

Appendix F: Desktop Maritime Archaeological Assessment

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December 11, 2015

ORIGINAL REPORT

Desktop Maritime Archaeological Assessment for the Oakville Water Treatment Plant Expansion, Oakville, Ontario

Submitted to:

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REPORT



Report Number: 1536759

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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.

This desktop maritime archaeological assessment was conducted at the request of exp Services Inc. as part of a Class Environmental Assessment in anticipation of proposed upgrades to the existing infrastructure at the Oakville Water Treatment Plant located at 21 Kerr Street, Oakville, Ontario.

The maritime archaeological study area encompasses a 3 km radius from the existing Oakville Water Treatment Plant facility and includes property along the Lake Ontario shoreline from Lots 8 to 22, Broken Front Concession, Trafalgar Township, City of Oakville, Regional Municipality of Halton. Included in the proposed upgrades is the installation of a new intake pipe which will extend offshore from the existing Oakville Water Treatment Plant into Lake Ontario.

The principal objectives of this investigation were to identify known archaeological sites and resources on and within the vicinity of the study area, to assess the archaeological potential of the project location and to recommend appropriate strategies for additional maritime investigations.

There are four known wreck sites located within the maritime archaeology project study area. Three of these vessels have been registered as protected archaeological sites with the Ontario Ministry of Tourism, Culture and Sport, including *Dawn of the Dead* (AiGw-461), *Rum Runner* (AiGv-14) and *Two Bits* (AiGv-15).

Historical documentation and research also indicates that several vessels are suggested to have wrecked in the Oakville area, many of which have not been located or identified. These include capsized and foundered vessels which were later recovered, in addition to an incident involving a portion of an unidentified vessel washing up along the shoreline.

Based on the identification of registered archaeological sites within the study area, and additional triggers identifying archaeological potential within the project location, it is recommended that all offshore areas to be potentially disturbed or impacted by construction associated with this project be subjected to additional archaeological investigations. These investigations should consist of geophysical surveys encompassing side scan sonar to identify anomalies which may represent historically significant features. If possible, multi-beam sonar and/or marine magnetometer surveys should also be completed, especially if they can be integrated to the overall project requirements.

Also, although the Lake Ontario shoreline landscape within the study area currently consists of recreational, commercial and residential properties, a significant amount of the shoreline has remained primarily undisturbed and has retained archaeological integrity. Therefore, all areas up to a depth of 5 m from shore should be assessed by a shoreline snorkel survey by qualified maritime archaeologists to visually inspect this area for historically significant artifacts and/or features.

This desktop maritime archaeological assessment has formed the basis for the following recommendations:

- 1) All areas to be potentially disturbed or impacted by construction associated with this project should be subjected to additional maritime archaeological investigations. These investigations should consist of geophysical surveys encompassing side scan sonar to identify anomalies which may represent historically



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significant features. If possible, multi-beam sonar and/or marine magnetometer surveys should also be completed, especially if they can be integrated to the overall project requirements;

- 2) That all areas up to a depth of 5 m from shore that will be potentially disturbed or impacted by construction associated with this project should be assessed by a shoreline snorkel survey by qualified maritime archaeologists to visually inspect this area for historically significant artifacts and/or features; and,
- 3) All three registered archaeological sites should be avoided and that no disturbance or construction activities occur with a 50 m buffer of each site location. If any of these three sites cannot be avoided, additional archaeological investigations will be required to mitigate the heritage resources known to be located within the study area. This may include additional underwater documentation and survey activities as well as potential excavation depending on the resource to be impacted.



Project Personnel

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1.0 PROJECT CONTEXT

1.1 Development Context

This desktop maritime archaeological assessment was conducted at the request of exp Services Inc. as part of a Class Environmental Assessment in anticipation of proposed upgrades to the existing infrastructure at the Oakville Water Treatment Plant located at 21 Kerr Street, Oakville, Ontario.

The maritime archaeological study area encompasses a 3 km radius from the existing Oakville Water Treatment Plant facility and includes property along the Lake Ontario shoreline from Lots 8 to 22, Broken Front Concession, Trafalgar Township, City of Oakville, Regional Municipality of Halton. Included in the proposed upgrades is the installation of a new intake pipe which will extend offshore from the existing Oakville Water Treatment Plant into Lake Ontario (Maps 1 and 2, pp.27 and 28).

1.2 Objectives

Background research for the maritime archaeological assessment was completed to identify known archaeological and heritage resources on or within the vicinity of the study area, as well as to assess the archaeological potential of the project location. The objectives of the background research investigation are based on principals outlined in the *Ontario Heritage Act (consolidated 2007)* and general legislative policies governing heritage and archaeological resources including the Ontario Ministry of Tourism, Culture and Sport's *Standards and Guidelines for Consulting Archaeologists* (2011). More specifically, this maritime archaeological assessment was completed with the following objectives:

- To provide information about the study area's geography, history, previous archaeological fieldwork and current conditions;
- To document all previously identified archaeological resources in the study area and general vicinity;
- To evaluate in detail the study area's archaeological potential, which will support recommendations for additional archaeological investigations for all or parts of the area;
- To recommend appropriate strategies for additional maritime archaeological investigations; and,
- To recommend appropriate mitigation or protection strategies for archaeological resources known to be located within the study area, if applicable.



2.0 HISTORIC CONTEXT

2.1 Aboriginal Regional History

The earliest human occupation of southern Ontario occurred during the Paleo-Indian Period (9050–8050 B.C.E.) which is broadly characterized by small populations of hunter gatherers who exploited large areas, often travelling distances in excess of 150 km in an effort to procure raw materials for the production of lithic tools. Archaeologists have given these early inhabitants of Ontario the archaeological moniker “Clovis” (Wright, 1994).

These early populations, identified by characteristic unfluted projectiles along with lanceolate parallel flaked stemmed and non-stemmed Plano points, most likely consisted of small mobile bands of hunter-gatherers relying on caribou, small game, fish and wild plants found in the sub-arctic environment of the time. Although Paleo-Indian sites are relatively rare, there are at least 19 known and documented sites dating to this period in the Halton region (MTCS, 2015).

The succeeding Archaic Period spans from 8050 B.C.E to 950 B.C.E. when modern landscape conditions began to develop. Adaptations to more temperate environments consisted of a transition from jack and red pine forests that characterized the Late Paleo Period, to forests dominated by white pine with some associated deciduous trees and included the introduction of ground stone tools such as adzes and gouges utilized for working wood (Ellis and Deller, 1990).

During the latter part of Middle Archaic, technological innovations such as fish weirs have been documented in addition to the development of stone tools specifically 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, predominately 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).

During the Late Archaic, as the environmental landscape approached modern conditions, the trend towards 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 appears the local population was expanding. It is during the Late Archaic that the first true cemeteries appear (Ellis, Kenyon and Spence, 1990). Prior to this period, individuals were traditionally interred close to the location where they died. Territorial burial grounds developed during the Late Archaic indicating that if an individual died while his or her group happened to be some distance from their traditional cemetery, the bones would be kept until they could be returned to the community and interred in the local burying place. 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 suggestion of increased territoriality is also consistent with the regionalized variation present in Late Archaic projectile point styles when distinct local styles begin to appear. Also during the Late Archaic, 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 in burial contexts (Ellis, Kenyon and Spence, 1990; Ellis, Timmins and Martelle, 2009). 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 artifact assemblage is the “birdstone” (Ellis, Kenyon and Spence, 1990) which are small, bird-like effigies usually manufactured from green banded slate.



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There are 255 Archaic component sites registered in the Regional Municipality of Halton, with many clustered within the lower Bronte Creek drainage basin (MTCS, 2015). This suggests that a significant component of human occupation within Halton during this period centered primarily along potable and navigable waterways.

The Archaic Period was followed by the Woodland Period (950 B.C.E. to 1550 A.D.), which is primarily distinguished by the introduction of refined ceramic technology. While the introduction of ceramics provides a useful demarcation point for archaeologists, it likely had less significance in the lives of the Early Woodland peoples. The first pots were very crudely constructed, thick walled, friable and decorated by rough cord marked impressions. 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 (Spence, Pihl and Murphy, 1990). 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 where no pottery was found, suggesting that these poorly constructed, undecorated vessels had yet to assume a central position in the daily lives of Early Woodland peoples. The trade networks initially established during the Middle and Late Archaic Periods also continued to operate, although there does not appear to have been as significant traffic in marine shell commodities compared to the Early Woodland Period (Spence, Pihl and Murphy, 1990).

It was during the Middle Woodland Period that a shift in settlement and subsistence patterns occurred compared to the Archaic and Early Woodland Periods. While Middle Woodland peoples still relied on hunting and gathering as part of their subsistence strategies, fish were becoming an increasingly important part of the diet (Spence, Pihl and Murphy, 1990), with some Middle Woodland sites producing literally thousands of bones from spring spawning species such as walleye and sucker. Varieties of nuts, including acorns, were also being collected and consumed more regularly (Spence, Pihl and Murphy, 1990). It is also at the beginning of the Middle Woodland Period that substantial, densely occupied sites appear on the valley floor of major river drainage basins. Middle Woodland sites are significantly different in that the same location was seasonally occupied for as long as several hundred years. Because of this phenomenon, vast deposits of artifacts and related occupation features often accumulated. The extensive trade networks that prevailed through the Late Archaic and Early Woodland continue through much of the Middle Woodland Period. Middle Woodland populations continued to utilize local chert sources augmented by Onondaga chert secured from the Niagara Escarpment area.

The Late Woodland Period was marked by a shift in settlement and subsistence patterns involving an increasing reliance on corn horticulture, which may have been introduced into southwestern Ontario from the American Midwest as early as 350 A.D. (Fox, 1990; Williamson, 1990). Although corn cultivation was introduced during this period, it did not, however, become a dietary staple until at least 300 to 400 hundred years later. The first agricultural villages in southern Ontario date to the 10th century A.D. Unlike the riverine base camps of the Middle Woodland Period, Late Woodland sites are predominately located on well-drained sandy soils in the uplands. More detailed investigations of Late Iroquoian sites in south-central Ontario have provided evidence of the coalescence of communities through the Late Woodland Period (Birch, 2012).

