also hamlets, cabins, camps and cemeteries; Potential tribal units; Fur trade begins ca. 1580; European trade goods appear

Although Iroquoian-speaking populations tended to leave a much more obvious mark on the archaeological record and are therefore emphasized in the Late Woodland entries above, it must be understood that Algonquian-speaking populations also represented a significant presence in southern Ontario. Due to the sustainability of their lifeways, archaeological evidence directly associated with the Anishinaabeg remains elusive, particularly when compared to sites associated with the more sedentary agriculturalists. Many artifact scatters in southern Ontario were likely camps, chipping stations or processing areas associated with the more mobile Anishinaabeg,

utilized during their travels along the local drainage basins while making use of seasonal resources. This part of southern Ontario represents the ancestral territory of various Indigenous groups, each with their own land use and settlement pattern tendencies.

### 1.2.1.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17<sup>th</sup> century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in Table 2.

**Table 2: Post-Contact Settlement History**  
 (Smith 1846; Coyne 1895; Lajeunesse 1960; Janusas 1988; Ellis and Ferris 1990; Surtees 1994; AO 2015)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17 <sup>th</sup> century	Brûlé explores southern Ontario in 1610; Champlain travels through in 1613 and 1615/1616, encountering a variety of Indigenous groups (including both Iroquoian-speakers and Algonquian-speakers); European goods begin to replace traditional tools
Increased Contact and Conflict	Mid- to late 17 <sup>th</sup> century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; ‘The Great Peace of Montreal’ treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18 <sup>th</sup> century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years’ War in 1754; French surrender in 1760
British Control	Mid- to late 18 <sup>th</sup> century	<i>Royal Proclamation</i> of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18 <sup>th</sup> century	United Empire Loyalist influx after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; Between the Lakes Purchase completed with the Mississaugas in 1784 and confirmed in 1792 (Treaty 3); Haldimand Proclamation of 1784 grants land to Six Nations (the Haldimand Tract), clarified by the Simcoe Patent (Treaty 4) in 1793; <i>Constitutional Act</i> of 1791 creates Upper and Lower Canada
County Development	Late 18 <sup>th</sup> to early 19 <sup>th</sup> century	Became part of York County’s ‘West Riding’ in 1792; Brant surrenders Blocks 1–6 of the Haldimand Tract to the Crown in 1798; Became part of the Gore District and Halton County in 1816; Wellington District and Waterloo County created in 1840; Waterloo County independent after the abolition of the district system in 1849
Township Formation	Early 19 <sup>th</sup> century	North Dumfries was originally part of Block 1 of the Haldimand Tract; Block 1 purchased by Philip Stedman in 1798; Acquired by William Dickson in 1816; Adrian Marlett surveyed the area that year; Early settlers in North Dumfries included the Shades, Frasers, McBeans, Mackenzies, Buchanans, Carricks, Harvies, McArthurs and McColls; Only 163 people in all of Dumfries by 1818 (the majority in the south); Rate of settlement increased after 1825

Historical Event	Timeframe	Characteristics
Township Development	Mid-19 <sup>th</sup> to early 20 <sup>th</sup> century	By 1846, there were 7 grist mills and 16 saw mills in all of Dumfries; North and South Dumfries divided between Waterloo and Brant Counties ca. 1850; Traversed by the Great Western Railway's Galt Branch (1854), the Galt & Guelph Railway (1855), the Grand Trunk Railway's Doon Branch (1873), the Credit Valley Railway (1881) and the Lake Erie & Northern Railway (1916); Largest settlements included Galt (Shade's Mill) and Ayr (Mudge's Mill); Smaller communities at Branchton, Greenfield (formerly Greenfield Mills), Reidsville, Roseville and Whistlebare

## 1.2.2 Past and Present Land Use

### 1.2.2.1 Overview

During Pre-Contact and Early Contact times, the vicinity of the study area would have comprised a mixture of coniferous trees, deciduous trees and open areas. Indigenous communities would have managed the landscape to some degree. During the early 19<sup>th</sup> century, Euro-Canadian settlers arrived in the area and began to clear the forests for agricultural and settlement purposes. The study area was located within the historic community of Galt. The land use at the time of assessment can be classified as commercial (a parking lot to support the existing Cambridge Mill Restaurant).

### 1.2.2.2 Galt

The community of Galt began to develop in 1802, when Alexander Miller purchased lands from Joseph Brant and commissioned Nathaniel Dodge to build a mill near the confluence of Mill Creek and the Grand River. Mr. Maas served as the miller, and “the business of gristing appears to have been carried on for some considerable time” (Cumming 1972:8). Miller lost his land rights after fighting for the Americans in the War of 1812. In 1816, William Dickson acquired Block 1 and immediately set about establishing a village on the Grand River and marketing his lands. Absalom Shade was retained to oversee the improvements, and the lands were surveyed later that year. The old Miller mill was repaired and used for gristing until a newer mill could be built, and the settlement became known as ‘Shade’s Mill’. Shade’s Mill contained a variety of buildings in 1820, including a saw mill, a new grist mill (the Dumfries Mills), a distillery and a blacksmith shop (Young 1880:30–34; Cumming 1972:8).

Shade purchased the Dumfries Mills of Mr. Dickson as well as 200 acres within the settlement in the 1820s (Cumming 1972:8). In 1827, John Galt met with Dickson and recommended that the Canada Company build a road between Galt and Guelph. In recognition of John Galt’s contribution to the settlement, Shade’s Mill was renamed ‘Galt’ (Young 1880:48–49). Dickson had previously commissioned John Telfer to recruit settlers from Scotland, and the resulting influx in the 1830s was substantial. A building boom occurred in the late 1830s, including Robert Dickson’s construction of the Galt Dam and Canal in 1837. The dam and canal attracted many industries in the 1840s, including the Galt Foundry in 1840, the Fisher Foundry in 1842, the Dickson Mills in 1842 and the Crombie Foundry in 1844. The Dickson Mills were destroyed by fire in 1843 but were quickly rebuilt. Galt was incorporated as a village in 1850, and the population reached 2,213 in 1851 (Young 1880:189–191; Janusas 1988:135–139).

The arrival of the Great Western Railway's Galt Branch in 1854 and the Galt & Guelph Railway in 1855 contributed immensely to Galt's industrial growth. The community was incorporated as a town in 1857, and the population reached 3,041 in 1861. Although previously limited to the areas immediately adjacent to the Grand River (i.e., between the large hills to the west and east), Galt spread east to Dundas Street and south to Concession Street and Cedar Street in 1867. The population reached 4,737 in 1875 and approximately 5,000 in 1880. The arrival of the Grand Trunk Railway's Doon Branch and the Credit Valley Railway further contributed to the development of the settlement. Galt passed a By-law in favour of purchasing power from Ontario Hydro in 1908, which facilitated growth in areas away from the waterways and railway lines. This change allowed for the development of new roads and the automobile industry (Janusas 1988:139–141).

### 1.2.2.3 Mapping and Imagery Analysis

In order to gain a general understanding of the study area's past land uses, one patent plan, five historic settlement maps, one topographic map, two fire insurance plans, one flood map and eight aerial images were examined during the research component of the study. Specifically, the following resources were consulted:

- The *Dumfries Patent Plan* (1930) (AO 2015);
- M. Smith's *Topographical Map of the Incorporated Village of Galt, Canada West* (1851) (Cambridge Archives);
- G.R. and G.M. Tremaine's *Tremaine's Map of the County of Waterloo, Canada West* (1861) (OHCMP 2019);
- J. Pollock's *Map of the Town of Galt, County of Waterloo* (1867) (Cambridge Archives);
- H. Brosius' *Bird's Eye View of Galt, Province Ontario, Canada* (1875) (Cambridge Archives);
- H. Parsell & Co.'s *Illustrated Historical Atlas of the County of Waterloo, Ont.* (1881) (McGill University 2001);
- A topographic map from 1916 (OCUL 2020);
- Fire insurance plans from 1919 (Revision of 1910) and 1929 (Archives of Ontario); and
- Aerial images from 1945 and 1955 (University of Waterloo 2016);
- *Flood Levels for Galt and Part of Preston* (1974) (Leach 1975);
- Aerial Images from 2000, 2006, 2009, 2010, 2014 and 2018 (Google Earth Pro 2020; Region of Waterloo 2020).

The limits of the study area are shown on georeferenced versions of the consulted historical resources in Map 2–Map 13.

The *Dumfries Patent Plan* (1930) is a copy of a plan created in December 1928, which itself was a copy of an earlier plan from July 1822. This plan identifies A. Shade as the patentee for the southern part of Lot 1 East of the Grand River ('Lot 1') but does not indicate anyone for the northern part ('Lot 2'). Like most patent plans, this map provides no insights regarding early land uses (Map 2). The *Topographical Map of the Incorporated Village of Galt, Canada West* (1851) indicates that the westernmost portion of the study area comprised part of the Grand River and that the remainder consisted of lands adjacent to Water Street North. The lands are shown as belonging to the late Hon. Robert Dickson, son of William Dickson. Two structures are shown in the southern

part of the study area, including part of the gates to the canal and a rectangular building west of Simcoe Street. A saw mill and flouring mill (the Dickson Mills) appear to the south (Map 3). *Tremaine's Map of the County of Waterloo, Canada West* (1861) provides a similar picture, although no structures are indicated within the study area (Map 4).

The *Map of the Town of Galt, County of Waterloo* (1867) shows several early structures along Water Street North, as well as dashed line that may indicate a subdivided parcel. The gates appear to the southwest, and a rectangular building appears once again in the southeast (Map 5). The *Bird's Eye View of Galt, Province Ontario, Canada* (1875) provides further evidence that several structures stood along Water Street North, and an additional building is illustrated along the waterfront near the canal gates (Map 6). A photograph from the north indicates that the buildings along Water Street North had been demolished by 1880, and the only structures in the area appear along the waterfront near the gates (Image 1). The *Illustrated Historical Atlas of the County of Waterloo, Ont.* (1881) provides little additional information regarding past land uses; the study area is shown as falling partly within the Grand River and partly within the core of Galt (Map 7). The topographic map from 1916 shows a stone or brick structure in the northeast and a wooden building in the southeast, but the illustration is quite schematic (Map 8).

The fire insurance plans from 1919 (Revision of 1910) and 1929 provide a much more complete picture of early 20<sup>th</sup>-century land uses. In the earlier plan, the study area consists of the mill pond in the west, the Galt Gas Co. in the northeast and W.I. Reid's lumber yard in the south. The central part of the study area contained piled lumber as well as an office in the east, and a concrete dam appears to the southwest (Map 9). The Galt Gas Co. was reportedly established in 1887 and included two gasometers, a gas purification yard and a retort building (MTE 2019:4). The later plan indicates that the southern part of the Galt Gas Co. building had been demolished and the northern part was used for storage. The rest of the study area remained largely the same (Map 10).

The aerial images from 1945 and 1955 demonstrate that the western portion of the study area continued to comprise part of the Grand River and that the eastern portion contained numerous commercial/industrial facilities (Map 11). The study area reported contained a textile plant operated by Stauffer-Dobbie Ltd. ca. 1940 (MTE 2016:2). In May 1974, this area was severely impacted by flooding. The water reached up to six feet deep in the downtown area and extended one to one-and-a-half blocks from the river (Leach 1975). Based on the available mapping, the flooding extended across the entire study area, save for the northeastern corner (Map 12). The textile plant was demolished in 1985, and the property was vacant until 2010 when it began to be used as a parking lot (MTE 2016:2). Aerial images from 2000–2018 demonstrate these land use changes, and also suggest that the northern portion was impacted during the construction of the adjacent condominium (Map 13–Map 14).

#### 1.2.2.4 Environmental Site Assessments

The ESAs completed for the project provide additional insights regarding the subsurface environment of the study area (MTE 2016, 2019). During the Phase Two ESA, 31 boreholes were drilled across the property, and monitoring wells were installed in 21 of the boreholes. The results indicated that the stratigraphy consisted of asphalt pavement, surficial gravel and small landscaped areas over historically placed fill over native sand and silt over native sand and gravel over bedrock. The fill was encountered in all boreholes to a maximum depth of 6.7 m, and the upper

portion typically consisted of granular base while the lower portion typically consisted of sand and gravel. In the north, west and central parts of the study area, “the lower portion of the fill also included varying amounts of ash, slag, cinders, brick and wood, which appear to be from historical placement of poor quality fill” (MTE 2019:10). The lower portion of the fill was saturated by the water table, which was encountered at a depth ranging from 2.2 m to 4.7 m (MTE 2019:11). The borehole locations and results are reproduced in Appendix A. The Cross-Section C-C’ clearly indicates that the fill in the eastern part of the study area was much shallower than in the west.

#### *1.2.2.5 Geophysical Assessment*

A geophysical survey of the property was conducted by Geophysics GPR International Inc. in March 2016. This involved a soil conductivity survey (EM-31), a high sensitivity metal detector survey (EM-61) and a GPR survey. The geophysical survey results confirmed extensive disturbance in the north and showed no significant anomalies elsewhere on the property (save for two parked cars in the southwest). The results of this study are reproduced in Appendix B.

### **1.3 Archaeological Context**

The Stage 1 assessment (desktop evaluation) was conducted in June 2020 under PIF #P007-1111-2020. The limits of the study area were confirmed using georeferenced aerial imagery showing artificial and natural formations in relation to the subject property.

The archaeological context of any given study area must be informed by 1) the condition of the property as found (Section 1.3.1), 2) a summary of registered or known archaeological sites located within a minimum 1 km radius (Section 1.3.2) and 3) descriptions of previous archaeological fieldwork carried out within the limits of, or immediately adjacent to the property (Section 1.3.3).

#### *1.3.1 Condition of the Property*

The study area lies within the deciduous forest region, which is the southernmost forest region in Ontario and is dominated by agricultural and urban areas. This region generally has the greatest diversity of tree and vegetation species, while at the same time having the lowest proportion of forest. It has most of the tree and shrubs species found in the Great Lakes–St. Lawrence forest (e.g., white pine, red pine, hemlock, white cedar, yellow birch, sugar and red maples, basswood and red oak), and also contains black walnut, butternut, tulip, magnolia, black gum, many types of oaks, hickories, sassafras and red bud (MNRF 2020).

In terms of local physiography, the subject lands fall within the Guelph Drumlin Field. This region is located northwest of the Paris Moraine and includes roughly 300 broad oval drumlins of various sizes. The drumlins themselves consist largely of loamy and calcareous till, and analyses have placed the average grain sizes in the neighbourhood of 50% sand, 35% silt and 15% clay. These drumlins are not closely grouped, and the intervening low ground supports mainly fluvial materials created by river action (Chapman and Putnam 1984:137–138).

The soils within the study area were not classified during the Ontario Soil Survey due to past urbanization (Presant and Wicklund 1971; Cressman 1996). In terms of local watersheds, the subject lands fall within the Middle Grand drainage basin, which is under the jurisdiction of the

Grand River Conservation Authority (GRCA 2020). Specifically, the study area is located 23 m east of the Grand River and 645 m northwest of Mill Creek.

At the time of assessment, the study area comprised part of a paved parking lot used to support the existing Cambridge Mill Restaurant and adjacent grassed and treed areas. Field conditions were not documented, as a property inspection did not occur.

### 1.3.2 Registered or Known Archaeological Sites

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were consulted to determine whether any registered or known archaeological resources occur within a 1 km radius of the study area. The available search facility returned a total of 10 registered sites located within at least a 1 km radius (the facility returns sites in a rectangular area, rather than a radius, potentially resulting in returns beyond the specified distance). In terms of other known resources (e.g., Isolated Non-Diagnostic Find Spots, Leads or unreported deposits), no unregistered sites were identified within a 1 km radius. The sites are summarized in Table 3.

**Table 3: Registered or Known Archaeological Sites**

Borden No. / ID No.	Site Name / Identifier	Time Period	Affinity	Site Type	Distance from Study Area
AiHb-3	Moffats Creek 1	Woodland, Middle	Indigenous	Camp/campsite	300 m–1 km
AiHb-9	Golf Course	Archaic, Late Woodland	Indigenous	Camp/campsite	> 1 km
AiHb-36	Riverwalk 1	Pre-Contact	Indigenous	Findspot	> 1 km
AiHb-37	Riverwalk 2	Pre-Contact	Indigenous	Findspot	> 1 km
AiHb-42	Riverwalk 3	Pre-Contact	Indigenous	Findspot	> 1 km
AiHb-43	Riverwalk 4	Pre-Contact	Indigenous	Scatter	300 m–1 km
AiHb-161	Cambridge City Hall	Post-Contact	Euro-Canadian	Building, administrative, market	300 m–1 km
AiHb-225	St. Andrews Cemetery	Post-Contact	Euro-Canadian	Cemetery	300 m–1 km
AiHb-352	Dobbie House 1	Post-Contact	Euro-Canadian	Residential	300 m–1 km
AiHc-70	Grandview Hills	Post-Contact	Euro-Canadian	Homestead	> 1 km

None of these previously identified sites are located within or immediately adjacent to the subject property; accordingly, they have no potential to traverse the study area. All of the sites are located over 300 m away and represent distant archaeological resources.

### 1.3.3 Previous Archaeological Work

Reports documenting assessments conducted within the subject lands and assessments that resulted in the discovery of sites within adjacent lands were sought during the research component of the study. In order to ensure that all relevant past work was identified, an investigation was launched to identify reports involving assessments within 50 m of the study area. The investigation determined that there are no available reports documenting previous archaeological fieldwork within the specified distance.

## **2.0 STAGE 1 BACKGROUND STUDY**

### **2.1 Background**

The Stage 1 assessment involved background research to document the geography, history, previous archaeological fieldwork and current land condition of the study area. This desktop examination included research from archival sources, archaeological publications and online databases. It also included the analysis of a variety of historic maps and aerial imagery. The results of the research conducted for the background study are summarized below.

With occupation beginning approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Post-Contact histories (Section 1.2). Artifacts associated with Palaeo, Archaic, Woodland and Early Contact traditions are well-attested in the City of Cambridge, and Euro-Canadian archaeological sites dating to pre-1900 and post-1900 contexts are likewise common. The presence of 10 previously identified sites in the surrounding area demonstrates the desirability of this locality for early settlement (Section 1.3.2). The investigation confirmed that none of these sites extend into the subject lands. Background research did not identify any areas of previous assessment within the study area (Section 1.3.3).

The natural environment of the study area would have been attractive to both Indigenous and Euro-Canadian populations as a result of proximity to the Grand River. The original soils were likely relatively well-drained and would have been ideal for agriculture, and the diverse local vegetation would also have encouraged settlement throughout Ontario's lengthy history. Euro-Canadian populations would have been particularly drawn to the historically-surveyed thoroughfares and amenities within the community of Galt.

In summary, the background study included an up-to-date listing of sites from the Ontario Archaeological Sites Database (within at least a 1 km radius), the consideration of previous local archaeological fieldwork (within at least a 50 m radius), the analysis of historic maps (at the most detailed scale available) and the study of aerial imagery. ARA therefore confirms that the standards for background research set out in Section 1.1 of the 2011 *S&Gs* were met.

### **2.2 Field Methods (Property Inspection)**

The study area was not subject to a property inspection, as the corpus of available imagery, topographic mapping and digital environmental data provided abundant information concerning current land conditions. This information was of a scale and detail that allowed for the accurate evaluation of the presence and character of features of potential, and no greater level of detail was needed to make appropriate Stage 2 recommendations. The results of ARA's archaeological potential modelling are discussed below.

### **2.3 Analysis and Conclusions**

In addition to relevant historical sources and the results of past archaeological assessments, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as considerations. Section 1.3.1 of the 2011 *S&Gs* recognizes the following features or characteristics as indicators of archaeological potential: previously identified sites, water sources (past and

present), elevated topography, pockets of well-drained sandy soil, distinctive land formations, resource areas, areas of Euro-Canadian settlement, early transportation routes, listed or designated properties, historic landmarks or sites, and areas that local histories or informants have identified with possible sites, events, activities or occupations.

The Stage 1 assessment resulted in the identification of several features of archaeological potential in the vicinity of the study area (Map 15). The closest and most relevant indicators of archaeological potential (i.e., those that would directly affect survey interval requirements) include one primary water source (the Grand River/Mill Pond), three historic roadways (Water Street North, Simcoe Street and Lavins Street) and numerous historic structure localities (e.g., the canal gates from 1851 and variety of buildings from 1851–1929).

Background research determined that the majority of the historic structure localities were overlain by later foundations, which would have resulted in the disturbance of the original soils to a significant depth and severe damage to the integrity of any archaeological resources. The Galt Gas Co. would have had a considerable impact on the northern portion of the study area, for example, obliterating the potential of any surviving structure from 1867. Given the facility's late date relative to the establishment of the town at the turn of the 19<sup>th</sup> century, the local significance of the Galt Gas Co. was determined to be too low to warrant further investigation. The demolition of the structures and heavy contamination in that area also suggest that there would be no surviving historical value and that the area would be too unsafe to even document structural finds. Only the canal gates and the southern structure from 1851 and the two southernmost structures from 1867 appear to have been situated in areas that were not deeply impacted by subsequent development. Based on the available information, the function of the three structures is unclear. The time frame of occupation appears to be between the 1850s and 1870s, if not earlier. Additional background research may be able to shed further light on the history of these buildings. These features indicate that the associated parts of the study area have potential for deeply buried archaeological resources.

