

Regional Municipality of Waterloo Cambridge East Water Supply Class Environmental Assessment

Project File Report Appendix B and C

**Appendix B - Cultural Heritage Screening Report - Cambridge East Water
Supply Class EA, City of Cambridge, Ontario**

**Appendix B - Cambridge East Water Supply Class Environmental
Assessment, City of Cambridge, Regional Municipality of Waterloo,
Ontario - Stage 1 Archaeological Assessment**

Appendix C - Source Water Protection Information

Appendix B

**Cultural Heritage Screening Report - Cambridge East Water
Supply Class EA, City of Cambridge, Ontario**

TECHNICAL MEMORANDUM

DATE September 13, 2018

Project No. 05-1112-010-1500

TO Richard Wootton, Senior Hydrogeologist
Water Services, Region of Waterloo

CC John Piersol, Associate

FROM Henry Cary, Ph.D., CAHP

EMAIL henry_cary@golder.com

CULTURAL HERITAGE SCREENING REPORT - CAMBRIDGE EAST WATER SUPPLY CLASS EA, CITY OF CAMBRIDGE, ONTARIO

1.0 EXECUTIVE SUMMARY

This cultural heritage screening conducted as part of the Cambridge East Water Supply Class (Schedule B) Environmental Assessment (Cambridge East EA) in the City of Cambridge determined that:

- There are no cultural heritage resources at risk of impact at the evaluated alternative well sites PBTW1-10, Portuguese Club (CMPW1-06) and Cedarbrook (CMPW2-06) and the associated watermain construction.

Golder therefore recommends that:

- No further cultural heritage studies or mitigation measures be required.

2.0 BACKGROUND

Golder completed this Cultural Heritage Screening Report (CHSR) to determine if the evaluated Cambridge East EA alternative well sites and associated watermain construction in the east-central portion of the City of Cambridge would potentially impact cultural heritage resources. The EA alternative solutions identified for evaluation are outlined in Table 1 below.

Table 1: Alternative Solutions Identified for Evaluation.

Alternative Solutions	
Do Nothing	Use existing wells. Maintain pumping at recent average rates
Upgrades at Existing Sites	2A) Increase supply from existing wells only: Deepened Well G16
	2B) Increased supply from Pinebush new wells at existing P10 site: P10A, P10B, PBTW1-10

Alternative Solutions	
New wells at New sites	3A) Increased supply from Clemens Mill new well: Cedarbrook well
	3B) Increased supply from Clemens Mill new well: Portuguese Club well
Upgrades at Existing Sites and New wells at New sites	4) Increase Supply from existing wells (G16) and new wells in Pinebush (P10 site) and Clemens Mill (Cedarbrook Well). <i>(Combination of alternative solutions 2A, 2B and 3A)</i>

The alternative solutions 2B (well PBTW1-10), 3A (Cedarbrook well) and 3B (Portuguese Club well) would involve the conversion of test production wells into new supply wells including the construction of new infrastructure (watermain connections and wellhouses in the case of new sites) and therefore were included in this CHSR evaluation. Note that new wells P10A and P10B are installed at the existing well site in close proximity to the existing pumphouse and therefore are not included in this CHSR evaluation.

The objective of a CHSR is to identify cultural heritage resources of value or interest (CHVI) located near proposed work areas and recommend whether a project will require subsequent cultural heritage evaluation reports (CHERs) or heritage impact assessments (HIAs). The guidelines for CHSRs are provided in the Ministry of Tourism, Culture and Sport (MTCS) *Ontario Heritage Tool Kit* series (2006) and MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016) checklist.

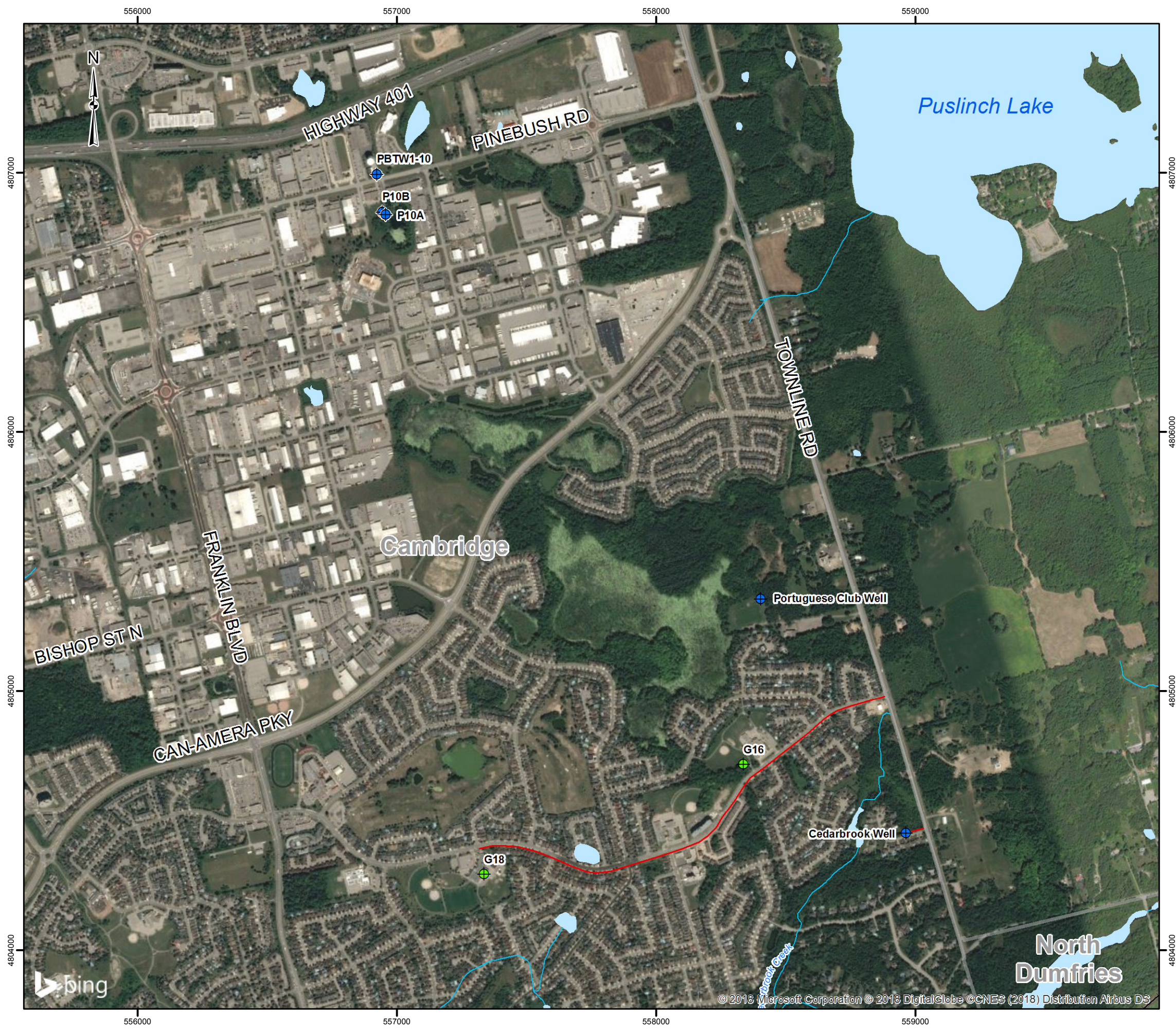
3.0 STUDY AREA

The well sites and watermain routes are within an approximately 3 km by 2 km area in the eastern portion of the City of Cambridge, generally bounded by Highway 401 to the north, Avenue Road to the south, Townline Road to the east, and Franklin Boulevard to the west (Figure 1). From north to south the proposed well sites are:

- PBTW1-10 – north side of Pinebush Road, between Balmoral Road and Fleming Drive;
- Portuguese Club well (CMPW1-06) – west side of Townline Road, on the Portuguese Club property; and
- Cedarbrook well (CMPW2-06) – north side of Cedarbrook Court, west of Townline Road.

Watermain construction is associated with the Cedarbrook well and Portuguese Club well and would be required to follow Saginaw Parkway from existing well G18 to Townline Road, and Cedarbrook Court from the Cedarbrook well to Townline Road. Existing watermains on Townline Road would be used.

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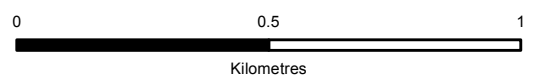


LEGEND

- + Existing Well Site
- + New Wells
- Watermain Construction
- Watercourse
- Waterbody

REFERENCE

Base Data - MNRF LIO obtained 2016
 Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources and Forestry, © Queens Printer 2016
 GRCA Wetlands - Produced using information under License with the Grand River Conservation Authority © Grand River Conservation Authority, obtained 2016
 Datum: NAD 83 Projection: UTM Zone 17N



PROJECT	CAMBRIDGE EAST WATER SUPPLY CLASS ENVIRONMENTAL ASSESSMENT		
TITLE	EXISTING AND NEW WELL SITES AND WATERMAIN CONSTRUCTION		
	PROJECT NO. 05-1112-010	SCALE 1:15,000	REV. 1
	DESIGN CCG 10 Mar. 2005		
	GIS MM/RP 15 Jun. 2018		
	CHECK JLH 15 Jun. 2018		
	REVIEW JAP 15 Jun. 2018		



FIGURE: 1

4.0 METHOD

The desktop survey for cultural heritage resources on or adjacent to the proposed work sites and routes involved the tasks outlined in the following subsections.

4.1 Task 1: Background research

Golder reviewed the following federal, provincial, and municipal heritage registers, inventories, and databases to identify known cultural heritage resources:

- City of Cambridge Heritage Properties Register GIS shapefile;
- Canadian Register of Historic Places (www.historicplaces.ca);
- Parks Canada Directory of Federal Heritage Designations (http://www.pc.gc.ca/apps/dfhd/default_eng.aspx);
- Ontario Heritage Foundation Online Plaque Guide (<http://www.heritagetrust.on.ca/en/index.php/online-plaque-guide>) and Ontario Places of Worship Inventory (<http://www.heritagetrust.on.ca/Ontario-s-Places-of-Worship/Inventory>);
- Ontario Ministry of Government and Consumer Services (OMGCS) Database of Registered Cemeteries (Accessed at: <https://www.consumerbeware.mgs.gov.on.ca/eseach/start.do>);
- Canadian Heritage River System list of designated heritage river systems (Accessed at: <http://chrs.ca/>);
- Region of Waterloo Scenic Roads and Special Character Streets Resource Document (Accessed at http://www.regionofwaterloo.ca/en/discoveringTheRegion/resources/SCENIC_ROADS_AND_SPECIAL_CHARACTER_STREETS_RESOURCE.pdf);
- Ontario's Historical Plaques (http://www.ontarioplaques.com/Menu_Map.html, data correlated with the Ontario Heritage Foundation Online Plaque Guide);
- Ontario Historical County Maps Project Web Map Application (<http://utoronto.maps.arcgis.com/apps/webappviewer/index.html?id=8cc6be34f6b54992b27da17467492d2f>);
- Historical Topographic Map Digitization Project (Ontario Council of University Libraries, main page: <https://ocul.on.ca/topomaps/>); and,
- Ontario Trails (<http://www.ontariotrails.on.ca/trails/index/city:Cambridge/>).

4.2 Task 2: Stakeholder Consultation

The results of stakeholder consultation are provided in Table 2.

Table 2: Results of consultation.

Contact	Date & type of consultation	Response & Date
Laura Waldie MA, CAHP Senior Planner <i>Heritage Community Development Department City of Cambridge</i>	Email sent January 9, 2018 querying if any new designations, listings, or inventorying of properties were in the map area provided and if the 2016 GIS shapefile of cultural heritage resources remains up to date.	January 9, 2018: confirmation that there are no new the potential for cultural resources in the 3 km by 2 km area that includes the proposed work areas. The consultation also confirmed that the City's GIS shapefile of municipal heritage properties was current and valid.

4.3 Task 3: MTCS Checklist

Based on the information compiled during Tasks 1 & 2, a *MTCS Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes (2016)* checklist was completed for the well sites and watermain construction (Appendix A).

5.0 RESULTS

Tasks 1 to 3 determined that:

- There are no known or potential cultural heritage resources at risk of impact at the evaluated alternative well sites PBTW1-10, Portuguese Club (CMPW1-06) and Cedarbrook (CMPW2-06) and the associated watermain construction.

Although all of these sites are within the watershed of a Canadian Heritage River (the Grand River), they are between 3 and 5 km from the watercourse and not predicted to impact the river's heritage values.

6.0 RECOMMENDATIONS

Since no cultural heritage resources will be at risk of impact during work proposed at the well sites or watermain construction, Golder recommends that:

- No further cultural heritage studies or mitigation measures be required.

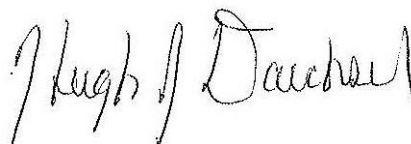
7.0 CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.



Henry Cary, Ph.D., CAHP
Cultural Heritage Specialist



Hugh Daechsel, M.A.
Principal

HC/HD/mp

Attachments:

Appendix A: Completed MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016) checklist and Supplementary Documentation.

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APPENDIX A

**Completed MTCS Criteria for
Evaluating Potential for Built
Heritage Resources and Cultural
Heritage Landscapes (2016)
checklist and Supplementary
Documentation**

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
 - is a recognized heritage property
 - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – [separate checklist](#)
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Cambridge East Water Supply Class (Schedule B) Environmental Assessment

Project or Property Location (upper and lower or single tier municipality)

Three well sites & one watermain construction, City of Cambridge

Proponent Name

Region of Waterloo

Proponent Contact Information

Richard Wootton

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the <i>Ontario Heritage Act</i> as being of cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. a National Historic Site (or part of)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. designated under the <i>Heritage Railway Stations Protection Act</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. designated under the <i>Heritage Lighthouse Protection Act</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has or is adjacent to a known burial site and/or cemetery?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. is in a Canadian Heritage River watershed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. contains buildings or structures that are 40 or more years old?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has a special association with a community, person or historical event?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. contains or is part of a cultural heritage landscape?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's [Ontario Heritage Toolkit](#) or [Standards and Guidelines for Conservation of Provincial Heritage Properties](#).

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties](#) [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

- i. designated under the *Ontario Heritage Act*
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note:** To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- [Ontario Heritage Trust](#)
- local land registry office (for a title search)

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- [Ontario Heritage Trust](#) - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note:** To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- [Ontario Heritage Trust](#)

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the [National Historic Sites website](#).

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the [Directory of Designated Heritage Railway Stations](#).

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the [Heritage Lighthouses of Canada](#) website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the [Federal Heritage Buildings Review Office](#).

See a [directory of all federal heritage designations](#).

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – [World Heritage Site website](#).

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- [municipal heritage committees](#) or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's [Heritage directory](#) – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a [list of plaques](#) commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a [list of plaques](#) commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a [database of registered cemeteries](#)
- Ontario Genealogical Society (OGS) – to [locate records of Ontario cemeteries](#), both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to [locate early cemeteries](#)

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the [Canadian Heritage River System](#).

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide [Heritage Property Evaluation](#).

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- [municipal heritage committees](#) or local heritage organizations
- Ontario Historical Society's "[Heritage Directory](#)" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through [Ontario Trails](#).