There are 107 known Woodland component sites recorded in the Regional Municipality of Halton comprising different eras of the period (MTCS, 2015).



2.2 Post European Contact History

The first Europeans to travel through the area were French explorers and missionaries in the early seventeenth century. At this time there were three main groups of Iroquois-speaking peoples in the area: the Huron, the Petun and the Neutral, with present day Oakville located between the regions of the Historic Neutral and Petun. The native confederacies in the area either collapsed or dispersed by the mid seventeenth century due to a variety of factors including warfare and the spread of European diseases.

The Mississauga people arrived along the north shore of Lake Ontario just after the turn of the eighteenth century. They were primarily hunter-gatherers whose lifestyle depended on seasonal movements for subsistence strategies and exploited environmental resources. The Mississauga were allies and trading partners with both the French, and later the British, as all parties were highly mobile and used the rivers and creeks to conduct their trade and orchestrate their movements across the landscape.

The Halton region of south-central Ontario has a long and complex Euro-Canadian history, with the arrival of permanent Euro-Canadian settlers during the late 18th century. The region is typical of many others in Southern Ontario, with concessions and lots being surveyed for settlement and the granting of Crown patents to individuals who settled on 100 acre or 200 acre plots.

The first land survey in Oakville was undertaken in 1763 and coincided with the first land treaty between the British Crown and the Mississauga inhabitants which officially established the boundaries of a vast native territory. The Mississauga territory would become progressively smaller as sections of the land were ceded to the British by treaties in 1781, 1784, 1805, 1818, and 1820. On August 10th, 1827, the remaining 200 acres of the original “Mississauga Tract”, in addition to 760 acres around the creeks and streams, was sold by the Crown at auction to Colonel William Chisholm (Griffin, 1912).

2.3 General Study Area History

Shortly after his land purchase in 1827, Chisholm began construction of a harbour installation at the mouth of Sixteen Mile Creek, which gained its name due to the distance from York (Malcomson, 2001). This was the same sheltered area the Mississauga’s had formerly utilized for camping and subsistence strategies prior relinquishing the land to the British Crown (Naismith, 2010).

By 1830, the harbour was completed and represented the only port in Upper Canada to be constructed by a private individual (Naismith, 2010; Griffin, 1912). In addition to the harbour installation, Chisholm also initiated a shipbuilding industry along the banks of Sixteen Mile Creek; launching his first steamer, the *Constitution*, in 1833. At 133 feet in length, the *Constitution* was one of the largest steamboats on Lake Ontario and was capable of carrying 51 passengers (Naismith, 2010).

By the following year the *Constitution* was making regular voyages between Oakville and York, with the newly constructed *Oakville*, later renamed the *Hamilton*, providing passage between Hamilton and York (Wright and Wright, 2011; Brown, 2010). These vessels not only provided reliable transport for people traveling throughout the Lake Ontario region, but also enabled goods and products to be conveniently shipped between ports across the Great Lakes contributing to the development of manufacturing industries.

The Oakville harbour soon developed into a significant maritime port accommodating a variety of private and commercial vessels. In an effort to regulate these enterprises, Oakville was declared an official Port of Entry in 1834, with William Chisholm presiding as the first Customs inspector (Naismith, 2010).



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An 1835 plan of Oakville shows the developed wharf and harbour installations around the mouth of Sixteen Mile Creek, as well as the prominent location of the shipyard along the west bank (Map 3, p.29). By 1836, traffic on Lake Ontario had increased significantly and a lighthouse was constructed at Oakville to warn seamen of the dangerous shoal and large boulders extending out from the shore between Oakville and Port Credit (Wright and Wright, 2011).

In 1855, Romain and McDougald built a stone warehouse within the harbour area to accommodate the increased commercial shipping enterprises developing at Oakville. This structure is still standing today and represents the only example of a stone warehouse in its original location (Naismith, 2010). The majority of limestone used for the original warehouse construction was locally extracted from Lake Ontario by vessels known as “stonehookers”.

Stonehooking involved the collection of stone, primarily shale and limestone, by schooners anchoring near the shore while scows with long rakes would wrench the stones from the lake bottom, which would then be loaded onto the schooners. This stone was later offloaded at the local port to be used for construction initiatives primarily within communities along Lake Ontario. Special schooners with square ends, shallow draft and a low gunnel were built in local shipyards specifically designed for stonehooking. Due to the weight of the stones, the vessels’ sides had to be lower and the holds shallower compared to typical vessels built during this period. At the height of this industry, forty-three thousand tons of stone was delivered to the docks of Toronto (Brown, 2010).

To accommodate the increasing maritime interests, a customs house was constructed in Oakville harbour in 1856. This building was later incorporated into the historic Erchless Estate, now home to the Oakville museum on the east side of Sixteen Mile Creek (Naismith, 2010). By 1857, the Oakville harbour was capable of accommodating vessels up to 200 tons which could run up to the storehouses to load and unload cargo (Hodder, 1857).

Based on the growing settlement and increased industrial and economic enterprises, Oakville was recognized as an official town in 1857 by an Act of Parliament (Griffin, 1912) signalling it as an important center similar to Hamilton and Toronto. Tremaine’s 1858 map of Halton County shows the expanding harbour facilities on property owned by George K. Chisholm with two vessels just south of the port representing the maritime activities prominent in the area (Map 4, p.30). The vessels used for local fishing and small commercial activities in this area were light but strong, clinker built and schooner rigged. Vessel types included those known as Collingwood skiffs, which were sharp sterned and double ended, Huron boats which were identified by their overhangs and Mackinaw vessels identified by their square sterns.

The Oakville harbour facilities continued to expand, with five large warehouses accommodating the grain and other produce shipped through the port. Another significant industry was the oak-stave trade which had been initiated by Colonel Chisholm in the early nineteenth century and may have influenced the origin of the town’s name (Griffin, 1912).

Another prominent shipbuilder along the banks of Sixteen Mile Creek was Captain James Andrew. Originally born and trained in Scotland, by 1861 Andrew had become recognized as one of Oakville’s finest shipbuilders (Griffin, 1912). The shipyard identified along the harbour’s east bank on the 1861 plan of Oakville may represent Captain Andrew’s facility (Map 5, p.31).



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A 1877 map of Trafalgar Township illustrates the area associated with the expanding harbour and maritime activities (Map 6, p.32). Beyond the harbour area, the majority of shoreline properties fronting the study area were privately owned and represented some of the earliest lots occupied in the Oakville area.

During a fierce storm on April 8, 1886, the harbour's east pier was swept away and the lighthouse originally built in 1836 was lost into Lake Ontario. Following funding approval, a new lighthouse was constructed in the spring of 1889 at a cost of \$960 (Wright and Wright, 2011).

Although the railway provided an alternative mode of transportation, the Hamilton Steamboat Company continued to call at Oakville for regular passenger service (Wright and Wright, 2011) and the steamer *Greyhound* was still making passages between Oakville and Toronto in 1897 (Commins, 1897) (Image 1, p.20). Eventually though, the railway became the preferred method of travel and the steamer service into Oakville ended in 1904 (Brown, 2010).

Oakville's shipbuilder's adapted to the evolving maritime conditions with most of the larger commercial vessel construction diminishing by the beginning of the twentieth century, with yachts, tugs and small steamers being built in their place (Griffin, 1912; Commins, 1897). Contemporary photographs show a variety of vessels being constructed along the banks of Sixteen Mile Creek likely for private buyers rather than commercial enterprises (Images 2 and 3, pp.20 and 21). The end of the maritime commercial era is considered to have occurred in the 1930s with the last load of coal unloaded at Hillmer's coal yard on the east bank of Sixteen Mile Creek from the *Coalhaven*, a laker operated by the Canada Steamship Line (Naismith, 2010) (Image 4, p.21). By the 1920s, stonehookers were no longer operating Lake Ontario as concrete became the construction material of choice, and the area's commercial fishing industry had effectively subsided by the 1950s (Brown, 2010).

Photographs from the 1950s show the shoreline and substrate materials within the study area similar to current conditions (Images 5 and 6, p.22). Today, Shipyard Park located on the west bank of Sixteen Mile Creek within the harbour contains the 1889 lighthouse and a relocated log cabin to remind visitors of Oakville's prominent maritime history. Of all the 19th century ports along Lake Ontario's west coast, the Oakville harbour area remains historically the most intact (Brown, 2010).



3.0 ARCHAEOLOGICAL CONTEXT

3.1 Study Area Environment

The project location lies within the Iroquois Plain Physiographic region (Chapman and Putnam, 1966). This area comprises a strip of low land along the shore of Lake Ontario which would have at one time represented the lakebed of a Late Pleistocene body of water known as Lake Iroquois. This prehistoric lake created barrier beaches of sand and gravel across drainage creeks like Bronte Creek and Sixteen Mile Creek.

Around approximately 11,500 years BP, following the demise of glacial Lake Iroquois, water levels in the western part of the Lake Ontario basin fell to 100 – 120 m below the present lake system as water drained through isostatically depressed outlets in the St. Lawrence River area (Sly and Prior, 1984). This extreme low exposed roughly 10,000 km² of former land, mainly along its northern shore, which provided additional lands and resources for Aboriginal populations to utilize (Jackson *et al*, 2000).

Over the past 3 300 years, water levels within Lake Ontario have risen on average 0.25 cm per year, intertwined with periods of rapid rise (3,000 – 3,200 BP, 1,500 – 2,100 BP, 950 – 1,200 BP and 400 BP to present) equilibrium (2,100 – 3,000 BP), or water level fall (400 – 950 BP) (Flint *et al*, 1987). Around 1,000 years ago water levels within Lake Ontario began to approach modern capacity (Sly and Prior, 1984).