Although proximity to a feature of archaeological potential is a significant factor in the potential modelling process, current land conditions must also be considered. Section 1.3.2 of the 2011 *S&Gs* emphasizes that 1) quarrying, 2) major landscaping involving grading below topsoil, 3) building footprints and 4) sewage/infrastructure development can result in the removal of archaeological potential, and Section 2.1 states that 1) permanently wet areas, 2) exposed bedrock and 3) steep slopes (> 20°) can also be considered as having no archaeological potential. Areas previously assessed and not recommended for further work also require no further assessment.

Background research did not identify any previously assessed areas of no further concern within the project lands. ARA's desktop evaluation, coupled with the analysis of historical sources and digital environmental data, resulted in the identification of multiple areas of no archaeological potential within the study area. Grading and major landscaping associated with the establishment of the parking lot have resulted in the removal of archaeological potential from all of the upper layers. Deep land alterations, including previous construction and demolition activities, the establishment of fills and the installation of various utilities (i.e., buried hydro, storm sewers and an abandoned sanitary sewer), have similarly removed potential from the majority of the lower layers. One area in the east and two areas on the south were determined to have potential for deeply buried archaeological resources associated with the earliest occupation of the property.

The borehole logs confirm the presence of fill in the vicinity of these areas of potential, suggesting that they may have been previously impacted. MW405-16 in the east contained 1.5 m deep fill with some ash/slag and wood over sand, for example, whereas BH513-17 in the southeast had up to 3.0 m of fill under the asphalt. MW404-16 in the southwest had 3.0 m deep fill with ash, slag and wood inclusions (Appendix A). The complete removal of all traces of the early structures cannot be confirmed based on the available data, however, so the identified areas retain potential.

In summary, the Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential and areas of no archaeological potential. The potential modelling results are presented in Map 16–Map 17. The application boundary (‘study area’) is depicted as a layer in these maps.

### 3.0 RECOMMENDATIONS

The Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential and areas of no archaeological potential. Grading and major landscaping associated with the establishment of the parking lot have resulted in the removal of archaeological potential from all of the upper layers. Deep land alterations, including previous construction and demolition activities, the establishment of fills and the installation of various utilities, have similarly removed potential from the majority of the lower layers. One area in the east and two areas in the south were determined to have potential for deeply buried archaeological resources associated with the earliest occupation of the property.

It is recommended that the identified areas of archaeological potential be subject to Stage 2 archaeological monitoring in accordance with Section 2.1.7 Standard 4 of the 2011 *S&Gs*. Deeply buried survey using mechanical trenching is not warranted due to the extent of the previous deep land alterations. The borehole results show substantial disturbed layers, and mechanical trenching would be an ineffective method of identifying any remains at the depths involved. Furthermore, the chances of any substantial archaeological remains are minimal due to the evidence of disturbance shown in the borehole and GPR results, the repeated uses and scouring floods in the area, and the impacts associated with the installation of various sewers. Potential soil contamination and toxicity resulting from the Galt Gas Co. were also important factors in the decision to recommend archaeological monitoring.

Prior to the commencement of construction and archaeological monitoring, detailed documentary research must be carried out for the property as set out in Section 3.1 of the 2011 *S&Gs*. This information will assist in determining the CHVI of any deeply buried archaeological resources. The proposed approach (including a contingency plan if archaeological resources are encountered during monitoring) is as follows:

1. As this investigation would be done in conjunction with construction activities, a work schedule prioritizing clearance of the areas of archaeological potential should be followed. This will allow time to address any archaeological concerns with minimal impact to construction timelines or activities.
2. Archaeological monitoring will only be required within the identified areas of archaeological potential. This will allow confirmation of the structures' presence/absence. As with any historic occupation, there is potential for outbuildings or other exterior occupation features (e.g., privies). The identified areas of potential include a buffer around the structures; accordingly, monitoring will allow for the observation of any such remains.
  - a. A licensed archaeologist must be present during fill removal within the areas of potential. Fill removal will extend beyond the area of potential to allow for stable slopes/work spaces so the archaeologist can examine the soils more closely.
3. It is anticipated that the maximum depth of project impacts will be 1.3 m below grade to avoid any dewatering activities. Based on the previous borehole information and environmental testing results, the following approaches are recommended:
  - a. Archaeological monitoring be carried out throughout the fill removal process within the areas of potential to the maximum depth of the excavation required for the project.

- b. The licensed archaeologist will work with the construction company and soil engineers to develop a shoring strategy to allow them to safely investigate any remains of CHVI (if encountered).
  - c. An excavator with a smooth edge bucket will be used if the licensed archaeologist deems it warranted based on the nature of the subsurface environment.
  - d. De-watering will be conducted if remains of CHVI are encountered below the water table in areas to be impacted by the project so that they can be appropriately investigated.
4. If intact cultural layers, structural remains or features are identified, fill removal must stop and the licensed archaeologist must evaluate the finds.
- a. If a cultural layer is identified and the licensed archaeologist determines that it has potential CHVI, a combination of test pitting or test unit excavation must be used to determine whether archaeological materials warranting further investigation are present. The findings should be evaluated against the criteria set out in Section 2.2 and Section 3.4 of the 2011 *S&Gs*, the additional guidance provided in Section 6.0 of the 2014 *RHF* and the specific land use history to determine CHVI. Given the land use history, it is suggested that a key determining factor of CHVI will be high integrity strata dating prior to 1830.
  - b. If structural remains or features are identified and the licensed archaeologist determines that they have potential CHVI, a combination of in-field documentation and feature excavation will be used to investigate the remains. The findings should also be evaluated against the criteria set out in Section 2.2 and Section 3.4 of the 2011 *S&Gs*, the additional guidance provided in Section 6.0 of the 2014 *RHF* and the specific land use history to determine CHVI. Given the land use history, it is suggested that a key determining factor of CHVI for structural remains or features will be high integrity features dating prior to 1870.
  - c. If archaeological resources are encountered, no construction-related activities can be allowed to continue in the vicinity of the finds for at least 20 m. Use of an excavator with a smooth bucket will likely be needed to assist in determining the extent of possible or confirmed areas of CHVI and must only be used while being instructed by a licensed archaeologist. If a deposit of further CHVI is identified and mitigation is determined to be warranted, a 10 m protective buffer shall be established beyond the extent of the finds. If the archaeological resources are determined to have no further CHVI (i.e., they do not warrant further investigation or have been fully mitigated by excavation), no protective buffer will be needed after the determination is made.
5. If areas of CHVI are encountered warranting mitigation, the investigation will proceed until the extents are fully documented and bounded by disturbance, natural soils or strata of no further CHVI.

These recommendations were informed by the results of a request for advice to the MHSTCI. The identified areas of no archaeological potential do not require any additional assessment.

## 4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the 2011 *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process:

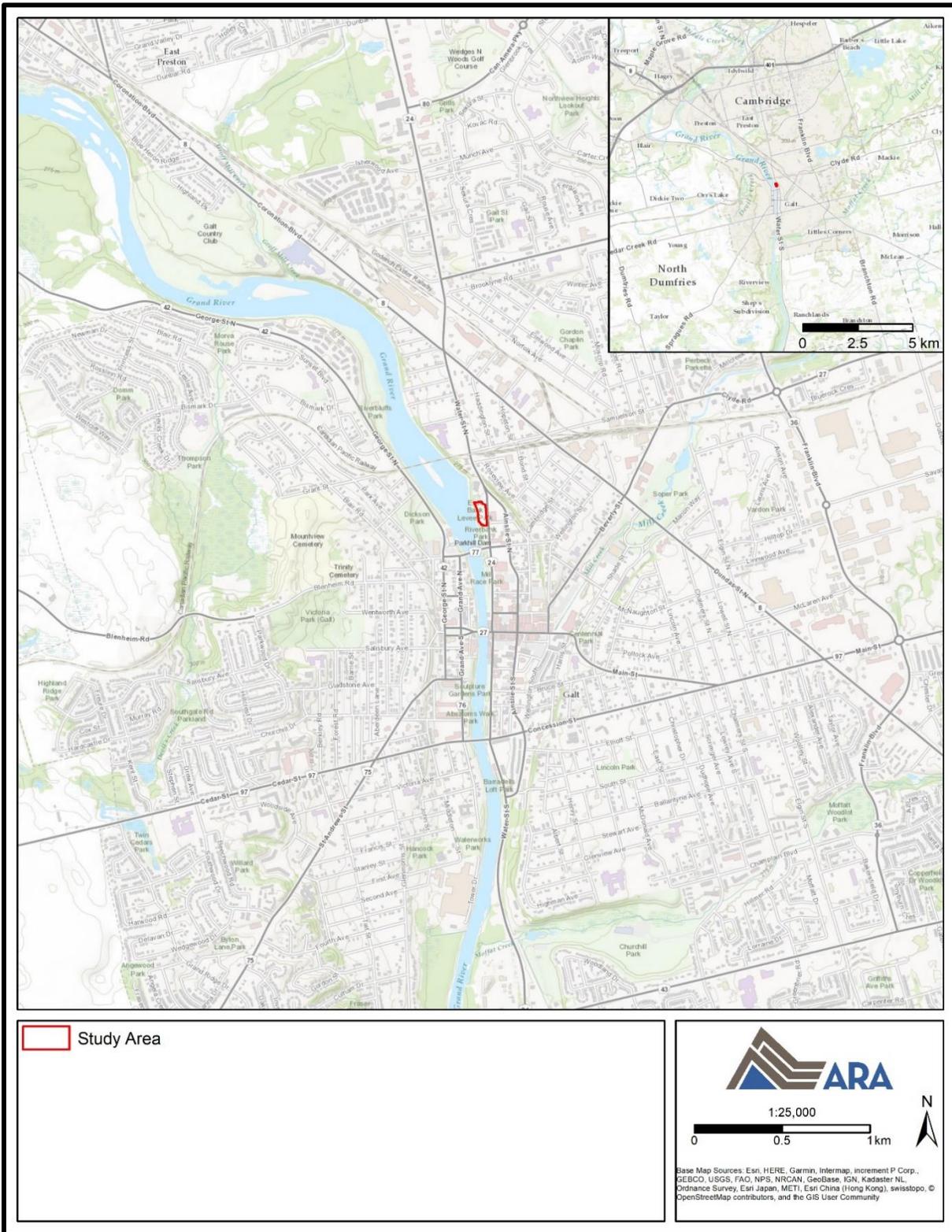
- This report is submitted to the Minister of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MHSTCI, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar at the Ministry of Government and Consumer Services.

## 5.0 IMAGES

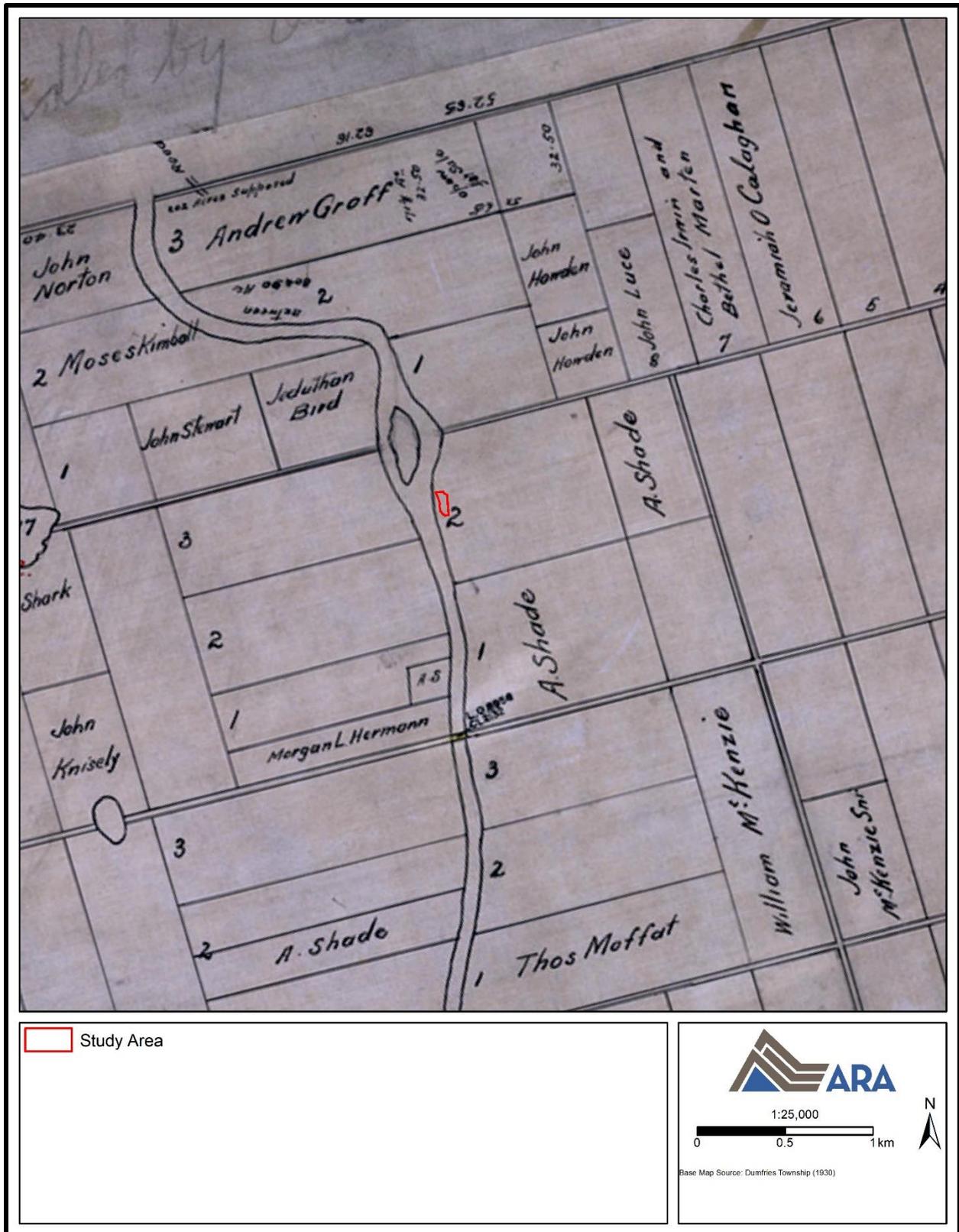


**Image 1: View of Study Area from the North (ca. 1880)**  
(MTE 2016:Photograph No. 7)

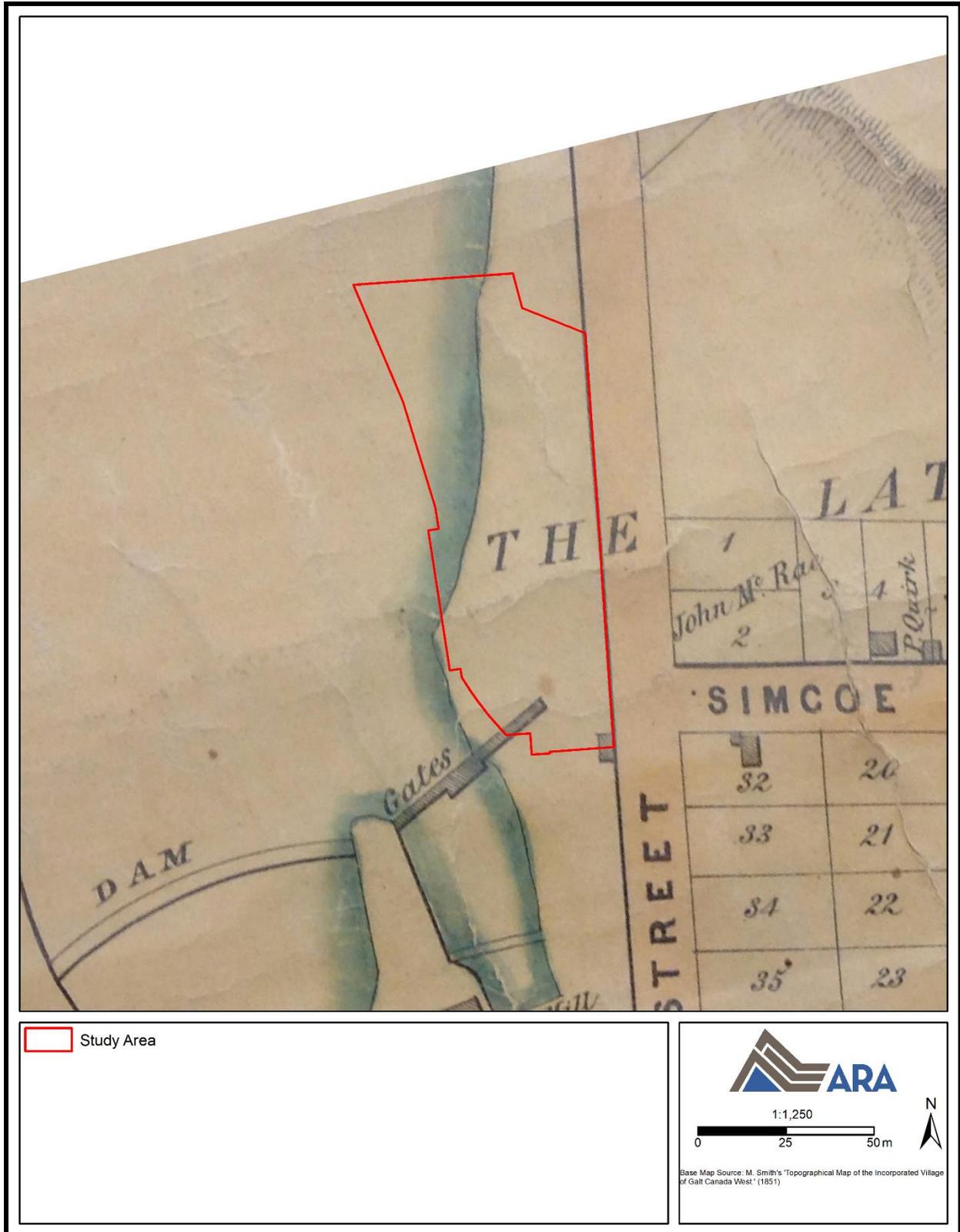
6.0 MAPS



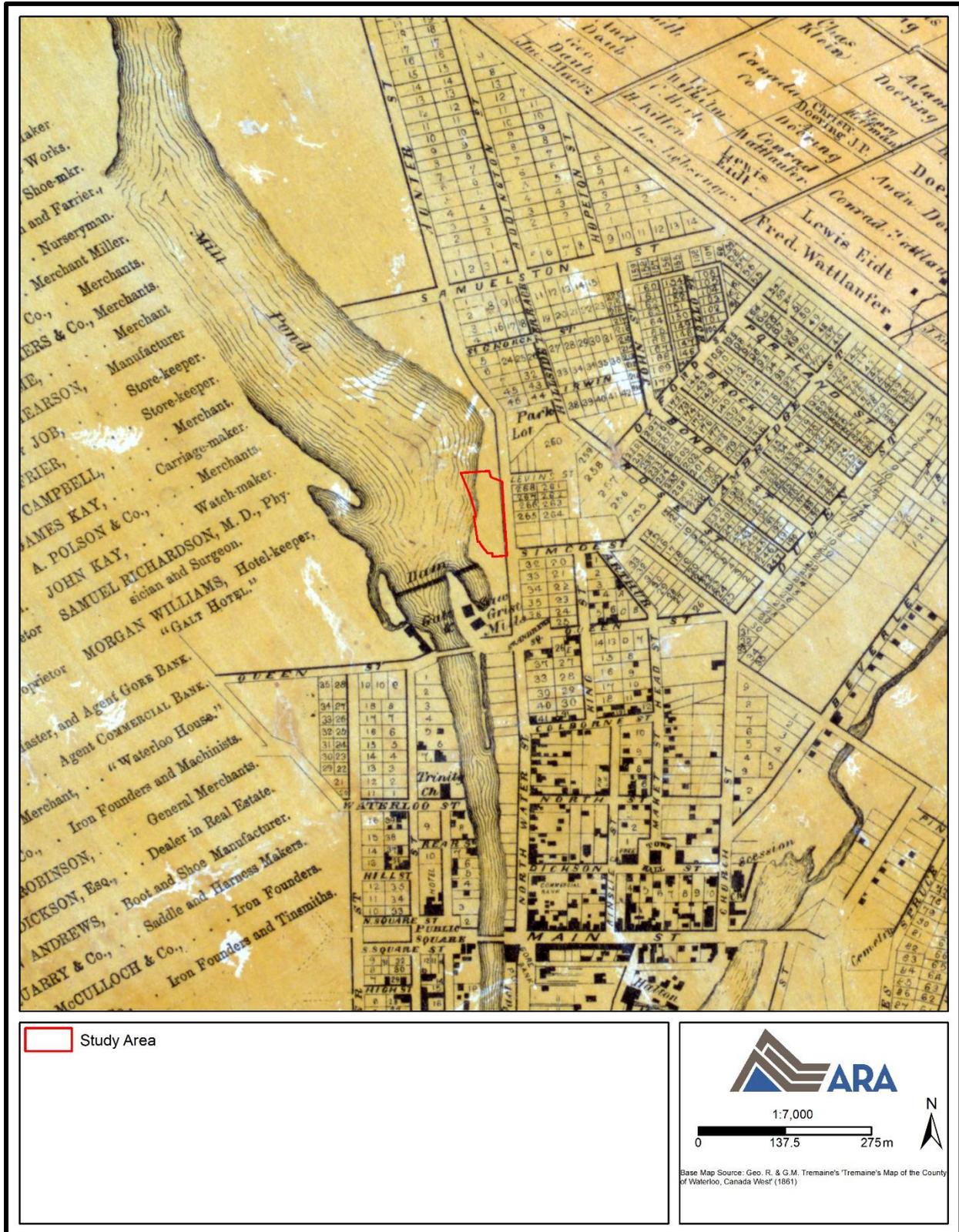
**Map 1: Location of the Study Area**  
 (Produced under licence using ArcGIS® software by Esri, © Esri)



