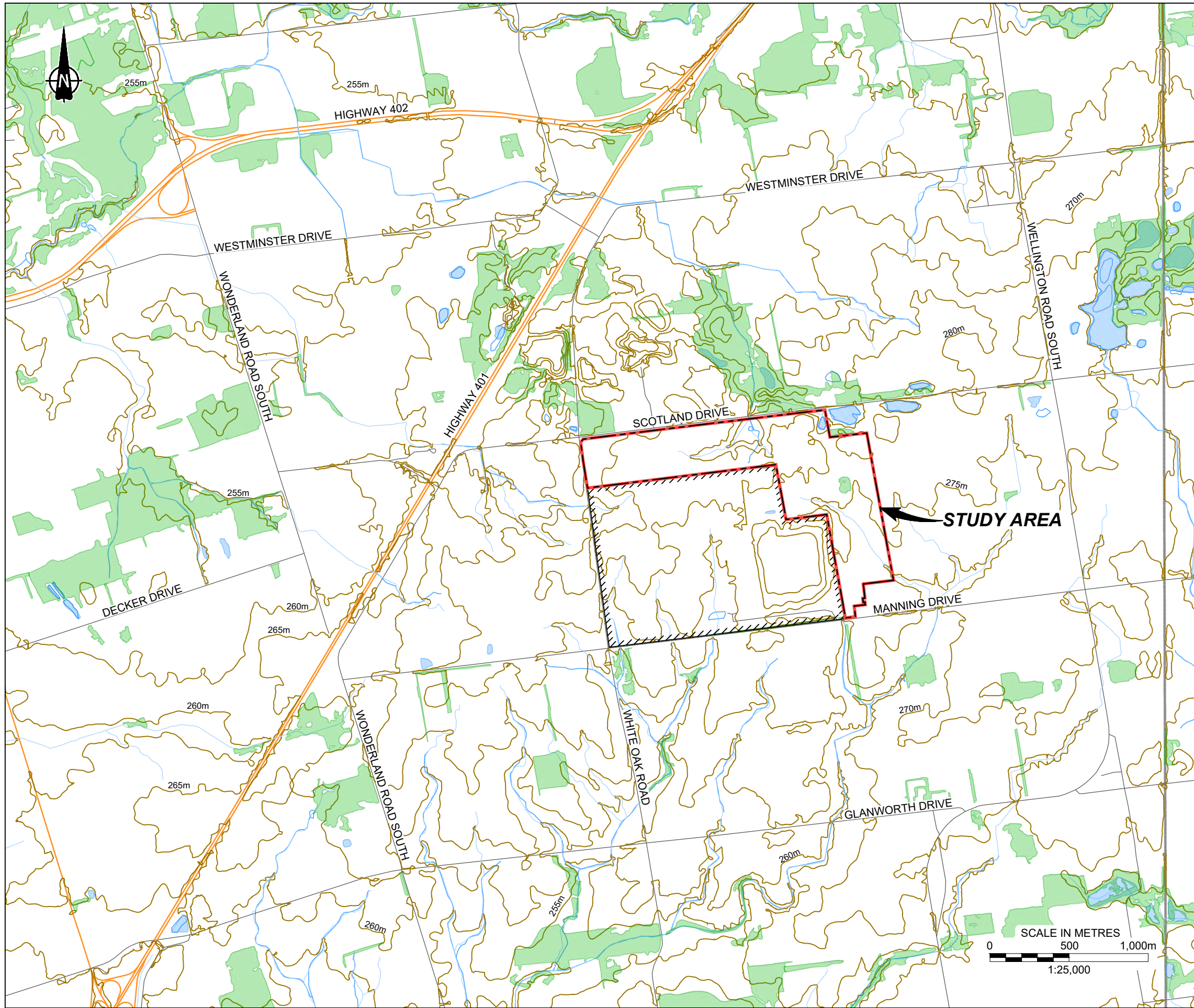
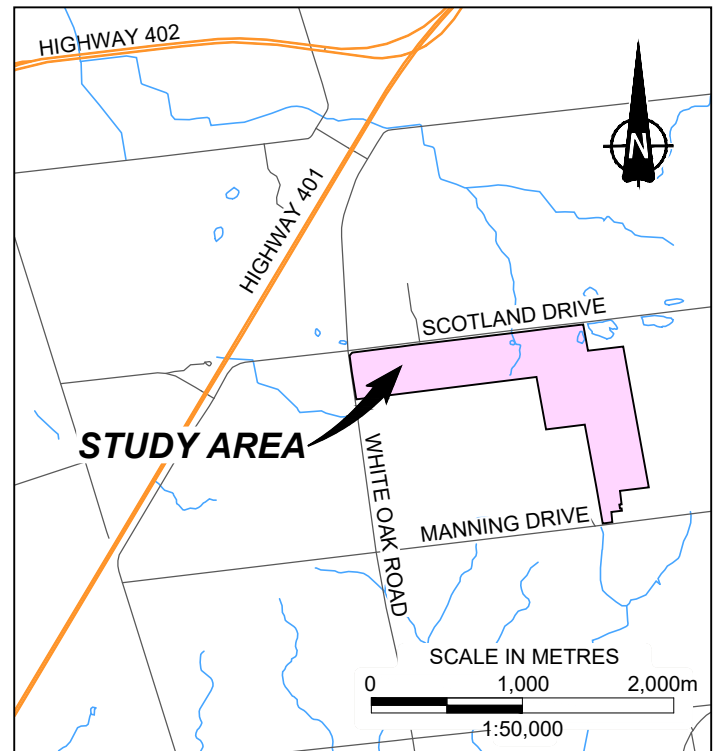


9.0 MAPS

All maps follow on the succeeding pages.

Client: Corporation of the City of London
Drawing file: 1648176-6400-R01001.dwg
Jan 09, 2020 - 3:04pm
25mm
Original Format is Tabloid 279mm x 432mm



REGIONAL MAP

LEGEND

- APPROXIMATE LOCATION OF STUDY AREA
- CURRENT LANDFILL FOOTPRINT

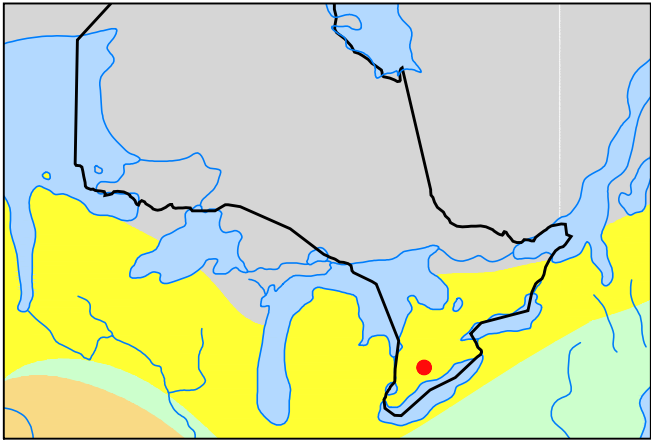
REFERENCE

DRAWING BASED ON MNR LIO, OBTAINED 2019
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RESOURCES, © QUEENS PRINTER 2019; AND
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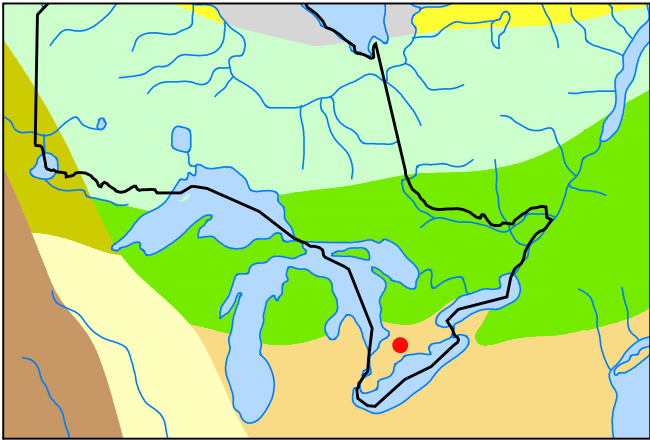
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THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ
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ALL LOCATIONS ARE APPROXIMATE.

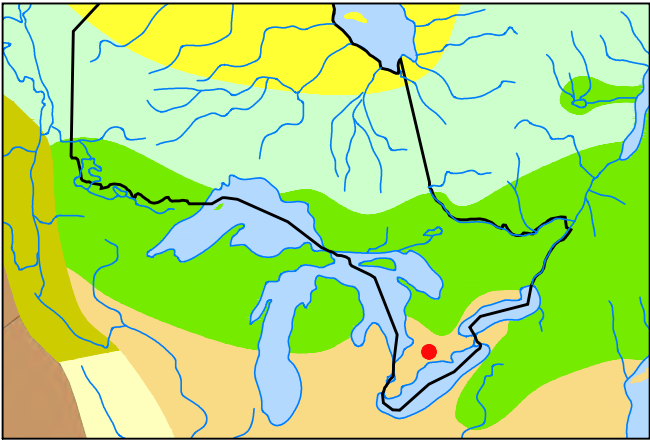
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TITLE	LOCATION OF STUDY AREA			
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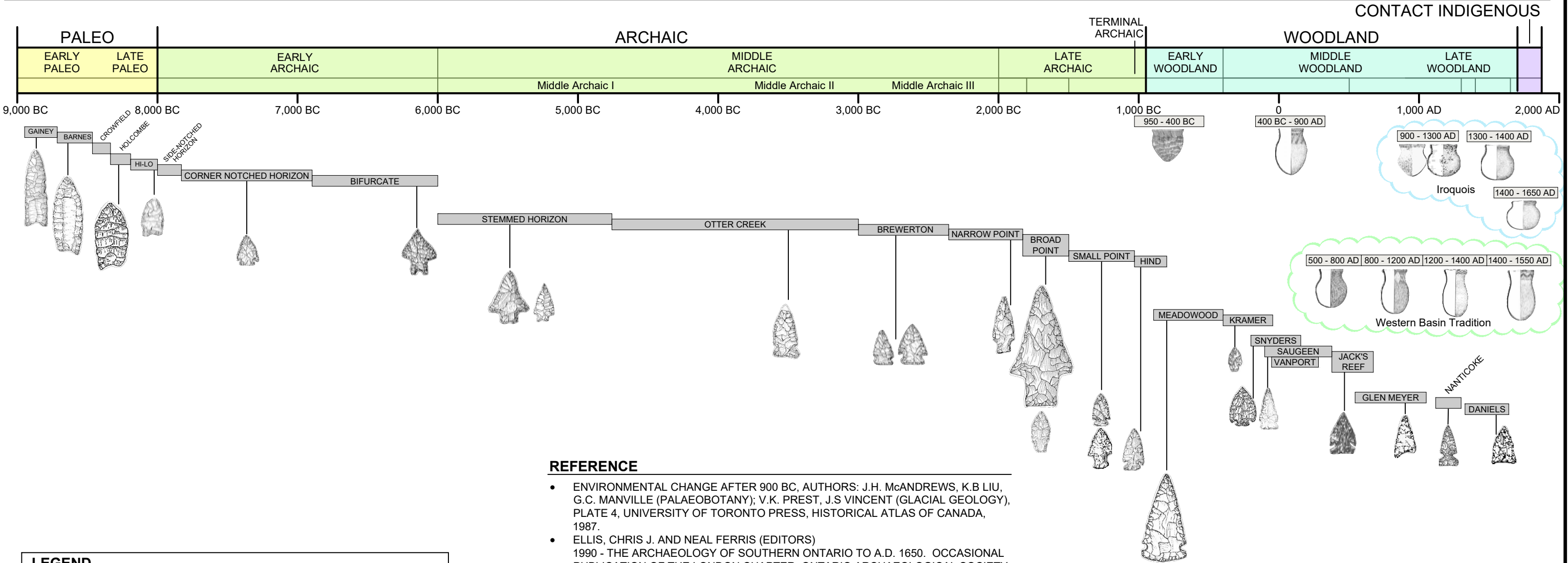
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5,000 BC



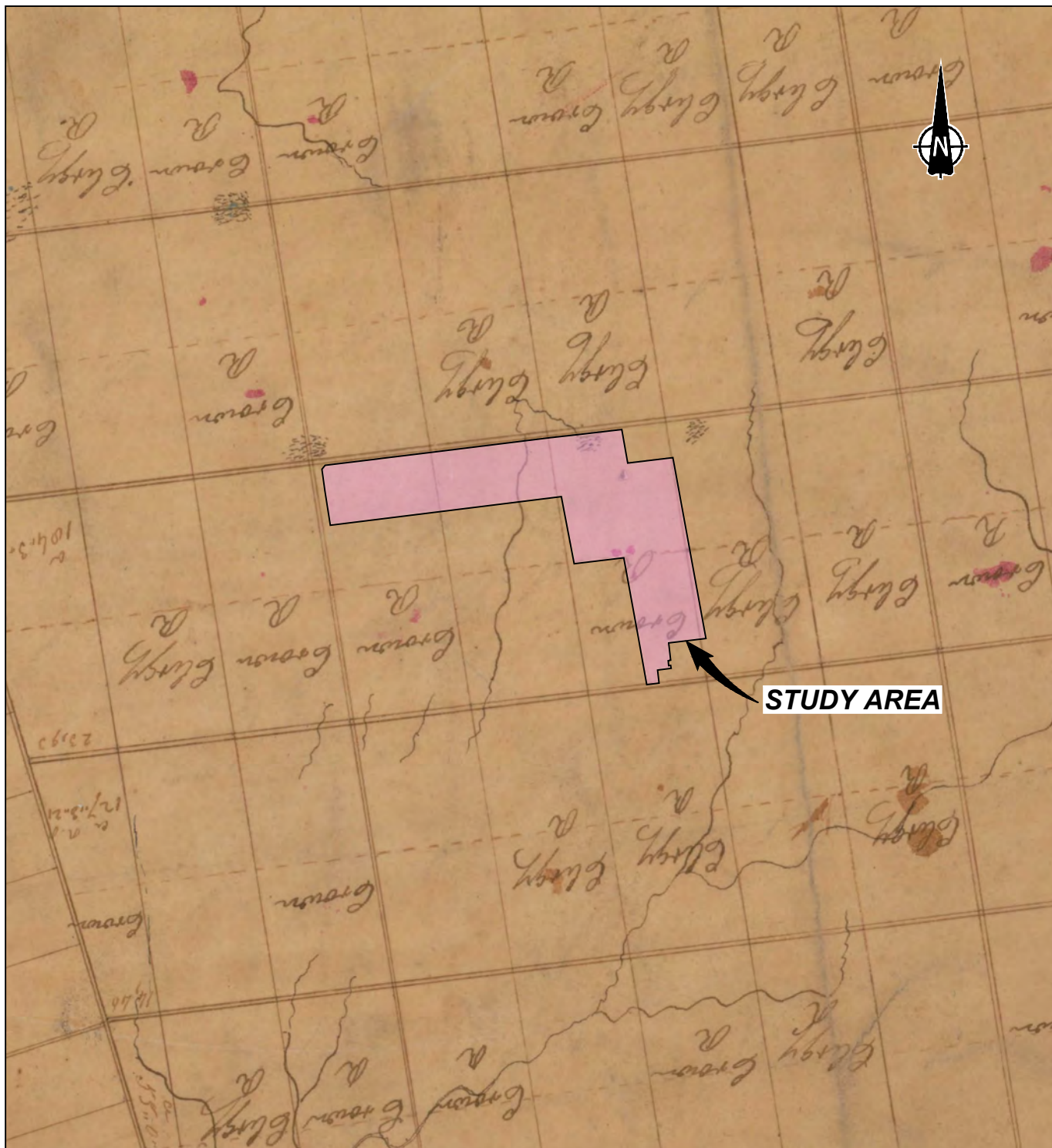
1,000 AD



REFERENCE

- ENVIRONMENTAL CHANGE AFTER 900 BC, AUTHORS: J.H. McANDREWS, K.B LIU, G.C. MANVILLE (PALAEOBOTANY); V.K. PREST, J.S VINCENT (GLACIAL GEOLOGY), PLATE 4, UNIVERSITY OF TORONTO PRESS, HISTORICAL ATLAS OF CANADA, 1987.
- ELLIS, CHRIS J. AND NEAL FERRIS (EDITORS) 1990 - THE ARCHAEOLOGY OF SOUTHERN ONTARIO TO A.D. 1650. OCCASIONAL PUBLICATION OF THE LONDON CHAPTER, ONTARIO ARCHAEOLOGICAL SOCIETY, NUMBER 5.
- ADAMS, NICK, IAN KENYON, DENA DOROSZENKO 1994 - FIELD MANUAL FOR AVOCATIONAL ARCHAEOLOGISTS IN ONTARIO. ONTARIO ARCHAEOLOGICAL SOCIETY INC., ARCHAEOLOGICAL STEWARDSHIP PROJECT.
- KENYON, I. - 1980 MEADOWOOD POINTS. KEWA 80-5.
- MURPHY, C. - 1988 SNYDERS POINTS. KEWA 88-3.
- KENYON, I. - 1979 SAUGEEN POINTS. KEWA 79-9.
- RITCHIE, WM. 1971. A TYPOLOGY AND NOMENCLATURE FOR NEW YORK PROJECTILE POINTS. ALBANY, NEW YORK: THE UNIVERSITY OF THE STATE OF NEW YORK, THE STATE EDUCATION DEPARTMENT.
- FOX, W.A. - 1982 GLEN MEYER TANGED-TRIANGULAR. KEWA 82-1.
- FOX, W.A. - 1981 NANTICOKE NOTCHED POINTS. KEWA 81-3.
- FOX, W.A. - 1981 DANIELS TRIANGULAR POINTS. KEWA 81-1.