The present-day Lake Ontario shoreline within the study area consists of a distinct bluff cut in red Queenston Shale between Burlington and Toronto (Chapman and Putnam, 1966). This region consists of a slightly sloping plain covered with stratified sands of varying depth on the red shale bedrock.

The lake bed within the project location consists of a thin layer of sediment over bedrock, with exposed bedrock in many areas. Geotechnical borehole data collected just south of the study area indicated areas of exposed and shallow bedrock, with areas of sediment depth ranging between 0 and 50 cm (Golder, 2011). Bathymetry surveys indicate water depths within the study area gradually increase from the shoreline to the southern limits of the study area 3 km from shore, reaching a maximum depth of 35 m (Map 7, p.33).

3.2 Previous Archaeological Investigations

Only one maritime archaeological assessment is known to have been completed within the vicinity of the project location. This project, completed by Golder in 2010, was located just south of the study area and was completed for a proposed effluent sewer and outfall for the Regional Municipality of Halton's (Region) Wastewater Treatment Plant. The archaeological investigation consisted of background research and in-water geophysical and archaeological investigations to locate and document known and/or potential archaeological resources within the study area. Following the in-water assessments, the corresponding report recommended the proposed areas of impact to be clear of archaeological and heritage resources, which was accepted by the Ontario Ministry of Tourism, Culture and Sport (Golder, 2011).

Several terrestrial archaeological investigations have been completed within the vicinity of the Lake Ontario shoreline in the area of the project location and are detailed in Table 1 below.



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Table 1: Terrestrial Archaeological Assessments in Vicinity of Study Area

Consultant	Year	Project Name	Stage	Concession	Lot(s)	PIF Number
Archaeological Services Inc.	2014	Stage 1 Archaeological Assessment (Background Study) Proposed Navy Street and Water Street WWPS Municipal Class Environmental Assessment Study, Former Township of Trafalgar, Halton County, Town of Oakville, Regional Municipality of Halton, Ontario	1	3 and B.F.	14, 15 (Con. 3) & 14, 15 (B.F.)	P392-0048-2014
Historic Horizon Inc.	2014	Erchless Estate (Oakville Museum) (AiGw-401) Garden Wall Restoration Project	3	B.F.	14	P322-026-2013
Christopher Michael Brown	2012	The Stage 1-2 Archaeological Assessment of 1215 & 1221 Lakeshore Road West, Part of Lot 22, Concession 4 S.D.S., Town of Oakville, Halton Region	1 & 2	4	22	P361-003-2012
Detritus Consulting	2009	Archaeological Assessment (Stages 1, 2 and 3) 394 Lakeshore Road West, Part of Lots 18 and 19, Concession 4 (Trafalgar) South of Dundas Street, in the Town of Oakville, in the Regional Municipality of Halton	1, 2 & 3	4	18 & 19	P017-162-2009 & P017-163-2009
Detritus Consulting	2007	Archaeological Assessment (Stage 1, 2 and 3) 456 Lakeshore Road West (Part of Lot 17 Broken Front Concession), City of Oakville, Regional Municipality of Halton	1, 2 & 3	B.F.	17	P017-124-2007 & P017-124-2007-STG3
Triggs Consulting	2006	Stage 2 Archaeological Assessment of Oakville Museum at Erchless Estate, AiGw-401, 8 Navy Street, Oakville, Ontario	2	B.F.	14	P048-028-2006
Triggs Consulting	2006	Stage 1 Archaeological Assessment of Oakville Museum at Erchless Estate, AiGw-401, 8 Navy Street, Oakville, Ontario	1	B.F.	14	P048-028-2006

Unfortunately not all reports are available for consultation and therefore a record of finds and recommendations for many of these assessments were available to be included in this report.



3.3 Known Archaeological Sites and Potential Heritage Resources

Research was conducted on known and potential archaeological and heritage resources within the vicinity of the study area. In addition to the Ontario Ministry of Tourism, Culture and Sport's sites database (OASD), resources consulted included archival and library documents stored at the Great Lakes Marine Museum in Kingston, Ontario, published books and online research sources which included old newspaper transcriptions and archival documents.

There are four known wreck sites located within the maritime archaeology project study area (Map 8, p.34). Three of these vessels have been registered as protected archaeological sites with the Ontario Ministry of Tourism, Culture and Sport, including *Dawn of the Dead* (AiGw-461), *Rum Runner* (AiGv-14) and *Two Bits* (AiGv-15).

Historical documentation and research also indicates that several vessels are suggested to have wrecked in the Oakville area, many of which have not been located or identified. These include capsized and foundered vessels which were later recovered, in addition to an incident involving a portion of an unidentified vessel washing up along the shoreline.

The known and potential archaeological sites near and within the study area determined from historical research have been summarized in Table 2 below.

Table 2: Known and Potential Archaeological Resources near and within the Study Area

Name	Site Type	Date of Event	Approximate Coordinates (if known) (NAD83 UTM Zone 17)	Source	Details
<i>Dawn of the Dead</i>	Wreck	Unknown	607853 E 4808770 N Located in study area	Ontario Underwater Council, 2015	<ul style="list-style-type: none">Used in the making of the movie Dawn of the Dead20th century power boatRegistered archaeological site AiGv-461
<i>Rum Runner</i>	Wreck	Unknown	608271 E 4808360 N Located in study area	Ontario Underwater Council, 2015	<ul style="list-style-type: none">20th century power boatIn 75 ft of water30 ft lengthRegistered archaeological site AiGv-14
<i>SA Queen</i>	Wreck	April, 2007	607986 E 4808165 N Located in study area	Ontario Underwater Council, 2015	<ul style="list-style-type: none">Constructed 1895Sank while undertowIn 75 ft of water56 ft length



DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION

Name	Site Type	Date of Event	Approximate Coordinates (if known) (NAD83 UTM Zone 17)	Source	Details
<i>Two Bits</i>	Wreck	Unknown	608313 E 4808360 N Located in study area	Ontario Underwater Council, 2015; Transport Canada, 2015	<ul style="list-style-type: none"> Built 1944 Wooden single-screw pleasure craft 10.82 m length, 3.96 m breadth, 1.46 m depth Used as a dive charter boat Registered archaeological site AiGv-15
P.W.D. 114	Wreck	Oct. 28, 1919	Unknown, 11 miles off Hamilton, near Oakville, ON	Swayze, 2009	<ul style="list-style-type: none"> Constructed 1914 Wooden barge
<i>Highland Beauty</i>	Debris field	Oct. 6, 1888	Oakville Harbour	Northern Shipwreck Database, 2002	<ul style="list-style-type: none"> Stranded, partial loss Built 1876 Two-masted schooner 80 ft length 15.9 ft breadth 6.6 ft draft 57.9 registered tons
Unknown	Wreck	Apx. April 23, 1880	Unknown, near Oakville, ON	British Whig, 1880	<ul style="list-style-type: none"> Debris from the cabin of an unknown wreck washed ashore, it was white with a green blind. The body of a young man was attached to the debris
<i>Pinta</i>	Debris field	Nov. 20 th , 1879	Unknown, approx. 1 mile off Oakville, ON	Swayze, 2009; Port Huron Daily Times, 1879	<ul style="list-style-type: none"> Vessel was recovered Foundering occurred in 30 ft of water
<i>Flora Baines</i>	Wreck	Sept. 13, 1879	Unknown, off Oakville, ON	Swayze, 2009	<ul style="list-style-type: none"> Propeller driven steam tug Constructed 1874 31 ft length, 8 ft beam
<i>Sphynx</i>	Spars only	Sept. 14, 1873	Unknown, near Oakville, ON	Daily News, 1873	<ul style="list-style-type: none"> The crew cut the spars out to right the vessel The vessel was recovered
<i>Swift</i>	Debris Field	Aug. 5, 1859	Unknown, near Oakville, ON	Weekly Chronicle & News, 1859	<ul style="list-style-type: none"> The <i>Swift</i> capsized and was later recovered 52 ft in length
<i>Belvidere</i>	Wreck	Dec. 14, 1856	Unknown, bound for Oakville, ON	Toronto Globe, 1856; Daily Republic, 1856	<ul style="list-style-type: none"> Constructed in 1847 Sank during a gale Entire crew died 25 ton vessel



The only known terrestrial registered archaeological site with a maritime component near the study area is the Erchless Estate (AiGw-401) which is located at 8 Navy St., Oakville Ontario. The property includes the former location of the harbour customs building constructed in 1856 (Historic Horizons, 2014; Naismith, 2010).

The general lack of registered archaeological sites is likely a result of early urbanization development prior to the requirements of archaeological assessments for construction and development activities. Also, no studies are known to have been completed along the Lake Ontario shoreline within the study area as much of this area has not been developed or significantly altered.

3.4 General Study Area Inspection

A general study area inspection was completed by Golder Associates archaeologist Kendra Patton on August 5, 2015, as part of the terrestrial Stage 1 archaeological assessment. The weather during the property inspection was sunny and warm. Lighting conditions were excellent, and at no time were field conditions found to be detrimental to the identification of archaeological resources or landscapes. The property inspection was conducted on foot, with existing conditions photographed. Map 9 provides locations and direction of each image used in this report and a photographic catalogue is provided as Appendix A.

This general property overview was concentrated on the area and shoreline around the Oakville Water Treatment Plant, located at 21 Kerr Street, and did not encompass the entire maritime Stage 1 study area. Permission for Golder staff to enter the property for the purposes of the property survey was provided by Jean-Louis Gaudet (exp Services Inc.) in consultation with Laura Kalika (Oakville Water Treatment Plant).

The existing shoreline conditions consist of a natural stone substrate (Image 7, p.23) extending approximately 2-3 meters from the existing water line (Image 8, p.23). Evidence of displaced concrete blocks along the shoreline (Image 9, p.24) and the remains of a concrete structure approximately 4-5 meters offshore (Image 10, p.24) suggest evidence of historic land use. The current aquatic conditions consist of similar substrate identified along the shoreline with minimal sediment accumulation (Image 11, p.25).