**Map 2: Dumfries Patent Plan (1930)**  
(Produced under licence using ArcGIS® software by Esri, © Esri; AO 2015)

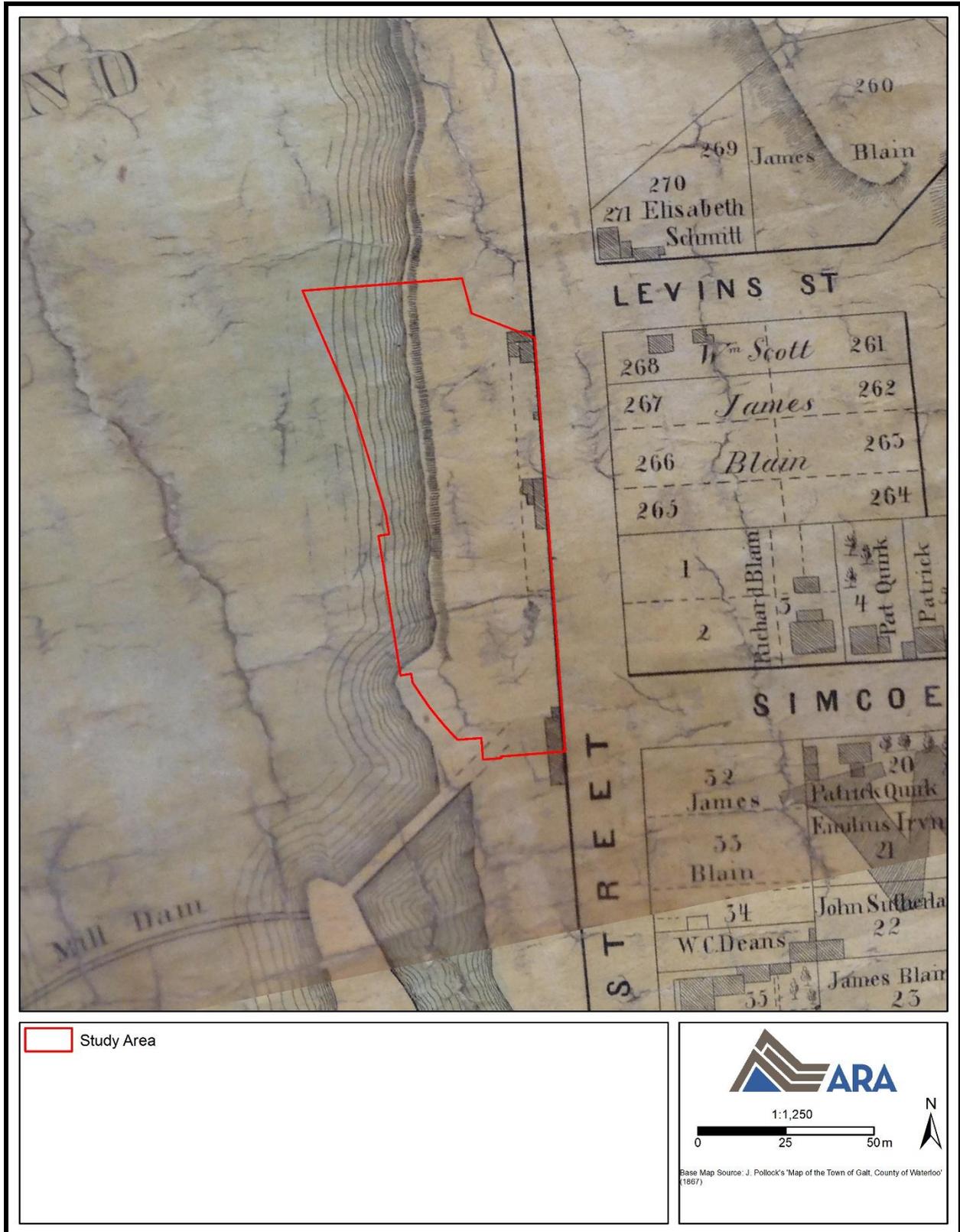


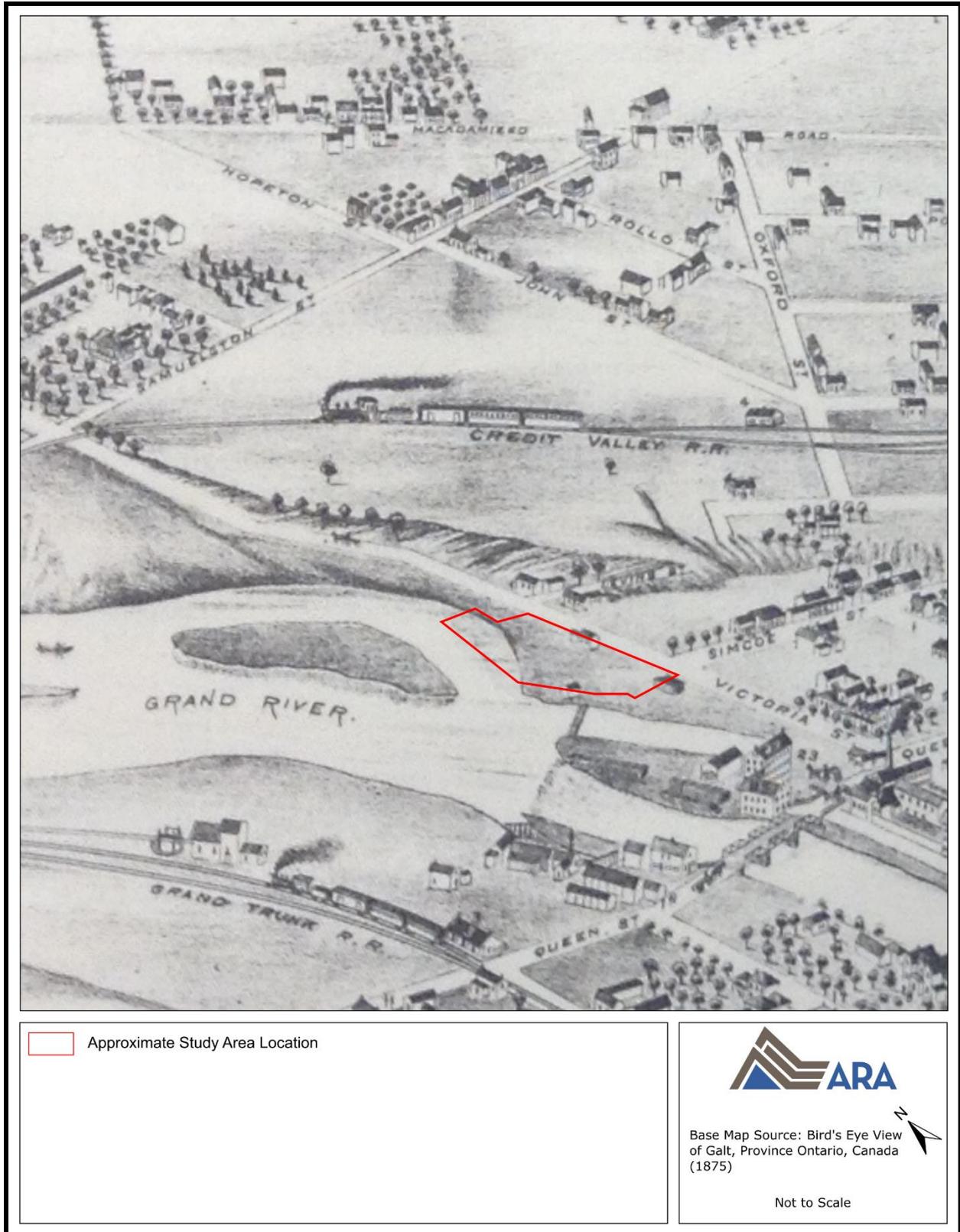
**Map 3: M. Smith's Topographical Map of the Incorporated Village of Galt, Canada West (1851)**  
(Cambridge Archives)



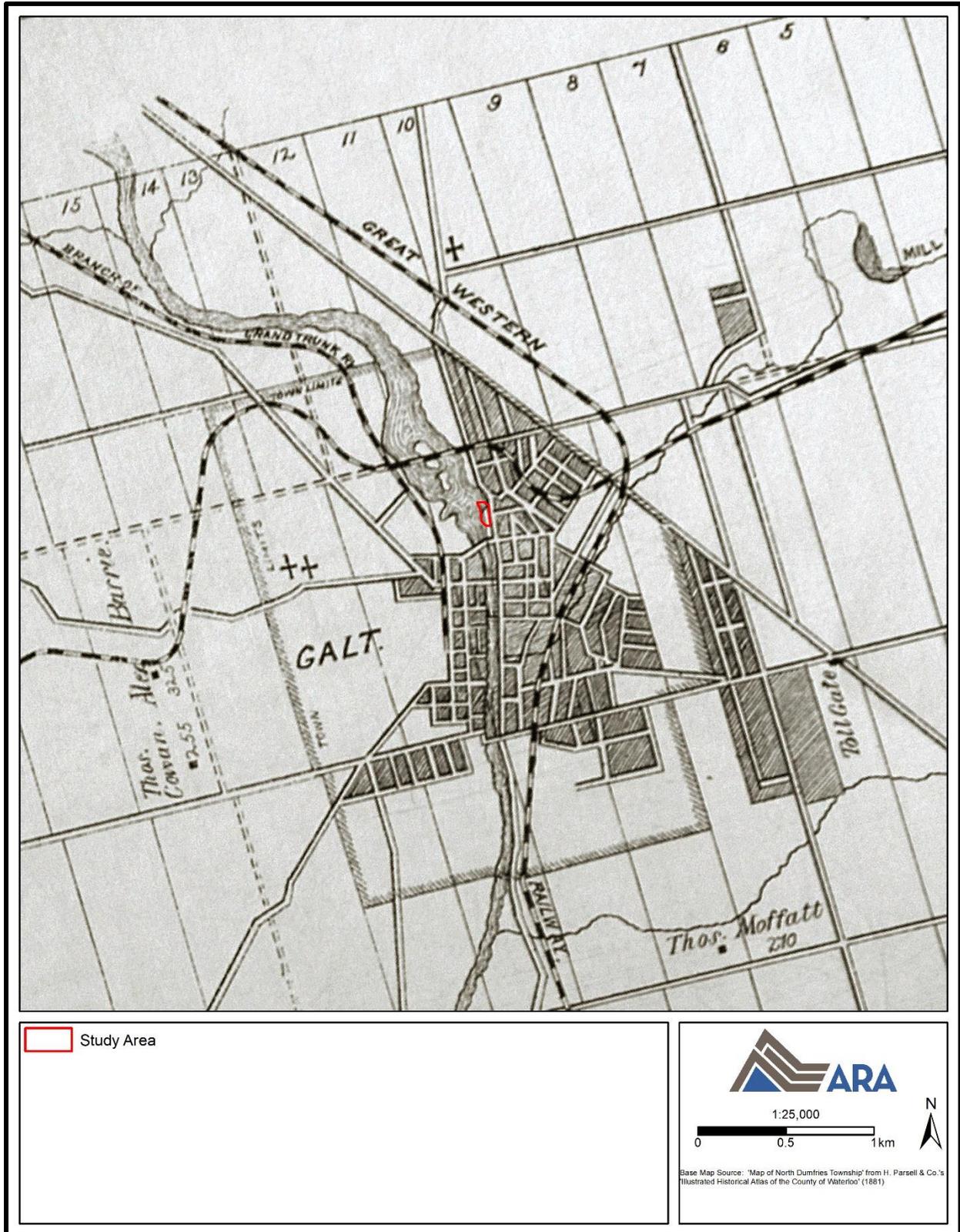
**Map 4: G.R. and G.M. Tremain's *Tremain's Map of the County of Waterloo, Canada West (1861)***

(Produced under licence using ArcGIS® software by Esri, © Esri; OHCMP 2019)

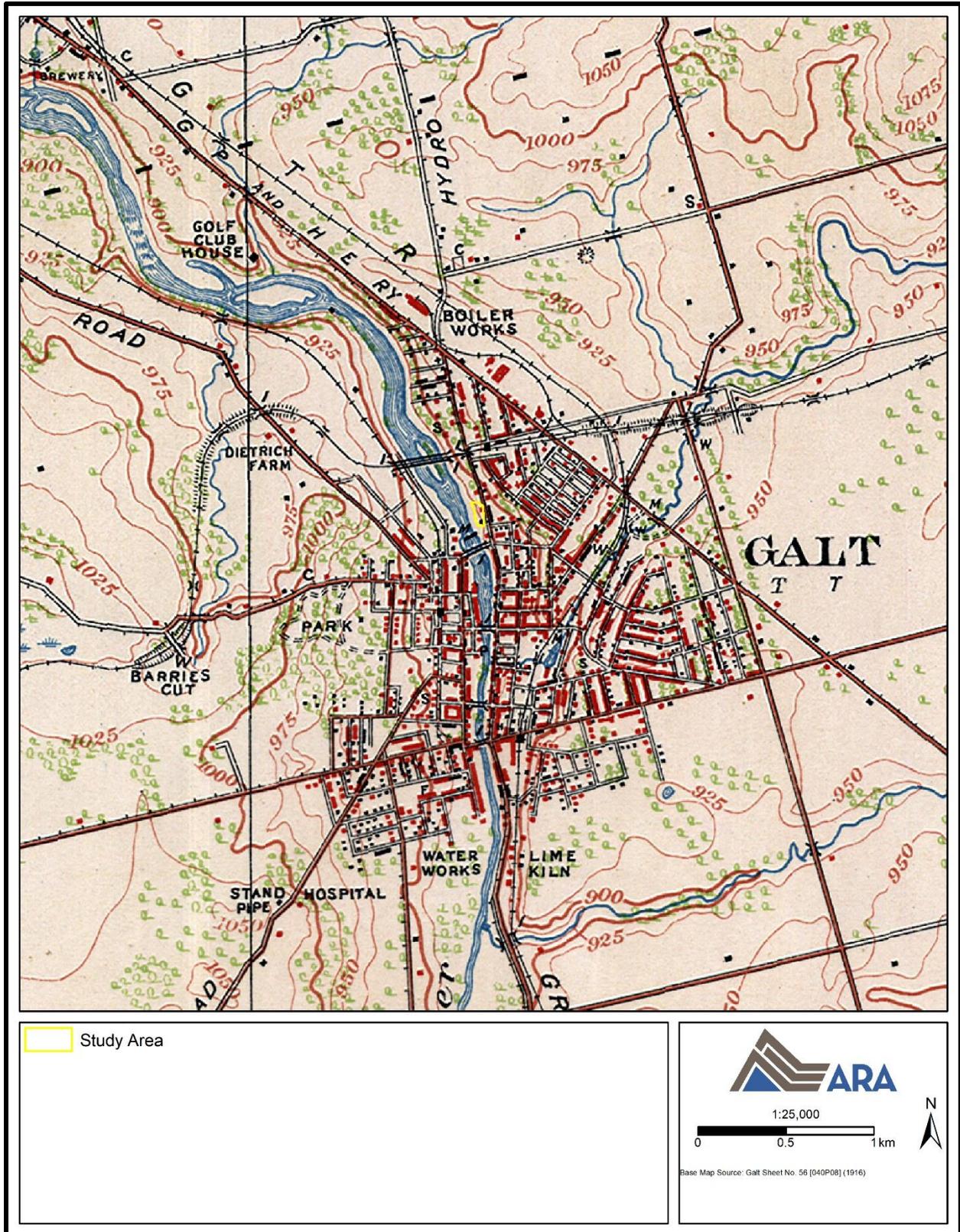




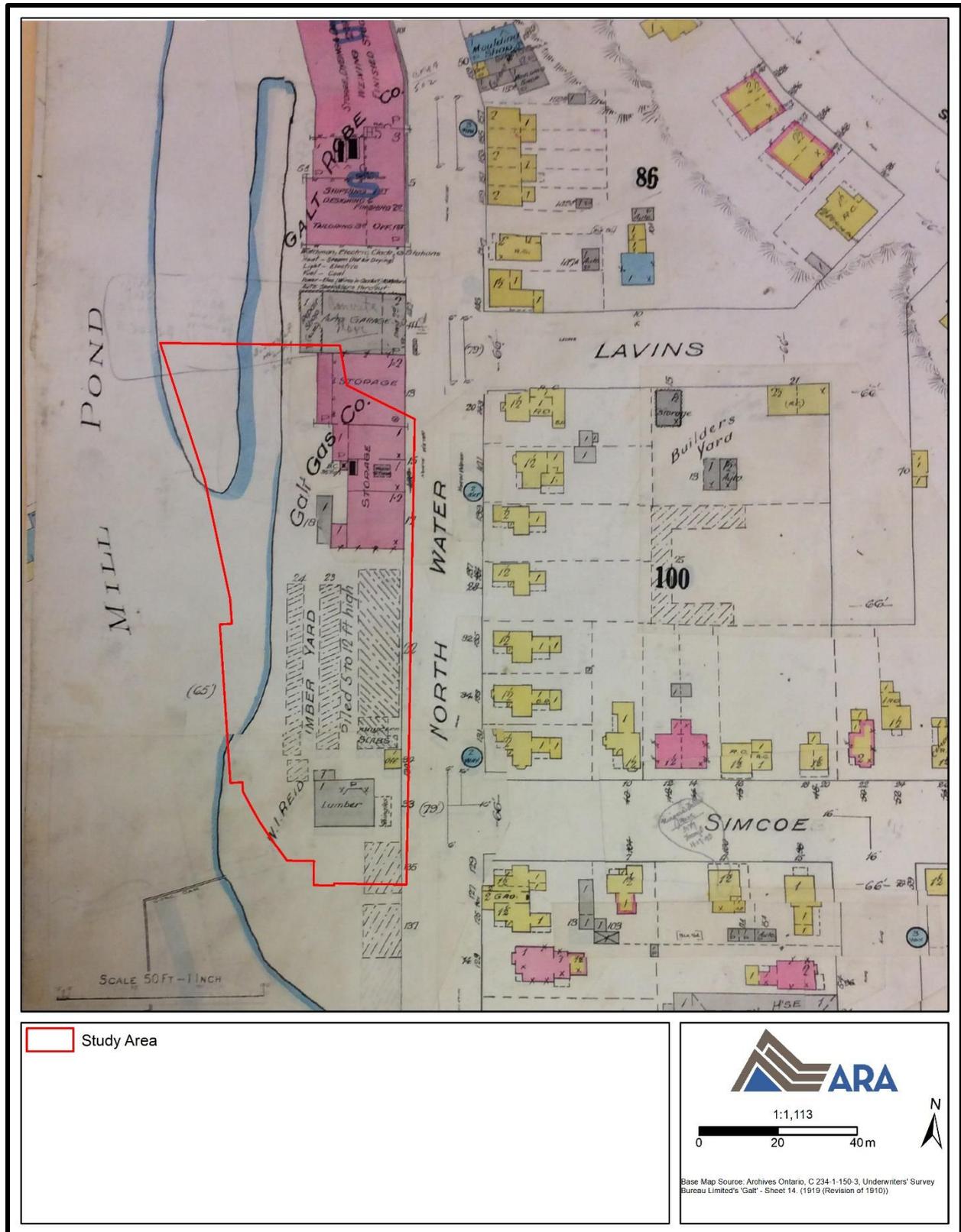
**Map 6: H. Brosius' Bird's Eye View of Galt, Province Ontario, Canada (1875)**  
(Cambridge Archives)