PROJECT		STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO	
TITLE		PRE-CONTACT INDIGENOUS CULTURE HISTORY OF MIDDLESEX COUNTY	
PROJECT No. 1648176		FILE No. 1648176-6400-R01002	
CADD ZJB Jan 9/20		SCALE AS SHOWN REV.	
CHECK Len		MAP 2	



LEGEND

APPROXIMATE LOCATION OF STUDY AREA

REFERENCE

BOSTWICK, JOHN, 1821, SURVEY MAP OF WESTMINSTER, DISTRICT OF LONDON. SHEET B12. JOHN BOSTWICK, YARMOUTH.

NOTES

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ALL LOCATIONS ARE APPROXIMATE ONLY.

PROJECT

STAGE 2 ARCHAEOLOGICAL ASSESSMENT
W12A LANDFILL EXPANSION
LONDON, ONTARIO

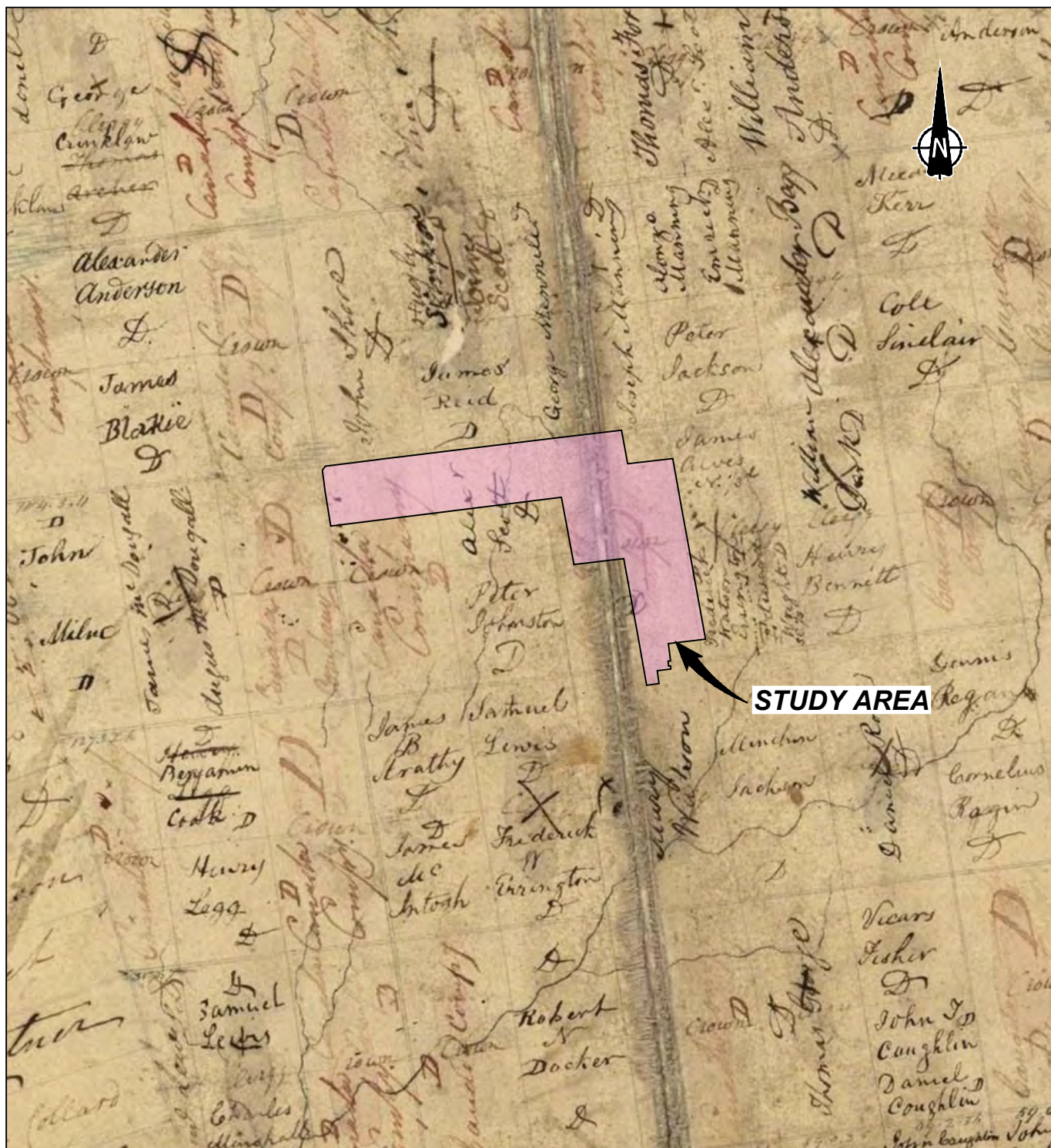
TITLE

**A PORTION OF BOSTWICK'S 1821 MAP
OF WESTMINSTER TOWNSHIP**



GOLDER

PROJECT No. 1648176		FILE No. 1648176-6400-R01003	
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CHECK	LCM		
			MAP 3



LEGEND

 APPROXIMATE LOCATION OF STUDY AREA

REFERENCE

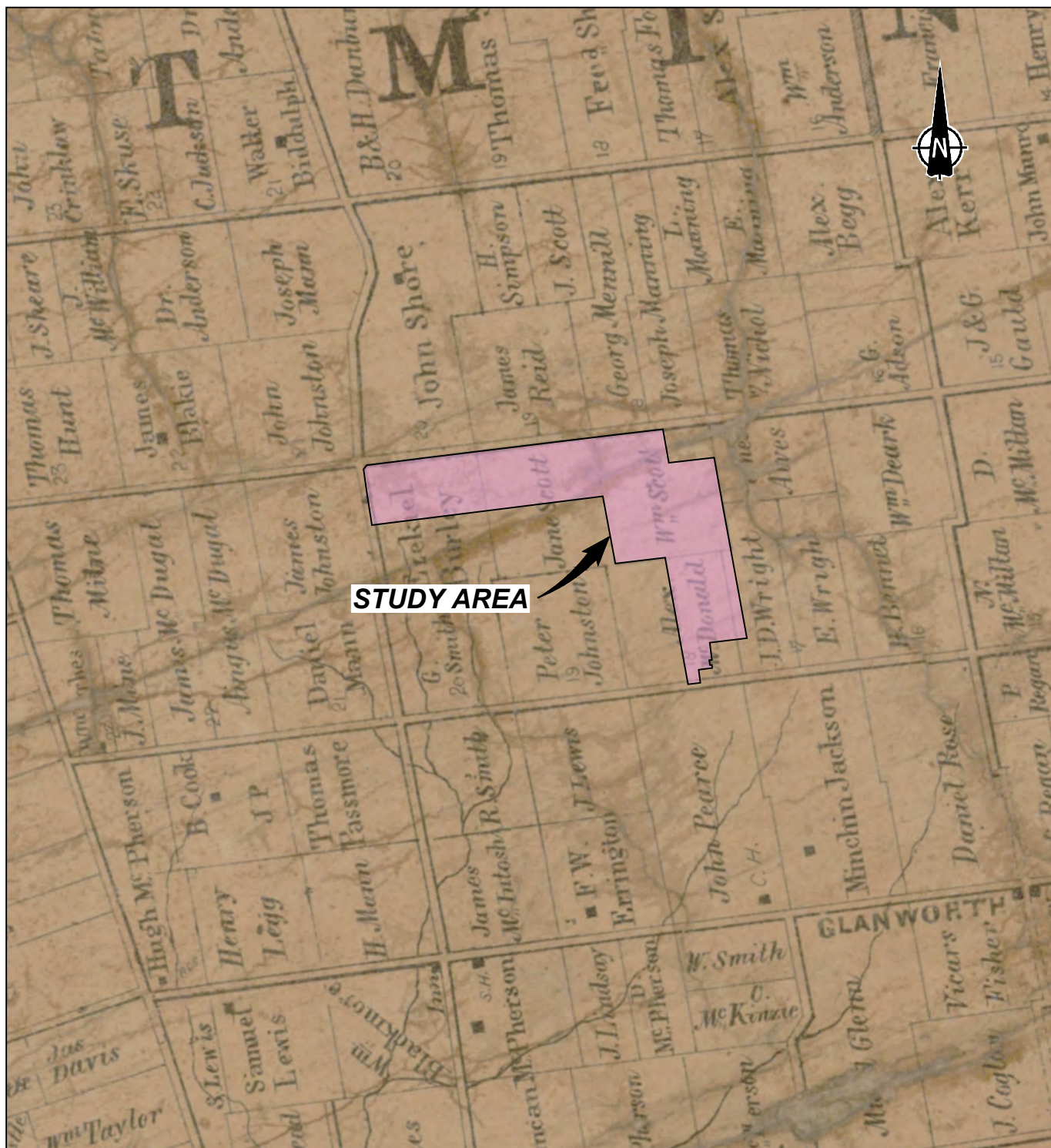
BURWELL, MAHLON, 1857, TOWNSHIP OF
WESTMINSTER PATENT PLAN, ONTARIO ARCHIVES
REFERENCE CODE RG 1-100-0-0-4142.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE
READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE ONLY.

PROJECT		STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO				
TITLE						
A PORTION OF BURWELL'S 1857 PATENT MAP FOR WESTMINSTER TOWNSHIP						
 GOLDER	PROJECT No.		1648176		FILE No. 1648176-6400-R01003	
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	CADD	ZJB/DCH	Jan 9/20		MAP 4	
	CHECK	LCM				



LEGEND

APPROXIMATE LOCATION OF STUDY AREA

REFERENCE

TREMAINE GEORGE R., 1862, TREMAINE'S MAP OF THE COUNTY OF MIDDLESEX. GEORGE C. TREMAINE., TORONTO.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE ONLY.

PROJECT

STAGE 2 ARCHAEOLOGICAL ASSESSMENT
W12A LANDFILL EXPANSION
LONDON, ONTARIO

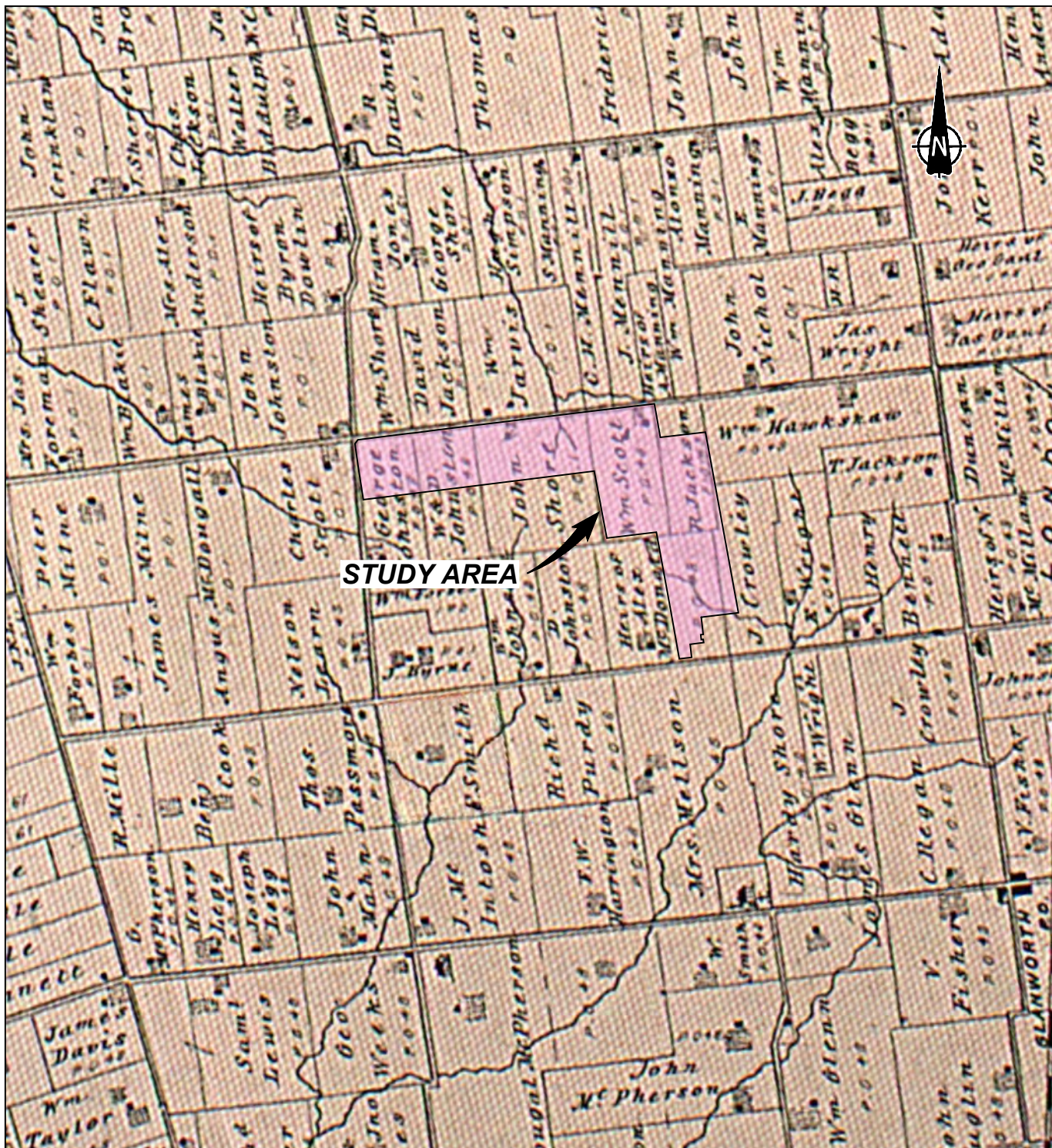
TITLE

**A PORTION OF TREMAINE'S 1862
MAP OF THE COUNTY OF MIDDLESEX**



GOLDER

PROJECT No. 1648176		FILE No. 1648176-6400-R01003	
CADD	ZJB/DCH	Jan 9/20	SCALE AS SHOWN
CHECK	LCM		REV.
			MAP 5



LEGEND



APPROXIMATE LOCATION OF STUDY AREA

REFERENCE

PAGE, H.R. AND CO., 1878, ILLUSTRATED HISTORICAL ATLAS OF MIDDLESEX COUNTY. H.R. PAGE & CO., TORONTO.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE ONLY.