APPENDIX A – SUPPLEMENTARY SCREENING DOCUMENTATION

Screening Criteria	Results
PART A	
Has the property (or project area) been evaluated before and found not to be of cultural heritage value?	Municipal consultation determined that that the project area has not been previously evaluated.
<i>Is the property (or project area):</i>	
identified, designated or otherwise protected under the Ontario Heritage Act as being of cultural heritage value?	Search of the <i>City of Cambridge Heritage Properties Register</i> GIS shapefile determined that there are no properties in the project area are identified, designated or otherwise protected under the <i>OHA</i> .
a National Historic Site (or part of)?	Search of the <i>Parks Canada Directory of Federal Heritage Designations</i> determined that no part of the project area is, or part, of an NSHC.
designated under the <i>Heritage Railways Stations Protection Act</i> ?	Search of the <i>Parks Canada Directory of Federal Heritage Designations</i> determined that no part of the project area is designated under the <i>Heritage Railways Stations Protection Act</i> .
designated under the <i>Heritage Lighthouse Protection Act</i> ?	Not applicable.
identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	Search of the <i>Parks Canada Directory of Federal Heritage Designations</i> determined that no buildings in the project area are identified by FHBRO.
located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	Not applicable.
PART B	
<i>Does the property (or project area) contain a parcel of land that:</i>	
is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	Search of the <i>Ontario Heritage Foundation Online Plaque Guide</i> and <i>Ontario's Historical Plaques</i> determined that no part of the

Screening Criteria	Results
	project area is the subject of a commemorative or interpretive plaque.
has or is adjacent to a known burial and/or cemetery?	Search of the online OMGCS <i>Database of Registered Cemeteries</i> determined there are no known burials or cemeteries in the study area.
is in a Canadian Heritage River watershed?	Search of the Canadian Heritage River System online list determined the Study Area is within the watershed of the Grand River Canadian Heritage River.
contains buildings or structures that are 40 or more years old?	<p>The project area was found to have no buildings or structures that are 40 more years old through review of the:</p> <ul style="list-style-type: none"> ▪ <i>Ontario Historical County Maps Project Web Map Application - Waterloo County</i> ▪ 1916, 1923, 1929, and 1938 1:63,360 national topographic system (NTS) maps (Galt, Ontario Map Sheet 040P08) and 1968 and 1975 1:25,000 NTS maps (Preston - Hespeler Ontario Map Sheet 040P08F) available through the online <i>Historical Topographic Map Digitization Project</i>; ▪ 1954 aerial image (National Air Photo Library); and, ▪ Google aerial and Streetview imagery.
PART C	
Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):	
is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	Municipal consultation and <i>Region of Waterloo Scenic Roads and Special Character Streets Resource Document</i> determined that no part of the project area is considered a landmark or contains structures that are important in defining the character of the area.

Screening Criteria	Results
has a special association with a community, person or historical event?	Municipal consultation determined that no part of the project area has a special association with a community, person or historical event.
contains or is part of a cultural heritage landscape?	Municipal consultation and review of the <i>City of Cambridge Heritage Properties Register</i> GIS shapefile and <i>Region of Waterloo Scenic Roads and Special Character Streets Resource Document</i> determined that no part of the project area contains or is part of a cultural heritage landscape.

Appendix B

**Cambridge East Water Supply Class Environmental Assessment,
City of Cambridge, Regional Municipality of Waterloo,
Ontario - Stage 1 Archaeological Assessment**



GOLDER

Original Report

Cambridge East Water Supply Class Environmental Assessment, City of Cambridge, Regional Municipality of Waterloo, Ontario

Stage 1 Archaeological Assessment

Submitted to:

Richard Wootton

Region of Waterloo

150 Frederick Street

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Submitted by:

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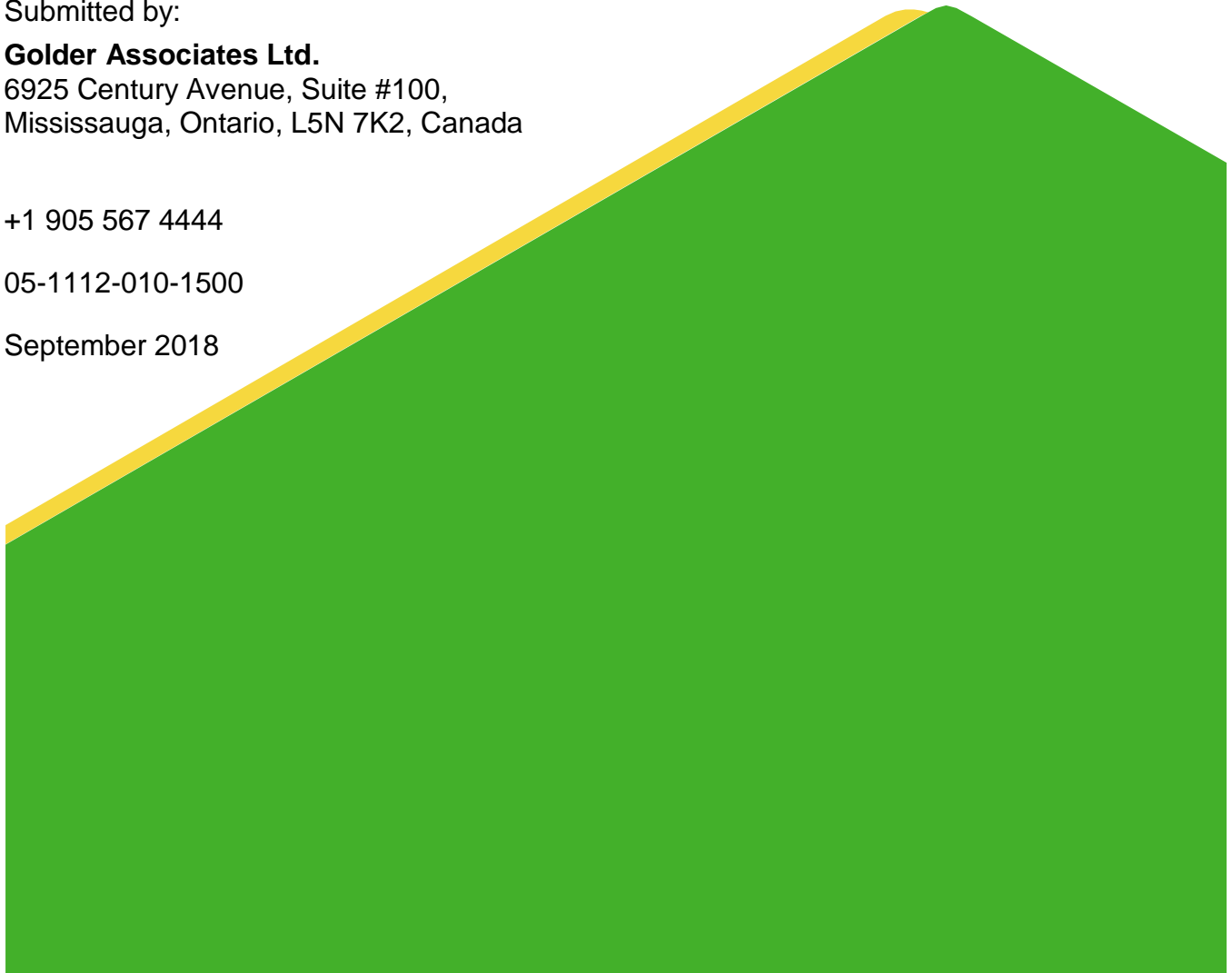
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September 2018



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Executive Summary

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

Golder Associates Ltd. (Golder) was retained by the Region of Waterloo to undertake a Stage 1 archaeological assessment as part of Cambridge East Water Supply Class (Schedule B) Environmental Assessment (Cambridge East EA) for the evaluated alternative well sites and associated watermain construction, in the City of Cambridge, Regional Municipality of Waterloo, Ontario.

The well sites and watermain routes are within an approximately 3 km by 2 km area in the eastern portion of the City of Cambridge, generally bounded by Highway 401 in the north, Avenue Road in the south, Townline Road in the east, and Franklin Boulevard in the west. From north to south the proposed well sites are:

- Well PBTW1-10 – north side of Pinebush Road, between Balmoral Road and Fleming Drive;
- Portuguese Club well – west side of Townline Road, on the Portuguese Club property; and
- Cedarbrook well – north side of Cedarbrook Court, west of Townline Road.

Watermain construction is associated with the Cedarbrook well and Portuguese Club well and would be required to follow Saginaw Parkway (2.8 km) from existing well G18 to Townline Road, and at Cedarbrook Court (85 m) from the Cedarbrook well to Townline Road. Existing watermains on Townline Road would be used. Collectively, these well and watermain components will be referred to as the 'Project Area'.

The background research determined the archaeological potential of the Project Area based on the proximity of various archaeological features. To determine if the Project Area retains its archaeological potential classification, an on-site property inspection was undertaken. The property inspection identified parts of the Project Area as having no and low archaeological potential based on previous disturbances and steeply sloping terrain. The remaining balance of the Project Area was identified as retaining archaeological potential.

Based on the results of this Stage 1 archaeological assessment, the following recommendations are presented:

- 1) PBTW1-10 Well Site (Map 5)
 - a) The PBTW1-10 well site was identified as having its archaeological potential removed based on previous disturbances, and as a result can be considered free of further archaeological concern.
- 2) Portuguese Well Site (Map 6)

-
- a) Portions of the Portuguese well site were identified as having archaeological potential removed based on previous disturbances and as a result, can be considered free of further archaeological concern.
 - b) Previously undisturbed portions of the Portuguese well site that were identified as having archaeological potential must be subjected to a Stage 2 archaeological assessment. These areas must be subjected to test pit survey at 5 m intervals in accordance with Section 2.1.2 of the 2011 Standards and Guidelines for Consultant Archaeologists published by the Ministry of Tourism, Culture, and Sport (MTCS) (2011) prior to construction activities.
- 3) Cedarbrook Well Site and Watermain Construction along Cedarbrook Court (Map 7)
- a) Portions of the Cedarbrook well site and watermain construction along Cedarbrook Court were identified as having archaeological potential removed as a result of previous disturbances and can be considered free of further archaeological concern.
 - c) Portions of the Cedarbrook well site and watermain construction along Cedarbrook Court that were identified as having low archaeological potential (i.e., steeply sloping), can be considered to be free of further archaeological concern.
 - d) Previously undisturbed portions of the Cedarbrook well site and watermain construction along Cedarbrook Court that were identified as having archaeological potential must be subjected to a Stage 2 archaeological assessment. These areas must be subjected to test pit survey at 5 m intervals in accordance with Section 2.1.2 of the MTCS (2011) prior to construction activities.
- 4) Watermain Construction (Map 8)
- a) The entirety of the watermain construction along Saginaw Parkway was identified as having its archaeological potential removed based on previous disturbances, and as a result, can be considered free of further archaeological concern.

Study Limitations

Golder has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the archaeological profession currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty expressed or implied is made.

This report has been prepared for the specific site, design objective, developments, and purpose described to Golder by the City of Waterloo (Client). The factual data, interpretations, and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

The information, recommendations, and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the Client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration, and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

Unless otherwise stated, the suggestions, recommendations, and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling, and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study, if any, comply with those identified in the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists*.

Table of Contents

1.0 Project Context	1
1.1 Objective	1
1.2 Development Context	1
1.3 Historical Context.....	2
1.3.1 Pre-Colonial Period Chronology	2
1.3.1.1 Pre-Colonial Indigenous Settlement	3
1.3.1.1.1 Paleo-Indian Period	4
1.3.1.1.2 Archaic Period	5
1.3.1.1.3 Woodland Period.....	6
1.3.2 Post-Contact Indigenous Period	10
1.3.3 Historical Euro-Canadian Period	10
1.3.3.1 Township of Waterloo	10
1.3.3.2 Project Area	12
1.4 Archaeological Context.....	12
1.4.1 Existing Conditions	12
1.4.2 Physiography.....	12
1.4.3 Registered Archaeological Sites	13
1.4.4 Previous Archaeological Assessments.....	18
1.4.5 Cultural Heritage Resources.....	19
2.0 Field Methods	19
3.0 Analysis and Conclusions	19
3.1 Archaeological Potential	19
3.1.1 Potential for Pre- and Post-Contact Indigenous Archaeological Resources.....	20
3.1.2 Potential for Historic Euro-Canadian Archaeological Resources	21
3.2 Archaeological Integrity	21
3.2.1 Well PBTW-10 Site.....	21

3.2.2	Portuguese Club Well Site	22
3.2.3	Cedarbrook Well Site and Watermain Construction along Cedarbrook Court	22
3.2.4	Watermain Construction along Saginaw Parkway	22
3.3	Conclusions	23
4.0	Recommendations	23
5.0	Advice on Compliance with Legislation.....	24
6.0	Bibliography and Resources	25
7.0	Maps.....	27
8.0	Images	36
9.0	Inventory of Documentary and Material Record	46

Tables

Table 1	Alternative Solutions Identified for Evaluation	1
Table 2	Overview of cultural chronology of southern Ontario	2
Table 3	Registered archaeological sites within 1 km of the Project Area	13

Maps

Map 1:	Location of Project Area	28
Map 2:	Location of Project Area overlaid on 1861 Tremaine’s Map of the County of Waterloo- Township of Waterloo (OHCM 2016).	29
Map 3:	Location of Project Area overlaid on the 1881 Illustrated Historical Atlas of the County of Waterloo- Townships of Waterloo and North Dumfries (Parsell & Co. 1881).	30
Map 4:	Location of Project Area overlaid on 1954 aerial (Hunting Survey Corporation Ltd. 1954).	31
Map 5:	Stage 1 archaeological assessment results for well PBTW1-10 site.	32
Map 6:	Stage 1 archaeological assessment results for the Portuguese Club well site.	33
Map 7:	Stage 1 archaeological assessment results for the Cedarbrook well site and watermain construction along Cedarbrook Court.....	34
Map 8:	Stage 1 archaeological assessment results for the watermain construction along Saginaw Parkway.....	35

Images

Image 1: View facing northwest at disturbances associated with the existing Pinebush Water Treatment Plant (PBTW1-10).	37
Image 2: Viewing facing northwest at disturbances associated with the existing Pinebush Water Treatment Plant (PBTW1-10).	37
Image 3: View facing north at disturbances associated with the existing Pinebush Water Treatment Plant (PBTW1-10).	38
Image 4: View facing east at disturbances associated with a paved access road (Portuguese Club well site).	38
Image 5: View facing west at disturbances associated with a paved access road and parking area (Portuguese Club well site).	39
Image 6: View facing north at disturbances associated with a paved access road and parking area (Portuguese Club well site).	39
Image 7: Grassed area with superficial gravel fill retaining archaeological potential (Portuguese Club well site).	40
Image 8: Grassed area with superficial gravel fill retaining archaeological potential (Portuguese Club well site).	40
Image 9: View facing southeast at disturbances associated with the existing paved Cedarbrook Court and underground utilities (Cedarbrook well site and watermain construction).	41
Image 10: View facing east at disturbances associated with the existing paved Cedarbrook Court and underground utilities (Cedarbrook well site and watermain construction).	41
Image 11: View facing southeast at disturbances associated with the existing paved Cedarbrook Court and underground utilities (Cedarbrook well site and watermain construction).	42
Image 12: View facing north at grassed area that retains archaeological potential (Cedarbrook well site and watermain construction).	42
Image 13: View facing west at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).	43
Image 14: View facing northeast at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).	43

Image 15: View facing southwest at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).44

Image 16: View facing west at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).....44

Image 17: View of facing east at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).45

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1.0 Project Context

1.1 Objective

The objectives of a Stage 1 archaeological assessment, as outlined by the 2011 Standards and Guidelines for Consultant Archaeologists published by the Ministry of Tourism, Culture, and Sport (MTCS) (2011), are as follows:

- to provide information about the property's geography, history, previous archaeological fieldwork and current land condition;
- to evaluate in detail the property's archaeological potential, to determine if a Stage 2 assessment is required for all or parts of the property; and,
- to recommend appropriate strategies for Stage 2 survey.

1.2 Development Context

Golder Associates Ltd. (Golder) was retained by the Region of Waterloo to undertake a Stage 1 archaeological assessment as part of Cambridge East Water Supply Class (Schedule B) Environmental Assessment (Cambridge East EA) for the evaluated alternative well sites and associated watermain construction, in the City of Cambridge, Regional Municipality of Waterloo, Ontario.

The EA alternative solutions identified for evaluation are outlined in Table 1.

Table 1 Alternative Solutions Identified for Evaluation

Alternative Solutions	
Do Nothing	Use existing wells. Maintain pumping at recent average rates
Upgrades at Existing Sites	2A) Increase supply from existing wells only: Deepened Well G16
	2B) Increased supply from Pinebush new wells at existing P10 site: P10A, P10B, PBTW1-10
New wells at New sites	3A) Increased supply from Clemens Mill new well: Cedarbrook well
	3B) Increased supply from Clemens Mill new well: Portuguese Club well
Upgrades at Existing Sites and New wells at New sites	4) Increase Supply from existing wells (G16) and new wells in Pinebush (P10 site) and Clemens Mill (Cedarbrook Well). (<i>Combination of alternative solutions 2A, 2B and 3A</i>)

The alternative solutions 2B (well PBTW1-10), 3A (Cedarbrook well) and 3B (Portuguese Club well) would involve the conversion of test production wells into new supply wells, including the construction of new infrastructure (watermain connections and wellhouses in the case of the

new sites) and therefore, were included in this Stage 1 archaeological assessment. Note that new test production wells P10A and P10B have been installed at the existing P10 well site in close proximity to the existing pumphouse and therefore, are not included in this Stage 1 archaeological assessment. In addition, alternative solution 2A (deepened well G16) is limited to the existing well site and deepening of the existing well and therefore, was not included in this Stage 1 archaeological assessment.