The existing shoreline conditions suggest that the landscape has not been significantly impacted by previous disturbance or construction activities and has retained archaeological integrity. The minimal accumulation of sediment and existing substrate composition suggest archaeological resources could be identified within the offshore area of the Oakville Water Treatment Plant.

3.5 Archaeological Potential

A number of factors are employed when determining archaeological potential within a particular area. In addition to the proximity to known archaeological sites, factors for determining Aboriginal and historical potential for archaeological resources within a maritime context include known and expected historic occupation or land use within proximity to the study area including wharfs, piers or dock installations, proximity of the area to known historic transportation corridors, distinctive land formations (e.g. caverns, waterfalls, peninsulas, etc.), biological features, such as the distribution of food and animal resources in the area, environmental and historically significant landscapes and proximity to properties designated and/or listed under the *Ontario Heritage Act*. Additionally, local knowledge from First Nations communities and heritage organizations, as well as consultation of available historical and archaeological literature and cartographic resources, aids in the identification of features and landscapes possessing archaeological potential.



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Components of previously undocumented sites dating to the Paleo-Indian and Archaic Periods that were formerly located along prehistoric shorelines may now be inundated due to the gradual rise in water levels over the past 4,000 years. Estimates suggest that during the Paleo-Indian Period a significant amount of land was exposed which today is under Lake Ontario and as many as 1,000 small sites may be present in the areas now inundated by Lake Ontario (Jackson *et al*, 2000). This is also likely true for occupation dating to the Archaic Period within the study area landscape as water levels within Lake Ontario didn't begin to reach modern levels until about 1,000 years ago (Sly and Prior, 1984).

There is also significant evidence suggesting First Nations people occupied land around the study area during the Woodland and Transitional Periods, likely utilizing the Lake Ontario shoreline for hunting and fishing and utilizing Sixteen Mile Creek and Lake Ontario as transportation routes to facilitate movement across these navigable waterways. Traces of this previous land use may be reflected in the archaeological record by shoreline occupation encampments, evidence of subsistence strategies through fish weirs and other hunting activities, as well as the potential to identify remains of First Nations vessels utilized for waterborne travel.

Archaeological potential for historically significant Euro-Canadian archaeological resources also exists within the area. In addition to the three registered archaeological sites comprising the sunken vessels *Dawn of the Dead* (AiGw-461), *Rum Runner* (AiGv-14) and *Two Bits* (AiGv-15) within the study area, previous activities such as the shipbuilding industry, commercial and private maritime ventures including stonehooking, early harbour facilities including the east pier lighthouse known to have been lost into Lake Ontario all represent attributes triggering archaeological potential within the study area. Additionally, the known and suspected wrecked vessels and associated debris fields whose locations have not been identified or confirmed also represent potential archaeological resources within the project boundaries.



4.0 ANALYSIS AND CONCLUSIONS

On behalf of exp Services Inc., Golder Associates completed a desktop maritime archaeological assessment as part of a Class Environmental Assessment in anticipation of proposed upgrades to the existing infrastructure at the Oakville Water Treatment Plant located at 21 Kerr Street, Oakville.

The maritime archaeological study area encompassed a 3 km radius from the existing Oakville Water Treatment Plant facility and includes property along the Lake Ontario shoreline from Lots 8 to 22, Broken Front Concession, Trafalgar Township, City of Oakville, Regional Municipality of Halton. Included in the proposed upgrades is the installation of a new intake pipe which will extend offshore from the existing Oakville Water Treatment Plant into Lake Ontario.

The principal objectives of this investigation were to identify known archaeological sites and resources on and within the vicinity of the study area, to assess the archaeological potential of the project location and to recommend appropriate strategies for additional maritime investigations.

This desktop analysis has identified four known vessels submerged within the study area, three of which have been registered as protected archaeological sites with the Ontario Ministry of Tourism, Culture and Sport. Based on these sites and additional triggers identifying archaeological potential within the project location, it is recommended that all offshore areas to be potentially disturbed or impacted by construction associated with this project be subjected to additional archaeological investigations (Map 10, p.36). These investigations should consist of geophysical surveys encompassing side scan sonar to identify anomalies which may represent historically significant features. If possible, multi-beam sonar and/or marine magnetometer surveys should also be completed, especially if they can be integrated to the overall project requirements.

Also, although the Lake Ontario shoreline landscape within the study area currently consists of recreational, commercial and residential properties, a significant amount of the shoreline has remained primarily undisturbed and has retained archaeological integrity. Therefore, all areas up to a depth of 5 m from shore should be assessed by a shoreline snorkel survey by qualified maritime archaeologists to visually inspect this area for historically significant artifacts and/or features.



5.0 RECOMMENDATIONS

This desktop maritime archaeological assessment has formed the basis for the following recommendations:

- 1) All areas to be potentially disturbed or impacted by construction associated with this project should be subjected to additional maritime archaeological investigations. These investigations should consist of geophysical surveys encompassing side scan sonar to identify anomalies which may represent historically significant features. If possible, multi-beam sonar and/or marine magnetometer surveys should also be completed, especially if they can be integrated to the overall project requirements;
- 2) That all areas up to a depth of 5 m from shore that will be potentially disturbed or impacted by construction associated with this project should be assessed by a shoreline snorkel survey by qualified maritime archaeologists to visually inspect this area for historically significant artifacts and/or features; and,
- 3) All three registered archaeological sites should be avoided and that no disturbance or construction activities occur with a 50 m buffer of each site location. If any of these three sites cannot be avoided, additional archaeological investigations will be required to mitigate the heritage resources known to be located within the study area. This may include additional underwater documentation and survey activities as well as potential excavation depending on the resource to be impacted.



6.0 ADVICE ON COMPLIANCE WITH PROVINCIAL 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. 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 Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject 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*. Archaeological sites recommended for further archaeological fieldwork or protection remains 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.

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. It is recommended that the Registrar of Cemeteries at the Ontario Ministry of Consumer Services is also immediately notified.



7.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder Associates Ltd. (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 exp Services Inc. (the 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 all 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 the 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 comply with those identified in the Ministry of Tourism and Culture's Standards and Guidelines for Consultant Archaeologists (2011).



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9.0 IMAGES



Image 1: Representative photograph of the side-paddle steamship *Greyhound* which regularly made voyages between Oakville and Toronto (Adopted from Commins, 1897).



Image 2: 1917 photograph of Oakville harbour on Sixteen Mile Creek showing yacht being built on shore, looking west (Library and Archives Canada).



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Image 3: 1917 photograph of Oakville harbour on Sixteen Mile Creek showing vessels under construction in shipyard, looking west (Library and Archives Canada).

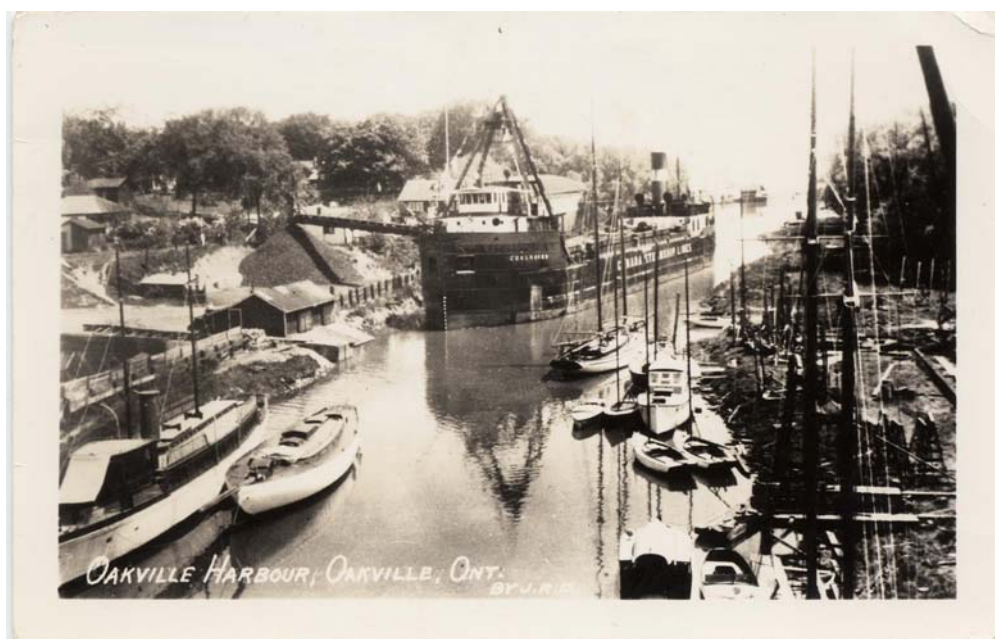


Image 4: *Coalhaven* unloading coal on the east bank of Oakville harbour, looking south (Adopted from Maritime History of the Great Lakes website).



Image 5: Lake Ontario shoreline from 176 Front Street, Oakville, looking west (Adopted from Trafalgar Township Historical Society Digital Collections).



Image 6: Lake Ontario shoreline from 176 Front Street, Oakville, looking east (Adopted from Trafalgar Township Historical Society Digital Collections).