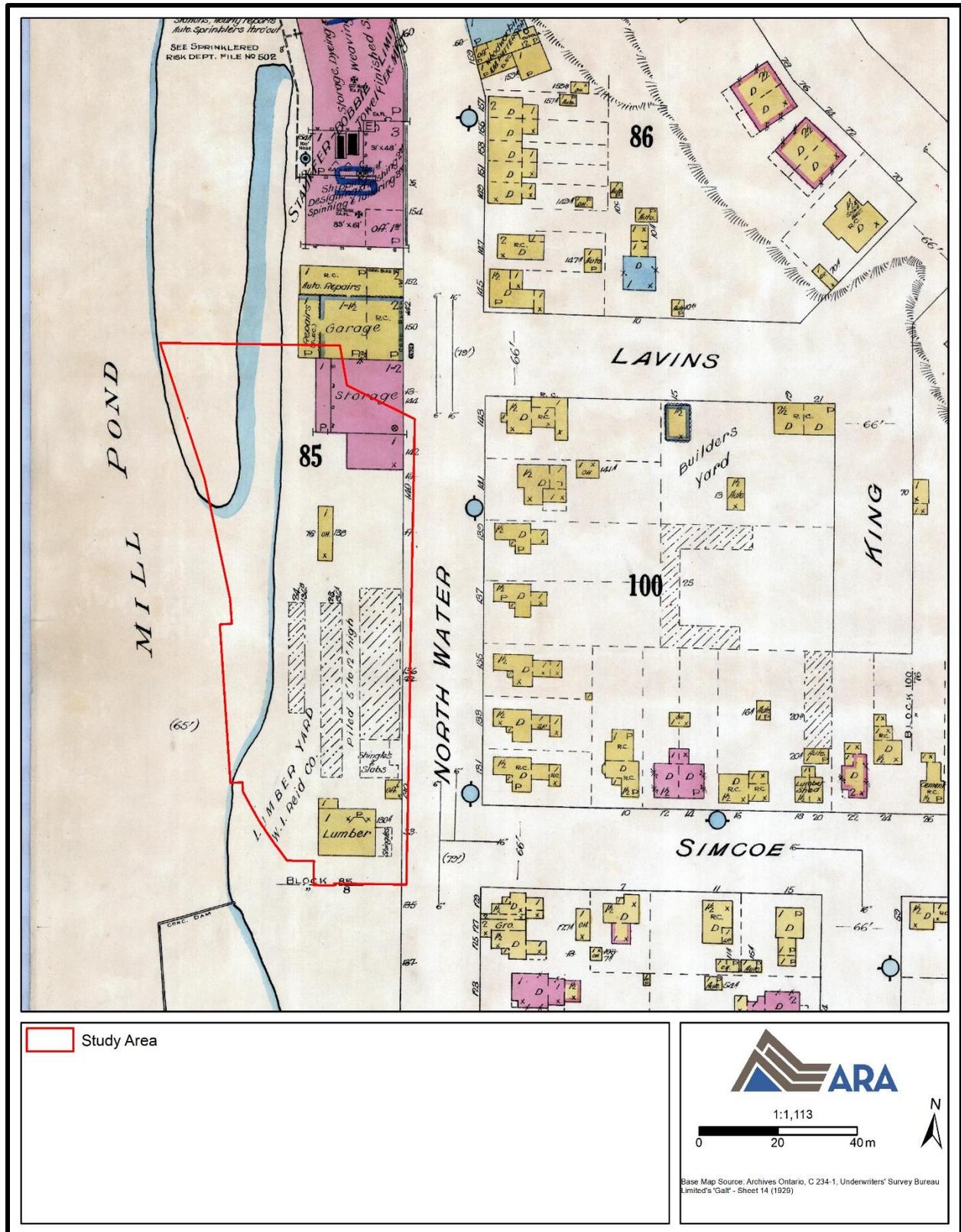
**Map 7: The Map of North Dumfries Township from H. Parsell & Co.'s *Illustrated Historical Atlas of the County of Waterloo, Ont.* (1881)**  
(Produced under licence using ArcGIS® software by Esri, © Esri; McGill University 2001)



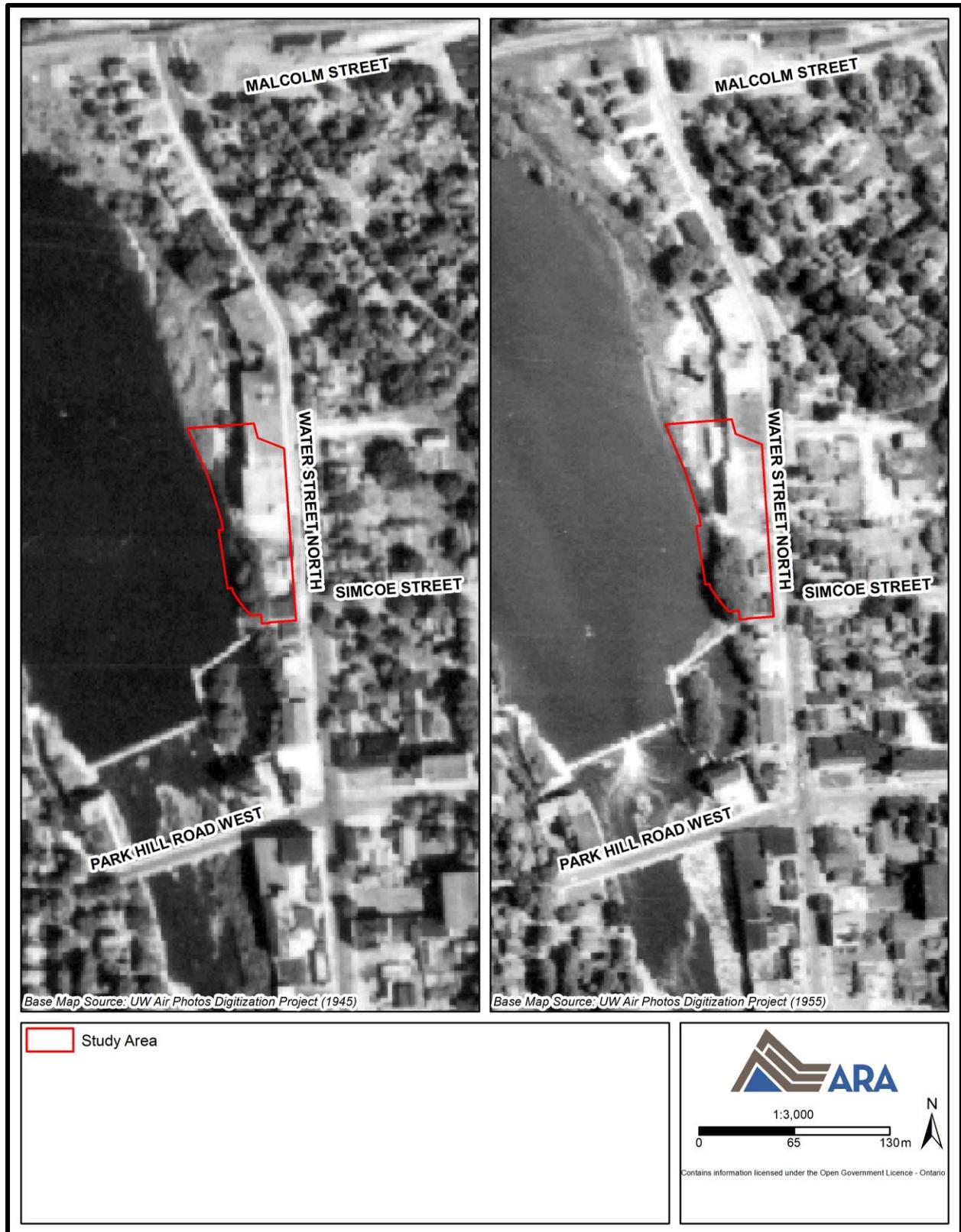
**Map 8: Topographic Map (1916)**  
(Produced under licence using ArcGIS® software by Esri, © Esri, OCUL 2020)



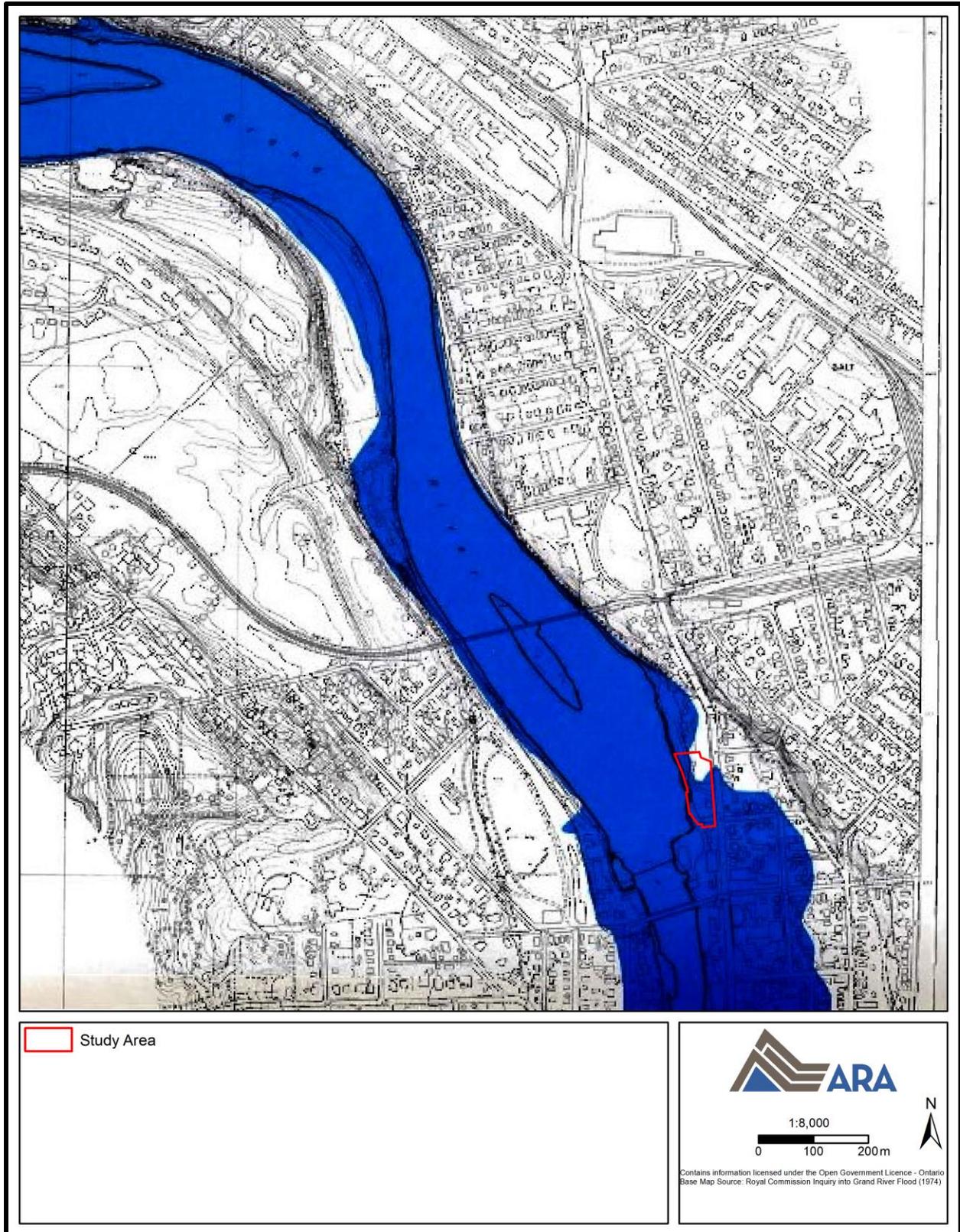
**Map 9: Fire Insurance Plan (1919, Revision of 1910)**  
(Produced under licence using ArcGIS® software by Esri, © Esri, Archives of Ontario)



**Map 10: Fire Insurance Plan (1929)**  
(Produced under licence using ArcGIS® software by Esri, © Esri, Archives of Ontario)



**Map 11: Aerial Images (1945 and 1955)**  
(Produced under licence using ArcGIS® software by Esri, © Esri; University of Waterloo 2016)



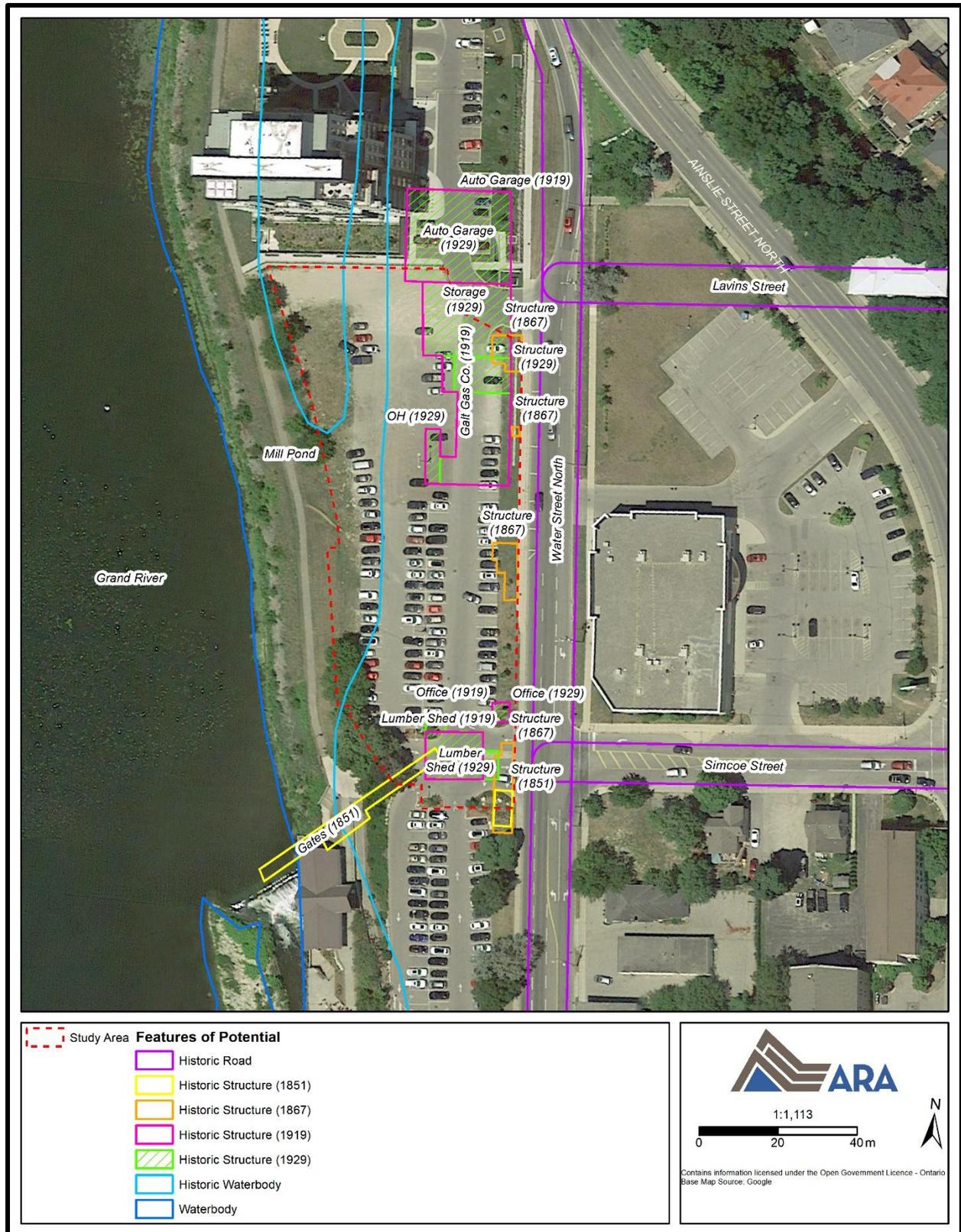
**Map 12: Flood Levels for Galt and Part of Preston (1974)**  
(Produced under licence using ArcGIS® software by Esri, © Esri; Leach 1975)



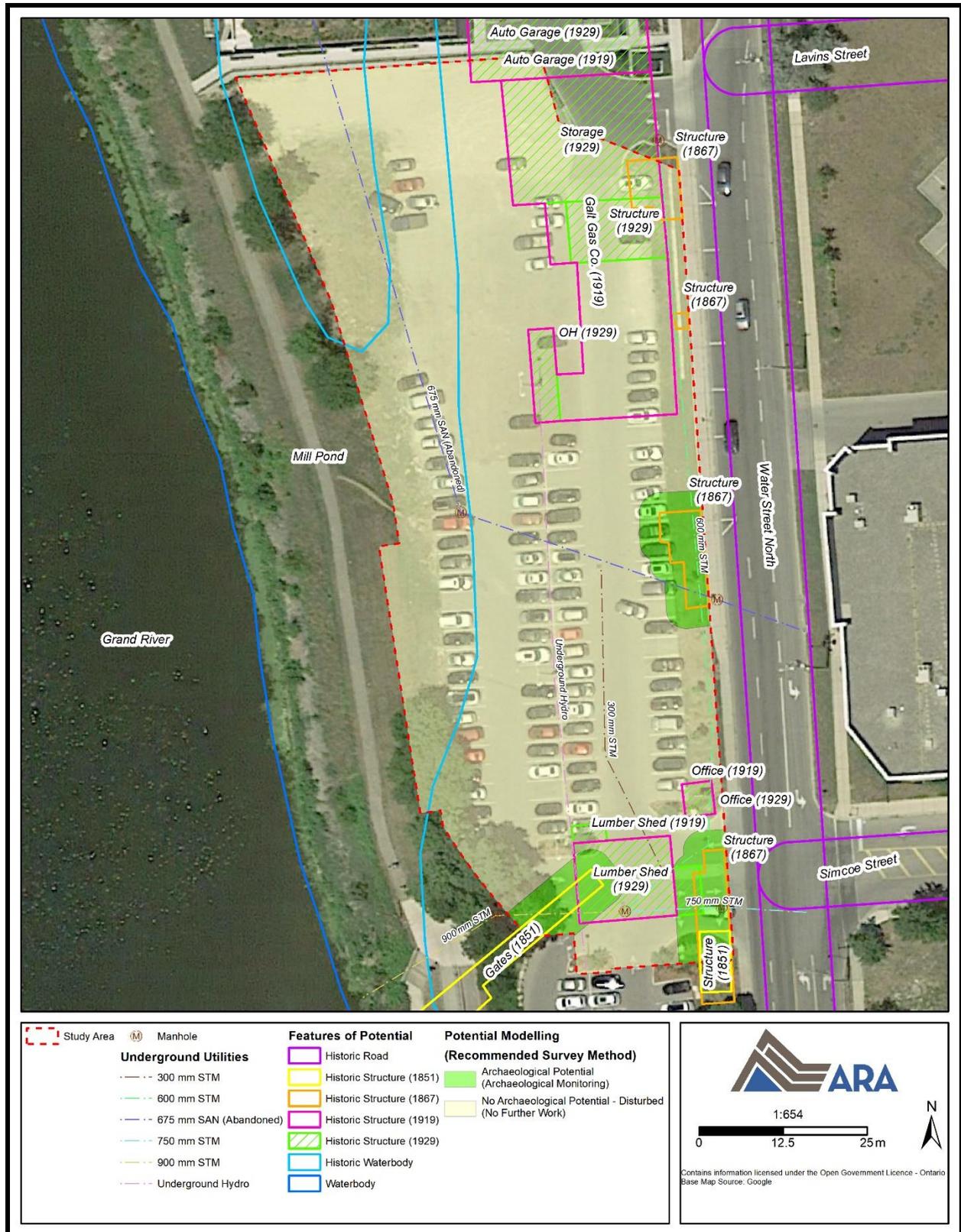
**Map 13: Aerial Images (2000, 2006, 2009 and 2010)**  
(Produced under licence using ArcGIS® software by Esri, © Esri; Region of Waterloo 2020)



**Map 14: Aerial Images (2014 and 2018)**  
(Produced under licence using ArcGIS® software by Esri, © Esri; Region of Waterloo 2020;  
Google Earth Pro 2020)



**Map 15: Features of Potential**  
 (Produced under licence using ArcGIS® software by Esri, © Esri)



**Map 16: Potential Modelling and Recommendations (Aerial Image)**  
 (Produced under licence using ArcGIS® software by Esri, © Esri)