The well sites and watermain routes are within an approximately 3 km by 2 km area in the eastern portion of the City of Cambridge, generally bounded by Highway 401 to the north, Avenue Road to the south, Townline Road to the east, and Franklin Boulevard to the west (Figure 1). From north to south the proposed well sites are:

- Well PBTW1-10 – north side of Pinebush Road, between Balmoral Road and Fleming Drive;
- Portuguese Club well (CMPW1-06) – west side of Townline Road, on the Portuguese Club property; and
- Cedarbrook well (CMPW2-06) – north side of Cedarbrook Court, west of Townline Road.

Watermain construction is associated with the Cedarbrook well and Portuguese Club well and would be required to follow Saginaw Parkway (2.8 km) from existing well G18 to Townline Road, and at Cedarbrook Court (85 m) from the Cedarbrook well to Townline Road. Existing watermains on Townline Road would be used. Collectively, these components will be referred to as the 'Project Area'.

This Stage 1 archaeological assessment was conducted under the archaeological consultant licensee, Henry Carey (P327). Permission to access the Project Area and conduct archaeological activities was granted by Region of Waterloo.

1.3 Historical Context

1.3.1 Pre-Colonial Period Chronology

The general culture history of southern Ontario, based on Ellis and Ferris (1990), spanning the entire pre-colonial period and continuing into the post colonial period is summarised in Table 2.

Table 2 Overview of cultural chronology of southern Ontario

Period	Characteristic Elements	Time Period	Comments
Early Paleo-Indian	Fluted Projectile Points	9000 – 8400 BC	Spruce parkland/caribou hunters
Late Paleo-Indian	Hi-Lo Projectile Points	8400 – 8000 BC	Smaller but more numerous sites

Period	Characteristic Elements	Time Period	Comments
Early Archaic	Kirk and Bifurcate Base Points	8000 – 6000 BC	Slow population growth
Middle Archaic	Brewerton-like Points	6000 – 2500 BC	Environment similar to present
Late Archaic	Lamoka (Narrow Points)	2000 – 1800 BC	Increasing site size
	Broad Points	1800 – 1500 BC	Large chipped lithic tools
	Small Points	1500 – 1100 BC	Introduction of bow hunting
Terminal Archaic	Hind Points	1100 – 950 BC	Emergence of true cemeteries
Early Woodland	Meadowood Points	950 – 400 BC	Introduction of pottery
Middle Woodland	Dentate/Pseudo-Scallop Pottery	400 BC – AD 550	Increased sedentism
	Princess Point	AD 550 – 900	Introduction of corn
Late Woodland	Early Ontario Iroquoian	AD 900 – 1300	Emergence of agricultural villages
	Middle Ontario Iroquoian	AD 1300 – 1400	Long longhouses (100m+)
	Late Ontario Iroquoian	AD 1400 – 1650	Tribal warfare and displacement
Colonial Indigenous	Various Algonkian Groups	AD 1700 – 1875	Early written records and treaties
Late Historic	Euro-Canadian	AD 1796 – present	European settlement

1.3.1.1 Pre-Colonial Indigenous Settlement

Previous archaeological assessments and research has demonstrated that the historical Township of Waterloo was intensively occupied by pre-colonial Indigenous communities from the Paleo-Indian Period up to the time of European contact. The following subsections outline the cultural or temporal periods recognized for southern Ontario more generally.

1.3.1.1.1 Paleo-Indian Period

The first human occupation of south-central Ontario begins just after the end of the Wisconsinan Glacial Period. Although there were a complex series of ice retreats and advances which played a large role in shaping the local topography, south-central Ontario was finally ice free by 12,500 years ago.

The first human settlement can be traced back 11,000 years, when this area was settled by Indigenous groups that had been living south of the Great Lakes. The period of these early Indigenous inhabitants is known as the Paleo-Indian Period (Ellis and Deller 1990).

Our current understanding of settlement patterns of Early Paleo-Indian peoples suggests that small bands, consisting of probably no more than 25-35 individuals, followed a pattern of seasonal mobility extending over large territories. One of the most thoroughly studied of these groups followed a seasonal round that extended from as far south as Chatham to the Horseshoe Valley north of Barrie. Early Paleo-Indian sites tend to be located in elevated locations on well-drained loamy soils. Many of the known sites were located on former beach ridges associated with glacial lakes. There are a few extremely large Early Paleo-Indian sites, such as one located close to Parkhill, Ontario, which covered as much as six hectares. It appears that these sites were formed when the same general locations were occupied for short periods of time over the course of many years. Given their placement in locations conducive to the interception of migratory mammals such as caribou, it has been suggested that they may represent communal hunting camps. There are also smaller Early Paleo Indian camps scattered throughout the interior of southwestern and south-central Ontario, usually situated adjacent to wetlands.

The most recent research suggests that population densities were very low during the Early Paleo-Indian Period (Ellis and Deller 1990:54). Archaeological examples of Early Paleo-Indian sites are rare.

The Late Paleo-Indian Period (8400-8000 BC) has been less well researched, and is consequently more poorly understood. By this time, the environment of south-central Ontario was coming to be dominated by closed coniferous forests with some minor deciduous elements. It seems that many of the large game species that had been hunted in the early part of the Paleo-Indian Period had either moved further north, or as in the case of the mastodons and mammoths, become extinct.

Like the early Paleo-Indian peoples, late Paleo-Indian peoples covered large territories as they moved about in response to seasonal resource fluctuations. On a province wide basis Late Paleo-Indian projectile points are far more common than Early Paleo-Indian materials, suggesting a relative increase in population.

The end of the Late Paleo-Indian Period was heralded by numerous technological and cultural innovations that appeared throughout the Archaic Period. These innovations may be best explained in relation to the dynamic nature of the post-glacial environment and region-wide population increases.

1.3.1.1.2 Archaic Period

During the Early Archaic Period (8000-6000 BC), the jack and red pine forests that characterized the Late Paleo-Indian environment were replaced by forests dominated by white pine with some associated deciduous trees (Ellis, Kenyon and Spence 1990:68-69). One of the more notable changes in the Early Archaic Period is the appearance of side and corner-notched projectile points. Other significant innovations included the introduction of ground stone tools such as celts and axes, suggesting the beginnings of a simple woodworking industry. The presence of these often large and not easily portable tools suggests there may have been some reduction in the degree of seasonal movement, although it is still suspected that population densities were quite low, and band territories large.

During the Middle Archaic Period (6000-2500 BC) the trend to more diverse toolkits continued, as the presence of netsinkers suggest that fishing was becoming an important aspect of the subsistence economy. It was also at this time that "bannerstones" were first manufactured.

Bannerstones are carefully crafted ground stone devices that served as a counterbalance for atlatls or spear-throwers. Another characteristic of the Middle Archaic was an increased reliance on local, often poor quality chert resources for the manufacturing of projectile points. It seems that during earlier periods, when groups occupied large territories, it was possible for them to visit a primary outcrop of high quality chert at least once during their seasonal round. However, during the Middle Archaic, groups inhabited smaller territories that often did not encompass a source of high quality raw material. In these instances, lower quality materials which had been deposited by the glaciers in the local till and river gravels were utilized.

This reduction in territory size was probably the result of gradual region-wide population growth which led to the infilling of the landscape. This process forced a reorganization of Indigenous subsistence practices, as more people had to be supported from the resources of a smaller area. During the latter part of the Middle Archaic, technological innovations such as fish weirs have been documented, as well as stone tools especially designed for the preparation of wild plant foods.

It is also during the latter part of the Middle Archaic Period that long distance trade routes began to develop, spanning the northeastern part of the continent. In particular, native copper tools manufactured from a source located northwest of Lake Superior were being widely traded (Ellis, Kenyon and Spence 1990:66). By 3500 BC the local environment had stabilized in a near modern form (Ellis, Kenyon and Spence 1990:69).

During the Late Archaic (2500-950 BC) the trend toward decreased territory size and a broadening subsistence base continued. Late Archaic sites are far more numerous than either Early or Middle Archaic sites, and it seems that the local population had definitely expanded. It is during the Late Archaic that the first true cemeteries appear. Before this time individuals were interred close to the location where they died. During the Late Archaic, if an individual died while his or her group happened to be at some distance from their group cemetery, the bones would be kept until they could be placed in the cemetery. Consequently, it is not unusual to find disarticulated skeletons, or even skeletons lacking minor elements such as fingers, toes or ribs, in Late Archaic burial pits.

The appearance of cemeteries during the Late Archaic has been interpreted as a response to increased population densities and competition between local groups for access to resources. It is argued that cemeteries would have provided strong symbolic claims over a local territory and its resources. These cemeteries are often located on heights of well-drained sandy/gravel soils adjacent to major watercourses.

This suggestion of increased territoriality is also consistent with the regionalized variation present in Late Archaic projectile point styles. It was during the Late Archaic that distinct local styles of projectile points appeared. Also during the Late Archaic the trade networks which had been established during the Middle Archaic continued to flourish. Native copper from northern Ontario and marine shell artifacts from as far away as the Mid-Atlantic coast are frequently encountered as grave goods. Other artifacts such as polished stone pipes and banded slate gorgets also appear on Late Archaic sites. One of the more unusual and interesting of the Late Archaic artifacts is the birdstone. Birdstones are small, bird-like effigies usually manufactured from green banded slate.

1.3.1.1.3 Woodland Period

The Early Woodland Period (950 to 400 BC) is distinguished from the Late Archaic Period primarily by the addition of ceramic technology. While the introduction of pottery provides a useful demarcation point for archaeologists, it may have made less difference in the lives of the Early Woodland peoples. The first pots were rough construction, thick walled, and friable. It has been suggested that they were used in the processing of nut oils by boiling crushed nut fragments in water and skimming off the oil. These vessels were not easily portable, and individual pots must not have enjoyed a long use life. There have also been numerous Early Woodland sites located at which no pottery was found, suggesting that these poorly constructed, undecorated vessels had yet to assume a central position in the day-to-day lives of Early Woodland peoples.

Other than the introduction of this limited ceramic technology, the life-ways of Early Woodland peoples showed a great deal of continuity with the preceding Late Archaic Period. For instance, birdstones continued to be manufactured, although the Early Woodland varieties have "pop-eyes" which protrude from the sides of their heads.

Likewise, the thin, well-made projectile points which were produced during the terminal part of the Archaic Period continued in use. However, the Early Woodland variants were side-notched rather than corner-notched, giving them a slightly altered and distinctive appearance.

The trade networks which were established in the Middle and Late Archaic also continued to function, although there does not appear to have been as much traffic in marine shells during the Early Woodland Period. During the last 200 years of the Early Woodland Period, projectile points manufactured from high quality raw materials from the American Midwest begin to appear on sites in southwestern Ontario.

In terms of settlement and subsistence patterns, the Middle Woodland (300 BC to 500 AD) provides a major point of departure from the Archaic and Early Woodland Periods. While Middle Woodland peoples still relied on hunting and gathering to meet their subsistence requirements, fish were becoming an even more important part of the diet.

In addition, Middle Woodland peoples relied much more extensively on ceramic technology. Middle Woodland vessels were often heavily decorated with hastily impressed designs covering the entire exterior surface and upper portion of the vessel interior. Consequently, even very small fragments of Middle Woodland vessels are easily identifiable.

It is also at the beginning of the Middle Woodland Period that rich, densely occupied sites appeared along the margins of major rivers and lakes. While these areas had been utilized by earlier peoples, Middle Woodland sites were significantly different in that the same location was occupied off and on for as long as several hundred years and large deposits of artifacts often accumulated. Unlike earlier seasonally utilized locations, these Middle Woodland sites appear to have functioned as base camps, occupied off and on over the course of the year. There are also numerous small upland Middle Woodland sites, many of which can be interpreted as special purpose camps from which localized resource patches were exploited. This shift toward a greater degree of sedentism continued the trend witnessed from at least Middle Archaic times, and provides a prelude to the developments that follow during the Late Woodland Period.

The Late Woodland Period began with a shift in settlement and subsistence patterns involving an increasing reliance on corn horticulture (Fox 1990:185; Smith 1990; Williamson 1990:312). Corn may have been introduced into southwestern Ontario from the American Midwest as early as AD 600 or a few centuries before. However, corn did not become a dietary staple until at least three to four hundred years later, and then the cultivation of corn gradually spread into south-central and southeastern Ontario.

During the early Late Woodland, particularly within the Princess Point Complex (circa AD 500-1050), a number of archaeological material changes have been noted: the appearance of triangular projectile point styles, first seen during this period began with the Levanna form; cord-wrapped stick decorated ceramics using the paddle and anvil forming technique replaced the mainly coil-manufactured and dentate stamped and pseudo-scallop shell impressed ceramics; and increased use of maize (*Zea mays*) as a food source (e.g., Bursey 1995; Crawford et al. 1997; Ferris and Spence 1995:103; Martin 2004 [2007]; Ritchie 1971:31-32; Spence et al. 1990; Williamson 1990:299).

The Late Woodland Period is widely accepted as the beginning of agricultural life ways in south-central Ontario. Researchers have suggested that a warming trend during this time may have encouraged the spread of maize into southern Ontario, providing a greater number of frost-free days (Stothers and Yarnell 1977). Further, shifts in the location of sites have also been identified with an emphasis on riverine, lacustrine and wetland occupations set against a more diffuse use of the landscape during the Middle Woodland (Dieterman 2001).

One such site, located on the Grand River near Cayuga, Ontario is the Grand Banks site (AfGx-3). As of 1997, 40 maize kernels and 29 cupules had been recovered at this site (Crawford et al. 1997). The earliest AMS radiocarbon assay run on maize from palaeosol II produced a date of approximately AD 500 (Crawford et al. 1997:116). This site is interpreted as a long-term basecamp that may have been used year-round or nearly year-round (Crawford and Smith 1996:785). This growing sedentism is seen as a departure from Middle Woodland hunting and gathering and may reflect growing investment in care of garden plots of maize

(Smith 1997:15). The riverine location of Grand Banks (AfGx-3) may have also provided light, nutrient-rich soil for agriculture (Crawford et al. 1998). While Levanna projectile points were formal tools, Princess Point Complex toolkits were predominantly characterized by informal or expedient flake tools and ground stone and bone artifacts were rare (Ferris and Spence 1995:103; Shen 2000). At Grand Banks, experimental archaeology suggests that chert flakes were put to a variety of use tasks, from butchering to bone-working to wood-working to plant-working. Formal bifaces and projectile points had less evidence of usewear (Shen 2000). Local cherts appear to have been used, although Onondaga, albeit also a local resource, was preferred at Grand Banks (AfGx-3) (Shen 1997).

The first agricultural villages in southern Ontario date to the 10th century. Unlike the riverine base camps of the Middle Woodland Period, these sites are located in the uplands, on well-drained sandy soils. Categorized as "Early Ontario Iroquoian" (AD 900-1300), many archaeologists believe that it is possible to trace a direct line from the Iroquoian groups which later inhabited southern Ontario at the time of first European contact, back to these early villagers.

Village sites dating between AD 900 and 1300 , shared many attributes with the historically reported Iroquoian sites, including the presence of longhouses and sometimes palisades. However, these early longhouses were actually not all that large, averaging only 12.4 m in length (Dodd et al. 1990:349; Williamson 1990:304-305). It is also quite common to find the outlines of overlapping house structures, suggesting that these villages were occupied long enough to necessitate re-building.

The Jesuits reported that the Huron moved their villages once every 10-15 years, when the nearby soils had been depleted by farming and conveniently collected firewood grew scarce (Pearce 2018). It seems likely that Early Ontario Iroquoians occupied their villages for considerably longer, as they relied less heavily on corn than did later groups, and their villages were much smaller, placing less demand on nearby resources.