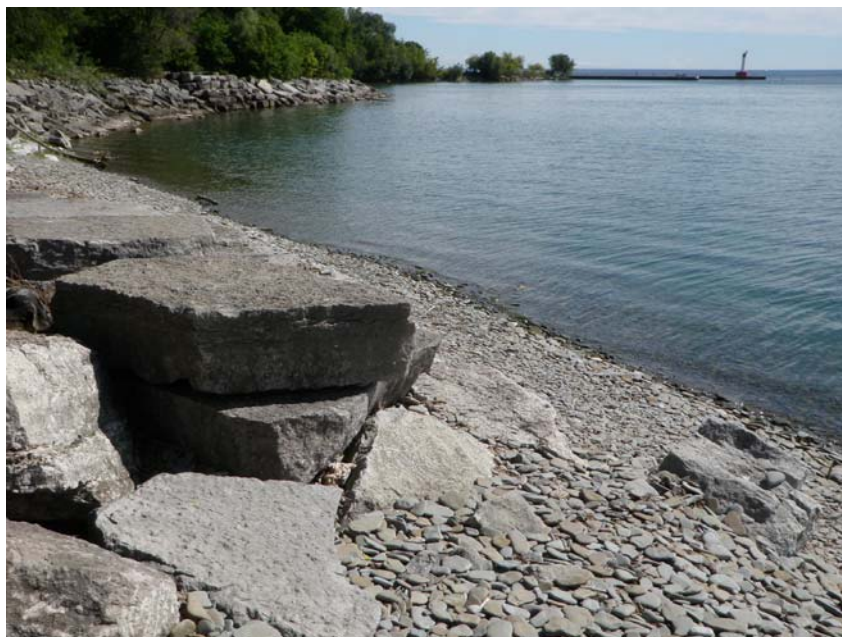


Image 7: Existing shoreline conditions from Oakville Water Treatment facility, looking east.



Image 8: Existing shoreline conditions from Oakville Water Treatment facility, looking east.



Image 9: Existing shoreline conditions from Oakville Water Treatment facility with evidence of displaced concrete block along waterline, looking west.



Image 10: Evidence of concrete structure offshore from Oakville Water Treatment facility, looking south.



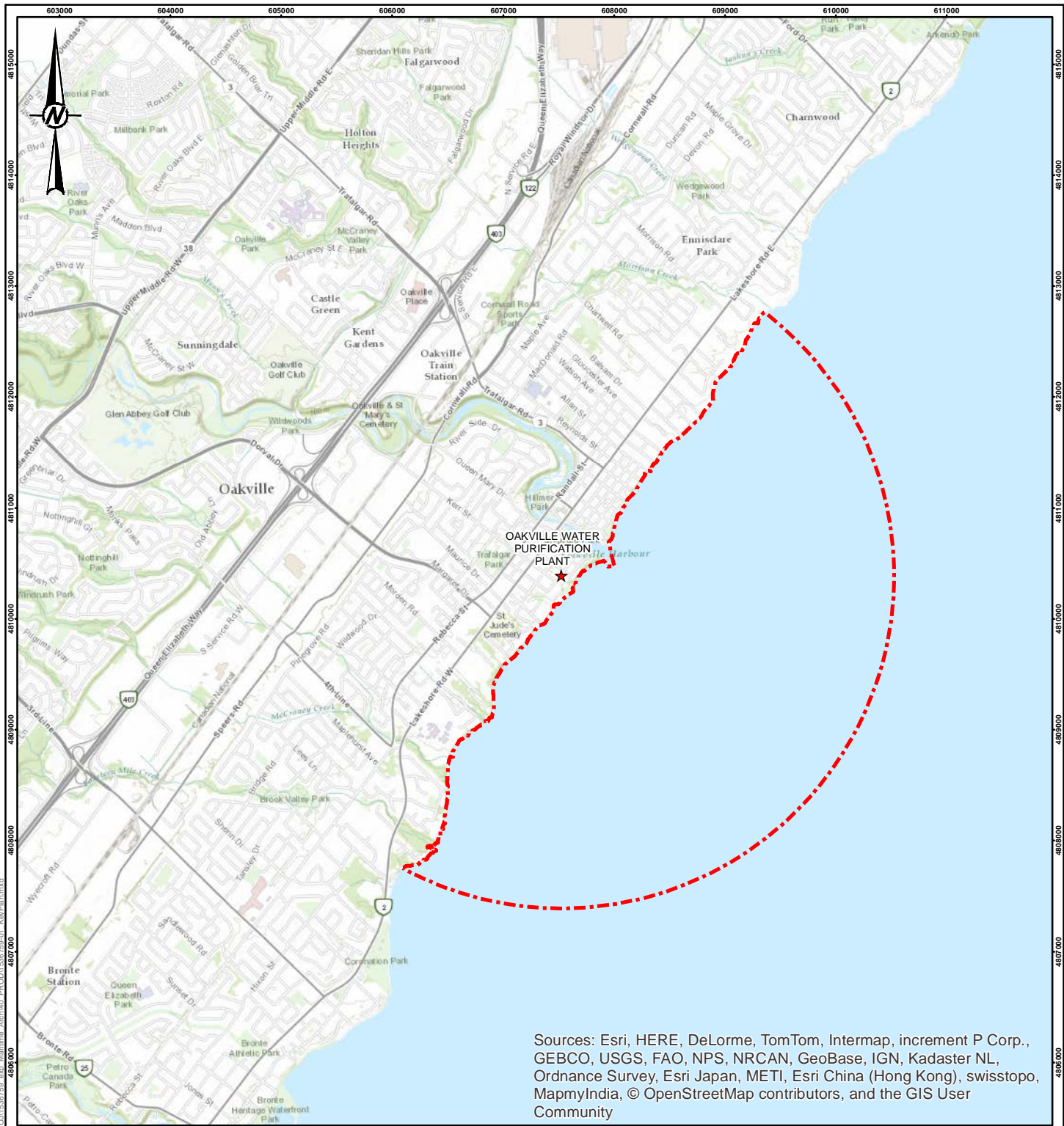
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Image 11: Current aquatic conditions consisting primarily of stone with minimal sediment accumulation offshore from Oakville Water Treatment facility, looking south.



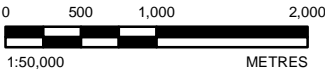
10.0 MAPS



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LEGEND

- ★ OAKVILLE WATER PURIFICATION PLANT
- STUDY AREA



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CLIENT
exp SERVICES INC.

PROJECT
**DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR
THE OAKVILLE WATER TREATMENT PLANT EXPANSION,
OAKVILLE, ONTARIO**

TITLE
KEY PLAN

CONSULTANT



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PREPARED BR

REVIEWED AM

APPROVED CP

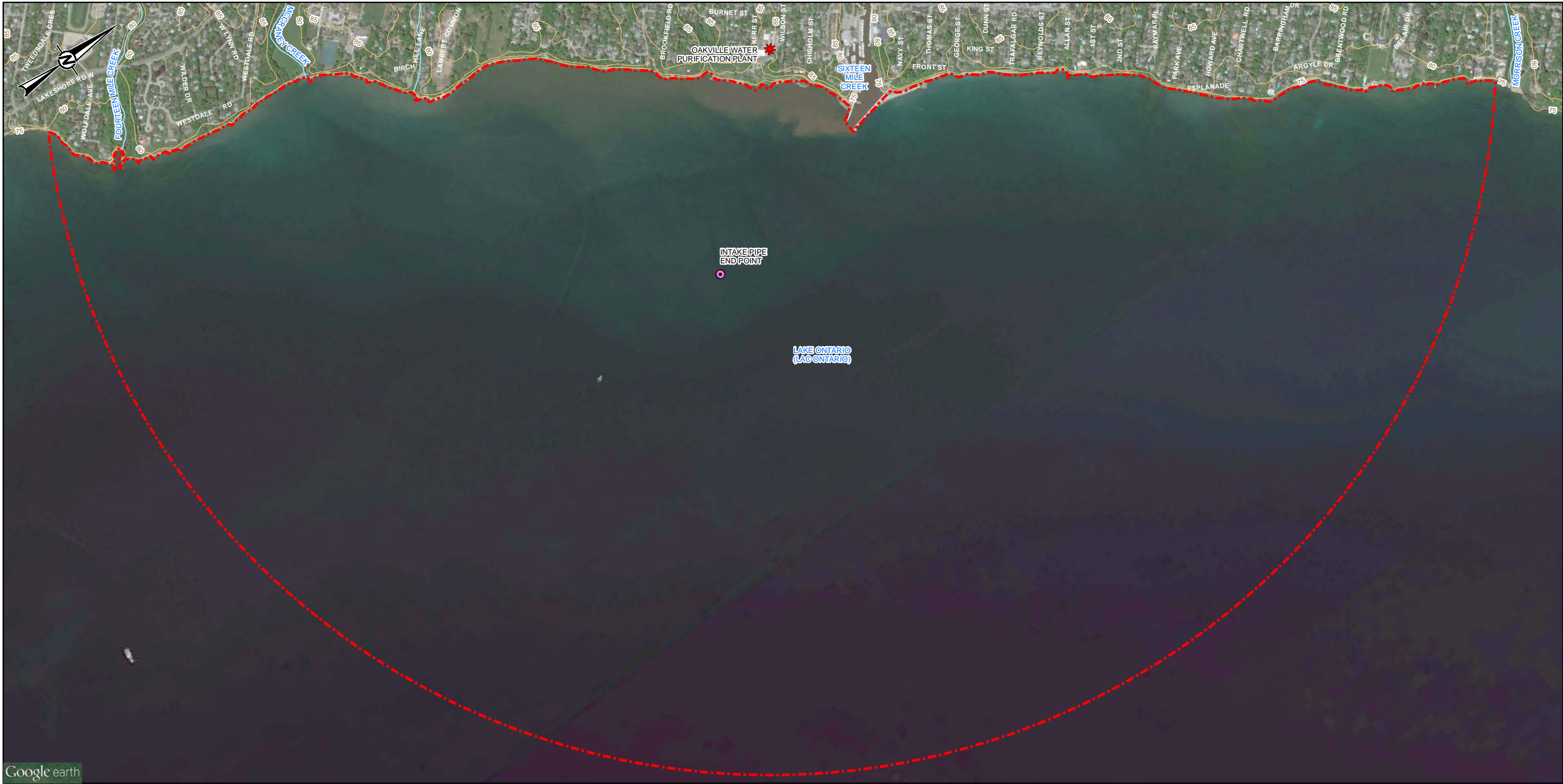
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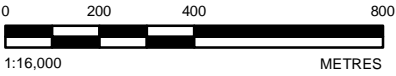
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 - INTAKE PIPE END POINT
 - STUDY AREA
 - TOPOGRAPHIC CONTOUR, metres
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LEGEND