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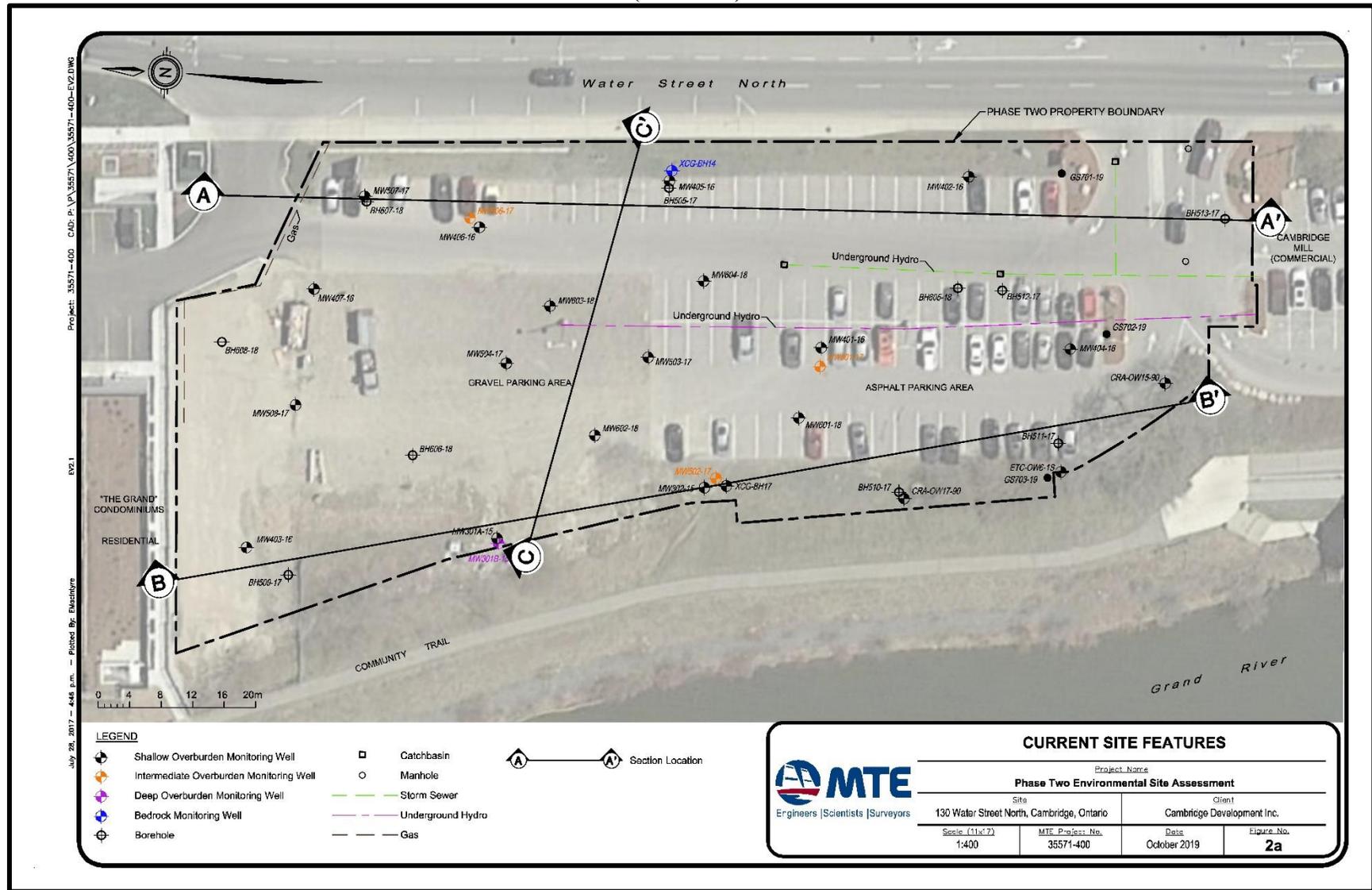
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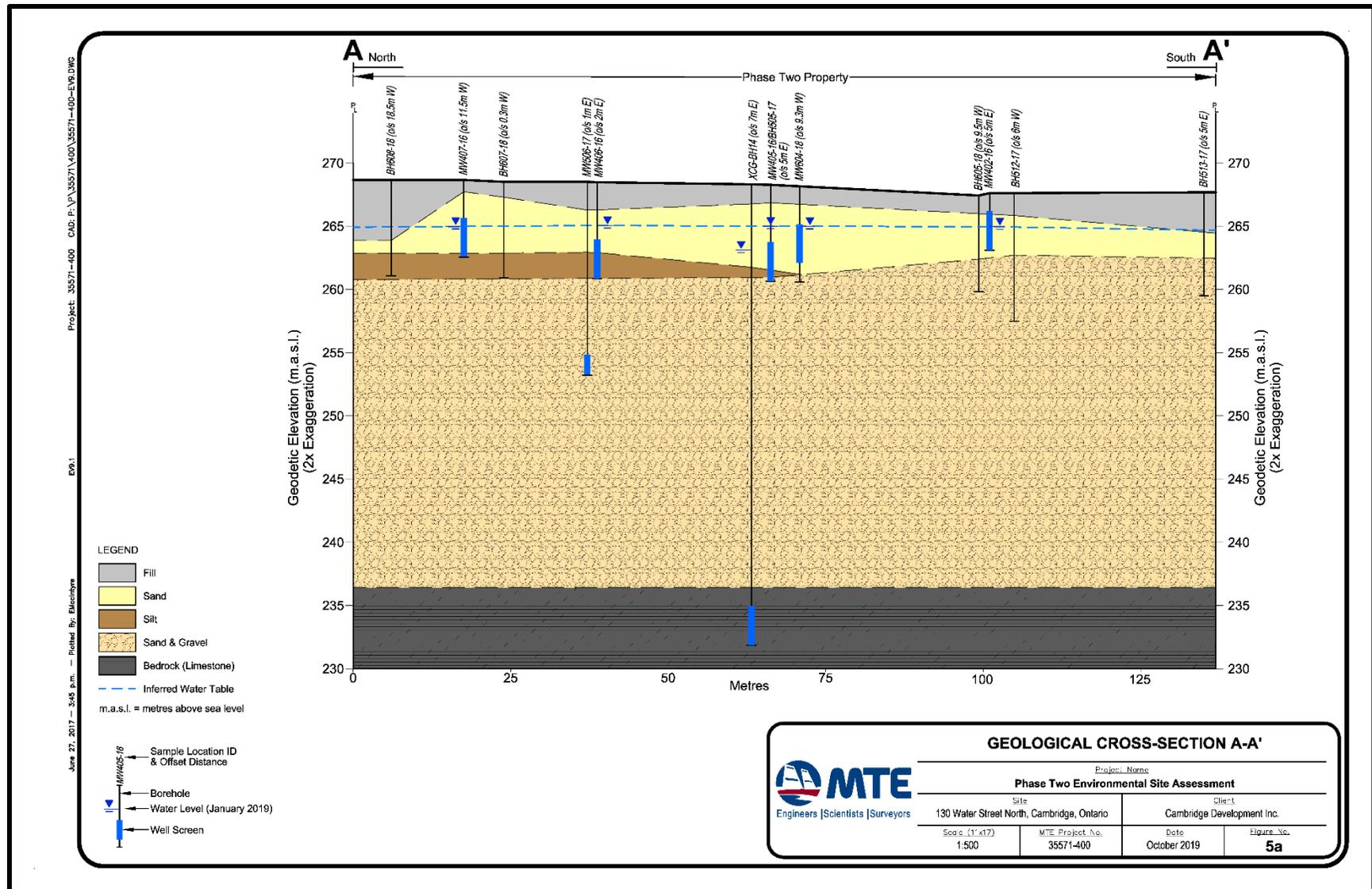
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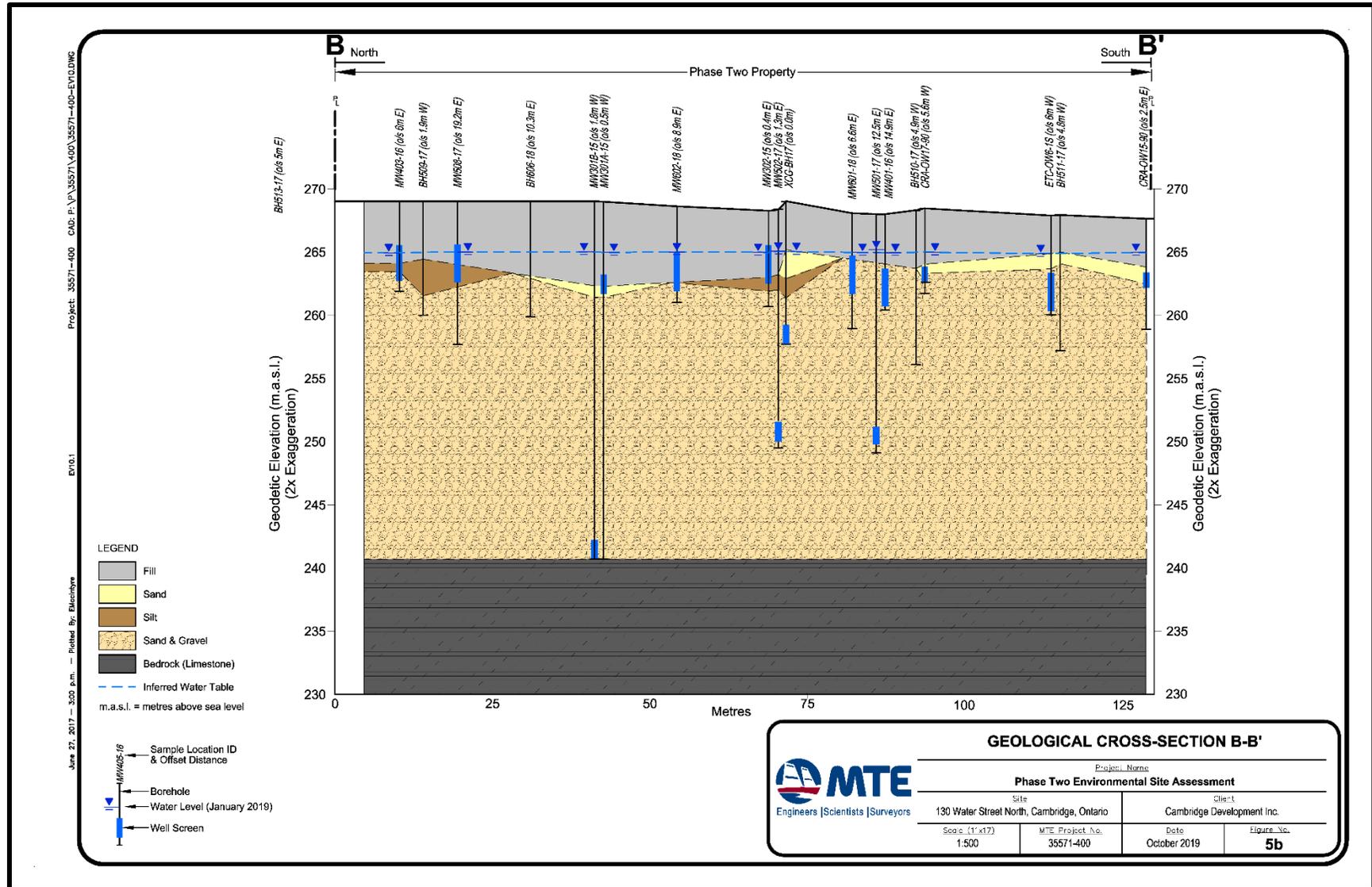
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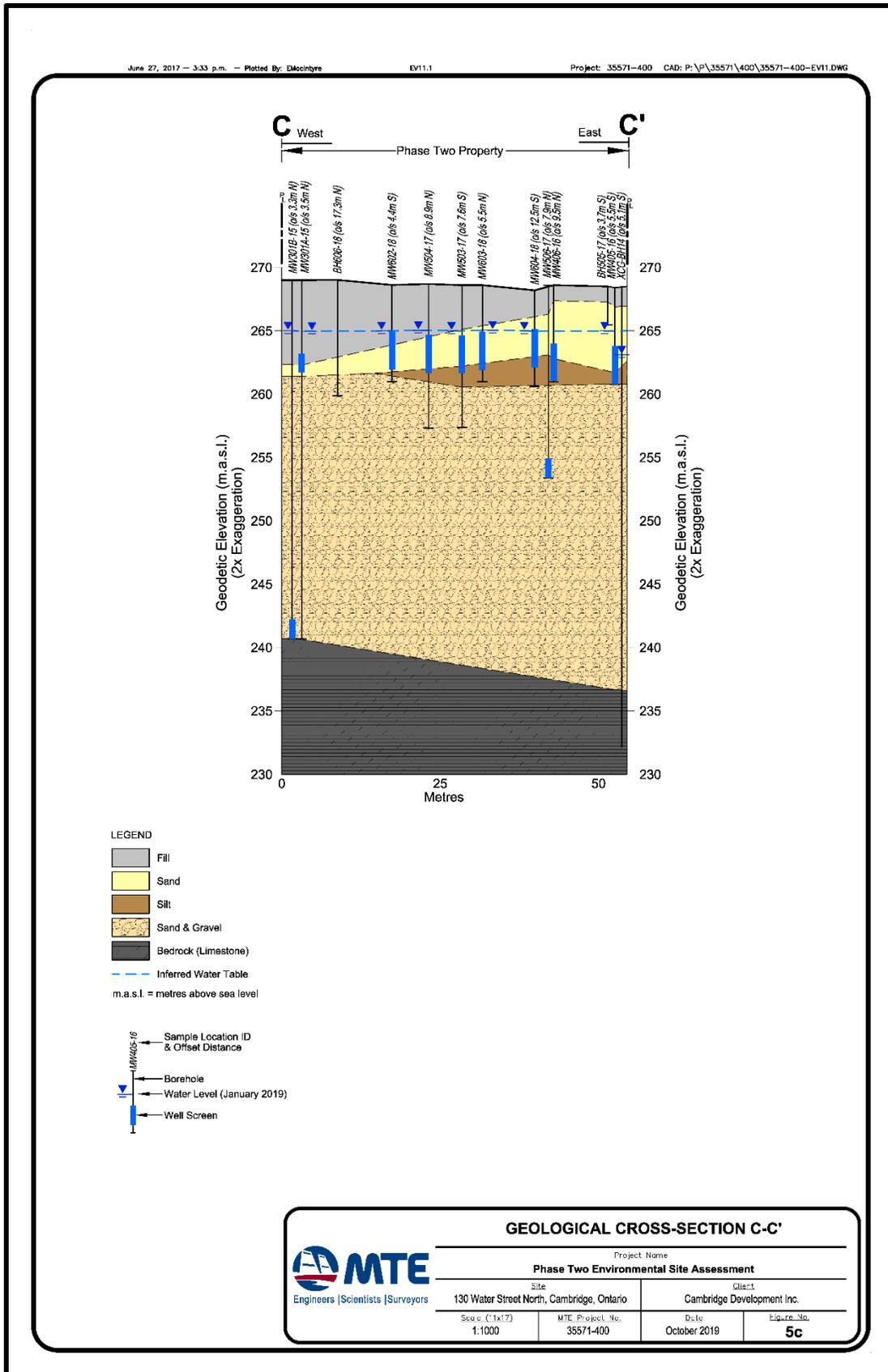
## **APPENDICES**

**Appendix A: Borehole Results  
 (MTE 2019)**









**Borehole Number: MTE-MW507-17**  
**Project:** Phase Two ESA **Drill Date:** 2/22/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.5						
0		<b>FILL</b> Loose, light brown, coarse sand and gravel, trace silt, dry, some brick fragments at 0.3 - 0.6 m.	0.0	1	SS		PAHs, metals		
2			267.0	2	SS				
4			266.2	3	SS				
6		<b>SAND AND GRAVEL</b> Loose, brown, coarse, damp.	1.5	4	SS		PAHs	0	
8			2.3	5	SS				
10		<b>SAND</b> Medium dense, light brown, fine silt, moist.	4.6					0	
12			263.9						
14		Saturated at 4.6 m.	263.5					0	
16			5.0	6	SS				
18		<b>SILT</b> Medium dense, light brown, fine sand, wet.	6.1					0	
20			262.4						
22		<b>SAND AND GRAVEL</b> Dense, brown, coarse, saturated.	6.7	7	SS			0	
24		End of Borehole	261.8						
26			6.7						
28									
30									
32									
34									
36									
38									
40									

**Cover Type:** Flushmount **Field Technician:** KMK  
**Notes:** No noticeable staining or odours  **Drafted by:** JYM  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MTE-MW508-17**  
**Project:** Phase Two ESA  
**Project No:** 35571-400  
**Client:** Cambridge Development Inc.  
**Location:** 130 Water Street North, Cambridge, ON

**Drill Date:** 2/22/2017  
**Drilling Contractor:** Direct Environmental Drilling  
**Drill Method:** GeoProbe 7822DT (Direct Push)

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.8						
0	FILL	Loose, light brown, coarse sand and gravel, some brick fragments, damp, no staining or odours.	0.0	1	SS			0	
0.6			268.2						
1.5		Some concrete. Some slag and wood.	267.3	2	SS				
				3	SS				
				4	SS				
3.8		Saturated, black staining, slight coal tar odour.	265.0	5	SS			1	
4.6	SAND	Medium dense, grey-black, fine silt and gravel, saturated, strong coal tar odour, no staining.	264.2	6	SS		PHCs, BTEX, PAHs	284	
5.3		Some organics and wood fragments at 5.6 m.	263.5	7	SS			23	
				8	SS			4	
7.6	SAND AND GRAVEL	Dense, light grey-black, trace silt, wet, coal tar odour.	261.2	9	SS			3	
				10	SS				
11.3			257.5	11	SS		PAHs	1	
		End of Borehole							

**Cover Type:** Flushmount  
**Notes:** Split Spoon (SS)  
**Sheet:** 1 of 1

**Field Technician:** KMK  
**Drafted by:** JM  
**Reviewed by:** RJF

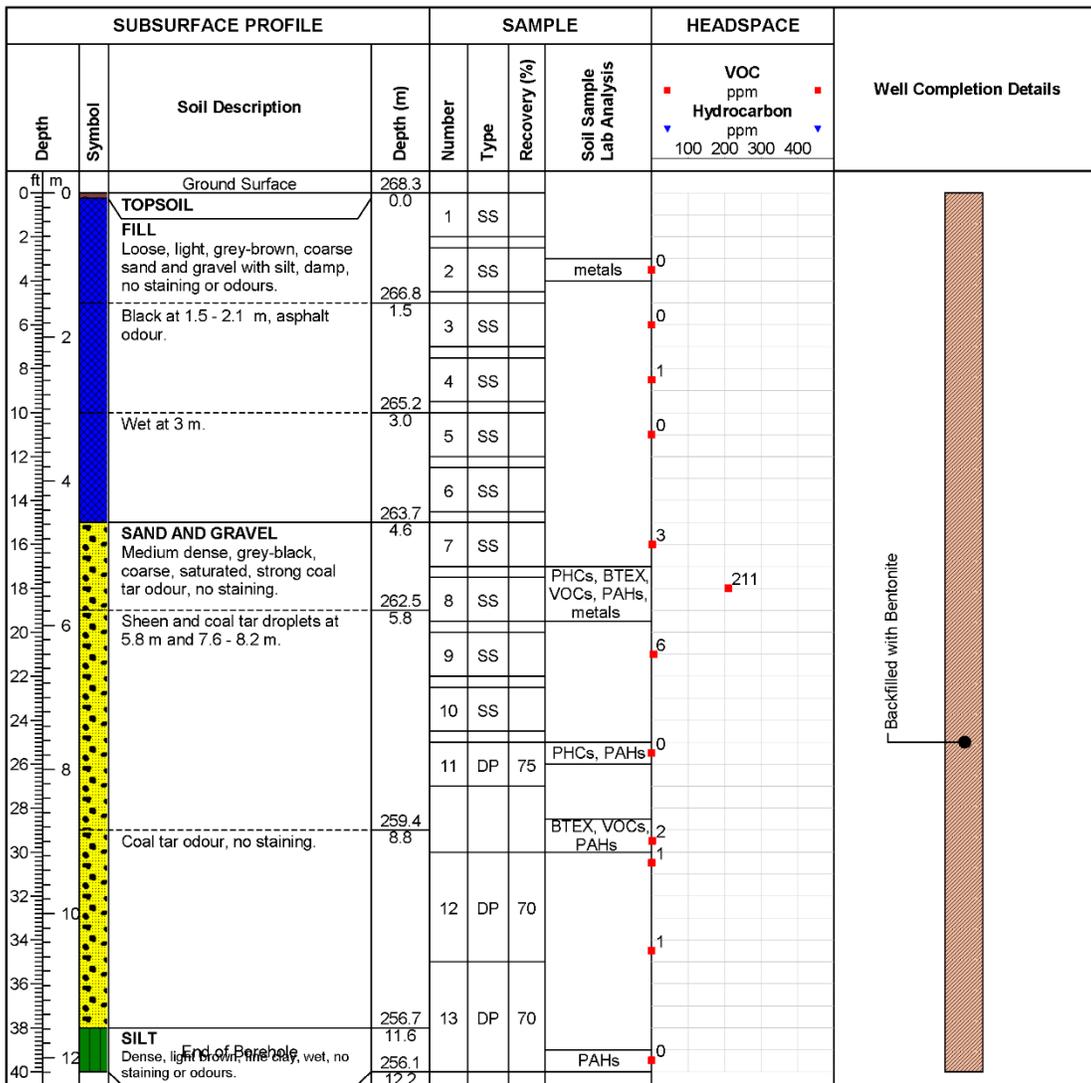
**Borehole Number: MTE-BH509-17**  
**Project:** Phase Two ESA **Drill Date:** 2/22/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	269.0						
0		<b>FILL</b> Loose, dark brown, coarse sand and gravel with some silt, cobbles and brick fragments, trace ash/slag, damp, no staining or odours.	0.0	1	SS				
2				2	SS				
4				3	SS				
6				4	SS		PAHs, metals	0	
8				5	SS				
10				6	SS				
12			264.9						
14			4.1						
14			264.4						
16		<b>SILT</b> Medium dense, grey-black, fine clay, coarse sand layers at 5.3 - 6.9 m, some rootlets and shells of marine organisms, wet, organic odour, no staining.	4.6	7	SS			0	
18				8	SS			0	
20				9	SS			0	
22				10	SS				
24			261.6						
26		<b>SAND AND GRAVEL</b> Loose, light grey-brown, coarse gravel, some cobbles, saturated, no staining or odours.	7.5	11	SS		PAHs	0	
28				12	SS				
30		End of Borehole	260.0						
32			9.0						
34									
36									
38									
40									