PROJECT

STAGE 2 ARCHAEOLOGICAL ASSESSMENT
W12A LANDFILL EXPANSION
LONDON, ONTARIO

TITLE

**A PORTION OF THE
1878 HISTORICAL ATLAS MAP OF
WESTMINSTER TOWNSHIP**



GOLDER

PROJECT No. 1648176			FILE No. 1648176-6400-R01003	
CADD	ZJB	Jan 9/20	SCALE	AS SHOWN
CHECK	LCM		REV.	
MAP 6				

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7A - 2014



7B - 2019



LEGEND

----- APPROXIMATE LOCATION OF STUDY AREA

REFERENCE

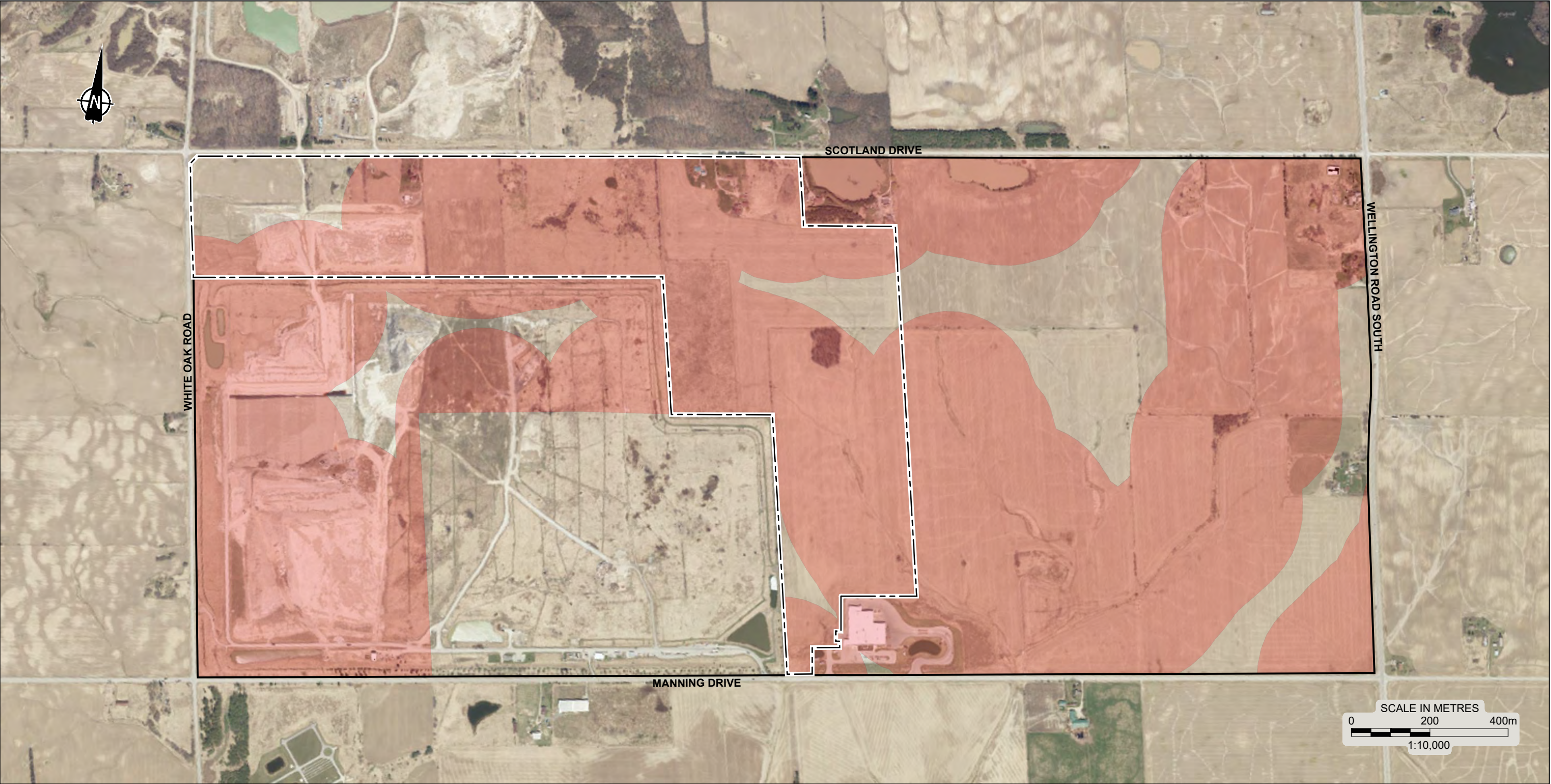
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NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT				STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO			
TITLE				AERIAL PHOTOGRAPHY SHOWING THE DEMOLITION OF THE FORMER COMPLEX AT 3713 SCOTLAND DRIVE			
		PROJECT No.		1648176		FILE No. 1648176-6400-R01007	
		CADD	ZJB	Jan 9/20	SCALE	AS SHOWN	REV.
		CHECK	len		MAP 7		

Drawing file: 1648176-6400-R01008.dwg Jan 09, 2020 - 2:02pm 0 25mm Original Format is Tabloid 279mm x 432mm Client: Corporation of the City of London



LEGEND

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- APPROXIMATE ARCHAEOLOGIX 2005 PRIMARY STUDY AREA
- AREA OF ARCHAEOLOGICAL POTENTIAL

REFERENCE

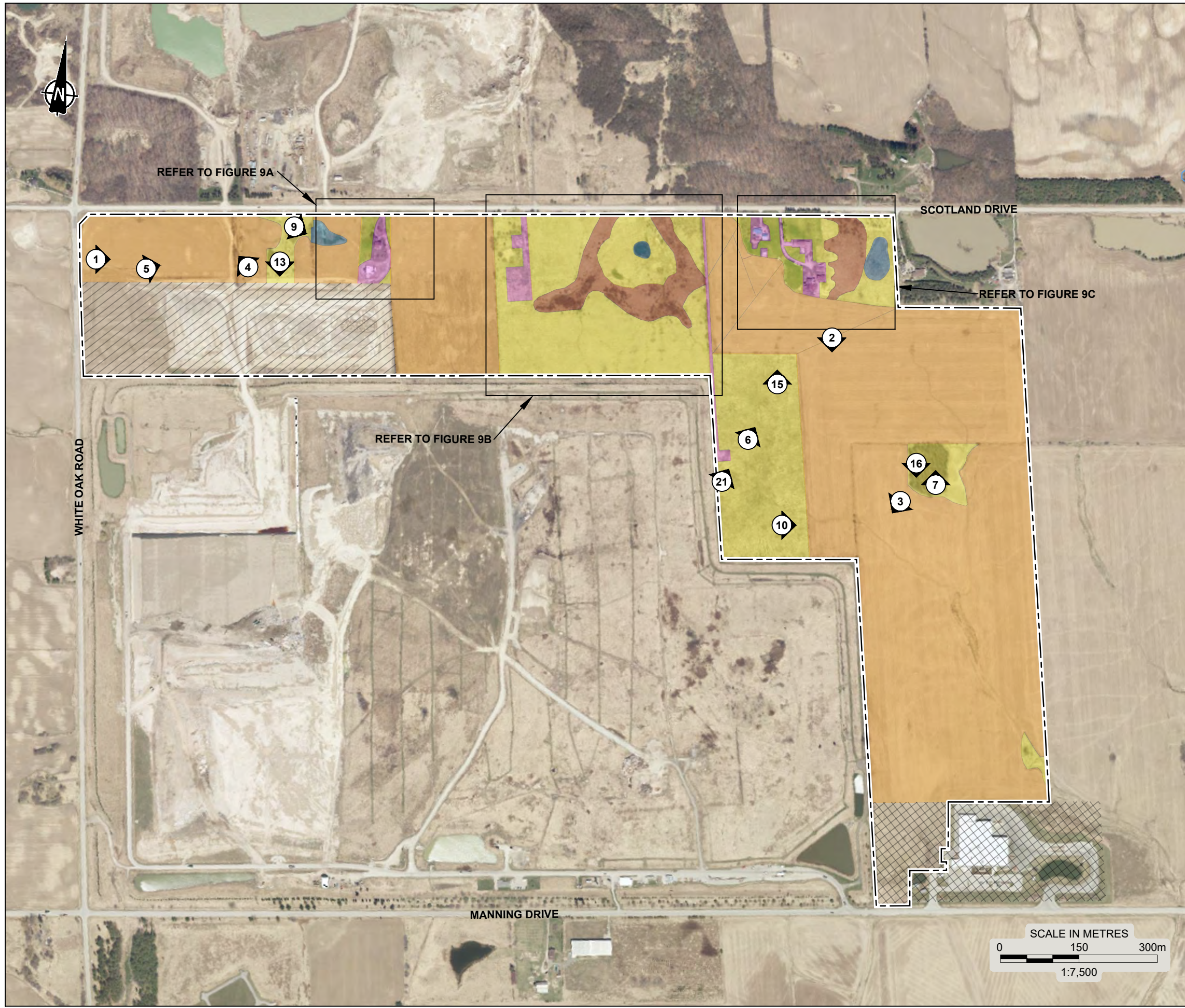
DRAWING BASED ON 2019 AERIAL IMAGE FROM THE CITY OF LONDON, 2019 OPEN DATA SET;
CITY OF LONDON, ARCHAEOLOGY POTENTIAL MAP, 2017.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT		STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO	
TITLE		2005 ARCHAEOLOGIX STAGE 1 AREAS OF ARCHAEOLOGICAL POTENTIAL	
	PROJECT No.	1648176	FILE No. 1648176-6400-R01008
	CADD	ZJB/DCH Jan 9/20	SCALE AS SHOWN REV.
	CHECK	Len	MAP 8

Client: Corporation of the City of London
Drawing file: 1648176-6400-R01009.dwg
Jan 09, 2020 - 3:00pm
25mm
Original Format is Tabloid 279mm x 432mm



LEGEND

- APPROXIMATE LOCATION OF STUDY AREA
- PREVIOUSLY DISTURBED;
NO FURTHER ASSESSMENT REQUIRED
- SLOPED; NO FURTHER ASSESSMENT REQUIRED
- PERMANENTLY WET, NO FURTHER
ASSESSMENT REQUIRED
- TEST PIT SURVEY AT 5m INTERVAL
- PEDESTRIAN SURVEY AT 5m INTERVAL
- PREVIOUSLY ASSESSED (GOLDER 2018);
WHITE OAK 1 SITE (AfHh-926);
RECOMMENDED FOR STAGE 4 AVOIDANCE AND
PROTECTION (GOLDER 2019)
- MRF FACILITY;
PREVIOUSLY ASSESSED (GOLDER 2010);
NO FURTHER ASSESSEMENT REQUIRED
- 1 PHOTOGRAPH LOCATION, VIEWING DIRECTION,
AND PLATE NUMBER

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE FROM THE CITY OF LONDON, 2019 OPEN DATA SET.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT				STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO			
TITLE				STAGE 2 METHODS AND RESULTS			
		PROJECT No.		1648176		FILE No. 1648176-6400-R01009	
		CADD		AMS/ZJB		Jan 9/20	
		CHECK		Len			
		SCALE		AS SHOWN		REV.	
						MAP 9	



LEGEND

- APPROXIMATE LOCATION OF STUDY AREA
- PREVIOUSLY DISTURBED;
NO FURTHER ASSESSMENT REQUIRED
- PERMANENTLY WET, NO FURTHER
ASSESSMENT REQUIRED
- TEST PIT SURVEY AT 5m INTERVAL
- PEDESTRIAN SURVEY AT 5m INTERVAL
- PREVIOUSLY ASSESSED (GOLDER 2018); WHITE OAK
1 SITE (AfHh-926) RECOMMENDED FOR STAGE 4
AVOIDANCE AND PROTECTION (GOLDER 2019)
- 1 PHOTOGRAPH LOCATION, VIEWING DIRECTION,
AND PLATE NUMBER

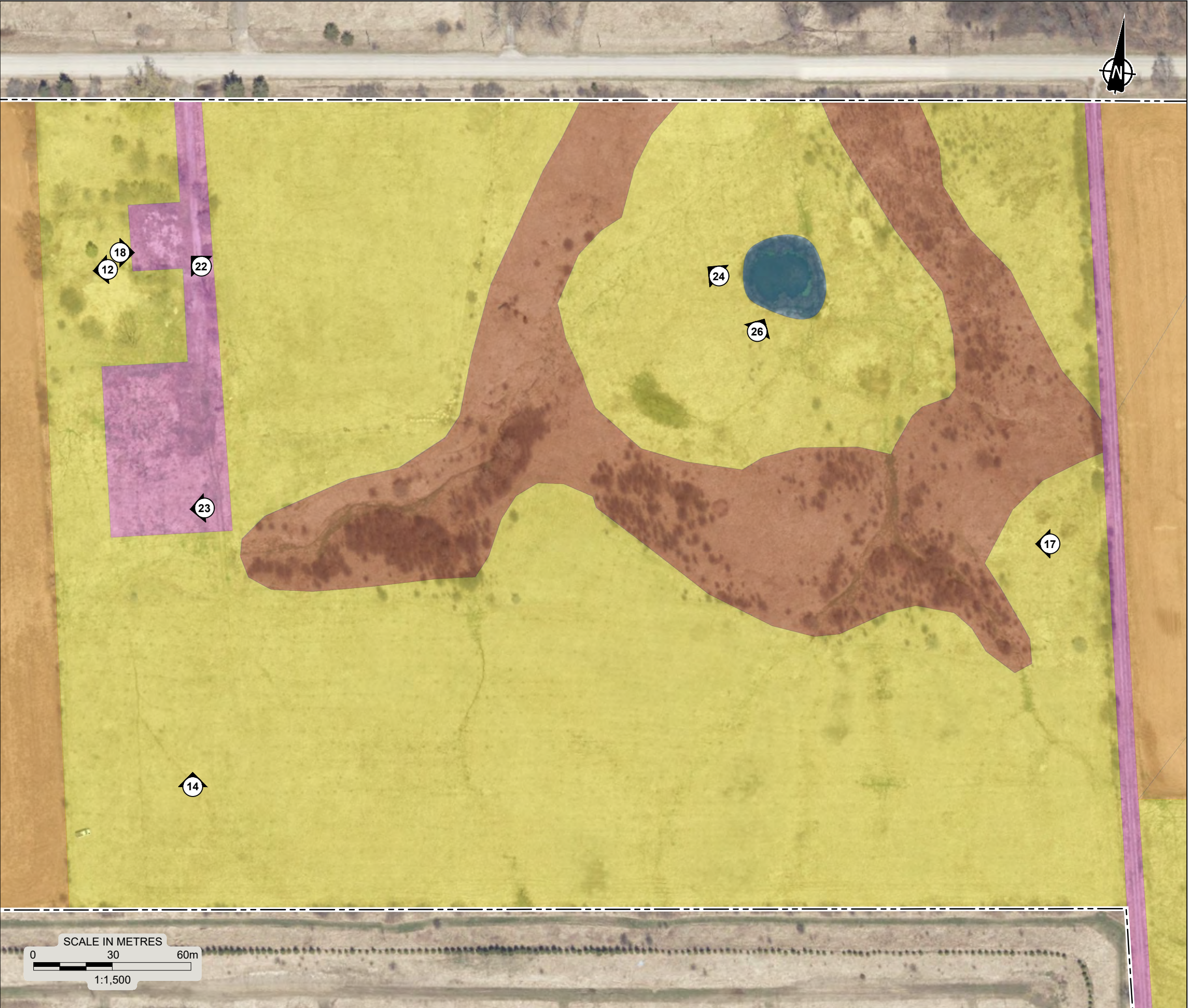
REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE FROM THE CITY OF LONDON, 2019 OPEN DATA SET.