 OAKVILLE WATER PURIFICATION PLANT

 STUDY AREA



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PROJECT
DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO

TITLE
1835 PLAN OF OAKVILLE


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LEGEND

 OAKVILLE WATER PURIFICATION PLANT

 STUDY AREA

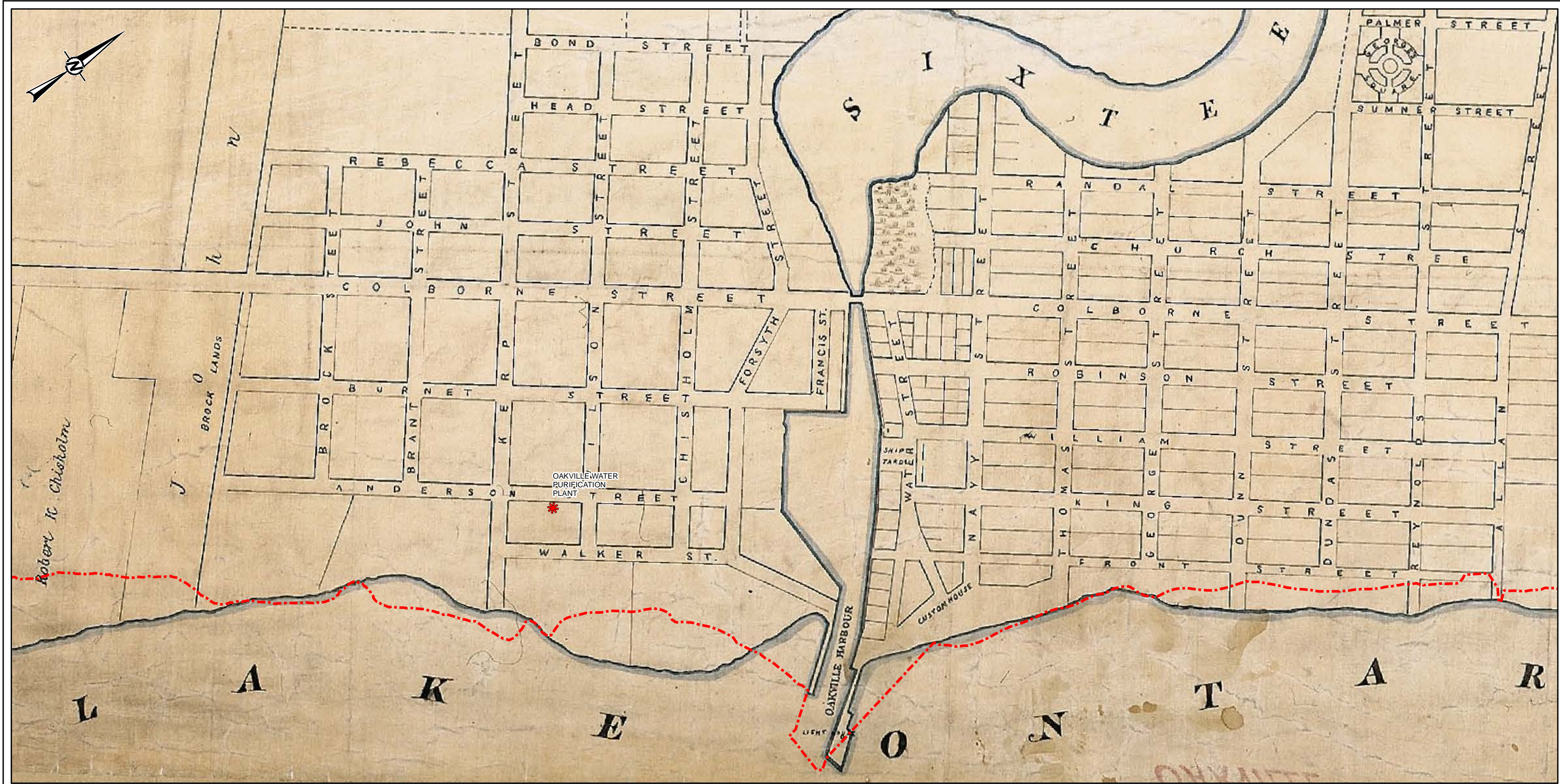


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		REVIEWED	AM
		APPROVED	CP
PROJECT NO. 1536759	PHASE 1000	REV. 0	MAP 4





LEGEND

OAKVILLE WATER PURIFICATION PLANT

STUDY AREA

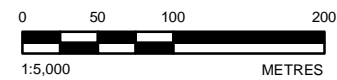


NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1536759.

REFERENCE(S)

1. 1861 PLAN OF OAKVILLE.
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, TOMTOM, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28



CLIENT
EXP SERVICES INC.

PROJECT
DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO

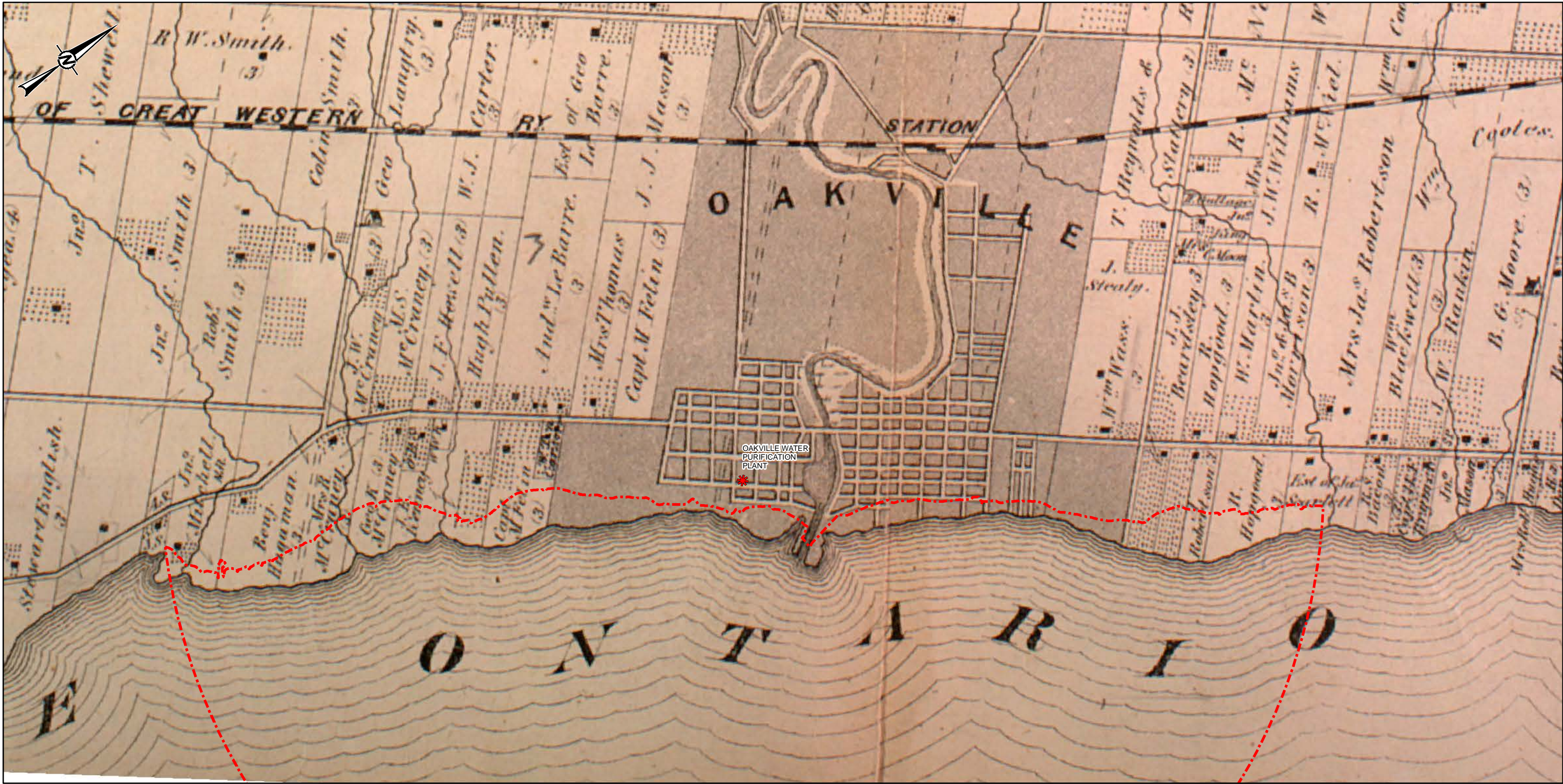
TITLE
1861 PLAN OF OAKVILLE

CONSULTANT	YYYY-MM-DD	2015-12-11
DESIGNED	---	
PREPARED	BR	
REVIEWED	AM	
APPROVED	CP	


PROJECT NO. 1536759 PHASE 1000 REV. 0 MAP 5


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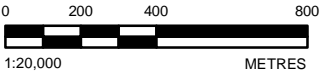
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm



LEGEND

 OAKVILLE WATER PURIFICATION PLANT

 STUDY AREA



NOTE(S)