**Cover Type:**  
**Notes:** Split Spoon (SS)  
**Sheet:** 1 of 1

**Field Technician:** KMK  
**Drafted by:** JYM  
**Reviewed by:** RJF

**Borehole Number: MTE-BH510-17**  
**Project:** Phase Two ESA **Drill Date:** 2/21/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON



**Cover Type:**  
**Notes:** Split Spoon (SS)  
**Sheet:** 1 of 1

**Field Technician:** KMK  
**Drafted by:** JYM  
**Reviewed by:** RJF

**Borehole Number: MTE-BH511-17**  
**Project:** Phase Two ESA **Drill Date:** 2/21/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
0		Ground Surface	267.8					
0	Blue hatched	TOPSOIL	0.0	1	SS	90		
2	Blue hatched	FILL Loose, light gre-brown, medium silty sand with clay, some organics, dry no staining or odours	266.3	2	SS	5	metals	
4	Blue hatched	FILL Some slag	264.9	3	SS	2		
6	Blue hatched		264.9	4	SS	20		
8	Blue hatched		264.0	5	SS	20	metals	
10	Yellow dotted	SAND medium dense, light brown, coarse gravel with some cobbles, moist, no staining or odours	264.0	6	SS	2		
12	Yellow dotted	SAND AND GRAVEL medium dense, light brown, coarse, large cobbles, saturated, no staining or odours	257.2	7	SS	50		
14	Yellow dotted		257.2	8	SS	50	PHCs, VOCs, PAHs	
16	Yellow dotted		257.2	9	SS	50		
18	Yellow dotted		257.2	10	SS	50		
20	Yellow dotted		257.2	11	SS	50		
22	Yellow dotted		257.2	12	SS	50		
24	Yellow dotted		257.2					
26	Yellow dotted		257.2					
28	Yellow dotted		257.2					
30	Yellow dotted		257.2					
32	Yellow dotted		257.2					
34	Yellow dotted		257.2					
36		End of Borehole	10.7					

**Cover Type:**  
**Notes:** SS (Split Spoon)  
**Sheet:** 1 of 1

**Field Technician:** KMK  
**Drafted by:** JYM  
**Reviewed by:** RJF

**Borehole Number: MTE-BH512-17**  
**Project:** Phase Two ESA **Drill Date:** 2/22/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
0		Ground Surface	267.4					
0		<b>FILL</b> Loose, medium to dark brown, coarse sand and gravel, large cobbles at 0.8 - 1.4 m, damp, no staining.	0.0	1	SS			
2				2	SS		metals	
2		<b>SAND</b> Loose, brown, fine silt, some stones, dry, no staining.	265.8	3	SS			
2.4		Wet at 2.4 m.	264.9	4	SS			
4				5	SS			
4.6		<b>SAND AND GRAVEL</b> Medium dense, light brown, coarse, large cobbles at 6.1 - 6.7 m, saturated, red mottling at 9.6 m.	262.8	6	SS			
6				7	SS		PHCs, BTEX PAHs	0
8				8	SS			
8				9	SS		PAHs	0
9.8		End of Borehole	257.6	10	SS			0

**Cover Type:**  
**Notes:** No noticeable odours  
**Sheet:** 1 of 1



**Field Technician:** KMK  
**Drafted by:** JYM  
**Reviewed by:** RJF

**Borehole Number: MTE-BH513-17**  
**Project:** Phase Two ESA **Drill Date:** 2/21/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
0		Ground Surface	267.2					VOC ppm Hydrocarbon ppm 100 200 300 400
0	ASPHALT		0.0	1	SS		metals	
2	FILL	Loose, light brown, coarse sand and gravel, damp.		2	SS			
4				3	SS			
6			264.9					
8		Black-brown, rust coloured sand and gravel at 2.3 - 2.6 m.	2.3	4	SS		0	
10	SAND	Medium dense, light brown, fine silt, saturated.	264.1	5	SS		0	
12			3.0	6	SS		0	
14				7	SS		0	
16			262.0				0	
18	SAND AND GRAVEL	Dense, light grey-brown, coarse, some silt layers, saturated.	5.2	8	SS		PHCs, BTEX, PAHs	
20				9	SS			
22								
24			259.6					
26	SILT	Dense, light brown, fine sand, saturated.	7.6	10	SS			
28			259.0					
30		End of Borehole	8.2					

**Cover Type:**  
**Notes:** No noticeable staining or odours  
**Sheet:** 1 of 1



**Field Technician:** KMK  
**Drafted by:** JYM  
**Reviewed by:** RJF

**Borehole Number: MW601-18**

**Project:** Phase Two ESA

**Drill Date:** 12/11/2018

**Project No:** 35571-400

**Drilling Contractor:** Direct Environmental Drilling

**Client:** Cambridge Development Inc.

**Drill Method:** GeoProbe 7822DT (Direct Push)

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.1						
0		<b>FILL</b> Brown sand and gravel, damp, no noticeable staining, slight odour	0.0						
2		Grey staining	267.2	1	DP	50	EC/SAR	2.5	
4		Black staining	0.9						
6				2	DP	30			
8			265.3				pH	0.2	
10		Brown sand with silt, moist, no noticeable staining	2.7						
12		Dark brown sandy silt with orange mottling, trace glass, moist, some black staining, odourous	264.4	3	DP	75		1.2	
14		Brown, saturated, no noticeable staining	3.7						
16		Sand	263.5						
18		Coarse-grained	4.6						
20		Strong coal tar odour	262.3	4	DP	100			
22		Coal tar staining (sheen), trace glass debris	5.8				Metals	11.4	
24		<b>SAND</b> Grey, saturated, no noticeable staining, odourous		5	DP	80			
26		Coarse-grained	260.8						
28		<b>GRAVEL</b> Grey, saturated, no noticeable staining, odourous	7.3						
30		Coal tar (sheen) on gravel					Metals + Dup	2.9	
32		Grey, coarse-grained sand seam		6	DP	70			
34			258.9						
36		End of Borehole	9.1						

**Cover Type:** Flushmount

**Notes:**

**Sheet:** 1 of 1



**Field Technician:** JYM

**Drafted by:** ZXT

**Reviewed by:** RJF

**Borehole Number: MW602-18**

**Project:** Phase Two ESA

**Drill Date:** 12/11/2018

**Project No:** 35571-400

**Drilling Contractor:** Direct Environmental Drilling

**Client:** Cambridge Development Inc.

**Drill Method:** GeoProbe 7822DT (Direct Push)

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.6						
0		FILL	0.0						
2		Dark brown sand and gravel with silt, moist, no noticeable staining/odour	267.7	1	DP	60	EC/SAR, pH	1.8	
4		Light brown	0.9						
4		Black staining with red brick fragments							
6		Brown sand, very moist, no noticeable staining							
6		Dark brown sand and gravel	266.2	2	DP	30		14.8	
8		Red brick fragments	2.4						
10									
12		Wet	265.0	3	DP	30		2.1	
14		Dark brown silty sand, saturated							
14		Crushed rock							
16		Black coal tar (sheen) stained sand, saturated, very odorous					CN-, ABNs, PAHs, PHCs, VOCs, BTEX	61.8	
18		Dark grey sandy silt, coal tar odour, no sheen	263.1	4	DP	70		4.6	
20		Grey sand	5.5						
20		Gravel with grey sandy silt							
22		Grey sandy silt with gravel and trace wood chips, no staining, very odorous		5	DP	50		1.9	
24			261.0						
26		End of Borehole	7.6						

**Cover Type:** Flushmount

**Notes:**

**Sheet:** 1 of 1



**Field Technician:** JYM

**Drafted by:** ZWT

**Reviewed by:** RJF

**Borehole Number: MW603-18**  
**Project:** Phase Two ESA **Drill Date:** 12/10/2018  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.6						
0		<b>FILL</b> Brown sand and gravel, damp, odourous	0.0						
2		Dark brown silty sand, with gravel, moist	267.7	1	DP	70	EC/SAR, pH+Dup	1.0	
4		Saturated seam	267.1						
6		Light brown sand and gravel, moist	1.5						
8		Brown sand with gravel		2	DP	50		2.5	
10		<b>SAND</b> Brown, coarse-grained, moist, no noticeable staining, odourous	265.5						
12		Saturated	264.6	3	DP	60		0.7	
14			4.0						
18			262.8	4	DP	75	CN-, ABNs+Dup, PAHs+Dup, PHCs, VOCs, BTEX	295.4	
20		Black coal tar staining, very odourous	5.8						
22		<b>SILTY SAND</b> Greyish brown, saturated, noticeable sheen and odour	261.9						
24		No noticeable sheen	6.7	5	DP	100		4.5	
26		End of Borehole	261.0						
28			7.6						
30									
32									
34									
36									
38									
40									

**Cover Type:** Flushmount **Field Technician:** JYM  
**Notes:**  **Drafted by:** ZWT  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MW604-18**  
 Project: Phase Two ESA  
 Project No: 35571-400  
 Client: Cambridge Development Inc.  
 Location: 130 Water Street North, Cambridge, ON

Drill Date: 12/11/2018  
 Drilling Contractor: Direct Environmental Drilling  
 Drill Method: GeoProbe 7822DT (Direct Push)

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.2						
0.0		<b>FILL</b> Brown sand and gravel, damp, slight odour Black stained silty sand Orangy-brown Gravel Brown sand with some silt, moist	0.0	1	DP	85	EC/SAR+Dup		
2.4		Wet Withe crushed gravel with sand	265.8	2	DP	85			
3.0		<b>SAND</b> Brown, coarse-grained, wet, no noticeable staining, slight odour Saturated	265.1	3	DP	60		0.7	
4.6		Odourous	263.6	4	DP	90			
5.8		Black coal tar (sheen) staining, extremely odourous	262.4	5	DP	50	CN-, PHCs, VOCs, BTEX	3.0	
6.4		Grey, with silt, no noticeable staining, coal tar odour	261.8						
7.3		Saturated gravel seam	260.9					0.8	
7.3		End of Borehole	260.9						
12									

Cover Type: Flushmount  
 Notes:  
 Sheet: 1 of 1

Field Technician: JYM  
 Drafted by: ZWT  
 Reviewed by: RJF

**Borehole Number: BH605-18**  
**Project:** Phase Two ESA  
**Project No:** 35571-400  
**Client:** Cambridge Development Inc.  
**Location:** 130 Water Street North, Cambridge, ON

**Drill Date:** 12/10/2018  
**Drilling Contractor:** Direct Environmental Drilling  
**Drill Method:** GeoProbe 7822DT (Direct Push)

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	267.4						
0.0		FILL	0.0						
2		Brown sand and gravel, damp, no staining, slight odour	266.8	1	DP	60			
0.6		Dark brown clayey silt seam	0.6						
4			265.9				EC/SAR, pH		
6		SAND AND GRAVEL	1.5	2	DP	60		0.0	
8		Brown, damp, no noticeable staining, odourous	264.7						
10		Moist	2.7						
12		Wet		3	DP	60		0.0	
14		Saturated	262.9						
16		SAND	4.6	4	DP	90	CN <sup>-</sup> , ABNs <sup>+</sup> , PAHs <sup>+</sup> , VOCs <sup>+</sup> , BTEX <sup>+</sup>	1.1	
18		Grey, fine-grained, saturated, no noticeable staining, odourous	262.2						
20		SILT SAND		5	DP	70	pH, VOCs <sup>+</sup> , BTEX <sup>+</sup>	0.0	
22		Grey	260.4						
24		SILT	7.0						
26		SAND AND GRAVEL	259.8						
28		Brown, saturated, no noticeable staining, odourous	7.6						
30		Light greyish brown							
32		End of Borehole							

**Cover Type:** Flushmount  
**Notes:** \*Duplicate collected  
**Sheet:** 1 of 1

**Field Technician:** JYM  
**Drafted by:** ZWT  
**Reviewed by:** RJF

**Borehole Number: BH606-18**  
 Project: Phase Two ESA  
 Project No: 35571-400  
 Client: Cambridge Development Inc.  
 Location: 130 Water Street North, Cambridge, ON

Drill Date: 12/10/2018  
 Drilling Contractor: Direct Environmental Drilling  
 Drill Method: GeoProbe 7822DT (Direct Push)

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.9						
0		<b>FILL</b> Dark brown sand and gravel, moist, no noticeable staining, odourous Brown to greyish brown, trace rock, asphalt and wood debris	0.0						
2			267.7	1	DP	70			
4		Orangey brown silty sand and gravel, moist, no noticeable staining/odour	1.2				EC/SAR, pH	0.5	
6		Black stained sand and gravel, odourous Brown		2	DP	50	pH	0.1	
8			266.2						
10		Wet Greyish brown sand and gravel, red brick fragments, black staining, odourous Red brick fragments	2.7						
12			264.6	3	DP	40			
14		Saturated Wood chip fragments	4.3				VOCs, BTEX	1.4	
16		<b>CLAYEY SILT</b> Black coal tar staining, with sand, very odourous		4	DP	20			
20			262.2				CN-, VOCs, BTEX	11.2	
22		<b>SAND AND GRAVEL</b> Black coal tar staining, becoming more gravelly, saturated, very odourous	6.7	5	DP	60		245.7	
24			261.3						
26		<b>SAND</b> Brown, coarse-grained, saturated, odourous	7.6					20.1	
28		<b>GRAVEL</b> Brown, saturated, no noticeable staining, odourous	8.2						
30		<b>SHALE</b> White, saturated, no noticeable staining, odourous	259.7				VOCs, BTEX		
32			9.1						
34		End of Borehole							

Cover Type: Flushmount  
 Notes:  
 Sheet: 1 of 1

Field Technician: JYM  
 Drafted by: ZWT  
 Reviewed by: RJF

**Borehole Number: BH607-18**  
**Project:** Phase Two ESA **Drill Date:** 12/10/2018  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.5						
0		<b>FILL</b> Brown sand and gravel, some asphalt and brick fragments, damp, slightly odourous	0.0						
2			267.0	1	DP	50	EC/SAR, pH	0.1	
6		<b>SAND AND GRAVEL</b> Brown, moist, no noticeable staining, odourous	1.5						
8			265.8	2	DP	50	pH*, VOCs, BTEX	0.0	
10		<b>SAND</b> Brown, coarse-grained, moist, no noticeable staining/odour Becoming saturated	2.7						
12				3	DP	60		0.0	
16								0.0	
18		Orange/brown	263.0	4	DP	60	CN- PHCs VOCs, BTEX	0.0	
20			262.4						
22		<b>SAND AND GRAVEL</b> Light greyish brown, saturated, no noticeable staining/odour	6.1						
24				5	DP	70			
26		End of Borehole	260.9						
28			7.6						
30									
32									
34									
36									
38									
40									

**Cover Type:** Flushmount **Field Technician:** JYM  
**Notes:** \*Duplicate collected **Drafted by:** ZWT  
**Sheet:** 1 of 1 **Reviewed by:** RJF



**Borehole Number: BH608-18**  
**Project:** Phase Two ESA  
**Project No:** 35571-400  
**Client:** Cambridge Development Inc.  
**Location:** 130 Water Street North, Cambridge, ON

**Drill Date:** 12/10/2018  
**Drilling Contractor:** Direct Environmental Drilling  
**Drill Method:** GeoProbe 7822DT (Direct Push)

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.9						
0		<b>FILL</b> Brown sand and gravel, damp, odourous	0.0						
2		Dark brownish black stained silty sand, some asphalt debris, odourous, stained	268.0	1	DP	50	EC/SAR, pH, VOCs, BTEX	0.1	
4		Brown saturated seam, no noticeable odour	267.1					0.0	
6		Sand with gravel, no noticeable staining	265.9	2	DP	30	pH	0.1	
10		Sand and gravel	264.5						
12		Dark brown with orange mottling, saturated	263.3	3	DP	40		0.0	
14		<b>SAND</b> Brown, fine-grained, saturated, no noticeable staining/odour	263.3	4	DP	NV	CN-PHCs*, VOCs*, BTEX*	0.0	
18		Coarse-grained Rust colour	261.9					0.0	
20		<b>SANDY SILT</b> Brown, some clay, saturated, no noticeable staining, slightly odourous	261.3	5	DP	NV		0.0	
22		<b>SILT</b> Brown, with clay, saturated, no noticeable staining/odour	261.3				pH	0.0	
24		End of Borehole	261.3						
26			7.6						
28									
30									
32									
34									
36									
38									
40									

**Cover Type:** Flushmount  
**Notes:** \*Duplicate collected, NV - No value  
**Sheet:** 1 of 1

**Field Technician:** JYM  
**Drafted by:** ZWT  
**Reviewed by:** RJF

**Borehole Number: MTE-MW301A-15**  
**Project:** Phase Two ESA **Drill Date:** 12/7/2015  
**Project No:** 35571-400 **Drilling Contractor:** Geo-Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** CME-75 Auger Drill Rig  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE				HEADSPACE				Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm	Hydrocarbon ppm			
0		Ground Surface	269.0									
0		<b>TOPSOIL</b>	0.0	1	SS							
2		<b>FILL</b> Loose, light brown, coarse sand and gravel, some silt, dry, no staining or odours.		2	SS		metals, pH					
2			266.7	3	SS							
8		Some brick fragments, ash/slag.	2.3	4	SS		PAHs, metals					
10				5	SS							
14			264.5	6	SS							
16		Saturated at 4.6 m.	4.6	7	SS		PHCs, PAHs, metals, pH					
22			262.3	8	SS		PHCs, PAHs					
24		<b>SAND</b> Dense, light brown, fine silt, wet, no staining or odours.	6.7									
26		<b>SAND AND GRAVEL</b> Dense, light brown, coarse gravel, saturated, coal tar odour and sheen.	7.6	9	SS		PHCs, PAHs					
30		No staining or odour.	259.9	10	SS		PAHs, pH					
36				11	SS		PAHs, pH					

**Cover Type:** Steel Stick-up **Field Technician:** BIM  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 1 of 3 **Reviewed by:** RJF





**Borehole Number: MTE-MW301A-15**  
**Project:** Phase Two ESA **Drill Date:** 12/7/2015  
**Project No:** 35571-400 **Drilling Contractor:** Geo-Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** CME-75 Auger Drill Rig  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
78	24							
80				20	SS			
82								
84								
86	26			21	SS			
88								
90	28							
92				22	SS			
94				End of Borehole	240.7 28.3			
96	30							
98								
100								
102								
104	32							
106								
108								
110								
112	34							
114								
116								
118								

**Cover Type:** Steel Stick-up **Field Technician:** BIM  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 3 of 3 **Reviewed by:** RJF



**Borehole Number: MTE-MW301B-15**

**Project:** Phase Two ESA

**Drill Date:** 12/10/2015

**Project No:** 35571-400

**Drilling Contractor:** Geo-Environmental Drilling

**Client:** Cambridge Development Inc.

**Drill Method:** CME-75 Auger Drill Rig

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
ft m								
0		Ground Surface	269.0					
0		<b>TOPSOIL</b>	0.0					
2		<b>FILL</b> Loose, light brown, coarse sand and gravel, some silt, dry, no staining or odours.						
2		Some brick fragments, ash/slag.	266.7					
2.3								
4.6		Saturated at 4.6 m.	264.5					
4.6								
6.7		<b>SAND</b> Dense, light brown, fine silt, wet, no staining or odours.	262.3					
6.7								
7.6		<b>SAND AND GRAVEL</b> Dense, light brown, coarse gravel, saturated, coal tar odour and sheen.	261.4					
7.6								
9.1		No staining or odours.	259.9					
9.1								

**Cover Type:** Steel Stick-up

**Field Technician:** BIM

**Notes:** SS (Split Spoon)

**Drafted by:** BIM

**Sheet:** 1 of 3

**Reviewed by:** RJF



**Borehole Number: MTE-MW301B-15**  
**Project:** Phase Two ESA **Drill Date:** 12/10/2015  
**Project No:** 35571-400 **Drilling Contractor:** Geo-Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** CME-75 Auger Drill Rig  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE			SAMPLE				HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
38	12 14 16 18 20 22							
40								
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								
70								
72								
74								
76								

**Cover Type:** Steel Stick-up  
**Notes:** SS (Split Spoon)  
**Sheet:** 2 of 3



**Field Technician:** BIM  
**Drafted by:** BIM  
**Reviewed by:** RJF

**Borehole Number: MTE-MW301B-15**  
**Project:** Phase Two ESA **Drill Date:** 12/10/2015  
**Project No:** 35571-400 **Drilling Contractor:** Geo-Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** CME-75 Auger Drill Rig  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE			SAMPLE				HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
78	24							<p>Sand Pack                      10" Slot 10 Screen</p>
80								
82								
84								
86	26							
88								
90								
92	28		240.7					
94		End of Borehole	28.3					
96								
98								
00	30							
02								
04								
06	32							
08								
10								
12	34							
14								
16								

**Cover Type:** Steel Stick-up **Field Technician:** BIM  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 3 of 3 **Reviewed by:** RJF



**Borehole Number: MTE-MW302-15**

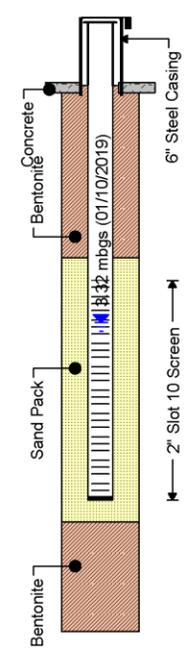
**Project:** Phase Two ESA **Drill Date:** 12/10/2015