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT	STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO			
	TITLE			
PROJECT No.	1648176			FILE No. 1648176-6400-R01009
	SCALE AS SHOWN			REV.
CADD	ZJB/DCH	Jan 9/20	MAP 9A	
CHECK	len			



LEGEND

- APPROXIMATE LOCATION OF STUDY AREA
- PREVIOUSLY DISTURBED;
NO FURTHER ASSESSMENT REQUIRED
- SLOPED; NO FURTHER ASSESSMENT REQUIRED
- PERMANENTLY WET, NO FURTHER
ASSESSMENT REQUIRED
- TEST PIT SURVEY AT 5m INTERVAL
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- PHOTOGRAPH LOCATION, VIEWING DIRECTION,
AND PLATE NUMBER

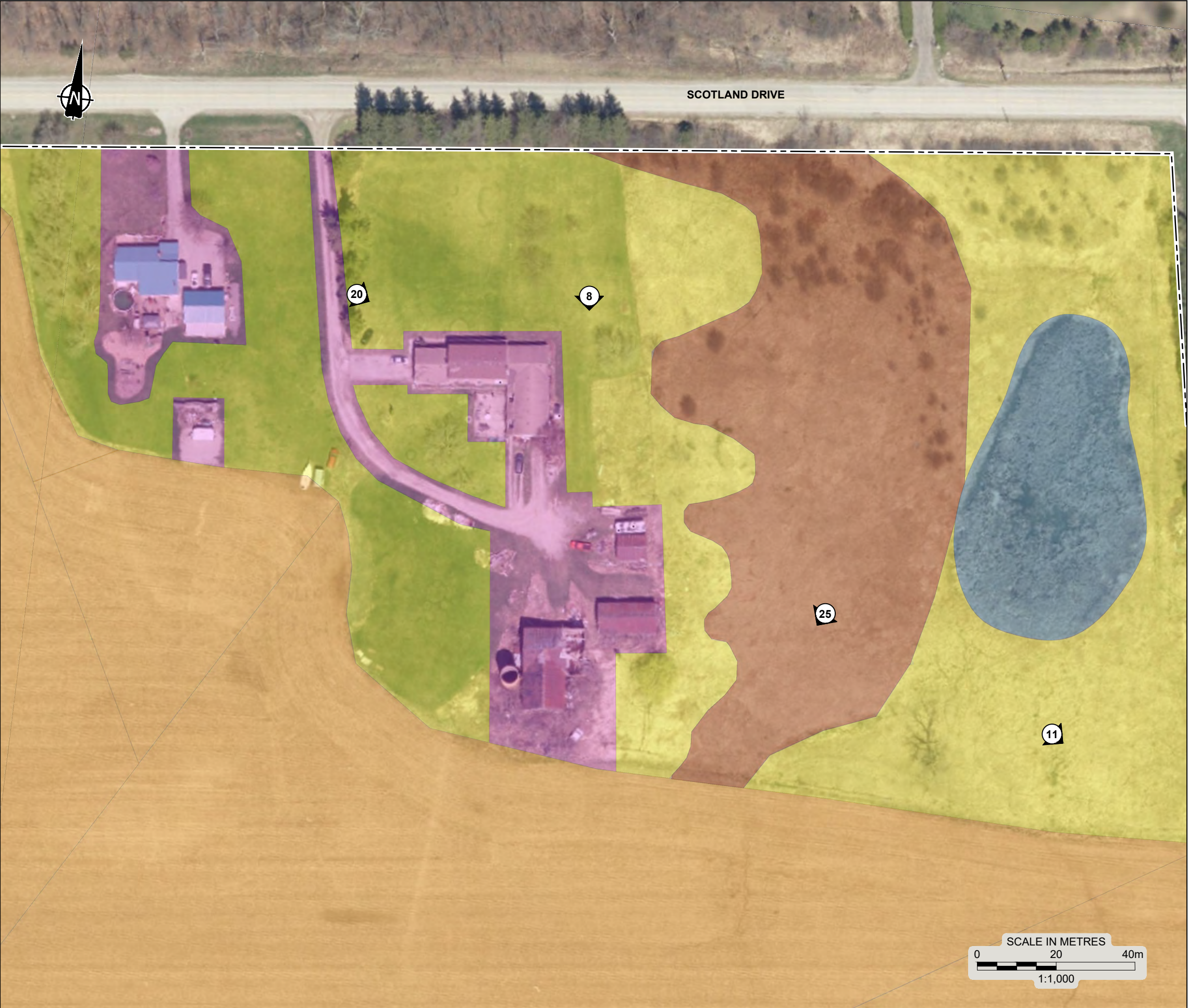
REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE FROM THE CITY OF LONDON, 2019 OPEN DATA SET.

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT										STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO																													
TITLE																				STAGE 2 METHODS AND RESULTS (3715 SCOTLAND DRIVE)																			
										PROJECT No.										1648176										FILE No. 1648176-6400-R01009									
										CADD					AMS/ZJB					Jan 9/20					SCALE					AS SHOWN					REV.				
										CHECK					LCM										MAP 9B														



LEGEND

- APPROXIMATE LOCATION OF STUDY AREA
- PREVIOUSLY DISTURBED;
NO FURTHER ASSESSMENT REQUIRED
- SLOPED; NO FURTHER ASSESSMENT REQUIRED
- PERMANENTLY WET, NO FURTHER
ASSESSMENT REQUIRED
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AND PLATE NUMBER

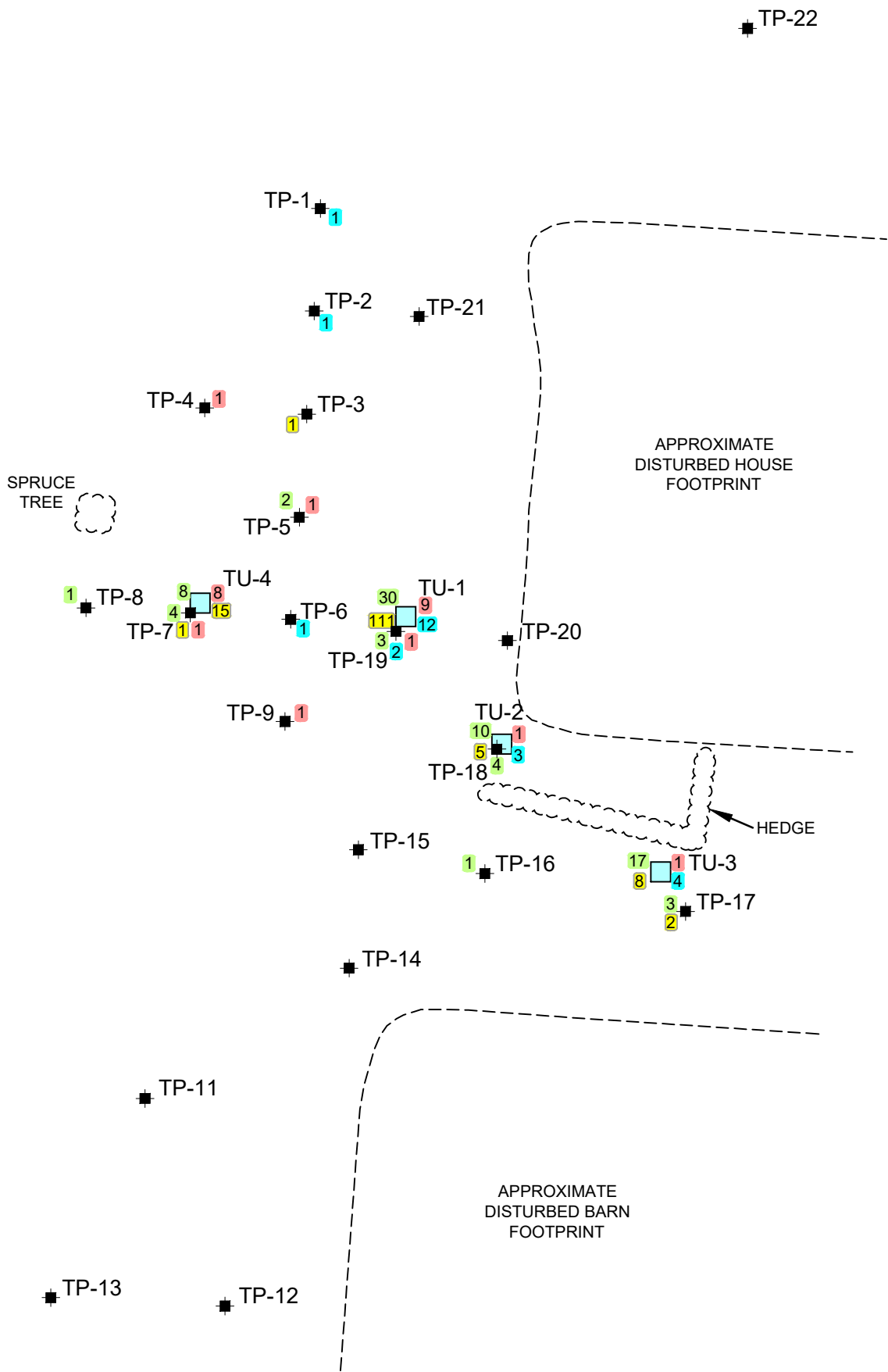
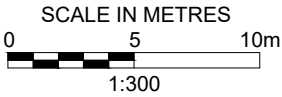
REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE FROM THE CITY OF LONDON, 2019 OPEN DATA SET.

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ALL LOCATIONS ARE APPROXIMATE.

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TITLE		STAGE 2 METHODS AND RESULTS (3801 SCOTLAND DRIVE)	
	PROJECT No.	1648176	FILE No. 1648176-6400-R01009
	CADD	AMS/ZJB Jan 9/20	SCALE AS SHOWN REV.
	CHECK	Len	MAP 9C



LEGEND

- STAGE 2 POSITIVE TEST PIT
- STAGE 2 TEST UNIT
- TOTAL NUMBER OF FAUNAL ELEMENTS (WITHIN STAGE 2 TEST PIT/ TEST UNIT)
- TOTAL NUMBER OF 20th CENTURY ARTIFACTS (WITHIN STAGE 2 TEST PIT/ TEST UNIT)
- TOTAL NUMBER OF LATE 19th CENTURY ARTIFACTS (WITHIN STAGE 2 TEST PIT/ TEST UNIT)
- TOTAL NUMBER OF MID 19th CENTURY ARITFACTS (WITHIN STAGE 2 TEST PIT/ TEST UNIT)

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.
ALL LOCATIONS ARE APPROXIMATE.

PROJECT				STAGE 2 ARCHAEOLOGICAL ASSESSMENT W12A LANDFILL EXPANSION LONDON, ONTARIO			
TITLE				LOCATION 4 (AfHh-945) DISTRIBUTION OF DATEABLE ARTIFACTS AND FAUNAL ELEMENTS			
 GOLDER		PROJECT No.		1648176		FILE No. 1648176-6400-R01010	
						SCALE AS SHOWN REV.	
		CADD	AMS/ZJB	Jan 9/20		MAP 10	
		CHECK	LCM				

10.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder has prepared this report in a manner consistent with the level of care and skill ordinary 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 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 comply with those identified in the Ministry of Heritage, Sport, Tourism and Culture Industries' *Standards and Guidelines for Consultants Archaeologists* (Government of Ontario 2011).

11.0 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.



Lafe Meichenheimer, M.A.
Staff Archaeologist



Michael Teal, M.A.
Associate, Senior Archaeologist

LCM/MT/ly

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[https://golderassociates.sharepoint.com/sites/114635/project files/5 technical work/5 - archaeology/stage 2/deliverables/1648176-6000-6400-r01 w12a landfill expansion st. 2.docx](https://golderassociates.sharepoint.com/sites/114635/project%20files/5%20technical%20work/5%20-%20archaeology/stage%202/deliverables/1648176-6000-6400-r01%20w12a%20landfill%20expansion%20st.%202.docx)

APPENDIX A

**Glossary of
Pre-Contact Indigenous Terms**

Debitage: Chipped lithic tools anddebitage were found at the site (or sites) described in this report. Some of the more common chert types found on pre-contact Indigenous sites in southern Ontario are described below.

Kettle Point chert: a relatively high quality raw material found within the Upper Devonian age Kettle Point Formation that outcrops between Kettle Point and Ipperwash, on Lake Huron. Currently, Kettle Point occurs as submerged outcrops extending for approximately 1,350 m into Lake Huron. Secondary deposits of Kettle Point chert have been reported in Essex County and in the Ausable River watershed (Eley and von Bitter 1989; Fox 2009:362).

Onondaga chert: a high quality raw material found within the Onondaga Formation that outcrops along the north shore of Lake Erie west of the mouth of the Grand River as far west as Nanticoke, east of the mouth of the Grand River as far east as Fort Erie, and along the Onondaga Escarpment between Cayuga and Hagersville (Telford and Tarrant 1975). This material can also be recovered from secondary, glacial deposits across much of southwestern Ontario, east of Chatham (Eley and von Bitter 1989; Fox 2009:361-362).

Selkirk chert: a moderate to relatively high quality raw material that occurs within the Dundee Formation; it outcrops along Sandusk Creek and its tributaries just west of the village of Selkirk (Telford and Tarrant 1975). The chert ranges in colour from mottled or banded grey to a predominantly brown colour, the latter of which being of relatively more vitreous fabric than the former. Its distribution as a secondary source material is similar to Onondaga chert and it is frequently encountered as far west as the Chatham area (Eley and von Bitter 1989; Fox 2009:362).

Non-chert: some materials other than chert were occasionally used for the manufacture of chipped tools, and consequently some pieces of non-chertdebitage may occur on some sites. Materials in the non-chert category may include quartzite, quartz-like materials, schist and slate or shale.

All chert types discussed herein were identified visually by comparison to reference materials located in Golder's London offices. The flake assemblage was subject to morphological analysis following the classification scheme described by Lennox et al. (1986) and expanded upon by Fisher (1997), with the exception that no attempt was made to distinguish "primary" from "primary bipolar" flakes.

With reference to the analysis of lithicdebitage, the following overview provides descriptions of the various types of cores anddebitage commonly found on pre-contact Indigenous sites.

Cores: Pieces of stone (usually chert) from which flakes or blades have been removed. A core may be uni-facetted (flake removed from one surface or edge only) or multi-facetted (flakes removed from two or more surfaces or edges. A core may retain a segment of its exterior, weathered surface.

Primary Reduction Flakes: are by-products of the initial stages of the reduction of lithic material, they are derived from cores and are generally attributed to direct hard hammer percussion. Primary flakes may exhibit a large cortical striking platform. This platform may appear on an otherwise unmodified flake scar or a crushed flake margin. Where measureable the striking platform – ventral surface angle is approximately 90 degrees, usually unfacetted and large. Ventral surface attributes are usually well pronounced while the dorsal surface consists of 50-100% cortex, implying little or no modification of the core prior to the removal of the primary flake.

Primary Thinning Flake: a large, thick flake with an unprepared striking platform and few to no flake scars on its dorsal (exterior) surface. These flakes are typically thinner than Primary Reduction Flakes. Their platform is usually large, flat or minimally facetted, and close to 90 degrees. A Large bulb of percussion is common on the

ventral side. Primary Thinning Flakes are typically associated with the hard hammer percussion method from the initial stage of chipped stone tool production.

Biface Thinning Flake: a moderately thick to thin flake with a small platform that can be ground and/or faceted to some degree. The platform angle is usually acute or less than 90 degree. The dorsal side of the flake often has several shallow intersecting scars with no cortex material remaining. Biface Thinning Flakes are associated with the medial stage of biface reduction where a stone tool is thinned through the removal of flakes from opposing surfaces.

Retouch Flakes: small, thin flakes removed from the edge of a stone tool or larger flake through pressure flaking. These flakes tend to have a small, lipped platform that may exhibit crushing or part of a dulled bifacial edge. The dorsal surface typically displays flake scars from previous removals and lacks cortex material. They are associated with the final stage of chipped stone tool production when edges are sharpened and notches for hafting are created. They are also associated with maintenance activities where tools are re-sharpened and broken edges rejuvenated.

Shatter: usually consists of thick, blocky pieces of chert which lack striking platforms and ventral flake surface attributes. This category of debitage is thought to be a by-product of the initial stages of reduction through the uncontrolled breakage of the raw material along structural faults or irregularities. They commonly result from the use of horizontally and vertically flawed material, these flaws apparently a result of stresses occurring to the material while still within its primary deposit. A relatively high incidence of shatter is usually associated with the bipolar reduction strategy.

Flake Fragments: are broken flakes with no platform or proximal end. They cannot be convincingly linked to any particular lithic activity. As such, they have very little analytical value.

Micro flake: Very small broken flakes are classed as micro flakes, less than 3mm in size. These flakes are small and generally only recovered from floatation samples.