Judging by the presence of carbonized corn kernels and cob fragments recovered from sub-floor storage pits, agriculture was becoming a vital part of the Early Ontario Iroquoian economy. However, it had not reached the level of importance it would in the Middle and Late Ontario Iroquoian Periods. There is ample evidence to suggest that more traditional resources continued to be exploited, and comprised a large part of the subsistence economy. Seasonally occupied special purpose sites relating to deer procurement, nut collection, and fishing activities, have all been identified. While beans are known to have been cultivated later in the Late Woodland Period, they have yet to be identified on Early Ontario Iroquoian sites.

The Middle Ontario Iroquoian Period (AD 1300-1400) witnessed several interesting developments in terms of settlement patterns and artifact assemblages. Changes in ceramic styles have been carefully documented, allowing the placement of sites in the first or second half of this 100-year period. Moreover, villages, which averaged approximately 0.6 hectares in extent during the Early Ontario Iroquoian Period, now consistently ranged between one and two hectares.

House lengths also changed dramatically, more than doubling to an average of 30 m, while houses of up to 45 m have been documented. This increase in longhouse length has been variously interpreted. The simplest possibility is that increased house length is the result of a gradual, natural increase in population (Dodd et al. 1990:323, 350, 357; Smith 1990). However, this does not account for the sudden shift in longhouse lengths around AD 1300. Other possible explanations involve changes in economic and socio-political organization (Dodd et al. 1990:357). One suggestion is that during the Middle Ontario Iroquoian Period, small villages were amalgamating to form larger communities for mutual defense (Dodd et al. 1990:357). If this was the case, the more successful military leaders may have been able to absorb some of the smaller family groups into their households, thereby requiring longer structures. This hypothesis draws support from the fact that some sites had up to seven rows of palisades, indicating at least an occasional need for strong defensive measures. However, there are other Middle Ontario Iroquoian villages which had no palisades present (Dodd et al. 1990). More research is required to evaluate these competing interpretations.

The lay-out of houses within villages also changed dramatically by AD 1300. During the Early Ontario Iroquoian Period villages were haphazardly planned, with houses oriented in various directions. During the Middle Ontario Iroquoian Period villages were organized into two or more discrete groups of tightly spaced, parallel aligned, longhouses. It has been suggested that this change in village organization may indicate the initial development of the clans which were a characteristic of the historically known Iroquoian peoples (Dodd et al. 1990:358).

Initially at least, the Late Ontario Iroquoian Period (AD 1400-1650) continued many of the trends which have been documented for the preceding century. For instance, between AD 1400 and 1450 house lengths continued to grow, reaching an average length of 62 m. One longhouse excavated on a site southwest of Kitchener was an incredible 123 m (Lennox and Fitzgerald 1990:444-445). After AD 1450 , house lengths began to decrease, with houses dating between AD 1500 and 1580 averaging 30 m in length.

Why house lengths decreased after AD 1450 is poorly understood, although it is believed that the even shorter houses witnessed on Historical Period sites can be at least partially attributed to the population reductions associated with the introduction of European diseases such as smallpox (Lennox and Fitzgerald 1990:405, 410).

Village size also continued to expand throughout the Late Ontario Iroquoian Period, with many of the larger villages showing signs of periodic expansions. The Late Middle Ontario Iroquoian Period and the first century of the Late Ontario Iroquoian Period was a time of village amalgamation. One large village situated just north of Toronto has been shown to have expanded on no fewer than five occasions. These large villages were often heavily defended with numerous rows of wooden palisades, suggesting that defence may have been one of the rationales for smaller groups banding together. Late Ontario Iroquoian village expansion has been clearly documented at several sites throughout southwestern and south-central Ontario. The ongoing excavations at the Lawson site, a large Late Iroquoian village located in southwestern Ontario, has shown that the original village was expanded by at least twenty percent to accommodate the construction of nine additional longhouses (Anderson 2009).

During the late 1600s and early 1700s, the French explorers and missionaries reported a large population of Iroquoian peoples clustered around the western end of Lake Ontario. The area which was later to become Halton Region was known to have been occupied by ancestors of two different Late Ontario Iroquoian groups who evolved to become the historically known Neutral and Huron. For this reason, the Late Ontario Iroquoian groups which occupied parts of south-central Ontario, prior to the arrival of the French, are often identified as "Prehistoric Neutral" and "Prehistoric Huron" (Lennox and Fitzgerald 1990; Smith 1990:283).

1.3.2 Post-Contact Indigenous Period

The post-colonial Indigenous occupation of Southern Ontario was heavily influenced by the dispersal of various Iroquoian-speaking peoples by the New York State Iroquois, and the subsequent arrival of Algonkian-speaking groups from northern Ontario at the end of the seventeenth century and beginning of the eighteenth century (Schmalz 1991).

Following the introduction of Europeans to North America, the nature of Indigenous settlement size, population distribution, and material culture shifted as settlers began to colonize the land. Despite this shift, "written accounts of material life and livelihood, the correlation of historically recovered villages to their archaeological manifestations, and the similarities of those sites to more ancient sites have revealed an antiquity to documented cultural expressions that confirms a deep historical continuity to Iroquoian systems of ideology and thought" (Ferris 2009:114). As a result, Indigenous peoples of southern Ontario have left behind archaeologically significant resources throughout southern Ontario which show continuity with past peoples, even if this connection has not been recorded in historical Euro-Canadian documentation.

1.3.3 Historical Euro-Canadian Period

1.3.3.1 Township of Waterloo

The Project Area falls within the historical Township of Waterloo. At the time of European contact, the area that would later become Waterloo Township was occupied by the Neutral Iroquoians. After the Six Nations Iroquois defeated, dispersed and amalgamated the Neutral Iroquoians in the late seventeenth century, large portions of southern Ontario, including the area of Waterloo Township, were occupied by the Algonkian-speaking Mississaugas.

During the American War of Independence, factions within the New York State Six Nations Iroquois sided with the British. One proponent of the First Nation allies was the former Swiss mercenary, Sir Frederick Haldimand, Governor of Québec. Haldimand made preparation to grant a large plot of land in southwestern Ontario to those Six Nations who were allies of the Crown (Weaver 1978:525). Haldimand arranged for the purchase of territory in southwestern Ontario from the Mississaugas. This is known as the Haldimand Tract land grant, or the 1793 Crown Grant to the Six Nations, provided for in the Haldimand Proclamation of October 25th, 1784, which:

...is a parcel or tract of land given to the Six Nations Indians, by Governor Haldimand October 25th, 1784, and conveyed by Grant the 14th of January 1793. ... This Grant was composed of the following Townships: Dunn, Sherbrooke, Moulton, Canborough, North and South Cayuga, Oneida and Seneca in Haldimand County; Tusc[aro]ra, Onondaga, Brantford and South Dumfries in Brant County; North Dumfries, Waterloo and Woolwich in Waterloo County; Pilkington and Nichol in Wellington County; and is described as a parcel or tract of land six miles on each side of the Ouse or Grand River from its mouth toward its source, to be bounded by the tract of land deeded December the 7th, 1792 by the Mississa[u]ga Chiefs and people to the Crown. This part was set aside as a suitable retreat for the Six Nation Indians who had shewn attachment and Fidelity to the British Government during the troublous times 1759 to 1783 and was granted to the Chiefs, Warriors, Women and People of the Six nations and their heirs forever.

Morris 1943: 19-21

Following this land grant, the upper part of the Haldimand Tract, north of Governor's Road, was surveyed into four blocks. In the late 1790s, Six Nations chief and land representative Joseph Brant sold these blocks to Euro-Canadian settlers. In 1796, Block 2 (later known as Waterloo Township) was sold to Richard Beasley and a group of merchants (Bloomfield 2006:20). Beasley divided the block into Upper, Middle, and Lower Blocks and began selling tracts of land and individual lots. In 1800, George Bechtel purchased a large tract of land (1,275 hectares) from Beasley, located in the Lower Block west of the Grand River, which would later be known as Bechtel's Tract (Bloomfield 2006:404). Following this sale, a group of Pennsylvania Mennonites, who would later form the German Company, purchased a large tract of land (24,281 hectares) mainly located in the Upper and Middle Blocks from Beasley in 1805 (Bloomfield 2006:23). The northern portion of the German Company Tract was subdivided into 128 lots, while the southern portion of the Tract (located in the Lower Block) was divided into 32 smaller lots, known as the German Company Tract Small Lots (Bloomfield 2006:24). The remainder of the Lower Block was subdivided into four different surveyed areas, including Beasley's Old Survey, Beasley's New Survey, Beasley's Broken Front, and Biehn's Tract, which were sold throughout the early 1800s. As a result of these land purchases and sales, Waterloo Township had the most complex survey system and associated pattern of land ownership of the more than 500 townships present in southern Ontario during the 19th century.

The initial settlement of Waterloo Township between 1800 and 1820 proceeded slowly and typically consisted of Pennsylvania Mennonite farmers settling along the banks of the Grand River (Waterloo Region Museum 2013). By 1820, only one hundred families had settled in the area. Following this period, encouraged by the development of road and trail systems throughout the Township, the population began to steadily rise, reaching 2,002 by 1831 (Waterloo Region Museum 2013). At this time, nearly all of Block Two had been sold, and the origins of settler groups began to diversify to include individuals of English, Irish, Scottish, and German descent.

Over the next few decades, the lots in the Township were subdivided and resold, and by the second half of the 19th century, the majority of new settlers in the area were not landowners or

farmers, but rather worked primarily as artisans, labourers, shopkeepers and millers (Waterloo Region Museum 2013). By 1851, the population in the Township had reached 8,878. Industrial businesses in the Township included mills, tanneries, and factories that manufactured agricultural equipment. In 1856, the Grand Trunk Railway reached Waterloo Township, prompting further settlement and development (Waterloo Region Museum 2013).

Over the course of the 19th century, several communities developed in Waterloo Township, including Waterloo, Berlin, Breslau, Shantz, Williamsburg, German Mills, Freeport, New Aberdeen, Strasburg, Doon, Blair, Preston and Hespeler. Many of these communities were subsequently annexed in the 20th century into the five larger centres of the City of Waterloo, the City of Kitchener, the City of Cambridge, Woolwich Township, and North Dumfries Township. The Project Area falls within the present City of Cambridge.

1.3.3.2 Project Area

To investigate the archaeological potential to encounter Euro-Canadian resources, the 1861 *Tremaine's Map of the County of Waterloo* and the 1881 *Illustrated Historical Atlas of the County of Waterloo* were reviewed. According to the MTCS (2011), lands within 300 metres of early Euro-Canadian settlements and 100 metres of early historic transportation routes are considered to have archaeological potential. Review of 1861 and 1881 maps revealed the Project Area to be located within proximity of a historic structure and two concession roads, present-day Pinebush Road and Townline Road (Figures 2 and 3). Therefore, based on the proximity of the features, the Project Area has archaeological potential to encounter Euro-Canadian resources.

1.4 Archaeological Context

1.4.1 Existing Conditions

The Project Area is located within the east portion of the City of Cambridge, generally bounded by Highway 401 to the north, Avenue Road to the south, Townline Road to the east, and Franklin Boulevard to the west. The PBTW1-10 well site is located within an industrial portion of the City of Cambridge and encompasses the existing Pinebush Water Treatment Plant. The Portuguese Club well site is located within the Portuguese Club of Cambridge property at 870 Townline Road, which encompasses an existing gravel parking area, access road and soccer field. The Cedarbrook well site is located within the existing Cedarbrook Court right-of-way and beyond, encompassing grassed margins and treed areas. The watermain construction is located along Saginaw Parkway from the existing well G18 to Townline Road, encompassing the existing roadway and its disturbed right-of-way.

1.4.2 Physiography

The Project Area is situated in the Horseshoe Moraines physiographic region of southern Ontario.

The Port Huron Moraine system forms the core of a horseshoe-shaped region flanking the upland that lies to the west of the Niagara cuesta. The associated meltwater stream deposits are also included, giving the region two chief landform components: the irregular, stony knobs and ridges which are composed mostly of till and with some sand and gravel deposits (kames); and the more or less pitted sand

and gravel terraces and swampy valley floors. Associated with the moraines is a system of old spillways with broad gravel and sand terraces and swampy floors. Some of it is very hilly, often with steep irregular slopes and small 'kettles' or enclosed basins which contain water in the spring and early summer. The soil material is coarse, open, stony till composed largely of dolostone with traces of red shale. The soils of these rough and stony surfaces are referred to as the Dumfries series, so named from the townships south of Cambridge. The soils of the associated outwash gravels are classified mainly in two series, Caledon and Burford.

(Chapman and Putnam 1984)

Soil texture can be an important determinant of past settlement, usually in combination with other factors, such as topography. The topography of the Project Area slopes north to south from an elevation of approximately 320 m above sea level at the northern extent of the Project Area to 300 m above seal level at the southern extent of the Project Area. The soils within the Project Area consist of Burford-Fox soils, which consist primarily of a loam to sand soil texture (Presant and Wicklund 1971). These soils would have supported pre-colonial Indigenous agricultural practices.

Properties within 300 m of a water source are deemed to have archaeological potential. Review of the Project Area and surrounding area revealed the presence of Cedarbrook Creek, tributaries of Puslinch Lake, and several kettle ponds within 300 m. These water sources would have provided potable water, as well as plant and food resources, which would have supported past human settlement of the area.

1.4.3 Registered Archaeological Sites

To compile an inventory of archaeological resources, the registered archaeological site records maintained by the MTCS in the Ontario Archaeological Site Database were consulted.

Ninety-nine archaeological sites are registered within 1 km of the Project Area (Table 3). Numerous Indigenous and Euro-Canadian sites are located within 300 m of the Project Area.

Table 3 Registered archaeological sites within 1 km of the Project Area

Borden Number	Name	Time Period	Cultural Affiliation	Site Type
AiHb-104	-	-	-	-
AiHb-105	-	-	-	-
AiHb-106	-	Late Archaic	Aboriginal	Findspot
AiHb-124	Pinebush South 1	Early Archaic	Aboriginal	Other camp/campsite
AiHb-125	Pinebush South 2	-	-	-
AiHb-126	Pinebush South 3	-	-	-

Borden Number	Name	Time Period	Cultural Affiliation	Site Type
AiHb-127	Pinebush South 4	-	-	-
AiHb-128	Pinebush South 5	Archaic	Aboriginal	Unknown
AiHb-131	Joseph Shaw	Post-Contact	Euro-Canadian	Homestead, midden
AiHb-132	Pinebush South 9	Early Archaic, Middle Archaic	Aboriginal	Hunting
AiHb-133	Pinebush South 10	Post-Contact	Euro-Canadian	Homestead, house
AiHb-134	Pinebush South 11	Middle Archaic	Aboriginal	Unknown
AiHb-135	Pinebush South 12	Early Archaic	Aboriginal	Unknown
AiHb-137	Pinebush South 14	-	-	-
AiHb-140	Pinebush South 17	Late Archaic, Late, Early Woodland, Late Woodland	Aboriginal	Unknown
AiHb-141	Pinebush South 18	-	-	-
AiHb-145	Pinebush South 22	Post-Contact	Euro-Canadian	Farmstead, homestead
AiHb-146	Pinebush 23	Early Archaic	Aboriginal	Findspot
AiHb-147	Pinebush 24	Early Woodland	Aboriginal	Findspot
AiHb-148	Pinebush 25	Late Woodland	Aboriginal	Findspot
AiHb-149	Pinebush 26	Early Archaic	Aboriginal	Findspot
AiHb-150	Pinebush 27	Middle Woodland	Aboriginal	Findspot
AiHb-152	Pinebush 29	Early Archaic	Aboriginal	Findspot
AiHb-217	Witmer 1	Middle Archaic, Pre-Contact	Aboriginal	Findspot
AiHb-218	Witmer 2	Late Archaic	Aboriginal	Findspot
AiHb-219	Witmer 3	Late Archaic	Aboriginal	Findspot