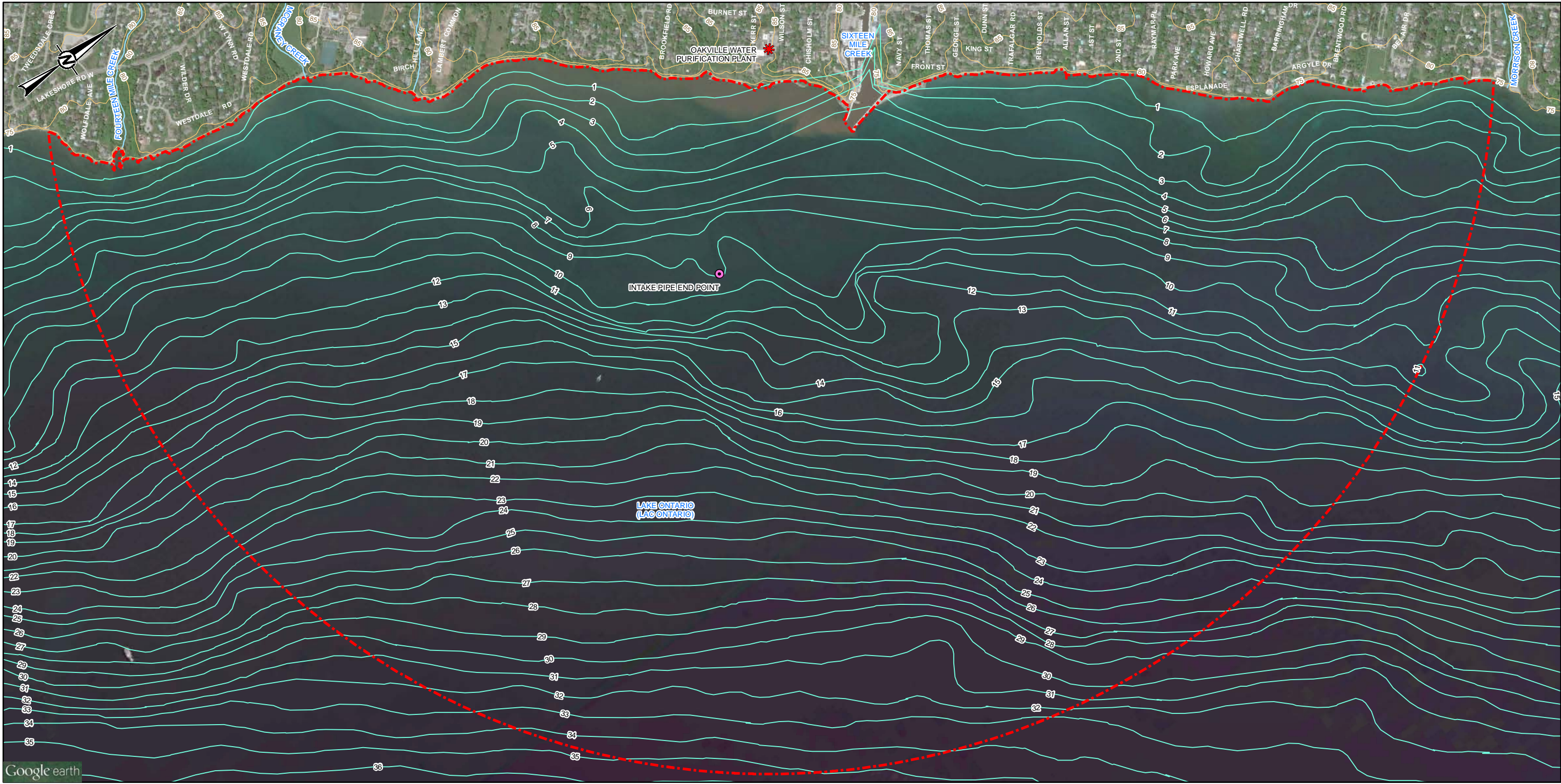
1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDBER ASSOCIATES LTD. REPORT NO. 1536759.

REFERENCE(S)

1. 1877 MAP OF TRAFALGAR TOWNSHIP.
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, TOMTOM, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

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EXP SERVICES INC.		
PROJECT		
DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO		
TITLE		
1877 MAP OF TRAFALGAR TOWNSHIP		
CONSULTANT		
YYYY-MM-DD	2015-12-11	
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APPROVED	CP	
PROJECT NO.	PHASE	REV.
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- LEGEND**
- OAKVILLE WATER PURIFICATION PLANT
 - INTAKE PIPE END POINT
 - STUDY AREA
 - TOPOGRAPHIC CONTOUR, metres
 - WATERCOURSE
 - BATHYMETRIC CONTOUR



NOTE(S)
1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1536759.

REFERENCE(S)
1. NATIONAL GEOPHYSICAL DATA CENTER, 1999. BATHYMETRY OF LAKE ONTARIO. NATIONAL GEOPHYSICAL DATA CENTER, NOAA. DOI:10.7289/V56H4FBH (ACCESS DATE: 11 AUG. 2015), [HTTP://WWW.NGDC.NOAA.GOV/MGG/GREATLAKES/ONTARIO.HTML](http://www.ngdc.noaa.gov/mgg/greatlakes/ontario.html)
2. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
3. GOOGLE EARTH PRO, © 2015 DIGITAL GLOBE, IMAGE DATE: 2015-06-01.
4. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, TOMTOM, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEBCO, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
5. PROJECTION: TRANSVERSE MERCATOR. DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

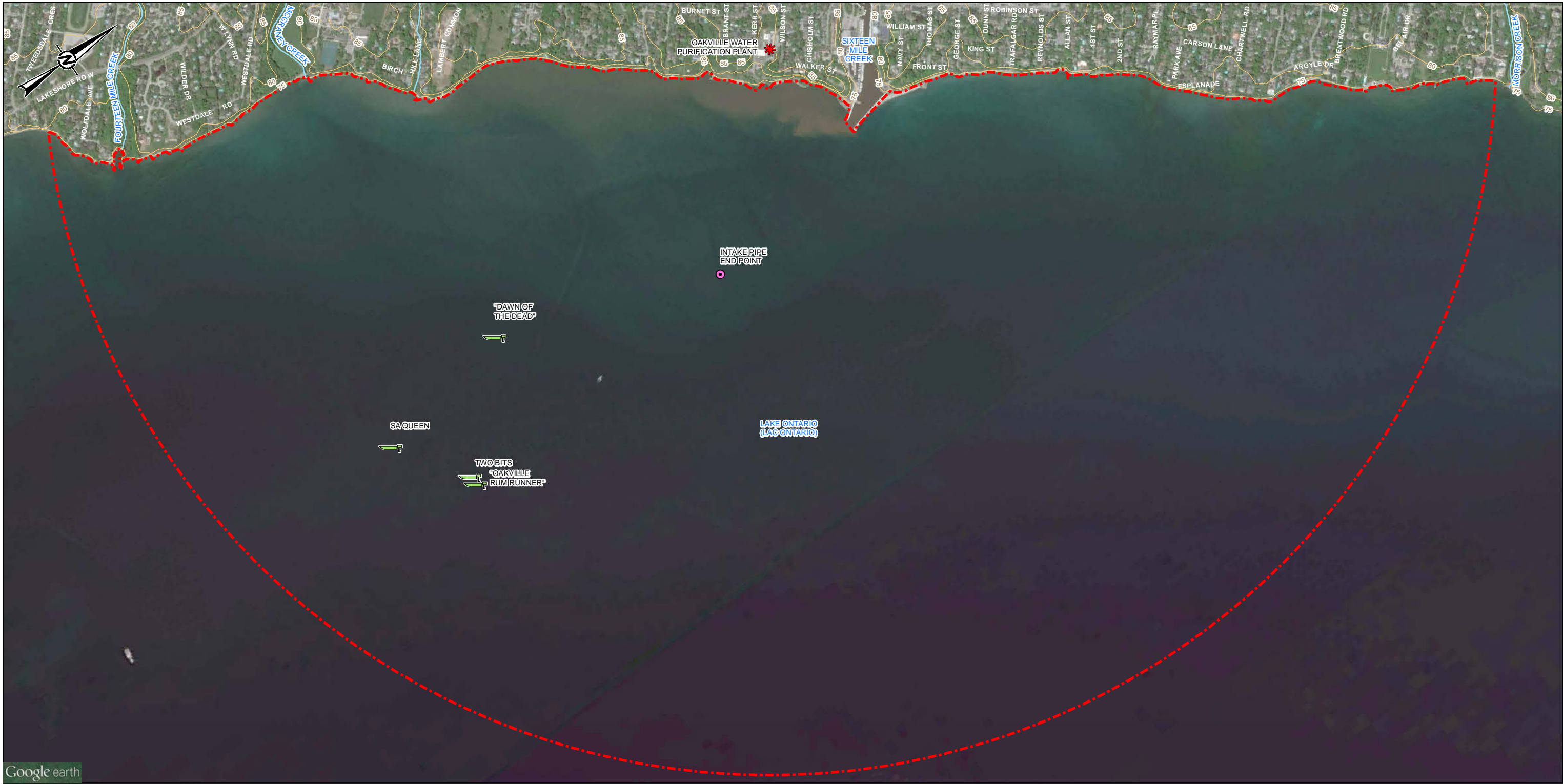
CLIENT
EXP SERVICES INC.

PROJECT
DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO

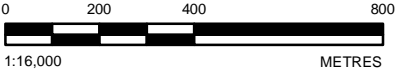
TITLE
STUDY AREA BATHYMETRY

CONSULTANT	YYYY-MM-DD	2015-12-11
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PREPARED	BR	
REVIEWED	AM	
APPROVED	CP	
PROJECT NO. 1536759	PHASE 1000	REV. 0
		MAP 7





- LEGEND**
- SHIPWRECK LOCATION
 - OAKVILLE WATER PURIFICATION PLANT
 - INTAKE PIPE END POINT
 - STUDY AREA
 - TOPOGRAPHIC CONTOUR, metres
 - BATHYMETRIC CONTOUR
 - WATERCOURSE



NOTE(S)
1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1536759.