Stages of Reduction for Chert Bifaces (based on Fisher 1997:25-29)

There have been several different approaches to the definition of the stages of biface reduction, in both Eurasia (Andrefsky 2005:32) and North America (i.e. Callahan 1979: 30-31). Many Ontario-based researchers have adopted the classification scheme used by Fisher (1997: 25-29), which was based largely on Callahan (1979: 30-31). Fisher's definitions of Stage 1 (initial) through Stage 4 (final) bifaces take into consideration characteristics such as number and size of flakes removed, length and depth of flake scars, cross-section, length-width ratio, and edge configuration.

Stage 1: During this initial stage of biface reduction specimens are only roughly shaped. The biface cross-section is hexagonal, irregular to thick lenticular, and is not plano-convex at all (Callahan 1979:36). Biface thinning flake scars are deep, large and generally do not cross half of the biface width, leaving remnants of the original material surface. From a lateral view, the edge of the biface is jagged and highly irregular.

Stage 2: At this stage the biface is still relatively thick compared to its width, with more lateral flake removals crossing over half the biface width, leaving less of the original surface present. As well, thinning flakes are more numerous and smaller. The edge of the biface is still irregular, but less jagged.

Stage 3: This stage of reduction produces a biface with a lenticular cross-section, thinning flakes are shallow and are consistently greater than half the biface width. Also, there is a greater regularity to the edge, and bases may be formed, if only incipiently, on some specimens.

Stage 4: Stage 4 is represented by an almost finished projectile point with a relatively high width to thickness ratio, a relatively regular or even edge, some retouch, and a shaped base. Some items classed as Stage 4 specimens may have been finished projectile points. However, they are not as finely crafted as the definitive finished projectile points, perhaps due to material or knapping flaws, or skills of knappers.

Other Artifacts

The following glossary defines some of the terms for some of the formal and informal chipped lithic tools from the sites discussed in this report. All of the definitions are derived from reputable online sources such as www.archaeologywordsmith.com and www.wvculture.org/shpo/glossary.html.

Artifact: “any object made, modified or used by people”.

Biface: “a stone tool which has been flaked on both surfaces or sides”; frequently made as roughed-out blanks or preforms intended for further reduction into finished tools such as projectile points or knives.

Burin: “from the French word *burin*, meaning cold chisel. A specialized engraving tool ... that is cut or ground [or flaked] diagonally downward to form a diamond-shaped point at the tip... In its most characteristic form, the working tip is a narrow transverse edge formed by the intersection of two flake scars produced by striking at an angle to the main axis of the blade... Burins were used to carve or engrave softer organic materials such as antler, bone... or wood”.

Debitage: “the by-products or waste materials left over from the manufacture of stone tools”.

Diagnostic artifact: “an item that is indicative of a particular time period or cultural group”.

Drill: “a tool used to drill holes through or into wood, stone or bone”.

Ecofact: “non-artifactual evidence that has not been technologically altered but that has cultural relevance.”

Graver: “a stone tool manufactured from a flake by chipping (pressure-flaking) it on two edges at one end so as to leave a sharp point. Gravers were used to cut or score organic materials such as bone, shell, wood and antler; perhaps for punching leather, and other purposes”.

Lithic: “stone, or made of stone”.

Knife: a purposefully formed cutting tool.

Perforator: “a flint [chert] tool for piercing holes”, or, “a small chipped stone implement with a rather long and slender point and usually a broad base, supposed to have been used for drilling or boring holes”. Perforators are sometimes referred to as borers.

Projectile point: “a general term for points [usually stone] that were hafted to darts, spears or arrows”; commonly referred to as either spearhead or arrowhead.

Retouched flake: “a flake that has had small flakes removed to blunt, sharpen, refine the outline or prepare the edge of the tool”.

Scraper: a stone tool formed by chipping [flaking] the end or side of a flake which can then be used to scrape animal hides or wood.

Spokeshave: “a stone tool with a semi-circular concavity on the edge, used for smoothing spear or arrow shafts; a drawknife or small transverse plane for planing convex surfaces”.

Utilized flake: “a piece of stone debitage that is used for cutting or slicing. The edge may be damaged from use, but not deliberately”.

Wedge: “an object used to split, force open or keep open another object; a tool used to split wood”.

APPENDIX B

Complete Artifact Catalogues

Cat. #	Loc.	CSP #	Depth (cm)	Material 1	Material 2	Function 1	Function 2	Object	Fragment	Attribute 1	Attribute 2	Manufacture	Alteration	# of Artifacts	# of Objects	Note
Location 1																
1	P1-6	1	N/A	stone	chert:Onondaga	tools and equipment	tool	biface	incomplete	stage 4		chipped		1		probable broken projectile point
Location 2																
1	P1-7	1	N/A	stone	chert:Onondaga	tools and equipment	debitage	biface thinning flake	complete			chipped		1		
2	P1-7	1	N/A	stone	chert:Onondaga	tools and equipment	debitage	biface thinning flake	complete			chipped		1		
Location 3																
1	P5-1	TP1	N/A	stone	chert: selkirk	tools and equipment	debitage	flake fragment				chipped		1		
Location 4 (AfHh-945)																
1	P5-2	TP1	N/A	faunal	bone	ecological	faunal	bone	long bone fragment	mammal, small to medium			burnt/calcined	1	2	
2	P5-2	TP2	N/A	faunal	bone	ecological	faunal	bone		mammal, indeterminate				1		
3	P5-2	TP2	N/A	metal	iron	miscellaneous	hardware	barbed wire	fragment					1		
4	P5-2	TP3	N/A	ceramic	Rockingham ware	food and beverage	tableware	tableware: indeterminate	body					1		
5	P5-2	TP3	N/A	glass	indeterminate	indeterminate	container	container: indeterminate	body		light aqua			1		
6	P5-2	TP4	N/A	ceramic	coarse buff earthenware	food and beverage	storage container	container: indeterminate	body					1		
7	P5-2	TP4	N/A	composite	asphalt	structural	building component	roof shingle	fragment		black			1		
8	P5-2	TP4	N/A	brick	brick	structural	building component	brick	fragment		red			1		exfoliated
9	P5-2	TP5	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	plain/undecorated				1		
10	P5-2	TP5	N/A	ceramic	refined white earthenware	food and beverage	tableware	holloware: indeterminate	body	hand-painted	late palette			1		green, floral pattern
11	P5-2	TP5	N/A	ceramic	coarse buff earthenware	food and beverage	storage container	container: indeterminate	body					1		
12	P5-2	TP5	N/A	ceramic	porcelain	structural	electrical	insulator	fragment		white			1		
13	P5-2	TP6	N/A	faunal	bone	ecological	faunal	bone	long bone fragment	mammal, small to medium			burnt	1		possibly butchered (sawn) but burnt
14	P5-2	TP6	N/A	brick	brick	structural	building component	brick	fragment		red			1		
15	P5-2	TP6	N/A	carbon	coal	miscellaneous	indeterminate	coal						1		
16	P5-2	TP7	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	hand-painted	early palette			1		brown
17	P5-2	TP7	N/A	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body/footring/base	plain/undecorated				1		
18	P5-2	TP7	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	plain/undecorated				1		
19	P5-2	TP7	N/A	ceramic	porcelain	food and beverage	tableware	tableware: indeterminate	body					1		
20	P5-2	TP7	N/A	ceramic	coarse earthenware, red	food and beverage	storage container	container: indeterminate	body					1		
21	P5-2	TP7	N/A	ceramic	clay: terracota	tools and equipment	agricultural	flower pot	body					2		
22	P5-2	TP7	N/A	ceramic	coarse buff earthenware	indeterminate	indeterminate	indeterminate	body					1		
23	P5-2	TP7	N/A	ceramic	coarse buff earthenware	indeterminate	indeterminate	indeterminate	body					1		
24	P5-2	TP7	N/A	metal	iron	structural	building component	nail: common	distal			machine-cut		1		
25	P5-2	TP7	N/A	carbon	coal	miscellaneous	indeterminate	coal						2		
26	P5-2	TP7	N/A	plastic	indeterminate	indeterminate	indeterminate	indeterminate	fragment		yellow			1		
27	P5-2	TP7	N/A	composite	indeterminate	indeterminate	indeterminate	tile	fragment		grey			1	2	cement based asbestos tile
28	P5-2	TP8	N/A	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	blue			1		indeterminate pattern
29	P5-2	TP9	N/A	concrete	concrete	structural	building component	concrete	fragment					1		
30	P5-2	TP9	N/A	composite	asphalt	structural	building component	roof shingle	fragment		black			1		
31	P5-2	TP11	N/A	metal	iron	indeterminate	indeterminate	can lid	fragment					2		
32	P5-2	TP12	N/A	glass	indeterminate	structural	building component	window pane	fragment		clear/colourless			2		
33	P5-2	TP13	N/A	metal	iron/white metal alloy	indeterminate	indeterminate	indeterminate machinery/mechanism	incomplete					1		
34	P5-2	TP14	N/A	ceramic	coarse earthenware, red	indeterminate	indeterminate	indeterminate	body					1		
35	P5-2	TP15	N/A	ceramic	coarse earthenware, red	food and beverage	storage container	container: indeterminate	body					1		
36	P5-2	TP16	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	plain/undecorated				1		
37	P5-2	TP16	N/A	brick	brick	structural	building component	brick	fragment		red			1		
38	P5-2	TP17	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	plain/undecorated				2		
39	P5-2	TP17	N/A	ceramic	porcelain	food and beverage	tableware	tableware: indeterminate	body					1		
40	P5-2	TP17	N/A	ceramic	Rockingham ware	food and beverage	tableware	tableware: indeterminate	body					1		
41	P5-2	TP17	N/A	ceramic	coarse earthenware, red	indeterminate	indeterminate	indeterminate	body					1		
42	P5-2	TP17	N/A	ceramic	coarse earthenware, yellow	indeterminate	indeterminate	indeterminate	body					1		
43	P5-2	TP17	N/A	metal	iron	structural	building component	nail: common	complete			machine-cut		1		
44	P5-2	TP18	N/A	ceramic	refined white earthenware	food and beverage	tableware	holloware: indeterminate	body	hand-painted	late palette			1		green, red, floral pattern
45	P5-2	TP18	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	transfer printed	blue			1		indeterminate pattern
46	P5-2	TP18	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	plain/undecorated				2		
47	P5-2	TP18	N/A	ceramic	clay: white ball	personal/societal	smoking	pipe bowl	rim					1		
48	P5-2	TP18	N/A	glass	indeterminate	indeterminate	container	container: indeterminate	body		clear/colourless			1		
49	P5-2	TP18	N/A	brick	brick	structural	building component	brick	fragment		red			2		
50	P5-2	TP19	N/A	ceramic	refined white earthenware	food and beverage	tableware	tableware: indeterminate	body	plain/undecorated				1		
51	P5-2	TP19	N/A	glass	indeterminate	indeterminate	container	container: indeterminate	body		dark olive			2		
52	P5-2	TP19	N/A	faunal	bone	ecological	faunal	bone	indeterminate fragment	mammal, small to medium			calcined	1		
53	P5-2	TP19	N/A	faunal	bone	ecological	faunal	bone	long bone fragment	mammal, small to medium				1		
54	P5-2	TP19	N/A	metal	iron	structural	building component	nail: common	complete/proximal			machine-cut		2		1 complete, 1 proximal frag.
55	P5-2	TP19	N/A	metal	iron	indeterminate	indeterminate	indeterminate	fragment					2		
56	P5-2	TP19	N/A	metal	copper alloy	miscellaneous	hardware	wire	fragment					1		
57	P5-2	TP19	N/A	clinker	clinker	miscellaneous	indeterminate	clinker						2		
58	P5-2	TP19	N/A	plastic	indeterminate	indeterminate	indeterminate	indeterminate	fragment		blue			1		
59	P5-2	TP20	N/A	metal	iron	miscellaneous	hardware	bolt	complete					1		
60	P5-2	TP20	N/A	plastic	indeterminate	indeterminate	indeterminate	indeterminate	fragment		blue			1		
61	P5-2	TP20	N/A	metal	brass	arms and ammunition	ammunition	shell casing; .22 caliber	fragment					1	3	
62	P5-2	TP21	N/A	glass	indeterminate	indeterminate	container	container: indeterminate	body		clear/colourless			1		
63	P5-2	TP22	N/A	glass	indeterminate	indeterminate	container	container: indeterminate	body		aqua			1		
64	P5-2	TU1-L1	0-26	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				3		
65	P5-2	TU1-L1	0-26	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	blue			2		
66	P5-2	TU1-L1	0-26	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	hand-painted	late palette			2		red
67	P5-2	TU1-L1	0-26	ceramic	refined white earthenware	food and beverage	tableware	holloware: indeterminate	body	industrial slip	banded			5		blue, green
68	P5-2	TU1-L1	0-26	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	rim	moulded	wheat/ceres			1		