Borden Number	Name	Time Period	Cultural Affiliation	Site Type
AiHb-23	Cambridge 1	Late Archaic	Aboriginal	Findspot
AiHb-231	AiHb231	Late Archaic	Aboriginal	Findspot
AiHb-232	AiHb-232	Pre-Contact	Aboriginal	Scatter
AiHb-233	-	Late Archaic	Aboriginal	Findspot
AiHb-234	AiHb-234	Pre-Contact	Aboriginal	Scatter
AiHb-235	AiHb-235	Middle Paleo-Indian, Early and Middle Archaic, Middle and Late Woodland	Aboriginal	Other camp/campsite, village
AiHb-236	-	Early Woodland	Aboriginal	Findspot
AiHb-237	-	Late Archaic	Aboriginal	Findspot
AiHb-238	-	Pre-Contact	Aboriginal	Findspot
AiHb-239	AiHb-239	Early Archaic	Aboriginal	Scatter
AiHb-240	-	Late Archaic	Aboriginal	Scatter
AiHb-241	-	Middle Archaic	Aboriginal	Scatter
AiHb-242	-	Pre-Contact	Aboriginal	Scatter
AiHb-243	-	Middle Archaic, Middle Woodland	Aboriginal	Other camp/campsite
AiHb-244	-	Pre-Contact	Aboriginal	Scatter
AiHb-245	-	Pre-Contact	Aboriginal	Scatter
AiHb-246	-	Pre-Contact	Aboriginal	Findspot
AiHb-247	-	Pre-Contact	Aboriginal	Findspot
AiHb-248	-	Pre-Contact	Aboriginal	Findspot
AiHb-249	-	Pre-Contact	Aboriginal	Findspot

Borden Number	Name	Time Period	Cultural Affiliation	Site Type
AiHb-250	-	Pre-Contact	Aboriginal	Findspot
AiHb-251	-	Pre-Contact	Aboriginal	Findspot
AiHb-252	-	Early Woodland	Aboriginal	Findspot
AiHb-253	-	Late Archaic	Aboriginal	Scatter
AiHb-254	AiHb-254	Pre-Contact	Aboriginal	Scatter
AiHb-255	AiHb-255	Middle Archaic, Middle Woodland	Aboriginal	Scatter
AiHb-256	AiHb-256	Middle Archaic	Aboriginal	Scatter
AiHb-257	AiHb-257	Middle Archaic, Early Woodland	Aboriginal	Scatter
AiHb-258	AiHb-258	Late Archaic	Aboriginal	Scatter
AiHb-259	-	Pre-Contact	Aboriginal	Scatter
AiHb-260	AiHb-260	Late Archaic	Aboriginal	Scatter
AiHb-261	-	Pre-Contact	Aboriginal	Findspot
AiHb-262	AiHb-262	Early Archaic, Late Archaic, Middle Archaic	Aboriginal	Scatter
AiHb-263	AiHb-263	Early Archaic, Late Archaic	Aboriginal	Scatter
AiHb-264	AiHb-264	Early Archaic, Late Archaic	Aboriginal	Scatter
AiHb-265	AiHb-265	Early Archaic, Late Archaic	Aboriginal	Scatter
AiHb-266	-	Pre-Contact	Aboriginal	Findspot
AiHb-267	-	Pre-Contact	Aboriginal	Findspot

Borden Number	Name	Time Period	Cultural Affiliation	Site Type
AiHb-268	AiHb-268	Late Archaic, Middle Archaic, Middle	Aboriginal	Scatter
AiHb-269	AiHb-269	Late Archaic	Aboriginal	Scatter
AiHb-270	AiHb-270	Early Archaic, Late Archai	Aboriginal	Scatter
AiHb-271	-	Late Woodland	Aboriginal	Findspot
AiHb-272	AiHb-272	Early Archaic	Aboriginal	Scatter
AiHb-273	AiHb-273	Pre-Contact	Aboriginal	Scatter
AiHb-274	-	Late Archaic	Aboriginal	Findspot
AiHb-275	-	Pre-Contact	Aboriginal	Findspot
AiHb-276	-	Pre-Contact	Aboriginal	Findspot
AiHb-277	-	Middle Archaic	Aboriginal	Findspot
AiHb-278	-	Late Archaic	Aboriginal	Findspot
AiHb-279	AiHb-279	Pre-Contact	Aboriginal	Scatter
AiHb-280	AiHb-280	Pre-Contact	Aboriginal	Scatter
AiHb-281	AiHb-281	Pre-Contact	Aboriginal	Scatter
AiHb-299	Townline West #2	Early Archaic, Late Archaic	-	-
AiHb-39	Wren	Early Archaic, Middle Archaic, Early Woodland	Aboriginal	Other camp/campsite
AiHb-46	-	-	-	-
AiHb-47	-	-	-	-
AiHb-48	-	-	-	-
AiHb-50	-	-	-	-

Borden Number	Name	Time Period	Cultural Affiliation	Site Type
AiHb-51	-	Early Archaic	Aboriginal	Findspot
AiHb-52	-	-	-	-
AiHb-53	-	-	-	-
AiHb-83	Hilborn	Middle Woodland	Aboriginal	-
AiHb-84	Birch	-	-	-
AiHb-86	-	Early Archaic, Early Woodland	Aboriginal	Other camp/campsite
AiHb-87	-	Other		Other camp/campsite_
AiHb-88	-	Middle Woodland	Aboriginal	Other camp/campsite, burial
AiHb-89	-	Late Archaic	Aboriginal	Other camp/campsite
AiHb-90	-	Post-Contact	Euro-Canadian	Other building, farmstead, midden
AiHb-91	-	Late Archaic	Aboriginal	Other camp/campsite
AiHb-92	-			
AiHb-93	-	Middle Woodland	Aboriginal	Other camp/campsite
AiHb-94	-	Other	-	Other camp/campsite
AiHb-95	-	Other	-	Other camp/campsite

1.4.4 Previous Archaeological Assessments

Per Section 1.1, Standard 1 of the MTCS (2011), a search of previous archaeological surveys immediately adjacent to the Project Area was undertaken. There were no records of previous archaeological surveys having been conducted within 50 m of the Project Area components.

1.4.5 Cultural Heritage Resources

Per Section 1.3.1 of the MTCS (2011), properties listed on a municipal register or designated under the *Ontario Heritage Act (OHA)* or that is a federal, provincial, or municipal historic landmark or site, are considered indicators of archaeological potential. Background research determined that there are no cultural heritage resources within 300 m of the Project Area. Therefore, this feature does not contribute to the archaeological potential of the Project Area.

2.0 Field Methods

The Stage 1 property inspection of the Project Area was conducted on June 16th, 2018. The weather during the Stage 1 property inspection was sunny and clear with warm temperatures. The weather and lighting conditions during the Stage 1 property inspection permitted good visibility of all parts of the Project Area and were conducive to identifying features and assessing the Project Area's archaeological potential.

The property inspection was carried out systematically every 5 to 10 m, reviewing the entire extent of the Project Area to gain first-hand knowledge of the Project Area's geography, topography, and current conditions, and to evaluate and map archaeological potential. Photographic images of the Project Area are presented within Section 8.0. Location and orientation information associated with all photographs taken in the field are provided within Maps 5 to 8.

3.0 Analysis and Conclusions

3.1 Archaeological Potential

Archaeological potential is established by determining whether any features or characteristics indicating archaeological potential are located on or in the vicinity of a Project Area. Features and characteristics that indicate archaeological potential are defined within Section 1.3.1 of the MTCS (2011:17-18) and include:

- Previously identified archaeological sites.
- Water sources:
 - Primary water sources (e.g., lakes, rivers, streams, creeks).
 - Secondary water sources (e.g., intermittent streams and creeks; springs; marshes; swamps).
 - Features indicating past water sources (e.g., glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels, shorelines of drained lakes or marshes, and cobble beaches).
- Accessible or inaccessible shorelines (e.g., high bluffs, swamps or marsh fields by the edge of a lake, sandbars stretching into marsh).

- Elevated topography (eskers, drumlins, large knolls, plateaux).
- Pockets of well drained sandy soil, especially near areas of heavy soil or rocky ground.
- Distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases.
- Resource areas including:
 - Food or medicinal plants.
 - Scarce raw minerals (e.g., quartz, copper, ochre or outcrops of chert).
 - Early Euro-Canadian industry (fur trade, logging, prospecting, mining).
- Areas of early Euro-Canadian settlement including:
 - Early military or pioneer settlements (e.g., pioneer homesteads, isolated cabins, farmstead complexes).
 - Early wharf or dock complexes, pioneer churches and early cemeteries.
 - Early historical transportation routes (e.g., trails, passes, roads, railways, portage routes).
- Property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial or municipal historic landmark or site.
- Property that local histories or informants have identified with possible archaeological sites, historical events, activities or occupations.

Many of the above features of archaeological potential have a buffer assigned to them, extending the zone of archaeological potential beyond the physical feature. The following buffers are commonly accepted by the MTCS and specifically indicated in Section 1.4 of the MTCS (2011:20-21).

- 300 m buffer: previously identified archaeological sites; water sources; areas of early Euro-Canadian settlements; or locations identified through local knowledge or informants.
- 100 m buffer: early historical transportation routes.
- No buffer, potential is restricted to the physical limits or the feature: elevated topography, pockets of well-drained sandy soil, distinctive land formations, resources areas, listed or designated properties and landmark properties.

3.1.1 Potential for Pre- and Post-Contact Indigenous Archaeological Resources

Archaeological potential for pre-Contact Indigenous archaeological sites is established by determining the likelihood that archaeological resources may be present within a Project Area. Archaeological potential can be affected by several variables, including: distance to various types of water sources, soil texture and drainage, glacial geomorphology, and the general topographic variability of the area.

Distance to modern or ancient water sources is generally accepted as the most important determinant of past human settlement patterns and, considered alone, may result in a determination of archaeological potential. However, any combination of two or more other criteria, such as well-drained soils or topographic variability, may also indicate archaeological potential.

In archaeological potential modeling, a distance to water criterion of 300 m is generally employed for all water sources including lakeshores, rivers, large creeks, swamps and small creeks. The PBTW1-10 well site is located in proximity to a kettle pond, and the Cedarbrook well site and watermain construction route are located in proximity to Cedarbrook Creek.

Soil texture can be an important determinant of past settlement, usually in combination with other factors, such as topography. The topography of the Project Area slopes north to south from an elevation of approximately 320 m above sea level at the northern extent of the Project Area to 300 m above seal level at the southern extent of the Project Area. The soils within the Project Area consist of Burford-Fox soils, which consist primarily of a loam to sand soi texture (Presant and Wicklund 1971). These soils would have supported pre-colonial Indigenous agricultural practices.

The MTCS also views the presence of previously identified archaeological sites as an indicator of archaeological potential. A search of the Ontario Archaeological Sites Database indicated that there are numerous documented archaeological sites with a pre-colonial Indigenous component located within a 1 km radius of Project Area. Archaeological potential is also determined when a known site is within 300 m of the Project Area. All components of the Project Area are located within 300 m of documented archaeological sites with a pre-colonial Indigenous component.

When the above-noted archaeological potential criteria are applied, the Project Area was determined to have archaeological potential for pre-colonial Indigenous resources.

3.1.2 Potential for Historic Euro-Canadian Archaeological Resources

The criteria used by the MTCS to determine potential for historical Euro-Canadian archaeological sites includes the presence of: particular, resource-specific features that would have attracted past subsistence or extractive uses; areas of initial, non-Indigenous settlement; early historical transportation routes; properties designated under the *Ontario Heritage Act*; and, previously identified archaeological sites with a Euro-Canadian component

Based on the above criteria, all components of the Project Area were determined to have potential for historical Euro-Canadian resources. This determination was based on the proximity (within 300 m) of water sources, historical transportation routes, a historic settlement, and a registered Euro-Candian site (AiHb-90) (Maps 2 and 3).

3.2 Archaeological Integrity

3.2.1 Well PBTW-10 Site

A negative indicator of archaeological potential is extensive below-grade land disturbance. This includes widespread earth movement activities that would have removed or relocated any

archaeological resources to such a degree that their information potential and cultural heritage value or interest has been lost.

Activities that are recognized to cause sufficient disturbance to remove archaeological potential include: quarrying, major landscaping involving grading below topsoil, building footprints and infrastructure development. Activities including agricultural cultivation, gardening, minor grading and landscaping do not necessarily remove archaeological potential (MTCS 2011: 18). The PBTW1-10 well site is located within the existing Pinebush Water Treatment Plant site at 490 Pinebush Road. The PBTW1-10 well site was subjected to extensive disturbances associated with the construction of the Pinebush Water Treatment Plant., which consists of an extant water tower and plant building, as well as a paved access road and extensively landscaped areas (i.e., berms) (Figures 4 and 5) (Images 1 to 3).

The construction of this feature would have resulted in severe damage to the integrity of any archaeological resources which may have been present within their footprints. Therefore, the PBTW1-10 well site does not retain archaeological potential.

3.2.2 Portuguese Club Well Site

The Portuguese Club well site is located within the Portuguese Club of Cambridge property at 870 Townline Road. The majority of the Portuguese Club well site was subjected to extensive disturbance through the construction of an access road and parking area affiliated with the Portuguese Club of Cambridge property (Figures 4 and 6) (Images 4 to8). Therefore, these areas do not retain archaeological potential.

The remainder of the well site, consisting of manicured grass appears to retain archaeological potential (Figures 4 and 6) (Images 7 and8).

3.2.3 Cedarbrook Well Site and Watermain Construction along Cedarbrook Court

The Cedarbrook well site and watermain construction along Cedarbrook Court is located along an approximately 85 m stretch of Cedarbrook Court from Townline Road, and includes the existing road right-of-way, as well as some lands beyond the right-of-way on the north side of Cedarbrook Court. The existing roadway and the southern half of the right-of-way were determined to be subjected to extensive disturbance (Figures 4 and 7) (Images 9 to11). Therefore, these areas do not retain archaeological potential. Furthermore, the well site consists of an area of steeply sloping terrain. Section 2.1, Standard 2.a. of the MTCS (2011) considers such features to be of low archaeological potential.

The remainder of the Cedarbrook well site, consisting of grassed margins, was determined to retain its archaeological potential (Figures 4 and7) (Image 12).

3.2.4 Watermain Construction along Saginaw Parkway

Watermain construction along Saginaw Parkway would stretch from existing well G18 to Townline Road. The watermain construction, which would be confined to the existing road right-of-way, was determined to be extensively disturbed from the construction of the Saginaw Parkway and surrounding area (Figures 4 and8) (Images 13 to17). Therefore, this watermain construction does not retain archaeological potential.

3.3 Conclusions

The areas of deep and extensive disturbances, as well as the area of steeply sloping terrain are considered to have no to low archaeological potential, respectively. The remainder of the Project Area specifically portions of the Portuguese well site, the Cedarbrook well site and watermain construction along Cedarbrook Court are considered to retain archaeological potential and must be subjected to a Stage 2 test pit survey at 5 m transects in accordance with Section 2.1.2 of the MTCS (2011).

4.0 Recommendations

Given the findings of the Stage 1 archaeological assessment of the Project Area, the following recommendations are provided:

- 1) PBTW1-10 Well Site (Map 5)
 - a) The PBTW1-10 well site was identified as having its archaeological potential removed based on previous disturbances, and as a result can be considered free of further archaeological concern.
- 2) Portuguese Well Site (Map 6)
 - a) Portions of the Portuguese well site were identified as having archaeological potential removed based on previous disturbances and as a result, can be considered free of further archaeological concern.
 - b) Previously undisturbed portions of the Portuguese well site that were identified as having archaeological potential must be subjected to a Stage 2 archaeological assessment. These areas must be subjected to a test pit survey at 5 m intervals in accordance with Section 2.1.2 of the 2011 Standards and Guidelines for Consultant Archaeologists published by the Ministry of Tourism, Culture, and Sport (MTCS) (2011) prior to construction activities.
- 3) Cedarbrook Well Site and Watermain Construction along Cedarbrook Court (Map 7)
 - a) Portions of the Cedarbrook well site and watermain construction along Cedarbrook Court were identified as having archaeological potential removed as a result of previous disturbances and can be considered free of further archaeological concern.
 - c) Portions of the Cedarbrook well site and watermain construction along Cedarbrook Court that were identified as having low archaeological potential (i.e., steeply sloping), can be considered to be free of further archaeological concern.
 - d) Previously undisturbed portions of the Cedarbrook well site and watermain construction along Cedarbrook Court, that were identified as having archaeological potential, must be subjected to a Stage 2 archaeological assessment. These areas must be subjected to a test pit survey at 5 m intervals in accordance with Section 2.1.2 of the MTCS (2011) prior to construction activities.

- 4) Watermain Construction (Map 8)
 - a) The entirety of the watermain construction along Saginaw Parkway was identified as having its archaeological potential removed based on previous disturbances, and as a result, can be considered free of further archaeological concern.