**Project No:** 35571-400 **Drilling Contractor:** Geo-Environmental Drilling

**Client:** Cambridge Development Inc. **Drill Method:** CME-75 Auger Drill Rig

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
0		Ground Surface	268.3					
0		<b>TOPSOIL</b>	0.0	1	SS			
2		<b>FILL</b> Loose, light brown, coarse sand and gravel, some silt, dry, no staining or odours.		2	SS			
6		Some ash.	266.5 1.8	3	SS		PHCs, PAHs, metals, pH	
10		Wet at 3.3 m.	265.6 2.7	4	SS			
12			264.5 3.8	5	SS		PHCs, BTEX, VOCs	
14		Some rootlets, black with coal tar odour and sheen.		6	SS			
16			263.1 5.2	7	SS			
18		<b>SILT</b> Medium dense, light grey-black, coarse sand, some clay, saturated, coal tar odour and sheen.		8	SS		PHCs, BTEX, VOCs, PAHs, metals, pH	
22		<b>SAND AND GRAVEL</b> Medium dense, light grey-black, coarse gravel, saturated, coal tar odour and sheen.	261.9 6.4	9	SS			
24			260.7 7.6	10	SS			
26		End of Borehole						



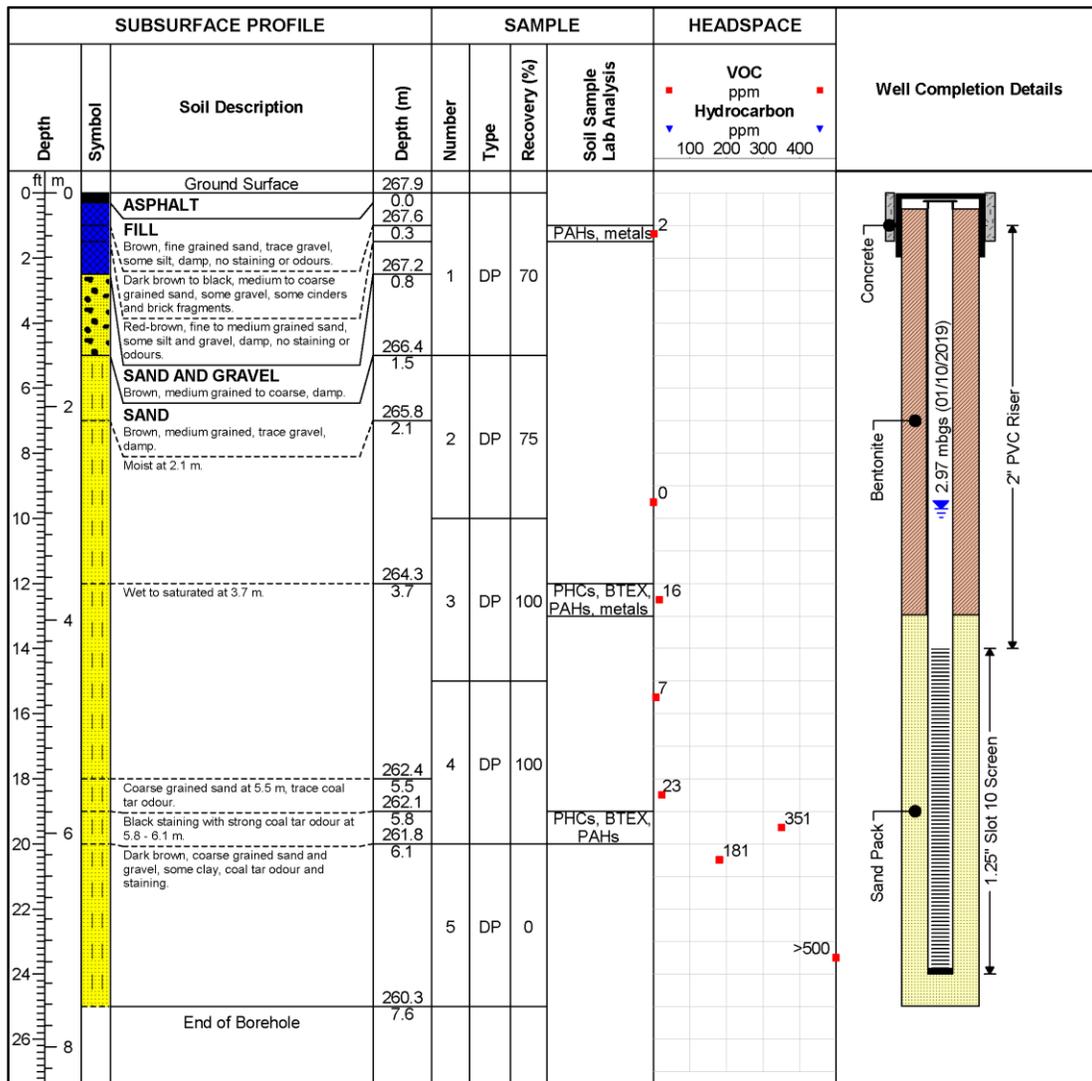
**Cover Type:** Steel Stick-up **Field Technician:** BIM

**Notes:** SS (Split Spoon) **Drafted by:** BIM

**Sheet:** 1 of 1 **Reviewed by:** RJF



**Borehole Number: MTE-MW401-16**  
**Project:** Phase Two ESA **Drill Date:** 5/3/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON



**Cover Type:** Flushmount **Field Technician:** SCA  
**Notes:** **Drafted by:** SCA  
**Sheet:** 1 of 1 **Reviewed by:** RJF



**Borehole Number: MTE-MW402-16**  
**Project:** Phase Two ESA **Drill Date:** 5/3/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	267.7						
0	Blue hatched	TOPSOIL	0.0					0	
0.6	Yellow hatched	FILL Red-brown, fine to medium grained sand, trace gravel, damp.	267.1	1	DP	40		0	
1.8	Yellow hatched	SAND AND GRAVEL Brown, medium to coarse grained sand, damp. Trace gravel.	265.9	2	DP	60		0	
3.0		Wet at 2.1 m. Saturated at 3.0 m.	264.7	3	DP	80		1	
7.6		End of Borehole	260.1	4	DP	0		1	
12				5	DP	0		0	

**Cover Type:** Flushmount **Field Technician:** SCA  
**Notes:** No noticeable staining or odours **Drafted by:** MEF  
**Sheet:** 1 of 1 **Reviewed by:** RJF

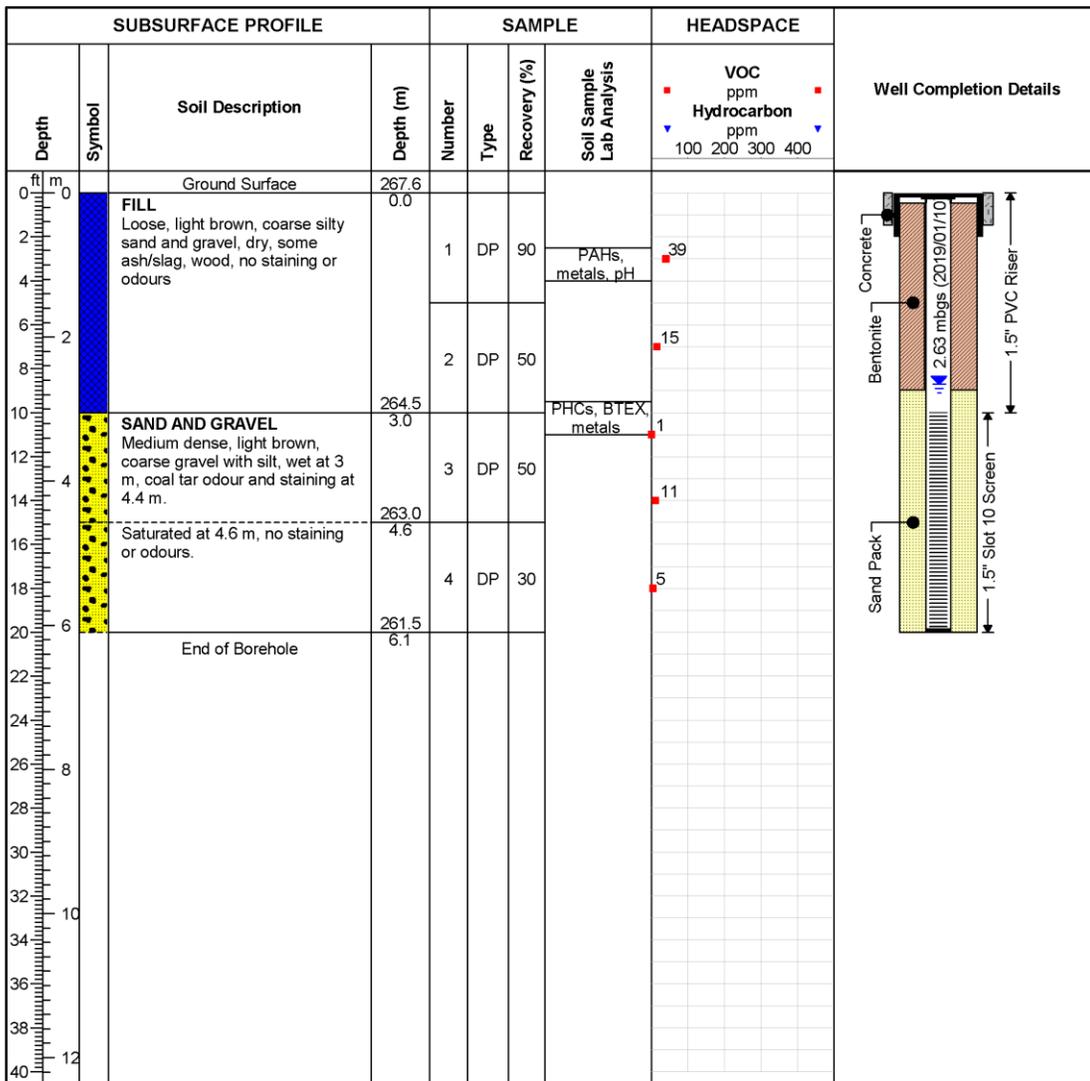


**Borehole Number: MTE-MW403-16**  
**Project:** Phase Two ESA **Drill Date:** 5/3/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	269.2						
0		<b>FILL</b> Dark brown, fine to medium grained sand and gravel, damp, no noticeable staining or odours.	0.0					0	
0.5		medium to coarse grained sand and gravel, trace cinders and brick fragments.	268.7	1	DP	60		0	
1.8		cinders, ash, slag and brick fragments	267.3	2	DP	50		0	
3.4		wet	265.8	3	DP	40		0	
4.9		<b>SILT</b> Black, high organic content, shells, saturated, no noticeable staining or odours.	264.3	4	DP	80		0	
6.7		<b>SANDY SILT</b> Dark grey, fine grained sand, high organic content, saturated, no noticeable staining or odours.	262.5	5	DP	100		0	
6.7		<b>SAND</b> Dark grey, medium grained, saturated	261.6					0	
7.6		<b>SANDY SILT</b> Dark grey, fine grained sand, high organic content, some wood, saturated, no noticeable staining or odours.	261.6					0	
8		End of Borehole						0	

**Cover Type:** Flushmount **Field Technician:** SCA  
**Notes:**  **Drafted by:** MEF  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MTE-MW404-16**  
**Project:** Phase Two ESA **Drill Date:** 5/3/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON



**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:**  **Drafted by:** BIM  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MTE-MW405-16**  
**Project:** Phase Two ESA **Drill Date:** 5/4/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.4						
0	FILL	Loose, light brown, coarse silty sand and gravel, dry, some ash/slag and wood at 0.9 - 1.5 m, no staining or odours.	0.0	1	DP	90	metals		
2	SAND	Medium dense, light brown, fine silt, dry, no staining or odours.	266.9	2	DP	50		13	
4		Fine silt with gravel, moist, no staining or odours.	265.0	3	DP	50		0	
6		Wet with coal tar odours at 5.2 - 6.1 m.	263.2	4	DP	30	PHCs, BTEX metals, ABNs	4	
8	SILT	Dense, light grey-brown, fine sand with clay, wet, slight coal tar odour, no staining.	261.7	5	DP	50		2	
10			261.1						
12			261.1				BTEX, metals	4	
14	SAND AND GRAVEL	Dense, light brown, coarse gravel, wet, no staining or odours.							
16		End of Borehole							

**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:**  **Drafted by:** BIM  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MTE-MW406-16**  
**Project:** Phase Two ESA **Drill Date:** 5/4/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.5						
0	ASPHALT		0.0						
2	FILL	Loose, light brown, coarse silty sand and gravel, dry, some ash/slag, wood, brick and concrete, no staining or odours.	267.0	1	DP	90	PAHs, metals, PCBs, OC Pesticides	12	
6	SAND	Medium dense, light brown, coarse gravel with silt, moist at 2.9 m, no staining or odours.	264.8	2	DP	50		3	
12		Saturated at 3.7 m.	3.7	3	DP	50	PHCs, BTEX, PAHs, metals, PCBs		
18		Black with coal tar odour at 5.3 m and sheen at 5.8 m.	263.2	4	DP	30	PHCs, BTEX, PAHs, metals, ABNs		
20	SILT	Dense, light grey-brown, fine sand, wet, coal tar odour and sheen.	262.7	5	DP	50			
24	SAND AND GRAVEL	Dense, light brown, coarse gravel, wet, no staining or odours.	261.0				PHCs, BTEX, PAHs, ABNs		
26		End of Borehole	7.5						

**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:**  **Drafted by:** BIM  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MTE-MW407-16**  
**Project:** Phase Two ESA **Drill Date:** 5/4/2016  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.6						
0	ASPHALT		0.0						
2	FILL	loose, light brown, coarse silty sand and gravel, dry, some brick at 0.6-0.9 m, no staining or odours	267.7	1	DP	90	PAHs, metals, OC Pesticides	120	
4	SAND	medium dense, light grey-brown, coarse gravel with silt, dry, coal tar odour and sheen	262.8	2	DP	50		37	
12			5.8	3	DP	50	PHCs, BTEX, PAHs, metals, ABNs	11	
18			5.8	4	DP	30	PHCs, BTEX, PAHs, metals, ABNs	31	
20	SILT	dense, light grey-brown, fine sand and clay, wet, faint odour, no staining	262.8				PHCs, BTEX, PAHs		
24		End of Borehole							

**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:**  **Drafted by:** BIM  
**Sheet:** 1 of 1 **Reviewed by:** RJF

**Borehole Number: MTE-MW501-17**

**Project:** Phase Two ESA

**Drill Date:** 2/27/2017

**Project No:** 35571-400

**Drilling Contractor:** Altech Drilling

**Client:** Cambridge Development Inc.

**Drill Method:** Dietrich D-120 Auger Rig

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE				HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm	Hydrocarbon ppm	
0		Ground Surface	268.0							
0	ASPHALT		0.0	1	SS					
2	FILL	Loose, light brown, coarse sand and gravel, trace silt, ash/slag/cinders, dry, no staining or odours.		2	SS		PCBs			
4			266.3							
6	SILT	Loose, light brown, coarse sand, dry, no staining or odours.	1.7	3	SS					
8				4	SS		PHCs, BTEX, PAHs			
10			264.8							
12	SAND	Medium dense, light brown, fine silt, wet, no staining or odours.	3.2	5	SS					
14				6	SS					
16			262.5				BTEX, VOCs, PAHs, ABNs			
18		Saturated, black staining with coal tar odour.	5.5	7	SS					
20	SILT	Dense, light grey-brown, coarse sand, some clay, wet, strong coal tar odour and sheen.		8	SS					
22				9	SS		PHCs, BTEX, PAHs			
24				10	SS					
26			259.6				PHCs, BTEX, PAHs			
28	SAND AND GRAVEL	Dense, light brown, coarse, wet, no staining or odours.	8.4	11	SS					
30										
32										
34										
36										
38										
40										

**Cover Type:** Flushmount

**Notes:** SS (Split Spoon)

**Sheet:** 1 of 2



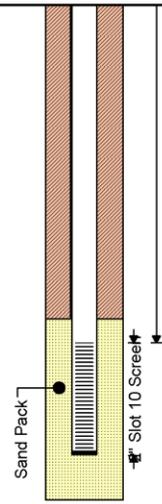
**Field Technician:** BIM

**Drafted by:** BIM

**Reviewed by:** RJF

**Borehole Number: MTE-MW501-17**  
**Project:** Phase Two ESA **Drill Date:** 2/27/2017  
**Project No:** 35571-400 **Drilling Contractor:** Altech Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** Dietrich D-120 Auger Rig  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE			SAMPLE				HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	
42	14							VOC ppm Hydrocarbon ppm 100 200 300 400
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								
70	16	End of Borehole	249.1	13	SS		PHCs, BTEX, VOCs, PAHs, metals, ABNs	
72	18		18.9					
74								
76								
78								
80								



**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 2 of 2 **Reviewed by:** RJF



**Borehole Number: MTE-MW502-17**  
**Project:** Phase Two ESA **Drill Date:** 3/7/2017  
**Project No:** 35571-400 **Drilling Contractor:** Altech Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** Dietrich D-120 Auger Drill Rog  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.4						
0		<b>TOPSOIL</b>	0.0	1	SS				
2		<b>FILL</b> Loose, light brown, coarse sand and gravel, some silt, dry, no staining or odours.		2	SS				
2		Some ash.	266.6 1.8	3	SS				
3		Wet at 3.3 m.	265.6 2.7	4	SS				
4		Some rootlets, black with coal tar odour and sheen.	264.6 3.8	5	SS				
5			263.2 5.2	7	SS				
6		<b>SILT</b> Medium dense, light grey-black, coarse sand, some clay, saturated, coal tar odour and sheen.	262.0 6.4	8	SS		ABNs	321	
6		<b>SAND AND GRAVEL</b> Medium dense, light grey-black, coarse gravel, saturated, coal tar odour and sheen.		9	SS				
8				10	SS				
10				11	SS			67	
12				12	SS			57	

**Cover Type:** Steel Stick-up **Field Technician:** ADP/KLW  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 1 of 2 **Reviewed by:** RJF



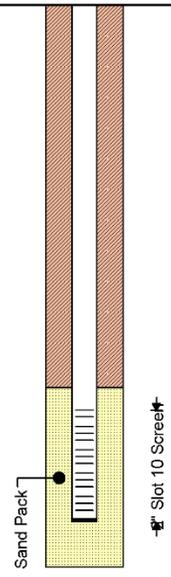
**Borehole Number:** MTE-MW502-17  
**Project:** Phase Two ESA  
**Project No:** 35571-400  
**Client:** Cambridge Development Inc.  
**Location:** 130 Water Street North, Cambridge, ON

**Drill Date:** 3/7/2017  
**Drilling Contractor:** Altech Drilling  
**Drill Method:** Dietrich D-120 Auger Drill Rog

SUBSURFACE PROFILE				SAMPLE				HEADSPACE				Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm	Hydrocarbon ppm			
38	12	No staining or odours.	256.2									
40			12.2	13	SS		PHCs, BTEX VOCs, PAHs	1				
42												
44												
46			14		14	SS			1			
48												
50												
52	16		249.5	15	SS		PHCs, BTEX PAHs	0				
54												
56												
58												
60	18		18.9	17	SS		PHCs, BTEX VOCs, PAHs	0				
62												
64		End of Borehole										
66	20											
68												
70												
72	22											
74												
76												

**Cover Type:** Steel Stick-up  
**Notes:** SS (Split Spoon)  
**Sheet:** 2 of 2

**Field Technician:** ADP/KLW  
**Drafted by:** BIM  
**Reviewed by:** RJF



**Borehole Number: MTE-MW503-17**

**Project:** Phase Two ESA

**Drill Date:** 2/22/2017

**Project No:** 35571-400

**Drilling Contractor:** Direct Environmental Drilling

**Client:** Cambridge Development Inc.

**Drill Method:** Dietrich D-50 Auger Rig

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.5						
0	FILL	Loose, light brown, coarse silty sand and gravel, dry, no staining or odours.	0.0	1	SS				
2			267.2	2	SS		metals, PCBs		
4		Some asphalt at 1.22 m, ash/slag at 2.8 - 3.4 m bgs, moist.	1.2	3	SS				
6				4	SS				
8				5	SS				
10			265.0	6	SS				
12	SAND	Medium dense, light brown, coarse gravel with silt, saturated, faint coal tar odour, no staining.	3.5	7	SS				
14				8	SS				
16			263.0	9	SS		PHCs, BTEX, PAHs, ABNs		
18		Strong coal tar odour and sheen.	5.5	10	SS				
20	SILT	Medium, dense, light grey-brown, coarse gravelly sand, wet, coal tar odour and sheen.	262.1	11	SS				
22			6.4	12	SS				
24			260.4						
26	SAND AND GRAVEL	Medium dense, grey-brown, wet, coal tar odour, no staining.	8.1						
28									
30									
32									
34									
36			257.2						
38		End of Borehole	11.3						
40									