Cat. #	Loc.	CSP #	Depth (cm)	Material 1	Material 2	Function 1	Function 2	Object	Fragment	Attribute 1	Attribute 2	Manufacture	Alteration	# of Artifacts	# of Objects	Note
69	P5-2	TU1-L1	0-26	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				5		
70	P5-2	TU1-L1	0-26	ceramic	coarse earthenware, red	food and beverage	container	container: indeterminate	body	red slip				1		
71	P5-2	TU1-L1	0-26	ceramic	coarse earthenware, yellow	food and beverage	container	container: indeterminate	body	yellow glaze				1		
72	P5-2	TU1-L1	0-26	ceramic	coarse earthenware, red	tools and equipment	agricultural	drainage tile						1		
73	P5-2	TU1-L1	0-26	glass		indeterminate	container	container: indeterminate	body		dark olive			1		
74	P5-2	TU1-L1	0-26	glass		indeterminate	container	container: indeterminate	body		clear/colourless			6		
75	P5-2	TU1-L1	0-26	metal	ferrous alloy	tools and equipment	clothing	clothespin spring	incomplete					1		
76	P5-2	TU1-L1	0-26	metal	ferrous alloy	structural	building component	nail: common	incomplete			machine-cut		4		
77	P5-2	TU1-L1	0-26	metal	ferrous alloy	miscellaneous	hardware	bolt	complete	lag	square head			1		
78	P5-2	TU1-L1	0-26	brick		structural	building component	brick	incomplete					3		2 yellow, 1 red
79	P5-2	TU1-L1	0-26	plastic		indeterminate	indeterminate	indeterminate			white			1		
80	P5-2	TU1-L1	0-26	faunal	bone	ecological	faunal	bone	incomplete	mammal, indeterminate				2		
81	P5-2	TU1-L1	0-26	faunal	bone	ecological	faunal	bone	incomplete	Bos taurus	metapodial condyle			1		
82	P5-2	TU1-L1	0-26	faunal	dentition	ecological	faunal	tooth	incomplete	Bos taurus	molar			1		
83	P5-2	TU1-L2	26-31	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	flow transfer printed	blue			1		
84	P5-2	TU1-L2	26-31	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	rim	moulded	wheat/ceres			1		
85	P5-2	TU1-L2	26-31	ceramic	stoneware	food and beverage	container	container: indeterminate	rim	clear glaze				2		
86	P5-2	TU1-L2	26-31	ceramic	white ball clay	personal/societal	smoking	pipe stem	incomplete					1		
87	P5-2	TU1-L2	26-31	brick		structural	building component	brick	incomplete					1		red
88	P5-2	TU1-L2	26-31	carbon	coal	miscellaneous	indeterminate	coal						1		
89	P5-2	TU2-L1	0-20	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				4		
90	P5-2	TU2-L1	0-20	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	rim	transfer printed	blue			2		
91	P5-2	TU2-L1	0-20	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	black			1		
92	P5-2	TU2-L1	0-20	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	brown			1		
93	P5-2	TU2-L1	0-20	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				1		
94	P5-2	TU2-L1	0-20	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	blue			1		
95	P5-2	TU2-L1	0-20	ceramic	coarse earthenware, red	food and beverage	container	container: indeterminate	body	yellow glaze				1		
96	P5-2	TU2-L1	0-20	glass		indeterminate	container	container: indeterminate	body		manganese			2		
97	P5-2	TU2-L1	0-20	glass		indeterminate	container	container: indeterminate	body		white			1		
98	P5-2	TU2-L1	0-20	glass		structural	building component	window pane	body		clear/colourless			2		
99	P5-2	TU2-L1	0-20	metal	ferrous alloy	indeterminate	indeterminate	indeterminate						2		
100	P5-2	TU2-L1	0-20	metal	ferrous alloy	structural	building component	nail: common	incomplete			machine-cut		1		
101	P5-2	TU2-L1	0-20	brick		structural	building component	brick	incomplete					2		red
102	P5-2	TU2-L1	0-20	mortar		structural	building component	mortar						1		
103	P5-2	TU2-L1	0-20	carbon	coal	miscellaneous	indeterminate	coal						1		
104	P5-2	TU2-L1	0-20	plastic		indeterminate	indeterminate	indeterminate			red			1		
105	P5-2	TU2-L1	0-20	faunal	bone	ecological	faunal	bone	incomplete	mammal, indeterminate				1		
106	P5-2	TU2-L2	20-25	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	rim	transfer printed	blue			2		
107	P5-2	TU2-L2	20-25	ceramic	coarse earthenware, red	food and beverage	container	container: indeterminate	body	yellow glaze				2		
108	P5-2	TU2-L2	20-25	glass		structural	building component	window pane			clear/colourless			1		
109	P5-2	TU2-L2	20-25	brick		structural	building component	brick						1		red
110	P5-2	TU2-L2	20-25	carbon	coal	miscellaneous	indeterminate	coal						1		
111	P5-2	TU2-L2	20-25	clinker		miscellaneous	indeterminate	clinker						1		
112	P5-2	TU2-L2	20-25	faunal	bone	ecological	faunal	bone	incomplete	mammal, large	humerus			1	4	
113	P5-2	TU2-L2	20-25	faunal	bone	ecological	faunal	bone	incomplete	mammal, large	ulna			1		
114	P5-2	TU3-L1A	0-10	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				2		
115	P5-2	TU3-L1A	0-10	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	rim	transfer printed	blue			1		
116	P5-2	TU3-L1A	0-10	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	flow transfer printed	blue			1		
117	P5-2	TU3-L1A	0-10	ceramic	vitrified white earthenware	food and beverage	tableware	holloware: indeterminate	rim	flow transfer printed	blue			3		
118	P5-2	TU3-L1A	0-10	ceramic	vitrified white earthenware	food and beverage	tableware	holloware: indeterminate	body	plain/undecorated				1		
119	P5-2	TU3-L1A	0-10	ceramic	coarse earthenware, red	food and beverage	container	container: indeterminate	body	yellow glaze				1		
120	P5-2	TU3-L1A	0-10	ceramic	coarse earthenware, red	tools and equipment	agricultural	drainage tile						8		
121	P5-2	TU3-L1A	0-10	glass		indeterminate	container	jar	finish	external thread	clear/colourless			1	2	
122	P5-2	TU3-L1A	0-10	glass		indeterminate	container	container: indeterminate	body		clear/colourless			15		
123	P5-2	TU3-L1A	0-10	glass		indeterminate	container	container: indeterminate	body	moulded	clear/colourless			4		plant motif
124	P5-2	TU3-L1A	0-10	glass		indeterminate	container	container: indeterminate	rim	moulded	clear/colourless	press moulded		1		
125	P5-2	TU3-L1A	0-10	glass		indeterminate	container	container: indeterminate	body				burnt	1		
126	P5-2	TU3-L1A	0-10	glass		structural	building component	window pane			clear/colourless			10		
127	P5-2	TU3-L1A	0-10	brick		structural	building component	brick	incomplete					2		1 red, 1 yellow
128	P5-2	TU3-L1A	0-10	metal	ferrous alloy	structural	building component	nail: common	incomplete			machine-cut		3		
129	P5-2	TU3-L1A	0-10	metal	ferrous alloy	structural	building component	nail: common	complete			wire-drawn		37		
130	P5-2	TU3-L1A	0-10	metal	ferrous alloy	structural	building component	nail: common	complete			wire-drawn		50		estimate; nail ball
131	P5-2	TU3-L1A	0-10	metal	ferrous alloy	miscellaneous	hardware	spike	complete			wire-drawn		1		
132	P5-2	TU3-L1A	0-10	metal	ferrous alloy	miscellaneous	hardware	bolt	complete	carriage				2		
133	P5-2	TU3-L1A	0-10	metal	lead alloy	miscellaneous	hardware	pipe cap	complete					1		
134	P5-2	TU3-L1A	0-10	metal	ferrous alloy	indeterminate	indeterminate	indeterminate						5		
135	P5-2	TU3-L1A	0-10	metal	aluminum alloy	indeterminate	decoration	indeterminate	incomplete					1		decorative metal
136	P5-2	TU3-L1A	0-10	metal	aluminum alloy	miscellaneous	container	tube	complete					1		like a toothpaste tube
137	P5-2	TU3-L1A	0-10	metal	aluminum alloy	miscellaneous	foil	aluminum foil						2		
138	P5-2	TU3-L1A	0-10	asbestos		structural	building component	tile	incomplete					1		
139	P5-2	TU3-L1A	0-10	plastic		indeterminate	indeterminate	indeterminate				white		1		
140	P5-2	TU3-L1B	10-22	ceramic	vitrified white earthenware	food and beverage	tableware	holloware: indeterminate	body	plain/undecorated				1		
141	P5-2	TU3-L1B	10-22	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	rim	lithographed			burnt	1		
142	P5-2	TU3-L1B	10-22	ceramic	coarse earthenware, red	tools and equipment	agricultural	drainage tile						5		
143	P5-2	TU3-L1B	10-22	glass		indeterminate	container	jar	finish	external thread	clear/colourless			4		
144	P5-2	TU3-L1B	10-22	glass		indeterminate	container	container: indeterminate	rim	moulded	manganese	press moulded		1		

Cat. #	Loc.	CSP #	Depth (cm)	Material 1	Material 2	Function 1	Function 2	Object	Fragment	Attribute 1	Attribute 2	Manufacture	Alteration	# of Artifacts	# of Objects	Note
145	P5-2	TU3-L1B	10-22	glass		indeterminate	container	container: indeterminate	body		clear/colourless			7		
146	P5-2	TU3-L1B	10-22	glass		structural	building component	window pane			clear/colourless			4		
147	P5-2	TU3-L1B	10-22	brick		structural	building component	brick	incomplete					1		yellow
148	P5-2	TU3-L1B	10-22	metal	ferrous alloy	structural	building component	nail: common	complete			wire-drawn		9		
149	P5-2	TU3-L1B	10-22	metal	ferrous alloy	miscellaneous	hardware	hinge	incomplete					1		spring-return
150	P5-2	TU3-L1B	10-22	metal	ferrous alloy	miscellaneous	hardware	bracket	complete					2		
151	P5-2	TU3-L1B	10-22	metal	steel	miscellaneous	hardware	pipe	incomplete	threaded				1		
152	P5-2	TU3-L1B	10-22	composite	metal/cloth	structural	building component	electrical wire						1		
153	P5-2	TU3-L1B	10-22	metal	aluminum alloy	miscellaneous	clothing	safety pin	complete					1		
154	P5-2	TU3-L1B	10-22	metal	ferrous alloy	miscellaneous	hardware	wire						2		
155	P5-2	TU3-L1B	10-22	metal	aluminum alloy	indeterminate	indeterminate	indeterminate						6		
156	P5-2	TU3-L1B	10-22	metal	aluminum alloy	personal/societal	photography	film canister						1		Kodak
157	P5-2	TU3-L1B	10-22	metal	aluminum alloy	miscellaneous	container	tube	complete					1		like a toothpaste tube
158	P5-2	TU3-L1B	10-22	metal	aluminum alloy	miscellaneous	foil	aluminum foil						4		
159	P5-2	TU3-L1B	10-22	metal	aluminum alloy	miscellaneous	container	can	incomplete		pink			1		
160	P5-2	TU3-L1B	10-22	plastic		indeterminate	indeterminate	indeterminate			grey			1		
161	P5-2	TU3-L1B	10-22	clinker		miscellaneous	indeterminate	clinker						1		
162	P5-2	TU3-L1B	10-22	faunal	bone	ecological	faunal	bone	incomplete	mammal, indeterminate			calcined	3		
163	P5-2	TU3-L1B	0-10	faunal	bone	ecological	faunal	bone	incomplete	mammal, indeterminate			1 calcined	3		
164	P5-2	TU3-L2	22-32	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated			1 burnt	4		
165	P5-2	TU3-L2	22-32	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	rim	edged	blue			2		1 scalloped, 1 unscalloped
166	P5-2	TU3-L2	22-32	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	blue			1		
167	P5-2	TU3-L2	22-32	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	black			2		
168	P5-2	TU3-L2	22-32	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				1		
169	P5-2	TU3-L2	22-32	ceramic	coarse earthenware, red	food and beverage	container	container: indeterminate	rim	yellow glaze				2		
170	P5-2	TU3-L2	22-32	ceramic	coarse earthenware, red	tools and equipment	agricultural	drainage tile	incomplete					1		
171	P5-2	TU3-L2	22-32	glass		indeterminate	container	bottle	finish	mineral	aqua		burnt	1		
172	P5-2	TU3-L2	22-32	glass		indeterminate	container	container: indeterminate	body		clear/colourless			1		
173	P5-2	TU3-L2	22-32	glass		structural	building component	window pane			clear/colourless			6		
174	P5-2	TU3-L2	22-32	metal	ferrous alloy	structural	building component	nail: common	complete			machine-cut		9		
175	P5-2	TU3-L2	22-32	metal	ferrous alloy	structural	building component	nail: common	complete			wire-drawn		7		
176	P5-2	TU3-L2	22-32	metal	ferrous alloy	miscellaneous	hardware	wire						1		
177	P5-2	TU3-L2	22-32	metal	bronze	indeterminate	indeterminate	indeterminate						2		
178	P5-2	TU3-L2	22-32	carbon	coal	miscellaneous	indeterminate	coal						1		
179	P5-2	TU3-L2	22-32	clinker		miscellaneous	indeterminate	clinker						1		
180	P5-2	TU3-L2	22-32	faunal	bone	food and beverage	food	bone	incomplete	Bos taurus	vertebra		butchered	1		
181	P5-2	TU3-L2	22-32	faunal	bone	ecological	faunal	bone	incomplete	mammal, indeterminate				3		
182	P5-2	TU3-L2	22-32	faunal	bone	ecological	faunal	bone	incomplete	mammal, indeterminate			calcined	2		
183	P5-2	TU3-L3	32-42	metal	ferrous alloy	structural	building component	nail: common	incomplete			machine-cut		3		
184	P5-2	TU3-L3	32-42	brick		structural	building component	brick	incomplete					1		red
185	P5-2	TU4-L1	0-13	ceramic	yellowware	food and beverage	tableware	hollowware: indeterminate	body	plain/undecorated				1		
186	P5-2	TU4-L1	0-13	ceramic	vitrified white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				1		
187	P5-2	TU4-L1	0-13	ceramic	stoneware	food and beverage	container	container: indeterminate	body	salt glaze ext	Albany slip int.			1		"D."
188	P5-2	TU4-L1	0-13	ceramic	coarse earthenware, red	tools and equipment	agricultural	drainage tile						5		
189	P5-2	TU4-L1	0-13	glass		structural	building component	window pane			clear/colourless			2		
190	P5-2	TU4-L1	0-13	metal	steel	miscellaneous	hardware	support						1		machine part
191	P5-2	TU4-L1	0-13	carbon	coal	miscellaneous	indeterminate	coal						1		
192	P5-2	TU4-L1	0-13	plastic		tools and equipment	agricultural	syringe	complete		white			1		antibiotic syringe
193	P5-2	TU4-L1	0-13	plastic		indeterminate	indeterminate	indeterminate						4		
194	P5-2	TU4-L2	12-41	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	plain/undecorated				2		
195	P5-2	TU4-L2	12-41	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	transfer printed	blue			2		
196	P5-2	TU4-L2	12-41	ceramic	refined white earthenware	food and beverage	tableware	flatware: indeterminate	body	industrial slip	banded			1		blue
197	P5-2	TU4-L2	12-41	ceramic	vitrified white earthenware	food and beverage	tableware	hollowware: indeterminate	body	transfer printed	blue			1		
198	P5-2	TU4-L2	12-41	ceramic	porcelain	food and beverage	tableware	hollowware: indeterminate	body	plain/undecorated				1		
199	P5-2	TU4-L2	12-41	ceramic	Rockingham ware	food and beverage	tableware	hollowware: indeterminate	body	Rockingham glaze				1		
200	P5-2	TU4-L2	12-41	ceramic	stoneware	food and beverage	container	container: indeterminate	body	salt glaze ext	Albany slip int.			6		
201	P5-2	TU4-L2	12-41	ceramic	stoneware	food and beverage	container	container: indeterminate	rim	yellow glaze				1		
202	P5-2	TU4-L2	12-41	ceramic	coarse earthenware, red	food and beverage	container	container: indeterminate	body	tan, brown, yellow glazes				4		2 tan, 1 brown, 1 yellow
203	P5-2	TU4-L2	12-41	ceramic	coarse earthenware, red	tools and equipment	agricultural	drainage tile						17		
204	P5-2	TU4-L2	12-41	ceramic	dust-pressed	structural	building component	tile	incomplete	unglazed				1		
205	P5-2	TU4-L2	12-41	glass		indeterminate	container	container: indeterminate	body	embossed	manganese	mould		2		illegible
206	P5-2	TU4-L2	12-41	glass		indeterminate	container	container: indeterminate	body		dark olive			1		
207	P5-2	TU4-L2	12-41	glass		indeterminate	container	container: indeterminate	body		brown			2		
208	P5-2	TU4-L2	12-41	glass		indeterminate	container	container: indeterminate	body		aqua	mould		2		
209	P5-2	TU4-L2	12-41	glass		indeterminate	container	container: indeterminate	body		clear/colourless			1		
210	P5-2	TU4-L2	12-41	glass		structural	building component	window pane			clear/colourless			4		
211	P5-2	TU4-L2	12-41	metal	ferrous alloy	structural	building component	nail: common	complete			machine-cut		2		
212	P5-2	TU4-L2	12-41	metal	ferrous alloy	structural	building component	nail: common	complete			wire-drawn		1		
213	P5-2	TU4-L2	12-41	metal	ferrous alloy	miscellaneous	hardware	bolt	complete	carriage				1		
214	P5-2	TU4-L2	12-41	metal	copper alloy	miscellaneous	hardware	pipe cap	complete		chromed			1		
215	P5-2	TU4-L2	12-41	metal	ferrous alloy	miscellaneous	hardware	fence wire						2		
216	P5-2	TU4-L2	12-41	metal	cast iron	indeterminate	indeterminate	plate						1		
217	P5-2	TU4-L2	12-41	metal	copper alloy	personal/societal	clothing	button	complete	4-hole				1		
218	P5-2	TU4-L2	12-41	metal	aluminum alloy	miscellaneous	container	tube	complete					1		like a toothpaste tube
219	P5-2	TU4-L2	12-41	brick		structural	building component	brick	incomplete					1		1 red, 1 yellow
220	P5-2	TU4-L2	12-41	carbon	coal	miscellaneous	indeterminate	coal						3		