5.0 Advice on Compliance with Legislation

This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18 (Government of Ontario 1990). 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 Ministry of Tourism and Culture, 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 Section 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alterations 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 Archaeological reports referred to in Section 65.1 of the *Ontario Heritage Act* (Government of Ontario 1990).

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* (Government of Ontario 1990).

The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33, requires that any person discovering or having knowledge of a burial site shall immediately notify the police or coroner (Government of Ontario 2002). It is recommended that the Registrar of Cemeteries at the Ministry of Consumer Services is also immediately notified.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

6.0 Bibliography and Resources

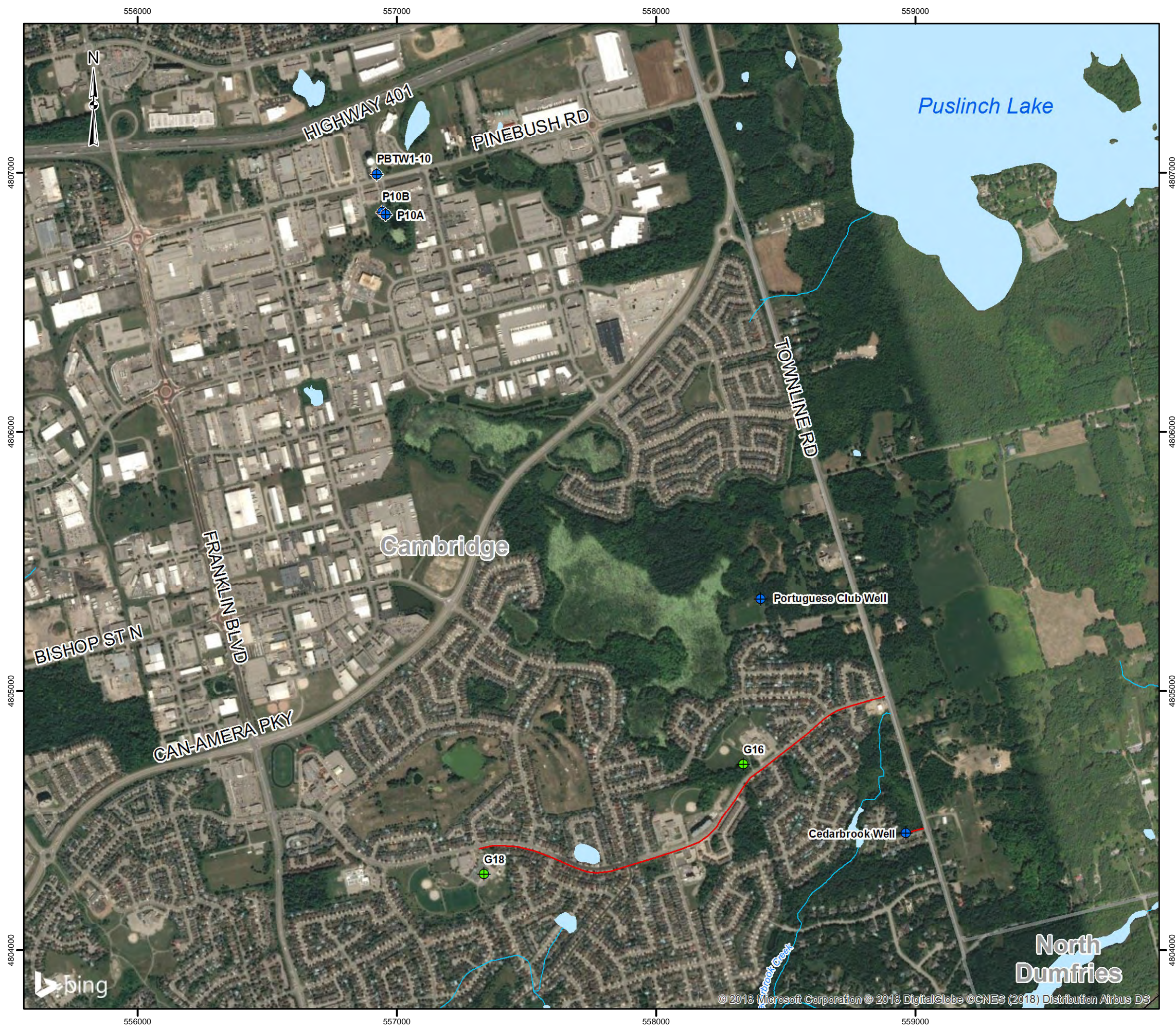
- Anderson, J. (2009). *The Lawson Site: An Early Sixteenth Century Neutral Iroquoian Fortress*. Museum of Ontario Archaeology, Special Publication No. 2. London.
- Bloomfield, Elizabeth. (2006). *Waterloo Township Through Two Centuries*. St. Jacob's Printery, Waterloo.
- Chapman, L. J. and Putnam, D. F. (1984). *Physiography of Southern Ontario*. 3rd ed. Ontario Geological Survey, Special Volume 2. Toronto: Ministry of Natural Resources.
- Dodd, C.F., Poulton, D. R., Lennox, P.A., Smith, D.G., and Warrick, G.A. (1990). The Middle Ontario Iroquoian Stage. In Ellis, C.J. and N. Ferris (Eds.) *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 321-359.
- Ellis, C.J. and Ferris, N. (editors) (1990). *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5.
- Ellis, C., Kenyon, I.T., and Spence, M.W. (1990). The Archaic. In *The Archaeology of Southern Ontario to A.D. 1650*, Chris J. Ellis and Neal Ferris (eds.), Occasional Publication of the London Chapter, Number 5. Ontario, pp. 65-124.
- Ferris, Neal. (2009). *The Archaeology of Native-Lived Colonialism: Challenging History in the Great Lakes*. University of Arizona Press, Tucson.
- Hunting Survey Corporation Ltd. (1954). Aerial Photograph. Retrieved June 15, 2018 from http://maps.library.utoronto.ca/data/on/AP_1954/index.html.
- Lennox, P.A. and Fitzgerald, W.R. (1990). The Culture History and Archaeology of the Neutral Iroquoians. In Ellis, C.J. and N. Ferris (Eds.) *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 405-456.
- Ministry of Tourism, Culture and Sport (MTCS) (2011). *Standards and Guidelines for Consultant Archaeologists*. Toronto: Ministry of Tourism, Culture and Sport.
- Morris, J.L. (1943). *Indians of Ontario*. 1964 reprint. Department of Lands and Forests, Government of Ontario.
- Ontario Historical County Map (OHCM). (2016). *Tremaine's Map of the County of Waterloo – Township of Waterloo (1861)*. Retrieved June 15, 2018 from <http://maps.library.utoronto.ca/hgis/countymaps/simcoe/index.html>
- Parsell, H. & Co. (1881). *Illustrated Atlas of the County of Waterloo*. Toronto.
- Presant, E.W., & Wicklund, R.E. (1971). *The Soils of Waterloo County*. Research Branch, Canadian Department of Agriculture, Ottawa.

- Schmalz, P.S. (1991). *The Ojibwa of Southern Ontario*. Toronto, Canada: University of Toronto Press.
- Smith, D.G. (1990). Iroquoian Societies in Southern Ontario: Introduction and Historic Overview. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 279-290.
- Waterloo Regional Museum. (2018). History of the Waterloo Township. Retrieved June 15, 2018 from <http://www.waterlooregionmuseum.ca/en/collections-and-research/waterloo-township.aspx>.
- Weaver, Sally M. (1978). Six Nations of the Grand River, Ontario. In William C. Sturtevant (Ed.), *Handbook of North American Indians*, Vol. 15, Northeast, Washington D.C., Smithsonian Institute.

7.0 Maps

Figures 1-8 on succeeding pages.

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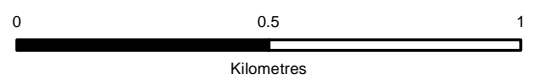


LEGEND

- Existing Well Site
- New Wells
- Watermain Construction
- Watercourse
- Waterbody

REFERENCE

Base Data - MNRF LIO obtained 2016
 Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources and Forestry, © Queens Printer 2016
 GRCA Wetlands - Produced using information under License with the Grand River Conservation Authority © Grand River Conservation Authority, obtained 2016
 Datum: NAD 83 Projection: UTM Zone 17N



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	DESIGN CCG 10 Mar. 2005		
	GIS MM/RJ 05 Jun. 2018		
	CHECK JLH 15 Jun. 2018		
	REVIEW JAP 15 Jun. 2018		



FIGURE: 1

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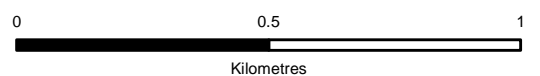


LEGEND

- New Wells
- Watermain Construction
- Watercourse
- Waterbody

REFERENCE

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REVIEW	JAP	15 Jun. 2018	



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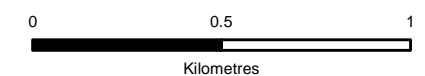


LEGEND

- New Wells
- Watermain Construction
- Watercourse
- Waterbody

REFERENCE

Datum: NAD 83 Projection: UTM Zone 17N



PROJECT
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 CLASS ENVIRONMENTAL ASSESSMENT**

TITLE
1881 ILLUSTRATED ATLAS


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	CHECK	JLH	15 Jun. 2018			
	REVIEW	JAP	15 Jun. 2018			

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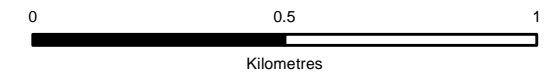


LEGEND

-  New Wells
-  Watermain Construction
-  Watercourse
-  Waterbody

REFERENCE

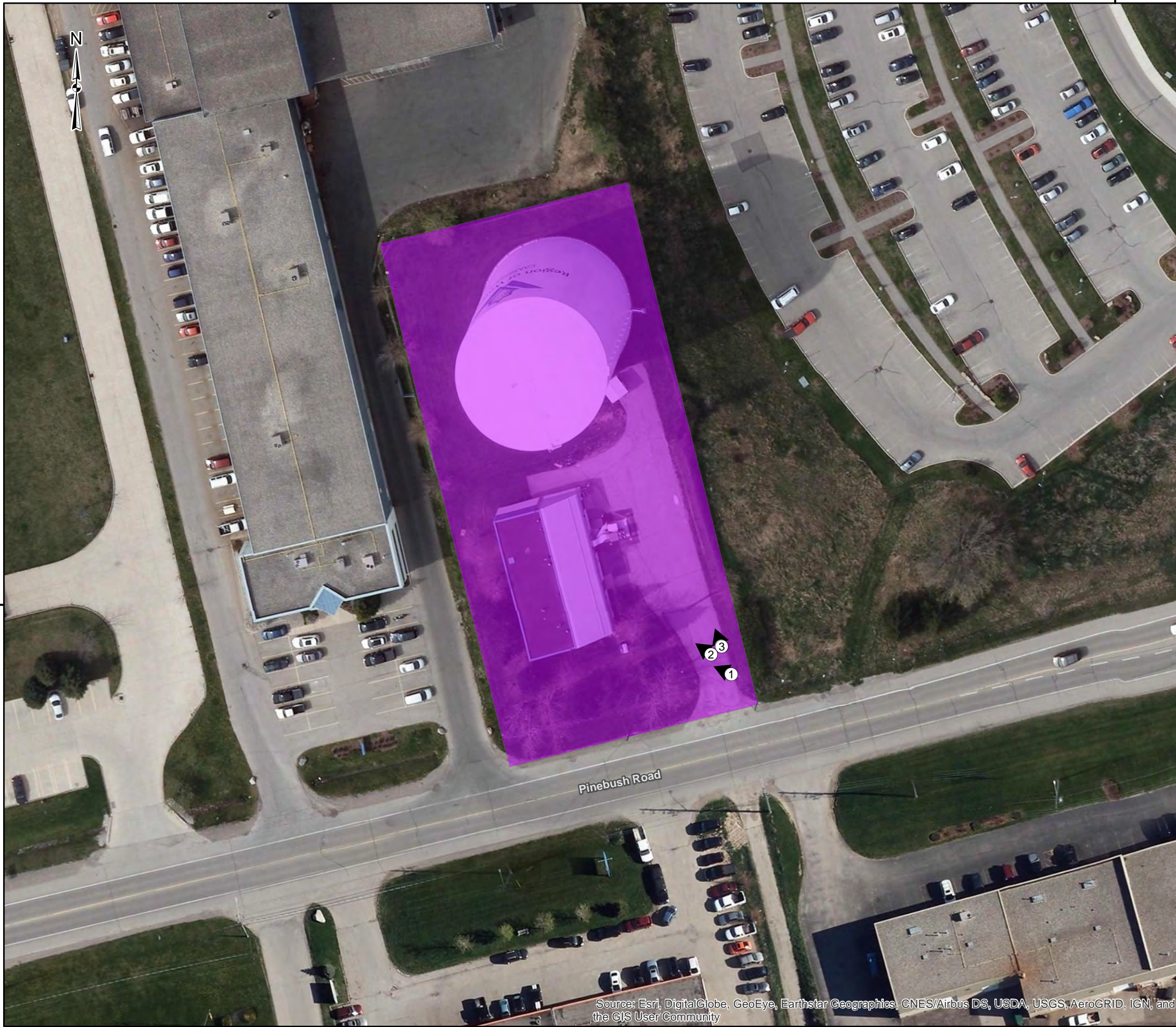
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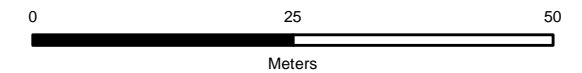
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REVIEW	JAP	15 Jun. 2018		



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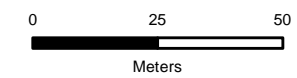


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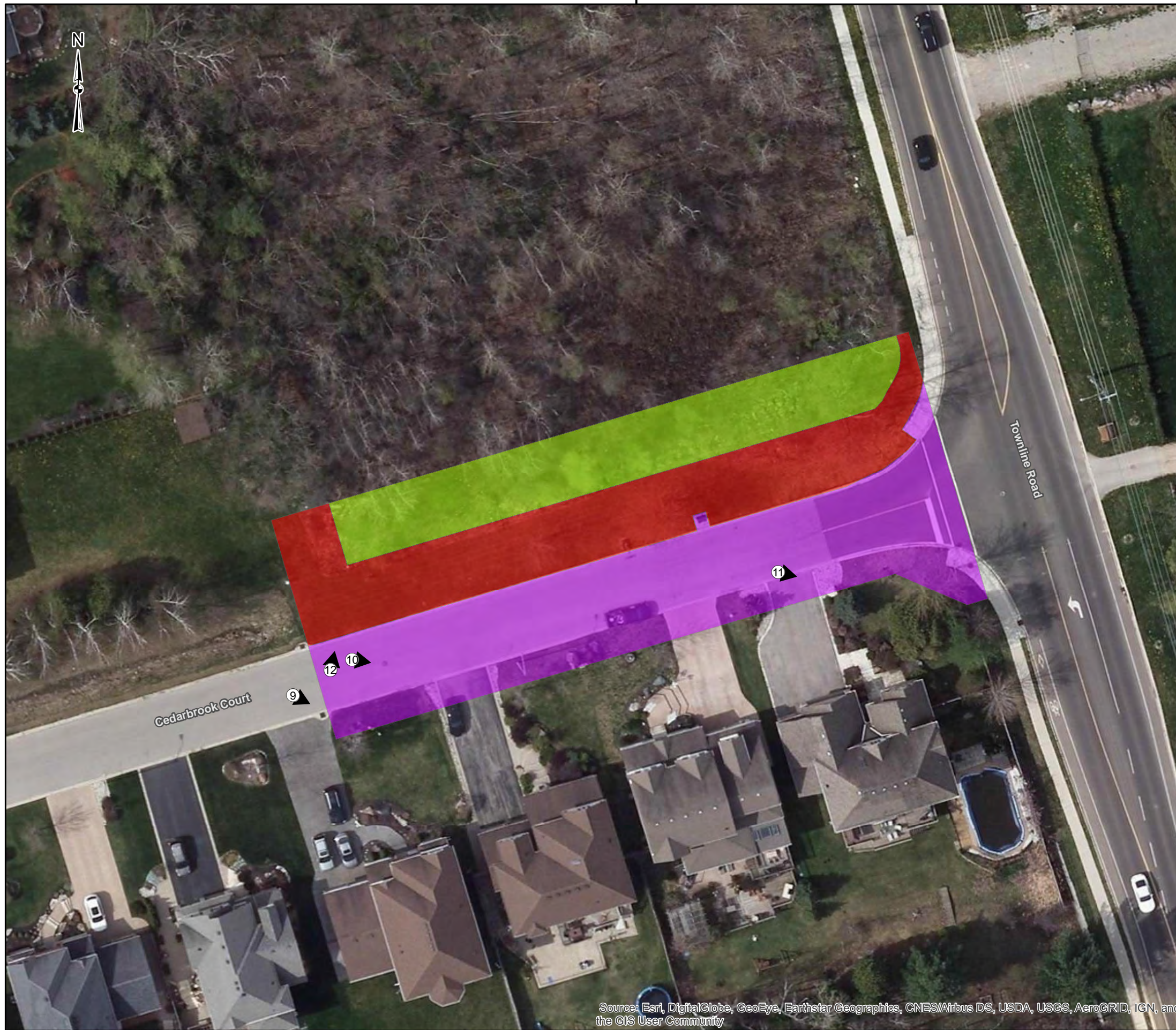
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