**Cover Type:** Flushmount

**Field Technician:** BIM

**Notes:** SS (Split Spoon)

**Drafted by:** BIM

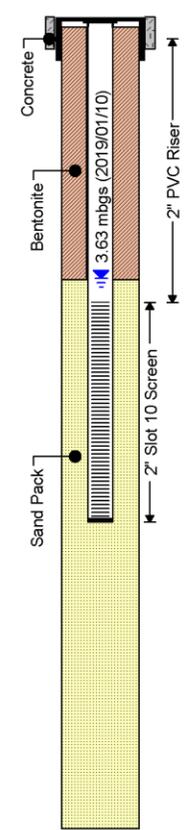
**Sheet:** 1 of 1



**Reviewed by:** RJF

**Borehole Number: MTE-MW504-17**  
**Project:** Phase Two ESA **Drill Date:** 2/22/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** Dietrich D-50 Auger Rig  
**Location:** 130 Water Street North, Cambridge, ON

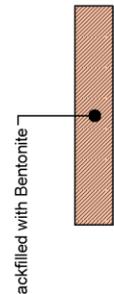
SUBSURFACE PROFILE				SAMPLE				HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm	Hydrocarbon ppm	
0		Ground Surface	268.7							
0		<b>FILL</b> Loose, medium brown, sand and gravel, trace silt, some brick fragments, ash/slag, no noticeable staining or odours.	0.0	1	SS		PAHs, metals, PCBs			
2				2	SS					
4				3	SS					
6				4	SS		metals			
8				5	SS					
10			265.3							
12		<b>SAND</b> Loose, light brown, medium silt, dry, no staining or odours.	3.4	6	SS					
14		Coal tar odour and saturated at 4.3 m bgs.		7	SS					
16				8	SS		PHCs, BTEX, PAHs, metals, ARNs			
18				9	SS					
20			262.3							
22		<b>SILT</b> Compact, fine, wet, faint coal tar odour.	6.4	10	SS					
24				11	SS					
26			260.7							
28		<b>SAND AND GRAVEL</b> Loose, brown, coarse, moist, faint coal tar odour, no staining.	7.9	12	SS		PAHs			
30										
32										
34										
36			257.4							
38		End of Borehole	11.3							
40										



**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 1 of 1 **Reviewed by:** RJF



**Borehole Number: MTE-BH505-17**  
**Project:** Phase Two ESA **Drill Date:** 2/21/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** GeoProbe 7822DT (Direct Push)  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details	
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis		
0		Ground Surface	268.5					VOC ppm Hydrocarbon ppm 100 200 300 400	 Backfilled with Bentonite
0		<b>TOPSOIL</b>	0.0						
2		<b>FILL</b> Loose, light brown, coarse sand and gravel with silt, some ash at 0.6 - 1.22 m, damp.	267.2	1	DP	50	PCBs		
4		<b>SAND</b> Medium dense, loose, light brown, fine silt, damp.	266.0	2	DP	75			
6		<b>SAND AND GRAVEL</b> Medium dense, light brown, coarse gravel, moist.	265.4						
10		End of Borehole	3.0						

**Cover Type:**  
**Notes:** No noticeable staining or odours  
**Sheet:** 1 of 1



**Field Technician:** KMK  
**Drafted by:** JYM  
**Reviewed by:** RJF

**Borehole Number: MTE-MW506-17**

**Project:** Phase Two ESA

**Drill Date:** 2/21/2017

**Project No:** 35571-400

**Drilling Contractor:** Direct Environmental Drilling

**Client:** Cambridge Development Inc.

**Drill Method:** Dietrich D-50 Auger Rig

**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE		Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	VOC ppm Hydrocarbon ppm	
0		Ground Surface	268.5						
0	ASPHALT		0.0	1	SS				
2	FILL	Loose, light brown, coarse sand and gravel, trace silt, dry, no staining or odours.		2	SS				
6			266.2				PCBs		
8	SAND	Loose, light brown, medium silt, dry, no staining or odours.	2.3						
12		Back staining with coal tar odour.	265.1	4	SS				
16		Saturated, coal tar odour and sheen.	263.9	5	SS				
18	SILT	Compact, fine, wet, some coal tar odour and sheen at 6.1 to 6.4 m.	263.0	6	SS		PHCs, BTEX, PAHs, ABNs		
20				7	SS				
26	SAND AND GRAVEL	Dense, light brown, coarse, moist, no staining or odours.	260.8	8	SS				
30				9	SS		PHCs, BTEX, PAHs		
36				10	SS				

**Cover Type:** Flushmount

**Notes:** SS (Split Spoon)

**Sheet:** 1 of 2



**Field Technician:** BIM

**Drafted by:** BIM

**Reviewed by:** RJF

**Borehole Number: MTE-MW506-17**  
**Project:** Phase Two ESA **Drill Date:** 2/21/2017  
**Project No:** 35571-400 **Drilling Contractor:** Direct Environmental Drilling  
**Client:** Cambridge Development Inc. **Drill Method:** Dietrich D-50 Auger Rig  
**Location:** 130 Water Street North, Cambridge, ON

SUBSURFACE PROFILE				SAMPLE			HEADSPACE	Well Completion Details
Depth	Symbol	Soil Description	Depth (m)	Number	Type	Recovery (%)	VOC ppm Hydrocarbon ppm 100 200 300 400	
42	14			11	SS			
44				12	SS		PAHs	
46								
48								
50		End of Borehole	253.2 15.2					
52	16							
54								
56								
58								
60	18							
62								
64								
66	20							
68								
70								
72	22							
74								
76								
78	24							
80								

**Cover Type:** Flushmount **Field Technician:** BIM  
**Notes:** SS (Split Spoon) **Drafted by:** BIM  
**Sheet:** 2 of 2 **Reviewed by:** RJF



**Appendix B: Geophysical Survey Results  
(Geophysics GPR International Inc.)**



**GEOPHYSICS GPR INTERNATIONAL INC.**

6741 Columbus Road  
Unit 14  
Mississauga, Ontario  
Canada L5T 2G9

Tel.: (905) 696-0656  
Fax: (905) 696-0570  
gprtor@gprtor.com  
www.geophysicsgpr.com

April 5, 2016

Our File: T16879

Sean Anderson, P. Eng  
Environmental Engineer  
**MTE Consultants Inc.**  
520 Bingemans Centre Drive  
Kitchener, Ontario  
N2B 3X9

**RE: Geophysical Survey conducted at 130 Water Street North, Cambridge, Ontario**

Dear Mr. Anderson:

Geophysics GPR International Inc. was requested by MTE Consultants Inc. to perform a geophysical survey at the above address. The purpose of the investigation was to locate any underground storage tanks, buried infrastructure or foundations. Survey extents are shown in Figure 1. The EM-31 survey was performed on March 20<sup>th</sup>, 2016, with the follow up EM-61 and georadar surveys completed on March 28<sup>th</sup>, 2016. The timing of the initial EM31 survey was not as ideal as had hoped because the parking lot was being heavily used on the weekend and also the site was being heavily used to store construction material. The data was resurveyed in the evening on March 30<sup>th</sup> when the cars were mostly absent and a great deal of the construction material was moved.

An EM-31 is a soil conductivity meter that can delineate larger metal objects such as underground storage tanks (UST's), but also some other buried infrastructure, former excavations, areas of fill material and in some cases soil contamination. Information regarding this survey can be found in Appendix A.

A follow up was conducted using a Geonics EM-61, a high sensitivity metal detector (EM-61) that can delineate larger metal objects such as USTs.

In addition to the EM61 a ground penetrating radar system was employed to delineate the location and shape of any targets. All radar data were collected and interpreted at the site. All radar data were generated in real time and interpreted on a colour monitor. The positions of any detected targets were determined from the radar image and marked on the ground. A 400 MHz antenna was used for this survey. This particular antenna is most appropriate for relatively shallow depth penetration and resolution of pipes, tanks, voids and shallow stratigraphy in the upper 2 meters.

There was several objects above ground, as noted on the attached anomaly maps. The ground radar follow-up scan could scan immediately adjacent to these objects (examples such as waste



bins and barrels) but not directly beneath these items.

The findings within Figure 2 (Anomaly Map) are as follows:

- Old building foundations and reinforced slabs were identified north and south of the waste bin dumpsters shown on the anomaly map, under the northernmost light post. The disturbed soils of this anomaly are located approximately 1-1.5m below this foundation. There may be two different foundations.
- Connections between the light posts are visible in a north-south direction by electrical wires approximately 0.7m below ground
- The catch basins and manholes are connected from north to south, and from south to east by storm pipes about 1.1m below ground.
- Area of fill material- There is a large area that includes the former building foundation where fill has been added that is more conductive than the native material. The background conductivity for this site is less than 20mS/m. Background conductivity is the level at which there is no influence from infrastructure or contaminants. 20mS/m is typical for sandy silts with some moisture content. The area within the fill material area starts at 40 mS/m and rises. This area should be the focus of intrusive investigations.

There is attached both EM 31 data sets. The first is the most important, Quadrature-phase, which is considered soil conductivity. The second data set is called In-phase. There are a few conditions that can influence this data set but the dominant condition is the presence of metal of any type. This particular data set highlights the building foundation very well.

I hope everything is to your satisfaction.

If you have any questions please do not hesitate to call.

Sincerely,



Milan Situm, P.Geo.  
Manager



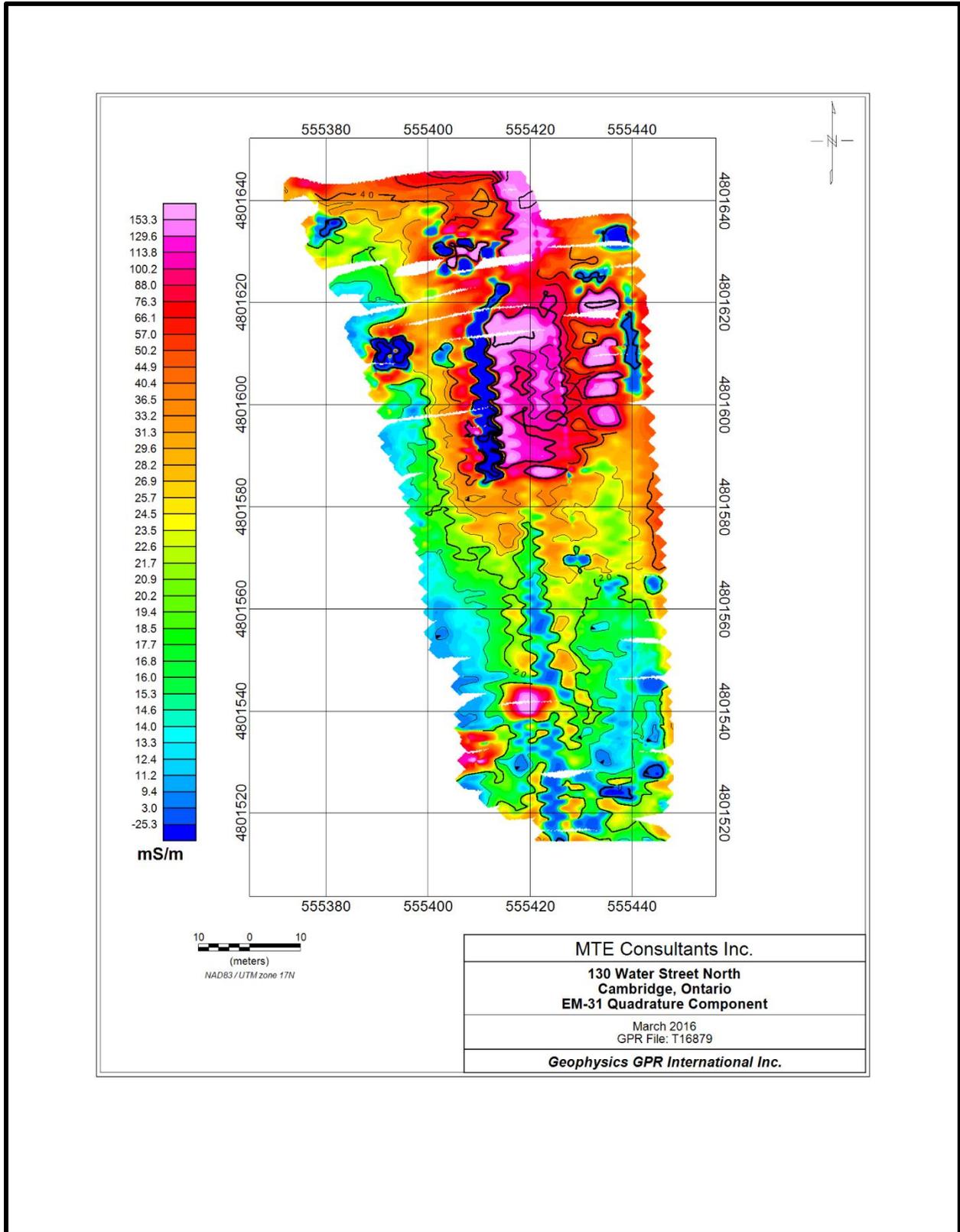
Attached: data sets and fact sheets.  
Anomaly Map is last page

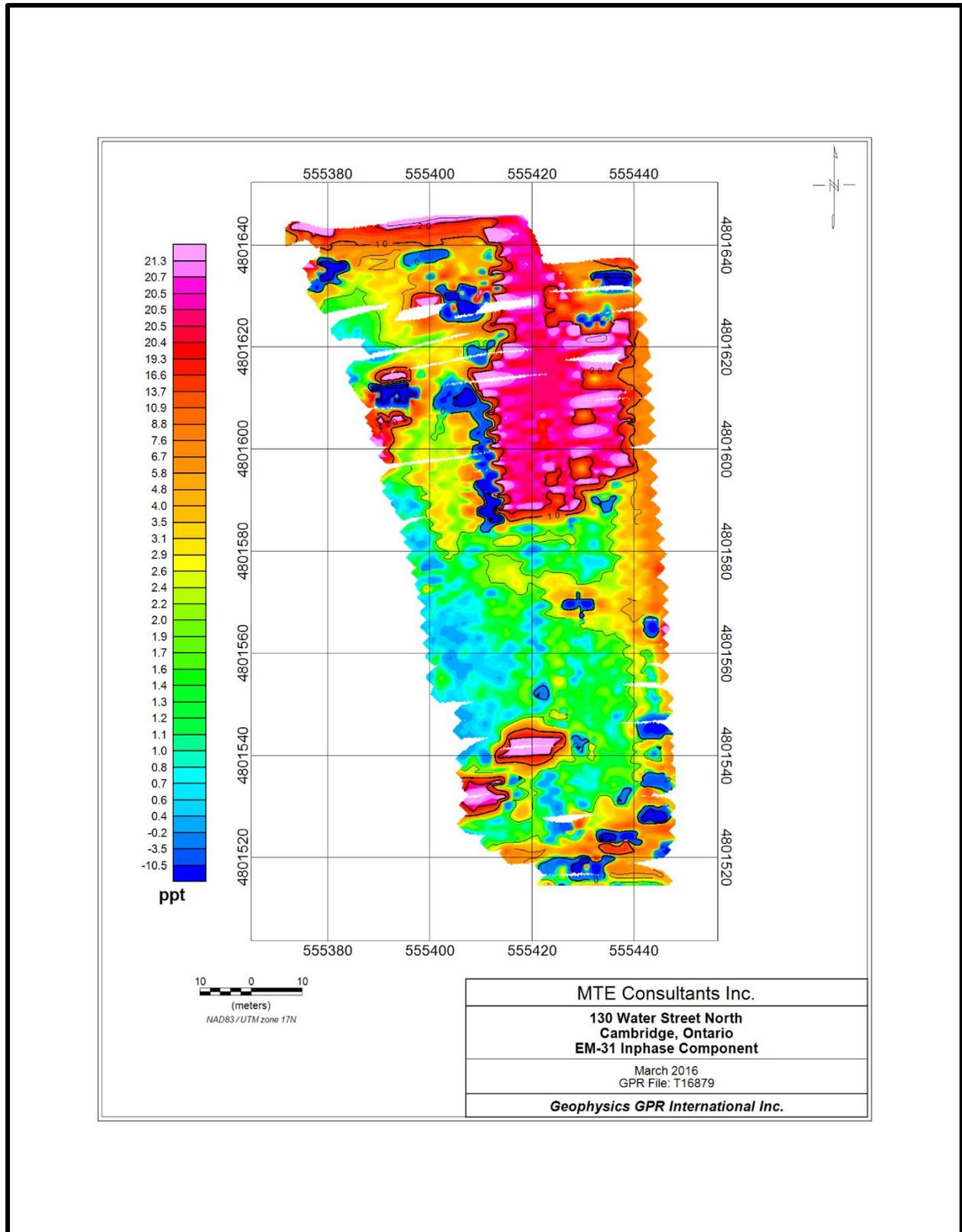




Figure 1: Survey Extents





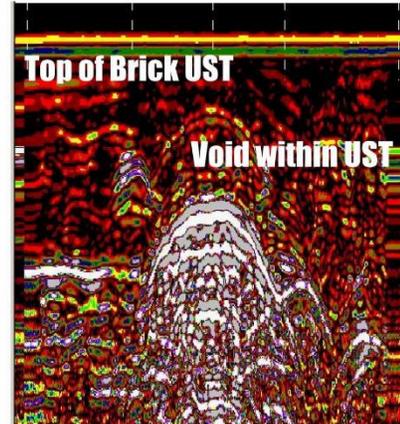


# Environmental Assessment Surveys

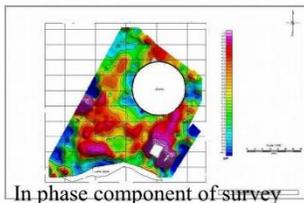


## Ground Penetrating Radar

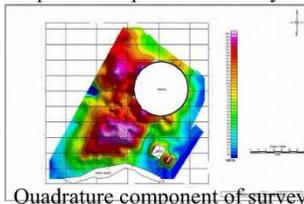
**Medium sized antennas often used to scan about 3m deep with good resolution of pipes, UST's, voids and former excavations**



## Electromagnetic Surveys



In phase component of survey



Quadrature component of survey

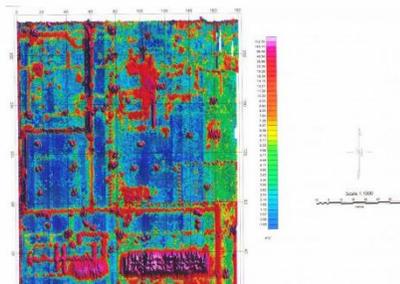
**Soil conductivity from surface to 10's of meters**

**Commonly used EM 31 penetrates about 6m  
High resolution image of materials shallower than 2.5m  
Good for locating:  
pipes, voids, gravel, disturbed soils, chemical plumes & UST's**



**High Sensitivity metal detection from near surface to 10 or more meters**

**Commonly used EM61 scans around 3m deep  
High resolution maps are generated.**



**GEOPHYSICS GPR INTERNATIONAL INC.**

6741 Columbus Road  
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Mississauga, Ontario  
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Tel.: (905) 696-0656  
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gprtor@gprtor.com  
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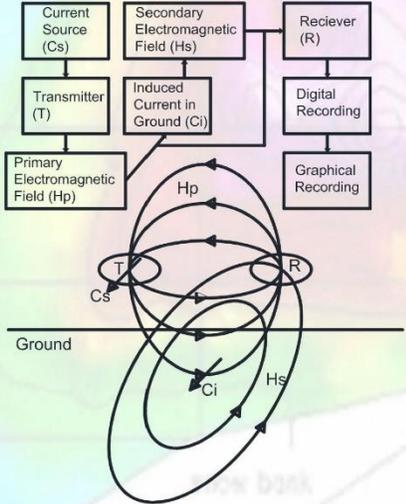
G E O P H Y S I C S   G P R      I N T E R N A T I O N A L   I N C .

**GROUND CONDUCTIVITY  
 METER  
 EM31-MK2**

A ground conductivity meter is an instrument that measures and records changes within ground conductivity or resistivity. Unlike traditional conductivity meters, EM31 does not require any contact with the ground. This inductive method is only possible through imparting an alternating current to a transmitter coil near Earth's surface, where a magnetic field is produced. This magnetic field will induce small currents in the underlying strata and produce a secondary magnetic field; both magnetic fields are detected by a receiver coil, resulting in an interpretable two phase colour image of the surveyed area: ground conductivity (quad-phase) and magnetic susceptibility (in-phase).

The effective depth is determined by the intercoil spacing (distance between the receiver coil and the transmitter coil). The EM-31 has an intercoil spacing of 3.66 m producing an effective investigation depth of approximately 6 m. Although the terrain conductivity value read by the instruments is an average conductivity over the effective depth of the survey, materials in the upper 2.5 m have a stronger weighting.





**Principles of Ground Conductivity Meter**

**Features**

- Surveys at walking speed
- Effective investigation depth of ~6 meters.
- Survey in continuous real-time mode
- Detection of gravel, voids in carbonate rocks, regions of permafrost, metallic conductors, pipes.
- General geological mapping (soil type, fault, etc)
- Maps bedrock topography, terrain conductivity, pollution plumes in groundwater, buried infrastructure (foundations, storage tanks, utilities)
- High resolution in conductivity.
- Precision within ±5% at 20mS/m