Cat. #	Loc.	CSP #	Depth (cm)	Material 1	Material 2	Function 1	Function 2	Object	Fragment	Attribute 1	Attribute 2	Manufacture	Alteration	# of Artifacts	# of Objects	Note
221	P5-2	TU4-L2	12-41	plastic		indeterminate	indeterminate	indeterminate						3		1 tan, 2 black
Location 5 (AfHh-946)																
1	P7-1	TP1	ceramic	vitrified white earthenware	food and beverage	tableware	tableware:indeterminate	body	plain/undecorated				2			
2	P7-1	TP7	glass		food and beverage	container	container: indeterminate	body		clear/colourless			1			
3	P7-1	TP6	glass		structural	building component	window glass	fragment		clear/colourless			1			
4	P7-1	TP11	glass		structural	building component	window glass	fragment		clear/colourless			1			
5	P7-1	TP5	fauna	bone	ecological	fauna	bone	incomplete	mammal, large	rib			1	3		
6	P7-1	TP8	glass		indeterminate	container	container: indeterminate	body		aqua:light			3			
7	P7-1	TP8	ceramic	vitrified white earthenware	food and beverage	tableware	tableware:indeterminate	rim	transfer print	blue			1			
8	P7-1	TP8	metal	iron	structural	building component	nail: common	complete			machine cut		1			
9	P7-1	TP8	metal	iron	miscellaneous	hardware	bracket	incomplete					1			
10	P7-1	TP8	metal	iron	indeterminate	indeterminate	indeterminate	incomplete					1			
11	P7-1	TP8	fauna	bone	food and beverage	food	bone	incomplete	<i>Bos taurus</i>	humerus, head		butchered	1			
12	P7-1	TP12	ceramic	vitrified white earthenware	food and beverage	tableware	tableware:indeterminate	body	plain/undecorated				1			
13	P7-1	TP12	ceramic	vitrified white earthenware	food and beverage	tableware	tableware:indeterminate	body	transfer print	teal			5			
14	P7-1	TP12	glass		food and beverage	container	container: indeterminate	body		clear/colourless			1			
15	P7-1	TP12	rubber	indeterminate	indeterminate	indeterminate	indeterminate	incomplete		black			1			
16	P7-1	TP12	metal	iron	structural	building component	nail: common	complete			wire drawn		1			
17	P7-1	TP12	fauna	bone	food and beverage	food	bone	incomplete	mammal, indeterminate	indeterminate		butchered	1			
18	P7-1	TP12	metal	iron	miscellaneous	hardware	staple	complete					1			
19	P7-1	TP12	plastic	indeterminate	indeterminate	indeterminate	indeterminate	incomplete		white			3			
20	P7-1	TP3	brick	brick	structural	building component	brick	incomplete					1			
21	P7-1	TP3	metal	iron	miscellaneous	indeterminate	wire						1			
22	P7-1	TP3	carbon	coal	miscellaneous	fuel	coal						1			
23	P7-1	TP3	glass		structural	building component	window glass	fragment		clear/colourless			1			
24	P7-1	TP9	carbon	coal	miscellaneous	fuel	coal						1			
25	P7-1	TP9	glass		food and beverage	container	container: indeterminate	body		green: dark olive			1			
26	P7-1	TP9	glass		food and beverage	container	container: indeterminate	body		clear/colourless			1		solarized	solarized
27	P7-1	TP9	glass		food and beverage	container	container: indeterminate	body		clear/colourless			2			
28	P7-1	TP9	glass		food and beverage	tableware	tableware:indeterminate	body	pressed	clear/colourless			1		diamond patter	diamond pattern
29	P7-1	TP9	ceramic	vitrified white earthenware	food and beverage	tableware	tableware:indeterminate	body	plain/undecorated				3			
30	P7-1	TP2	metal	iron	structural	building component	nail: common	complete			wire drawn		1			
31	P7-1	TP2	metal	iron	structural	building component	nail: common	incomplete			wire drawn		1			
32	P7-1	TP10	metal	iron	structural	building component	nail: common	complete			machine cut		1			
33	P7-1	TP13	ceramic	coarse red earthenware	food and beverage	storage container	container: indeterminate	rim	green salt glaze int. and ext.				1			
34	P7-1	TP13	metal	tinfoil	indeterminate	indeterminate	tinfoil	fragment					1	2		
35	P7-1	TP4	glass		structural	building component	window glass	fragment		clear/colourless			1			
Location 6																
1	P7-2	TP1	N/A	stone	chert:Onondaga	tools and equipment	debitage	biface thinning flake	complete			chipped		1		

ATTACHMENT B

B.01 Stage 3 Archaeological Assessment
B.02 MHSTCI Review and Entry in Public Registry



REVISED REPORT

Stage 3 Archaeological Assessment

*White Oak 1 Site (AfHh-926),
W12A Landfill Site, Potential Landfill Expansion Area,
Part of Lot 20, Concession 6,
Former Township of Westminster, Middlesex County,
Now City of London, Ontario*

Submitted to:

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June 12, 2020

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1 e-copy to the Ministry of Tourism, Culture, and Sport

1 e-copy to Golder

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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 contracted by the Corporation of the City of London (the "City") to conduct a Stage 3 Archaeological Assessment of the White Oak 1 Site (AfHh-926), a pre-contact Indigenous site located within a potential landfill expansion area for the W12 Landfill Site at 3502 Manning Drive, London, Ontario (Map 1 and Map 2). The potential landfill expansion area, hereafter referred to as the "Study Area", is being considered by the City as an option for further growth of the W12A Landfill Site. It is approximately 3 ha in size and legally described as part of Lot 20, Concession 6 in the former geographic Township of Westminster, Middlesex County, now City of London, Ontario. The White Oak 1 site (AfHh-926) was previously identified by Golder during a Stage 2 survey of the Study Area and subsequently recommended for Stage 3 assessment (Golder 2018).

The Stage 3 Archaeological Assessment of White Oak 1 (AfHh-926) was conducted to meet the standard requirements of the *Environmental Assessment Act*, R.S.O 1990, c.E.18 (Government of Ontario 1990a), as required by the City of London prior to land disturbance. It consisted of the hand excavation of 28 one-metre square test units across an area measuring approximately 30 m east-west by 25 m north-south and resulted in the recovery of 126 pre-contact Indigenous artifacts and 62 historical Euro-Canadian artifacts.

Based on the results of the Stage 3 Archaeological Assessment, the White Oak 1 site (AfHh-926) is interpreted as a small Late Archaic campsite that meets provincial criteria for have sufficient cultural heritage value or interest to require Stage 4 mitigation prior to development impacts. This conclusion is based on the identification of four Stage 3 test units that produced 10 or more pre-contact Indigenous artifacts.

The Ministry of Tourism, Culture and Sport's (MTCS) preferred method of Stage 4 mitigation is through avoidance and protection. Through discussions with the proponent and engagement with Indigenous communities, it has been determined that White Oak 1 (AfHh-926) can be avoided. As such, Stage 4 mitigation by long-term avoidance and protection is recommended for the White Oak 1 site (AfHh-926). Further details regarding this recommendation are provided in Section 5.0.

There are no further concerns for impacts to archaeological sites in the remainder of the Study Area outside the 10 m buffer.

The MTCS is asked to review the results and recommendations presented herein, accept this report into the Provincial Register of archaeological reports and issue a standard letter of compliance with the Ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licencing.

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APPENDICES

APPENDIX A

Glossary of Terms and Definitions

APPENDIX B

Artifact Catalogue

User Note: This Table of Contents section acts as a reference point for the Record of Issue, Executive Summary and Study Limitations sections as and when they might be required.

1.0 PROJECT CONTEXT

1.1 Development Context

Golder Associates Ltd. (“Golder”) was contracted by the Corporation of the City of London (the “City”) to conduct a Stage 3 Archaeological Assessment of the White Oak 1 Site (AfHh-926), a pre-contact Indigenous site located within a potential landfill expansion area for the W12 Landfill Site at 3502 Manning Drive, London, Ontario (Map 1 and Map 2). The potential landfill expansion area, hereafter referred to as the “Study Area”, is being considered by the City as an option for further growth of the W12A Landfill Site. It is approximately 3 ha in size and legally described as part of Lot 20, Concession 6 in the former geographic Township of Westminster, Middlesex County, now City of London, Ontario. The White Oak 1 site (AfHh-926) was previously identified by Golder during a Stage 2 survey of the Study Area and subsequently recommended for Stage 3 assessment (Golder 2018).

The Stage 3 assessment was conducted to meet the standard requirements of the *Environmental Assessment Act*, R.S.O 1990, c.E.18 (Government of Ontario 1990a), as required by the City of London prior to land disturbance. White Oak 1 (AfHh-926) was discovered during a Stage 1-2 Archaeological Assessment conducted by Golder in the spring of 2018 (Golder 2018).

The Stage 3 assessment was conducted under professional archaeological licence P457, issued to Lafe Meicenheimer of Golder by the MTCS (PIF# P457-0071-2018). Permission to enter the property to conduct all required archaeological fieldwork activities, including the recovery of artifacts, was granted by Michael Losee of the City of London.

1.2 Historical Context

The Study Area is situated in an area of Ontario that exhibits evidence of an extended period of human settlement dating back at least 11,000 years (see Map 3). To provide context to the following sections of this report, the nature of this settlement is summarized below, beginning with the pre-contact Indigenous period as it relates to the London area in general. This is followed by a summary of the historical Euro-Canadian period for Westminster Township in general, and the Study Area specifically.

1.2.1 Pre-Contact Indigenous Period

Table 1 provides a general outline of the pre- and post-contact culture history for Middlesex County, drawn from Ellis and Ferris (1990).

Table 1: Cultural Chronology for Middlesex County

Period	Characteristics	Time	Comments
Early Paleo	Fluted Projectiles	9000 - 8400 BC	spruce parkland/caribou hunters
Late Paleo	Hi-Lo Projectiles	8400 – 8000 BC	smaller but more numerous sites
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	Narrow Points	2000 - 1800 BC	increasing site size
	Broad Points	1800 - 1500 BC	large chipped lithic tools

Period	Characteristics	Time	Comments
	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 500	increased sedentism
	Princess Point	AD 550 – 900	introduction of corn
Ontario Iroquoian 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
Western Basin Late Woodland	Riviere au Vase	AD 500 - 900	introduction of corn
	Young Phase	AD 900 - 1200	dense storage pits, proto-settlements
	Springwell Phase	AD 1200 - 1400	emergence of agricultural villages
	Wolf Phase	AD 1400 - 1550	palisaded villages, tribal warfare and displacement
Contact Indigenous	Various Algonquian Groups	AD 1700 – 1875	early written records and treaties
Historical	Euro-Canadian	AD 1796 – present	European settlement

1.2.1.1 Paleo Period

The first human occupation of the London area, known as the Paleo Period, begins just after the end of the Wisconsin Glacial Period. Although there was a complex series of ice retreats and advances which played a large role in shaping the local London topography, southwestern 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.

Our current understanding of Early Paleo settlement patterns suggests that small bands, that consisted of probably no more than 25 to 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 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 Lake Algonquin, the post-glacial lake occupying the Lake Huron/Georgian Bay basin.

There are a few extremely large Early Paleo sites, such as the 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 camps scattered throughout the interior of southwestern Ontario, usually situated adjacent to wetlands.

Research suggests that population densities were very low during the Early Paleo Period, with all of southwestern Ontario being occupied by perhaps only 100 to 200 people (Ellis and Deller 1990:54). Because this is the case, Early Paleo sites are exceedingly rare, and within the limits of London only four locations are known. Three of these sites are isolated find spots of the distinctive fluted points or channel flakes, while one site, located near Dingman Creek, represents a rare occupation area with a good deal of potential for contributing to our knowledge of this period. To date, all of the known Early Paleo sites in Middlesex are located south of the Main and South branches of the Thames River.

While the Late Paleo Period (8400-8000 BC) is more recent, it has been less well researched, and is consequently more poorly understood. By this time the environment of southwestern 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 Period had either moved further north, or as in the case of the mastodons and mammoths, become extinct.

During the late Paleo Period people continued to cover large territories as they moved about in response to seasonal resource fluctuations. On a province wide basis Late Paleo projectile points are far more common than Early Paleo materials, suggesting a relative increase in population.

The end of the Paleo 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.

1.2.1.2 Archaic Period

During the Early Archaic Period (8000-6000 BC), the jack and red pine forests that characterized the Late Paleo environment were replaced by forests dominated by white pine with some associated deciduous trees (Ellis et al 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 include 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 towards more diverse toolkits continued, as the presence of net-sinkers 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 is 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 resulted in a reorganization of Indigenous subsistence practices, as more people had to rely on resources from smaller areas. 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 et al 1990:66). By 3500 BC, the local environment had stabilized in a near modern form (Ellis et al 1990:69).

During the Late Archaic (2500-950 BC) 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 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 such as the Thames River.

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 appear. 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. While the function of these artifacts is presently poorly understood, they are especially common in the London area.

1.2.1.3 Woodland Period

The Early Woodland Period (950-400 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 very crudely constructed, 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 (Spence et al 1990:137). These vessels were not easily portable, and individual pots must not have sustained 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 rather limited ceramic technology, the life-ways of Early Woodland peoples show a great deal of continuity with the preceding Late Archaic Period. For instance, birdstones continue 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 continue 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 shell 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 the London area.

In terms of settlement and subsistence patterns, the Middle Woodland (400 BC- AD 900) 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 became an even more important part of the diet. This is especially true in the nearby London area, where some Middle Woodland sites have produced literally thousands of bones from spring spawning species such as walleye and sucker. In addition, Middle Woodland peoples relied much more extensively on ceramic technology. Middle Woodland vessels are often garishly 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 appear on the valley floor of major rivers. While the valley floors of floodplains had been utilized by earlier peoples, Middle Woodland sites are significantly different in that the same location was repeatedly occupied over several hundred years. Because this is the case, rich 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 towards a greater degree of sedentism continues 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; Smith 1990; Williamson 1990). Corn may have been introduced into southwestern Ontario from the American Midwest as early as AD 600. However, it did not become a dietary staple until at least three to four hundred years later.

The first agricultural villages in southwestern Ontario date to the 10th century AD. 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 inhabited southwestern Ontario at the time of first European contact, to these early villagers.

Village sites dating between AD 900 and 1300 share many attributes with the historically reported Iroquoian sites, including the presence of longhouses and sometimes palisades. However, these early longhouses were not actually 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 2010). 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 range between one and two hectares.

House lengths also change dramatically, more than doubling to an average of 30 m, while houses of up to 45 m have been documented. This radical 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. There are, however, 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 changes dramatically by AD 1300. During the Early Ontario Iroquoian Period villages were haphazardly planned at best, with houses oriented in various directions. During the Middle Ontario Iroquoian Period villages are 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) continues many of the trends which have been documented for the proceeding 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 stretched an incredible 123 m (Lennox and Fitzgerald 1990:444-445). After AD1450, house lengths begin to decrease, with houses dating between AD 1500-1580 averaging only 30 m in length.

Why house lengths decrease 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 in the London area. The ongoing excavations at the Lawson site, a large Late Iroquoian village located on the grounds of the Museum of Ontario Archaeology, has shown that the original village had expanded by at least twenty percent to accommodate the construction of nine additional longhouses (Anderson 2009).

The Ontario Iroquoian and Western Basin are two archaeological traditions that characterize pre-contact Indigenous communities living in the Middlesex County area of southwestern Ontario from about AD 500 to 1650. Peoples of the Western Basin Tradition lived throughout the southwestern-most portion of the province, from the present-day Sarnia/Windsor area to about London. Iroquoian peoples, on the other hand, appear to have lived from the present-day Chatham area east to Toronto. Each of these traditions are divided into distinct temporal phases (see Table 1) defined by material cultural attributes, and settlement and subsistence patterns that exhibit a shift towards larger and more permanent villages due to an increasing reliance on cultivated plants such as corn, beans, squash, sunflower, and tobacco (Dodd et al. 1990; Foreman 2011; Fox 1990; Lennox and Fitzgerald 1990; Murphy and Ferris 1990).

After AD 1525, communities of pre-contact Indigenous peoples of the Late Ontario Iroquoian Period who had formerly lived throughout southwestern Ontario as far west as the Chatham area moved further east to the Hamilton area. 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. They called these people the "Neutral", because they were not involved in the ongoing wars between the Huron and the League Iroquois located in upper New York State.

It has been satisfactorily demonstrated that the Late Ontario Iroquoian communities which were located in southwestern Ontario as far west as the Chatham area were ancestral to at least some of the Neutral Nation groups (Lennox and Fitzgerald 1990; Smith 1990:283). For this reason, the Late Ontario Iroquoian groups which occupied southwestern Ontario prior to the arrival of the French are often identified as "Prehistorical Neutral". They occupied a large area extending along the Grand River and throughout the Niagara Peninsula as far east as Fort Erie and Niagara Falls (Lennox and Fitzgerald 1990:448).

1.2.2 Post-Contact Indigenous Period

The post-contact Indigenous occupation of southern Ontario was heavily influenced by the dispersal of various Iroquoian-speaking peoples, such as the Huron and closely related Petun, by the New York State Iroquois and the subsequent arrival of Algonkian-speaking groups from northern Ontario at the end of the 17th century and beginning of the 18th century (Schmalz 1991).