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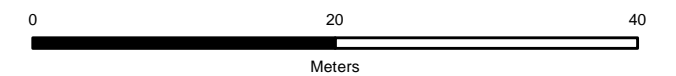


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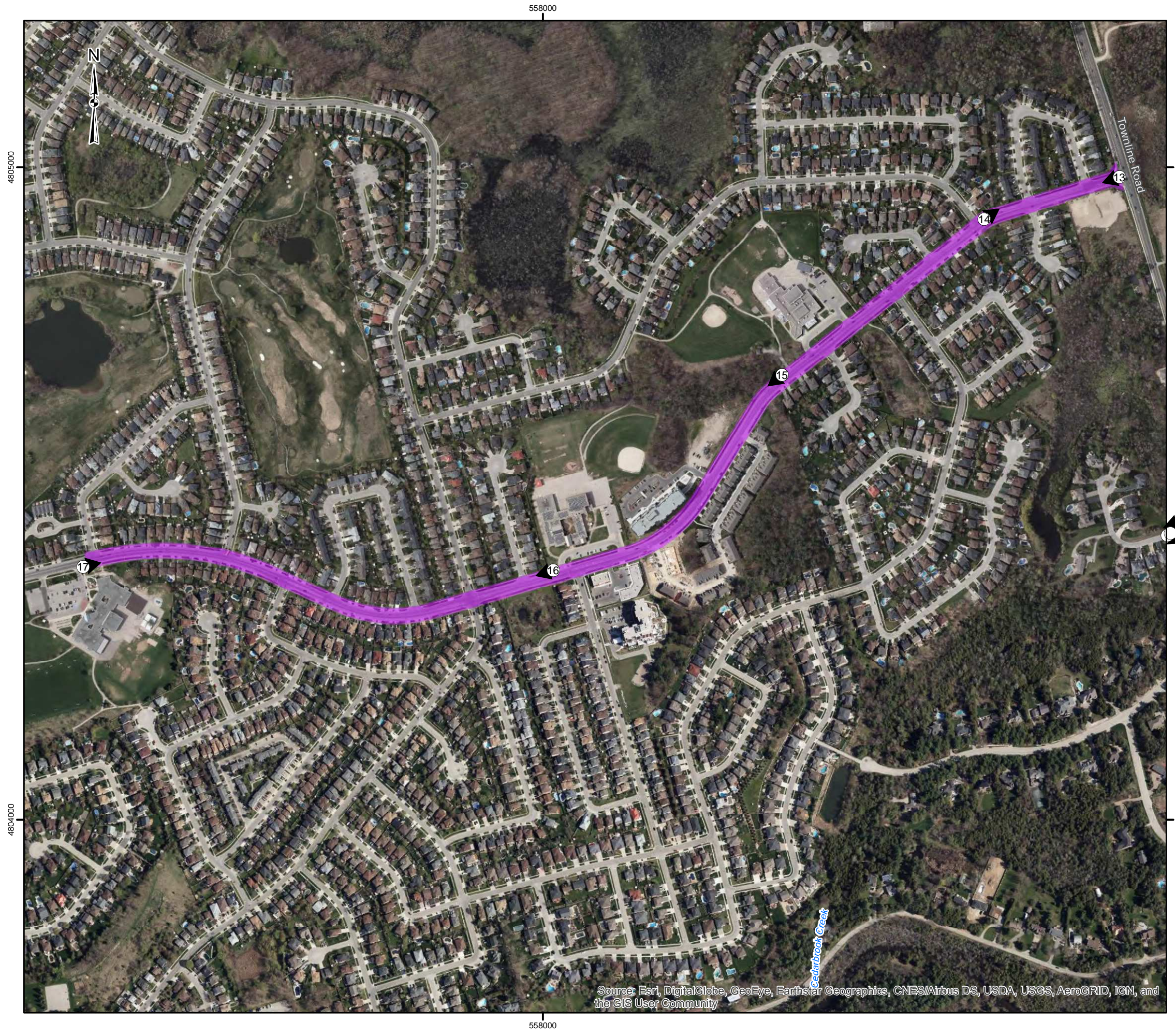
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REFERENCE

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REVIEW	JAP	15 Jun. 2018	



LEGEND

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REFERENCE

Datum: NAD 83 Projection: UTM Zone 17N

Meters

PROJECT		CAMBRIDGE EAST WATER SUPPLY CLASS ENVIRONMENTAL ASSESSMENT	
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GIS	RRD	15 Jun. 2018	
CHECK	JLH	15 Jun. 2018	
REVIEW	JAP	15 Jun. 2018	

FIGURE: 8

8.0 Images

Images 1-17 on succeeding pages.



Image 1: View facing northwest at disturbances associated with the existing Pinebush Water Treatment Plant (PBTW1-10).



Image 2: Viewing facing northwest at disturbances associated with the existing Pinebush Water Treatment Plant (PBTW1-10).



Image 3: View facing north at disturbances associated with the existing Pinebush Water Treatment Plant (PBTW1-10).



Image 4: View facing east at disturbances associated with a paved access road (Portuguese Club well site).



Image 5: View facing west at disturbances associated with a paved access road and parking area (Portuguese Club well site).



Image 6: View facing north at disturbances associated with a paved access road and parking area (Portuguese Club well site).



Image 7: Grassed area with superficial gravel fill retaining archaeological potential (Portuguese Club well site).



Image 8: Grassed area with superficial gravel fill retaining archaeological potential (Portuguese Club well site).



Image 9: View facing southeast at disturbances associated with the existing paved Cedarbrook Court and underground utilities (Cedarbrook well site and watermain construction).



Image 10: View facing east at disturbances associated with the existing paved Cedarbrook Court and underground utilities (Cedarbrook well site and watermain construction).



Image 11: View facing southeast at disturbances associated with the existing paved Cedarbrook Court and underground utilities (Cedarbrook well site and watermain construction).



Image 12: View facing north at grassed area that retains archaeological potential (Cedarbrook well site and watermain construction).



Image 13: View facing west at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).



Image 14: View facing northeast at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).



Image 15: View facing southwest at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).



Image 16: View facing west at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).



Image 17: View of facing east at disturbances associated with the existing paved Saginaw Parkway and existing infrastructure (watermain construction along Saginaw Parkway).

9.0 Inventory of Documentary and Material Record

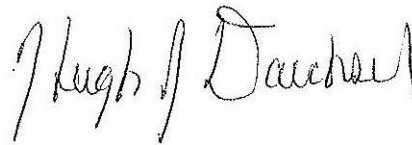
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Maps Provided by Client	Golder office, Whitby	Digital files stored on secure server.
Digital Photographs	Golder office, Whitby	49 digital photographs saved on secure server.

Signature Page

Golder Associates Ltd.



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Archaeologist



Hugh Daechsel, M.A.
Principal, Senior Archaeologist

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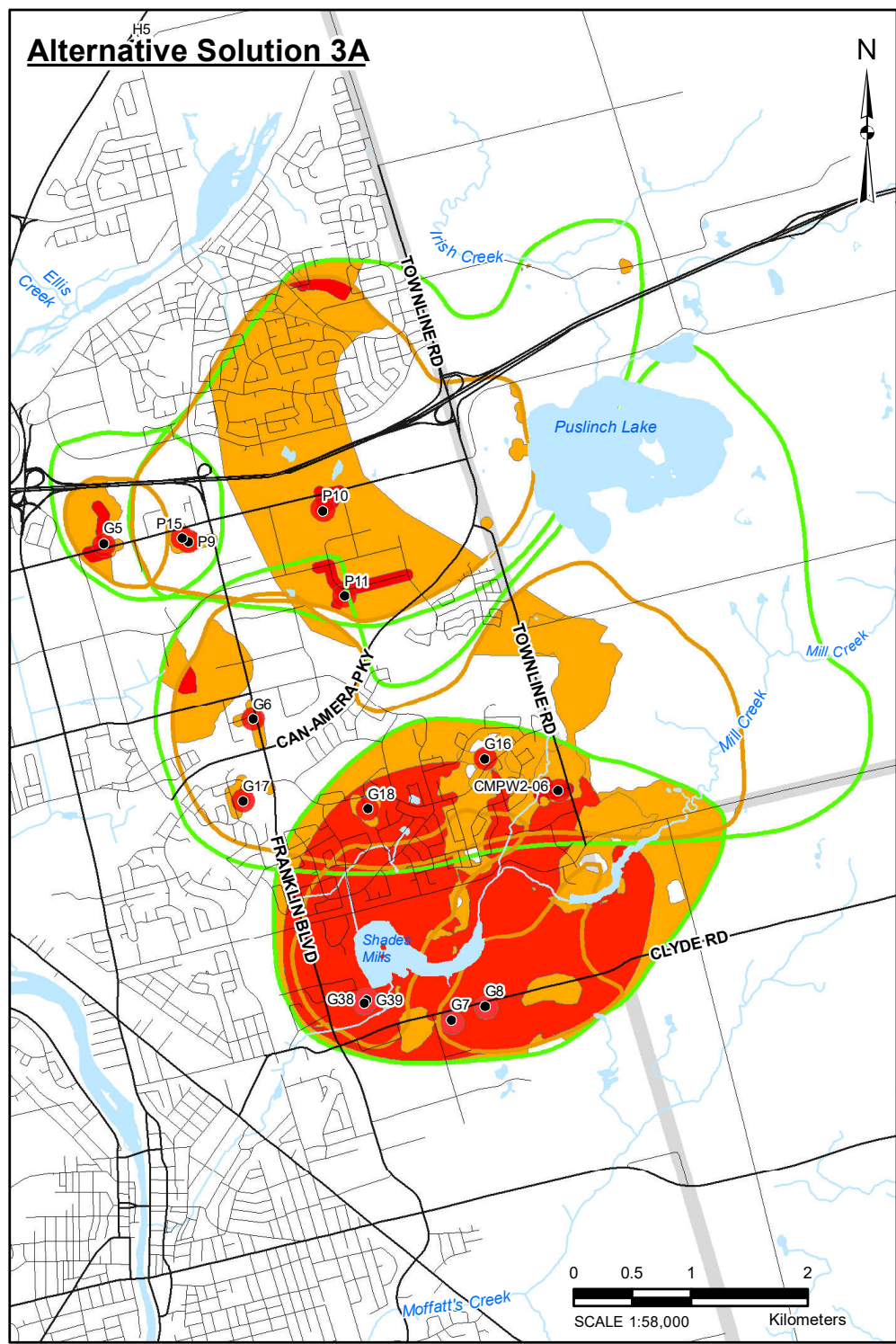
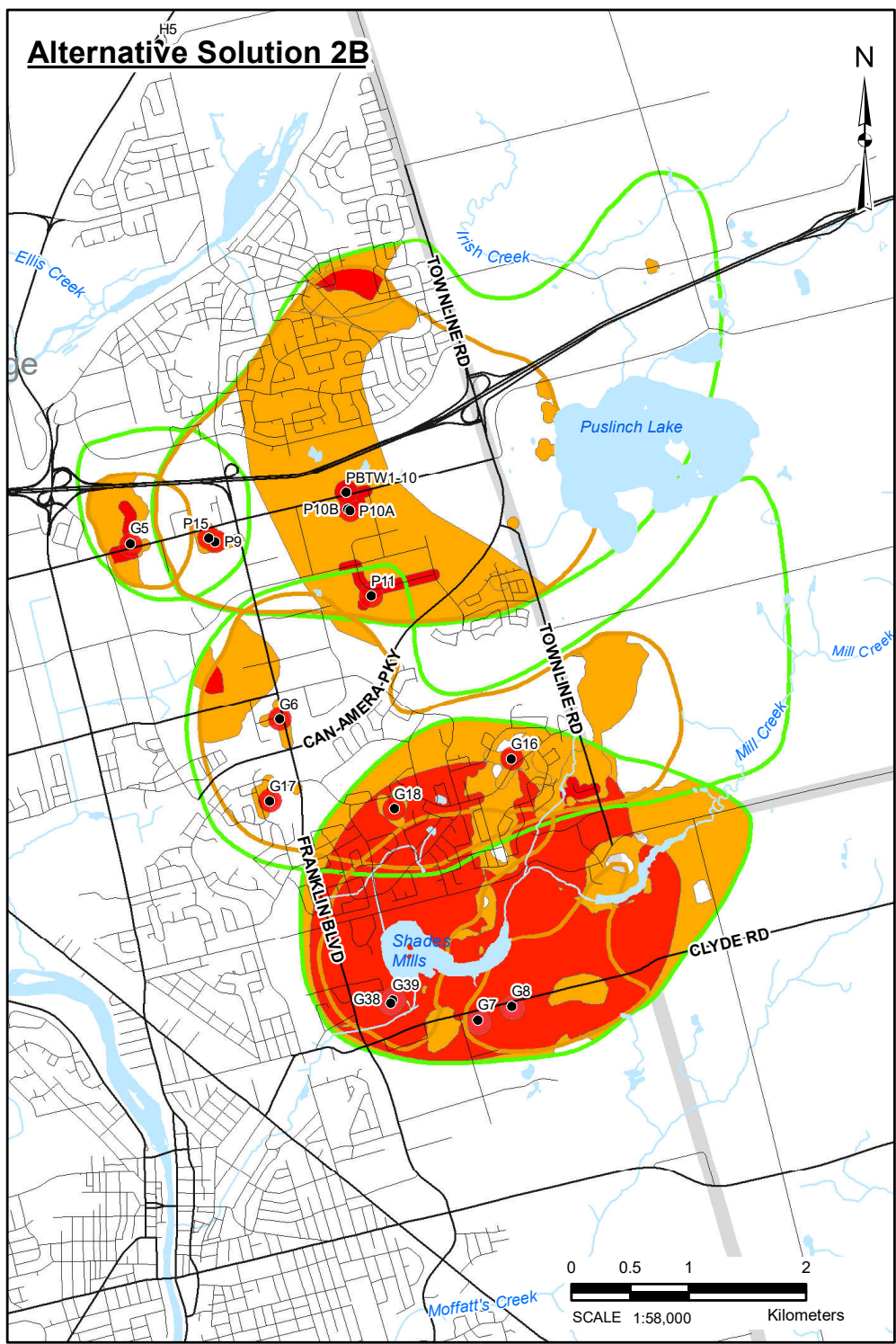
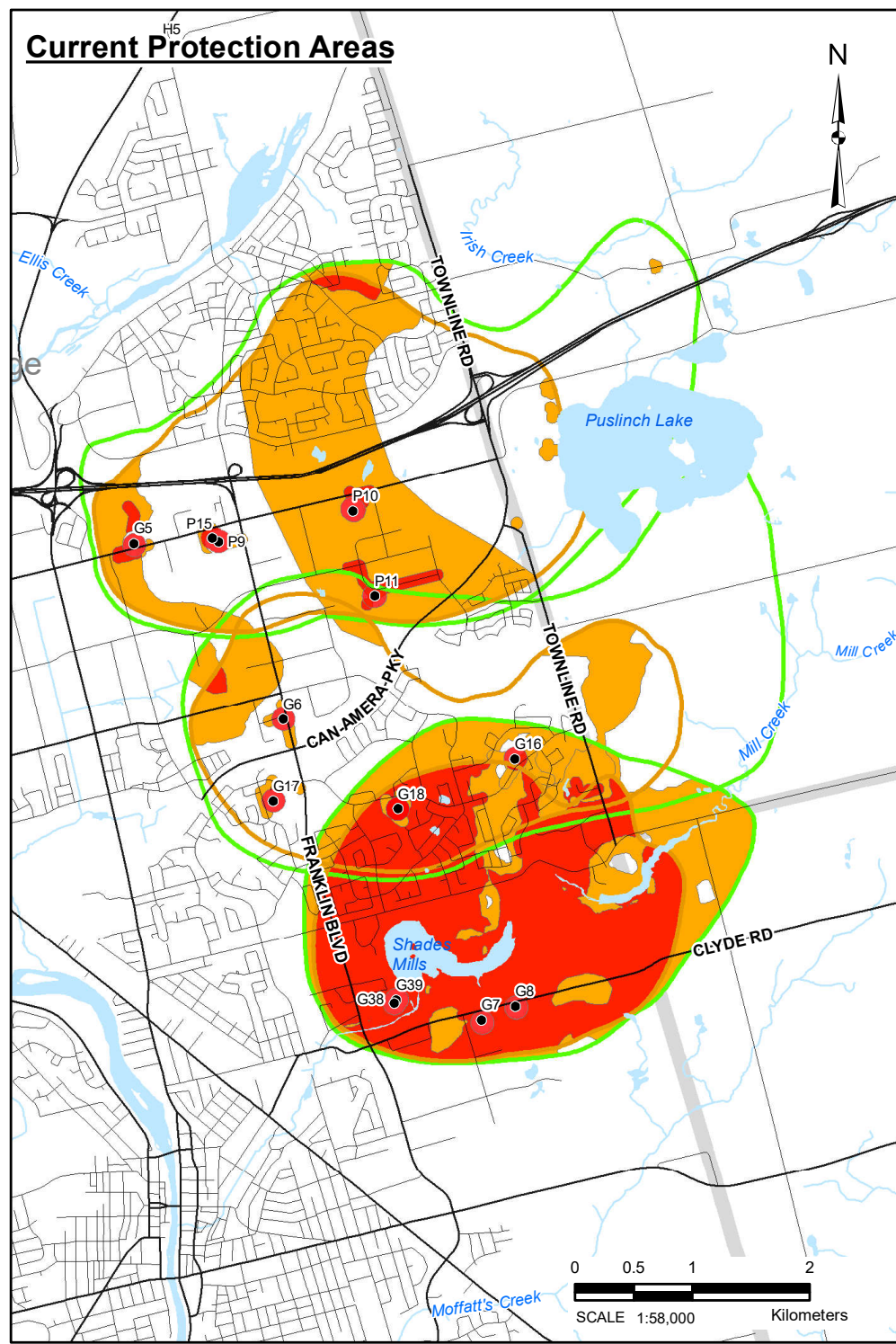
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Appendix C