REFERENCE(S)
1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. GOOGLE EARTH PRO, © 2015 DIGITAL GLOBE, IMAGE DATE: 2015-06-01.
3. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, TOMTOM, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
4. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

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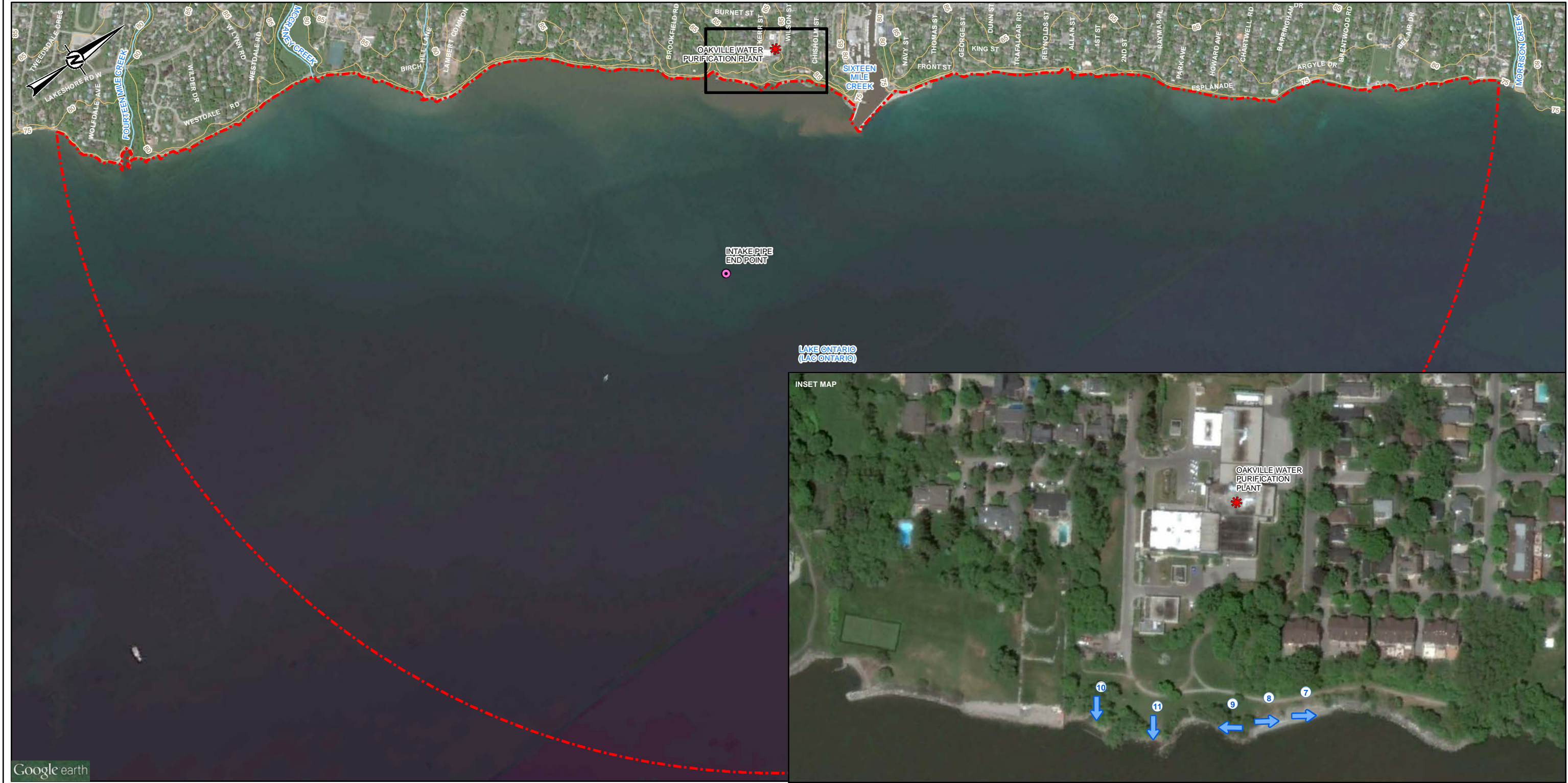
PROJECT
DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO

TITLE
KNOWN VESSELS IN THE STUDY AREA

CONSULTANT	YYYY-MM-DD	2015-12-11
DESIGNED	----	
PREPARED	BR	
REVIEWED	AM	
APPROVED	CP	

PROJECT NO. 1536759 PHASE 1000 REV. 0 MAP 8

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LEGEND

IMAGE LOCATION AND DIRECTION

OAKVILLE WATER PURIFICATION PLANT

INTAKE PIPE END POINT

STUDY AREA

TOPOGRAPHIC CONTOUR, metres

WATERCOURSE



NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1536759.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014

2. GOOGLE EARTH PRO, © 2015 DIGITAL GLOBE, IMAGE DATE: 2015-06-01.

3. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, TOMTOM, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

4. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83

COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

0 200 400 800
1:16,000 METRES

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EXP SERVICES INC.

PROJECT

DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO

TITLE

IMAGE LOCATION AND DIRECTION

CONSULTANT

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2015-12-11

DESIGNED

PREPARED

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REVIEWED

AM

APPROVED

CP

PROJECT NO.

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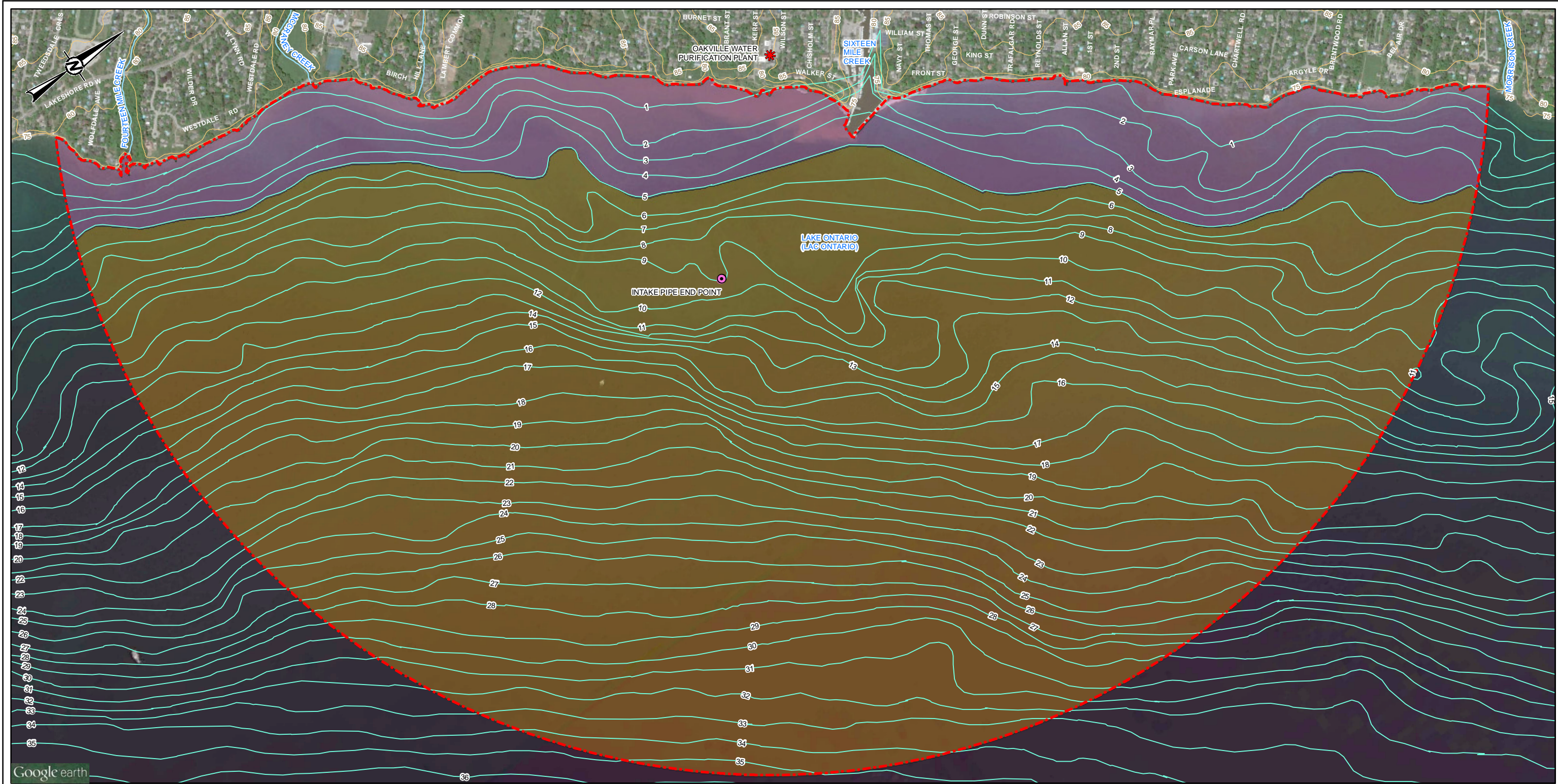
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MAP

9

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm



OAKVILLE WATER PURIFICATION PLANT

INTAKE PIPE END POINT

STUDY AREA

TOPOGRAPHIC CONTOUR, metres

WATERCOURSE

RECOMMENDED FOR VISUAL INSPECTION BY SNORKLE SURVEY

RECOMMENDED FOR ADDITIONAL INVESTIGATIONS BY GEOPHYSICAL SURVEY



1:16,000

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1536759.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. GOOGLE EARTH PRO, © 2015 DIGITAL GLOBE, IMAGE DATE: 2015-06-01.
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4. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 17 VERTICAL DATUM: CGVD28

CLIENT

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PROJECT

DESKTOP MARITIME ARCHAEOLOGICAL ASSESSMENT FOR THE OAKVILLE WATER TREATMENT PLANT EXPANSION, OAKVILLE, ONTARIO

TITLE

RECOMMENDATIONS

CONSULTANT

YYYY-MM-DD

2015-12-11

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APPROVED

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PROJECT NO.

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Path: \\Active\Spatial\Map_Services\Inc\Oakville_Water_Treatment_Plant_Expansion\09_PRCO\1536759_exp_Marine_Arch\140_PRCO\1536759-10_Recommendations.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm



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.

Aaron Mior, M.MA
Staff Archaeologist

Carla Parslow, Ph.D
Associate, Senior Archaeologist

AM/CP/mp/ca

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