Source Water Protection Information



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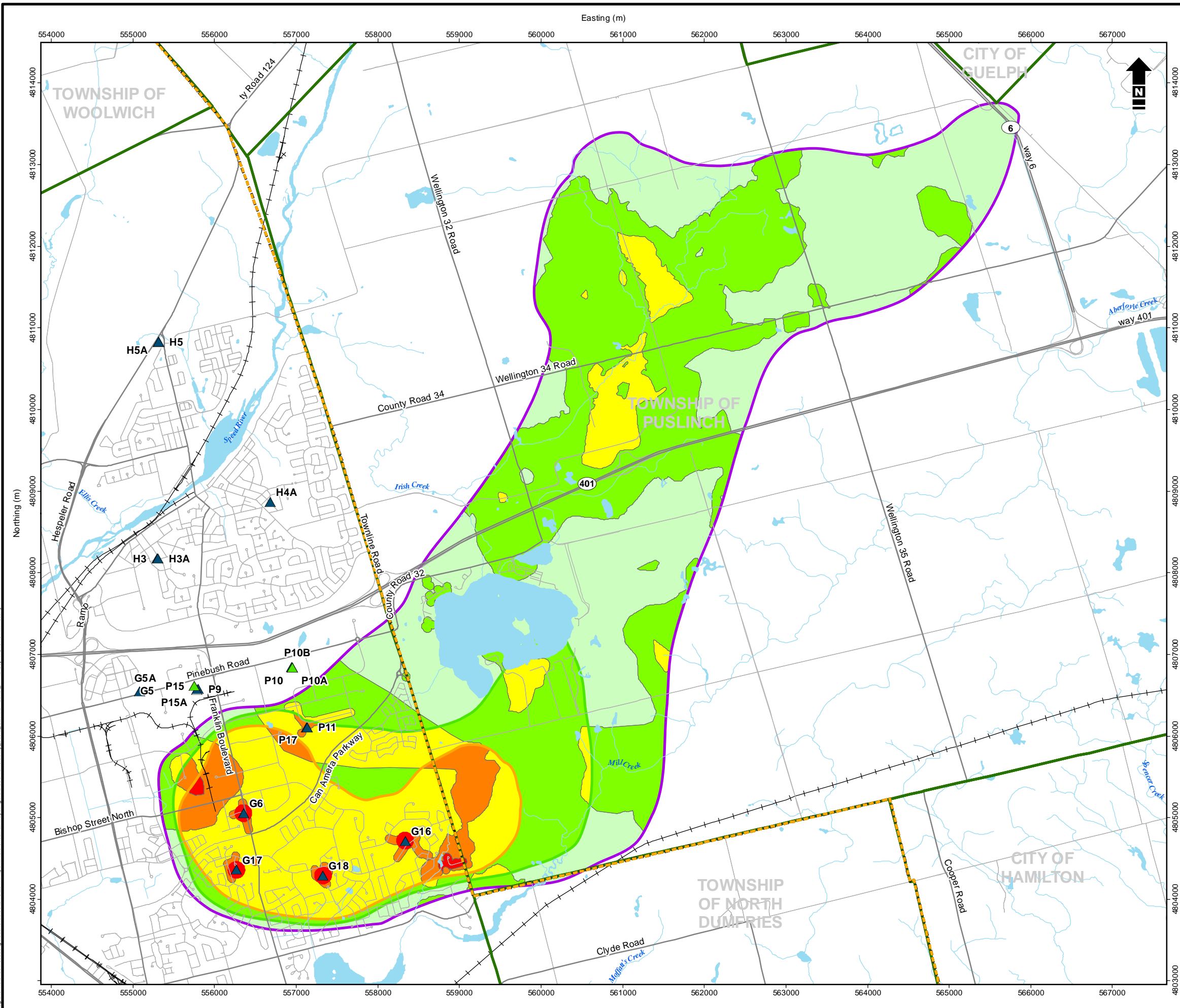
- Municipal Supply Well
- Watercourse
- Waterbody
- 100 m Zone of Prohibition (WHPA-A)
- WHPA-B (2-year)
- WHPA-C (5-year)
- Areas Where:
 - Chemical handling including fuel, certain industrial chemicals and waste will require spill containment and response.
 - Salting of parking lots will be required in accordance with right time/right place/right amount principles.
- Areas Where:
 - Handling of certain industrial chemicals and wastes will require spill containment and response.
- Areas Where:
 - Handling of Dense Non-Aqueous Phase Liquids (DNAPL) will require a risk management plan including spill containment and response measures. For existing uses within the Region of Waterloo, a risk management plan will only be required where the vulnerability is 8 or 10.
 - In WHPA-A areas, DNAPL handling will be prohibited for future uses. Within the Region of Waterloo only, DNAPL handling will also be prohibited in WHPA-B for future uses where the vulnerability is equal to 10 and will be prohibited for existing uses within WHPA-A areas.

REFERENCE

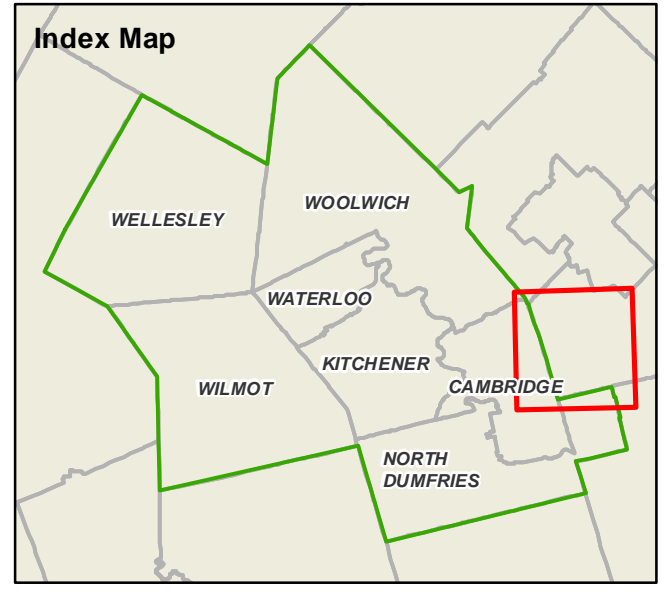
Base Data - MNRF LIO obtained 2016, ROW 2017
 Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources and Forestry, © Queens Printer 2016
 Datum: NAD 83 Projection: UTM Zone 17N

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DESIGN PR 2 Feb. 2017	GIS PR 31 Oct. 2018	FIGURE: C1	
CHECK JAP 31 Oct. 2018	REVIEW JAP 31 Oct. 2018		

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- Region of Waterloo Municipal Boundary
 - Municipal Boundary
 - Water Body
 - Watercourse
 - Highway
 - Road
 - Railway
 - Production Well
 - Production Well (Not included in WHPA delineation study, Matrix 2017a)
- Wellhead Protection Area**
- 100 m Zone of Prohibition (WHPA-A)
 - 2-year Capture Zone (WHPA-B)
 - 5-year Capture Zone (WHPA-C)
 - 25-year Capture Zone (WHPA-D)
- Vulnerability Score for Contact Zone**
- 2 (Low)
 - 4
 - 6
 - 8
 - 10 (High)



Reference: Data obtained from GeoBase® used under license.
 Produced using information provided by the Ministry of Natural Resources, Copyright © Queen's Printer 2017.

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 NAD 1983 UTM Zone 17N

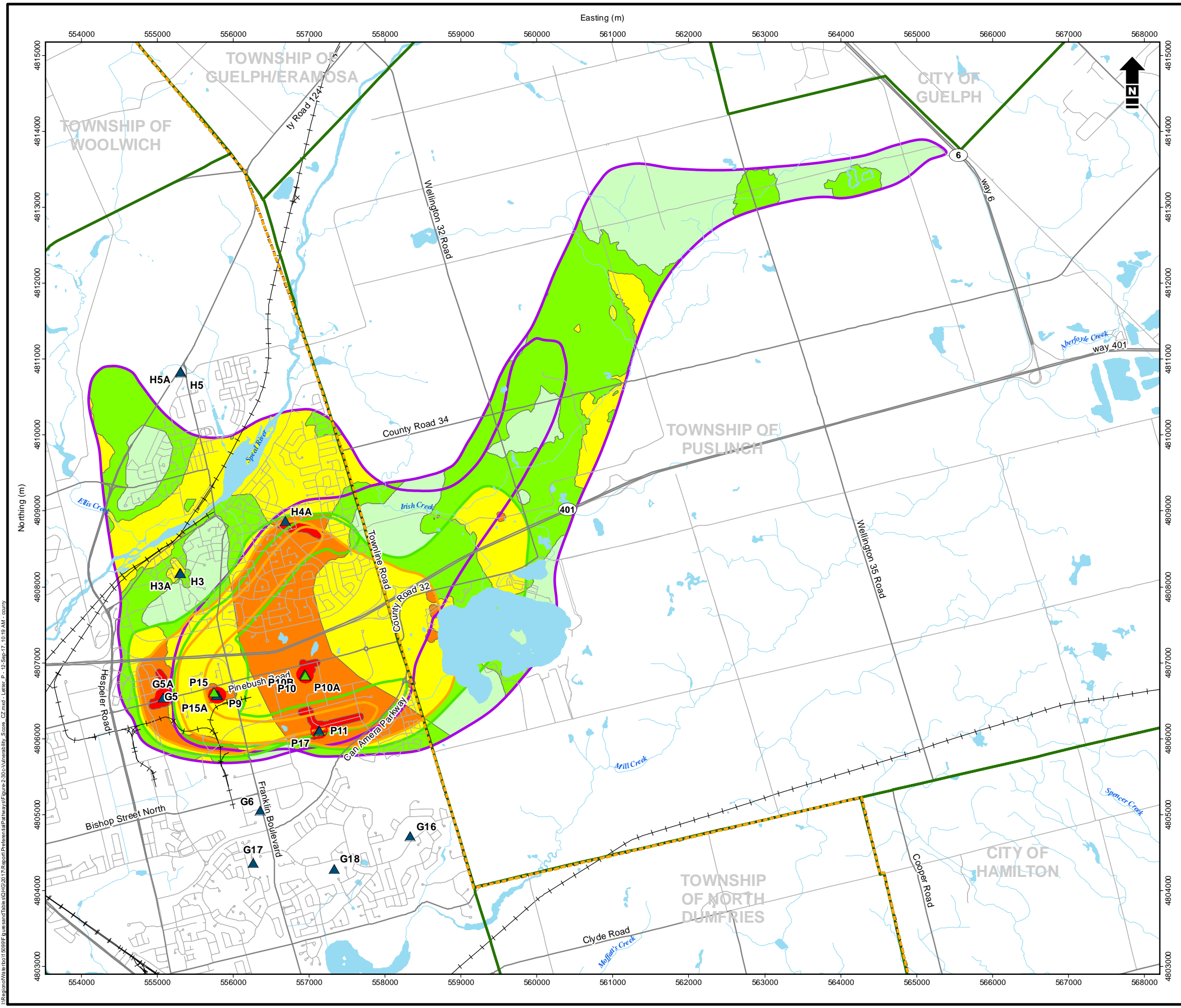


Region of Waterloo
 Vulnerability Assessment for Updated Protection Areas

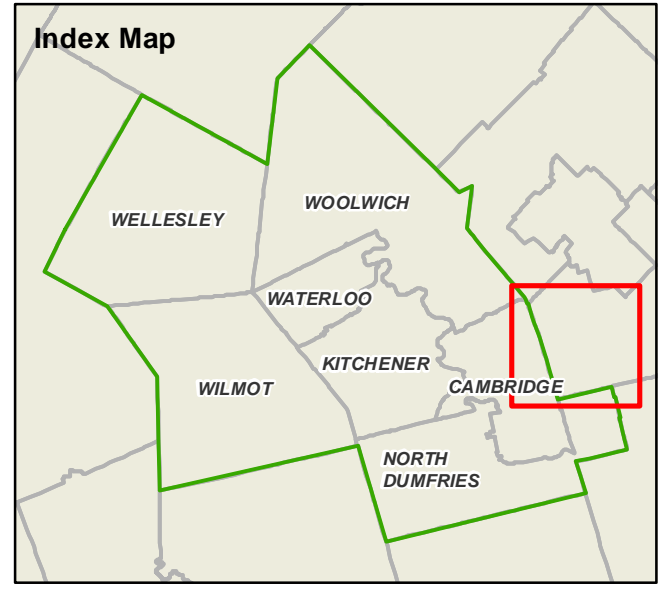
**Clemens Mill Well Field -
 Vulnerability Score**

Date: 12 Sep 2017 Project: 15099 Submitter: D. Martin Reviewer: P. Chin

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- Region of Waterloo Municipal Boundary
- Municipal Boundary
- Water Body
- Watercourse
- Highway
- Road
- Railway
- Production Well
- Production Well (Not included in WHPA delineation study, Matrix 2017a)
- Wellhead Protection Area**
- 100 m Zone of Prohibition (WHPA-A)
- 2-year Capture Zone (WHPA-B)
- 5-year Capture Zone (WHPA-C)
- 25-year Capture Zone (WHPA-D)
- Vulnerability Score for Contact Zone**
- 2 (Low)
- 4
- 6
- 8
- 10 (High)



Reference: Data obtained from GeoBase® used under license.
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 Scale: 1:50,000
 NAD 1983 UTM Zone 17N



Region of Waterloo
 Vulnerability Assessment for Updated Protection Areas

**Pinebush Well Field -
 Vulnerability Score**

Date: 12 Sep 2017 Project: 15099 Submitter: D. Martin Reviewer: P. Chin

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