The nature of their settlement size, population distribution, and material culture shifted as European settlers encroached upon their territory. However, despite this shift, “written accounts of material life and livelihood, the correlation of historically recorded 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). Indigenous peoples of southern Ontario have left behind archaeologically significant resources throughout southern Ontario which show continuity with past peoples, even if they have not been recorded in historical Euro-Canadian documentation.

Portions of southwestern Ontario were also occupied by Algonkian-speaking groups who also exhibited cultural influence from Iroquoian-speaking groups, both before and after European contact. Generally, the pre-contact Indigenous presence in much of southern Ontario reflects occupation by northern Iroquoian speakers. During and following the Iroquois Wars of the mid-17th century and the dispersal of the Iroquoian-speaking Huron-Petun and Neutral, a considerable reduction in the extent of territory occupied by Algonkian speakers occurred in southern Ontario. Beginning about 1690, northern Algonkian speakers from northern Ontario began to move southwards and southern Iroquoian speakers began to push southern Algonkian speakers further west (Ferris 2009; Schmalz 1991).

1.2.3 Historical Euro-Canadian Period

Following the Toronto Purchase of 1787, today's southern Ontario was within the old Province of Quebec and divided into four political districts: Lunenburg, Mechlenburg, Nassau, and Hesse. These became part of the Province of Upper Canada in 1791, and renamed the Eastern, Midland, Home, and Western Districts, respectively. The Study Area is within the former Hesse District, then later the Western District, which originally included all lands lying to the west of a line running north from Long Point on Lake Erie to Georgian Bay. Each district was further subdivided into counties and townships, with the Study Area falling within Middlesex County and Westminster Township, respectively. One of the first Euro-Canadian historic records for this area is found as part of Treaty No. 2, which:

... was made with the O[dawa], Chippew[a], Pottawatom[i] and Huro[n] May 19th, 1790, portions of which nations had established themselves on the Detroit River all of whom had been driven by the Iroquois from the northern and eastern parts of the Province, from the Detroit River easterly to Catfish Creek and south of the river La Tranche [Thames River] and Chenail Ecarte, and contains Essex County except Anderdon Township and Part of West Sandwich; Kent County except Zone Township, and Gores of Camden and Chatham; Elgin County except Bayham Township and parts of South Dorchester and Malahide. In Middlesex County, Del[a]ware and Westminster Townships and part of North Dorchester [are included].

Morris 1943:17

In 1791, Colonel John Graves Simcoe became the first Lieutenant-Governor of the newly formed Province of Upper Canada. Simcoe was particularly concerned about the threat of American expansion northward and their ability to cross at Detroit into the area known as the Western District (DWTH 2006:32).

It was believed that the best way to defend the land was to populate the area; therefore, in 1793, Simcoe ordered the lands of the Thames River basin to be surveyed for habitation. Surveying and settlement of the Middlesex County area was arranged by Colonel Thomas Talbot, who had been granted a 618,000-acre tract of land along the north shore of Lake Erie. He arranged for his settlement to be surveyed into various townships with networks of roads and concessions that were divided into 200 acre lots.

1.2.3.1 Westminster Township

Westminster Township, in particular, was surveyed in three different segments (DWTH 2006:33-34). The first segment along the North Branch of the Talbot Road (NBTR) was surveyed according to the single front survey system by Deputy Provincial Surveyor Simon T. Z. Watson in 1809. The second segment, which included Concessions A, B, 1 and 2, was also surveyed according to the single front survey system by Deputy Provincial Surveyor Watson and Deputy Surveyor John Bostwick in 1810. The remainder of the township (Concessions 3 to 9 and the Gore Concession between the NBTR and Delaware Township) was surveyed according to the double front survey system by Colonel Mahlon Burwell and John Bostwick in 1820.

The first land patents for Westminster Township were issued as early as 1812 (Brock and Moon 1972). Settlement in the area began in the southwest corner of the township along NBTR. This was followed by later settlements along Commissioners Road, with the southeast portion of the township being settled last (Wilson and Horne 1995). By 1817, the township contained 107 houses and 428 people, and the first meeting of the Westminster Council was held. Two school houses, one grist mill and one saw mill were the only public buildings present in the township at this time (Brock and Moon 1972:566). By 1842, the population had grown to 3,376 and four grist and two saw mills were operating in the township (Smith 1846). By 1850, the population had grown to 4,525 residents, and the industries present included three grist mills, two carding machines, and a fulling mill (Brock and Moon 1972:566). The London and Port Stanley Railway line, which runs north-south through the township, was fully operational by 1856 (Brock and Moon 1972:566). Several small hamlets also developed within the township, including Byron, Lambeth, Hall Mills, Pond Mills, and Glanworth; these communities were settled over the course of the 19th century (Brock and Moon 1972:577-581). Residents were undoubtedly attracted to the fertile soils and plethora of natural resources (e.g., rivers and streams, game animals, fish, fruit trees, limestone) that the area boasted (H.R. Page and Co. 1878).

1.2.3.2 Study Area Historical Context

Prior to its annexation by the City of London in 1993, the Study Area fell within the northern half of Lot 20, Concession 6 in the former geographic Township of Westminster, Middlesex County, Ontario. Several maps of the Study Area exist through online resources and publications, dating as far back as the Patent Plan of Westminster Township from 1857 (Map 4; Burwell 1857). The Patent Plan states that the land was owned by the Canada Company at the time of the map's creation (Heritage Property Index 2018), however, the Abstract Index to Deeds records obtained from the Land Registry Office in London indicate that the Canada Company obtained the 200-acre lot from the Crown in 1835. Edward Jarmain (illegible) and wife had obtained the north half and part of the south half of the lot totalling 168 acres a few years later in 1839.

The 1862 Tremaine Map of Middlesex County shows that the Ezekiel Burley owned the north half of the Lot, while a G. Smith resided in the south half (Map 5; Tremaine 1862). Burley's property shows a house or other structure

just south of centre, adjacent to a jog in the road which is no longer present. In lots directly east and west of Lot 20, the Johnson Family own land. Burley had obtained the north portion of the lot in 1854, and subsequently held mortgages on the land from several individuals, suggesting that he had tenants on the land.

In 1869, Peter Johnson obtained the north half and a portion of the south half of Lot 20, totalling 108 acres, from Samuel St. Lewis. He further subdivided the property, selling the west half and part of the south portion to George Johnson in 1873. The 1878 *Illustrated Historical Atlas* map of Westminster Township indicates that George Johnson was residing on the west half of the north half of Lot 20, while W & D Johnson held the east half of the north (Map 6; Page and Co. 1878). A house and garden are illustrated on this map just north of center on George Johnson's property. The Johnson Family had resided in the area, on the south half of Lot 19 Con 6 primarily, since approximately 1834/35 (Murray 1987), and had obtained land on several adjacent lots, as is evident in the historical records.

The current Study Area is a portion of ploughed agricultural field, located immediately north of the London landfill and adjacent to White Oak Road to the west.

1.3 Archaeological Context

1.3.1 The Natural Environment

The Study Area is situated within the "Mount Elgin Ridges" physiographic region. According to Chapman and Putnam (1984: 144-146) the Mount Elgin Ridges is located:

Between the Thames Valley and the Norfolk sand plain lies a succession of ridges and vales which are called the Mount Elgin Ridges....South of the Westminster and St. Thomas Moraines the country drains to Lake Erie by means of the tributaries of Kettle, Catfish and Otter Creeks....The two major landform components of this region provide obviously contrasting soils. The ridges are well drained while imperfect and even poor drainage characterize the hollows. The ridges are formed from clay till similar to that of the Wyoming Moraine and the Stratford plain.

The localized topography of the Study Area is moderately flat with mildly undulating terrain. Elevation for the Study Area ranges between 270 and 280 metres above sea level. The soils of the Study Area are comprised of the Muriel Association, specifically Muriel, Gobles and Kelvin soils, which include silty clay loams, silty clays, and clay loams. Muriel soils are generally found on higher slope positions and are well to imperfectly drained. Gobles and Kelvin soils generally occur at mid to lower slope positions or depressional areas and are imperfectly to poorly drained. Due to their lower slope position, Gobles and Kelvin soils tend to exhibit a mottled upper B-horizon due to perched water tables, as well as a higher organic matter content. Muriel Association soils are used today for common field crops, including corn and soybeans (Hagerty and Kingston 1992). The closest potable water source is an unnamed tributary of Dodd Creek, which flows through the northern portion of the landfill (Cells 9 and 10), located immediately south of the current Study Area. Dodd Creek is located in the Kettle Creek Watershed and is Kettle Creek's largest tributary, joining it in St. Thomas before continuing to flow south and ultimately draining into Lake Erie at Port Stanley, Ontario.

The bedrock deposits in the vicinity date to the Middle Devonian Period and consist of the Hamilton Group and Dundee Formations (Hewitt 1972). Selkirk chert, a moderate quality raw material, outcrops from the Dundee formation from the mouth of the Grand River along the north shore of Lake Erie, and as far west as the Chatham area (Eley and von Bitter 1989; Fox 2010).

The Study Area lies within the Mixed-wood Plains ecozone of Ontario (The Canadian Atlas Online 2015). Although largely altered by recent human activity, this ecozone once supported a wide variety of deciduous trees, such as various species of ash, birch, chestnut, hickory, oak, and walnut, as well as a variety of birds and small to large land mammals, such as raccoon, red fox, white tailed deer, and black bear. Smith (1850:90) confirms that the timber present in the vicinity of Westminster Township during the first half of the 19th century included oak, beech, maple and chestnut, among other varieties.

Currently, the Study Area is comprised of ploughed agricultural field, bordered by unploughed overgrown grassy fencelines or drainage ditches.

1.3.2 Previous Archaeological Work

A search of the Ontario Archaeological Sites Database (OASD) indicated that there are no registered archaeological sites located within a 1 km radius of the Study Area (MTCS 2018).

According to MTCS records, one assessment has taken place within 50 m of the Study Area, including the current Study Area. In 2005, Archaeologix Inc. conducted a Stage 1 archaeological and built heritage assessment of a 397-ha study area from Scotland Drive to Manning Drive between White Oak Road and Wellington Road. This Stage 1 assessment found areas within the 397 ha study area to have archaeological potential and recommended that those areas be subject to Stage 2 archaeological assessment should they be developed (Archaeologix 2005).

1.3.2.1 Previous Assessments of the Current Study Area

In the spring of 2018, Golder conducted a Stage 1-2 Archaeological Assessment for the current Study Area. The Stage 2 consisted of a combination of pedestrian survey and test pit survey and resulted in the identification of seven archaeological locations. For sites found during pedestrian survey, a controlled surface pickup (CSP) that met all requirements outlined in Section 3.2.1 of the *Standards and Guidelines for Consultant Archaeologists* was conducted (Golder 2018).

Location A (AfHh-929) consisted of 717 Euro-Canadian artifacts and 80 faunal elements recovered from 42 test pits and two test units in an area measuring roughly 30 m east-west by 50 m north-south. The location was determined to be in an area of disturbance associated with the demolition of the farm complex that existed there before the creation of the W12A landfill site. This complex was demolished between 2008 and 2014. Because the artifacts recovered from Location A (AfHh-929) were recovered from disturbed context, the site was concluded to have no further cultural heritage value or interest and not recommended for further work (Golder 2018).

Location 1 (AfHh-928) consisted of one Late Archaic Innes projectile point and one piece of lithic debitage. This location was concluded to have no further cultural heritage value or interest and was not recommended for further work (Golder 2018).

Location 2 consisted of four pieces of lithic debitage, while Locations 3, 5, and 6 were each represented by a single chert flake. Given the isolated and non-diagnostic nature of the finds, these locations were concluded to have no further cultural heritage value or interest and were not recommended for further work (Golder 2018).

Location 4 (AfHh-926) consisted of one projectile point, one scraper, and four pieces of lithic debitage from an area measuring approximately 23 m east-west by 20 m north-south. The projectile point was determined to be a Late Archaic Crawford Knoll point. Location 4 (AfHh-926) was concluded to have further cultural heritage value or interest and was recommended for Stage 3 Archaeological Assessment; this site was named White Oak 1 and is the subject of the current report (Golder 2018).

To the best of our knowledge, no additional archaeological assessments have been conducted within 50 m of the current Study Area.

Information concerning specific site locations is protected by provincial policy and is not fully subject to the *Freedom of Information Act*. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. For this reason, maps and data that provide information on archaeological site locations are provided as supplementary documentation and do not form part of this public report.

The MTCS will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

2.0 FIELD METHODS

2.1 Methodology

The Stage 3 Archaeological Assessment of the White Oak 1 site (AfHh-926) was conducted between June 15, 18-22, 25-26 and 28, 2018, under archaeological consulting license P457, issued to Lafe Meichenheimer of Golder by the MTCS (PIF# P457-0071-2018). Rebecca Parry (R1013), delegated licensed field supervisor for Golder, assumed responsibility of undertaking the archaeological fieldwork at the Study Area as per Section 12 of the MTCS 2013 *Terms and Conditions for Archaeological Licences*, issued in accordance with clause 48(4)(d) of the *Ontario Heritage Act*.

The weather during the assessment was variable, ranging from mainly sunny to overcast with temperatures varying from 13°C to 33°C. At no time were the conditions detrimental to the observation or recovery of archaeological material. Photo locations are illustrated on Map 7. All activities undertaken during the assessment were in compliance with the *Ontario Heritage Act* and the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011).

White Oak 1 (AfHh-926) was relocated from the original Stage 2 assessment data, including field notes, maps, and UTM coordinates. Since a controlled surface pick-up (CSP) that met all requirements outlined in Section 3.2.1 of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011) was conducted for White Oak 1 (AfHh-926), previously Location 4, during the Stage 2 Assessment of the Study Area, the Stage 3 Assessment began with test unit excavations.

A network of 5 m by 5 m grid squares was established across the extent of the site as determined by the location of the Stage 2 surface finds. The grid squares are referred to by the intersection coordinates of their southwest corner. Each 5 m² set was further subdivided into 25 1 m² units, with sub-square number one located in the southwest corner of the 5 m² set, number five in the southeast corner, number six located immediately north of number one, and so on.

Since the White Oak 1 site (AfHh-926) was interpreted in the previous Stage 2 assessment as a small, pre-contact Indigenous site where it is not clearly evident that Stage 4 mitigation of impacts will be required, the location and placement of test units followed the strategy outlined in Section 3.2 and Table 3.1, Standards 1 and 2 of the MTCS' *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). Test units were excavated at 5 m intervals across the site with 20% infill units placed in areas of interest around the site. White Oak 1 (AfHh-926) consisted of 21 grid units and seven infill units.

Each 1 m² test unit was excavated to the interface between the topsoil and subsoil and all soil was screened through 6 mm hardware cloth to facilitate the recovery of small artifacts (Image 1 and Image 2). The subsoil surface of each unit was then shovel shined and examined for evidence of subsurface cultural features prior to backfilling. If no possible features were identified, then excavation continued into the top 5 cm of the subsoil layer. No potential cultural features were encountered during the Stage 3 of White Oak 1 (AfHh-926). Test units ranged from 18 cm to 33 cm in depth and yielded from 0 to 14 artifacts (Image 3 and Image 4). Stage 3 test units were backfilled upon completion (Image 5, Image 6, and Image 7).

All excavated artifacts were recorded with reference to their sub-square unit number and retained for laboratory analysis and description, as per Section 6.0 of the *Standards and Guidelines* (Government of Ontario 2011).

2.2 GPS Coordinates

All coordinates and elevations were collected with a Trimble Geo7X Global Navigation Satellite System (GNSS) using the UTM NAD 83 (Zone 17) datum, and coordinated within the Cansel network (Can-Net) for base station references. The collected coordinates are provided as a six digit easting, and a seven digit northing.

The Trimble Geo7x GPS receiver has built-in Wide-Area Augmentation System (WAAS) and European Geostationary Navigation Overlay Service (EGNOS) capabilities. It supports a wide range of satellite signals, including GPS L1C/A/L2C/L2E and GLONASS L1C/A/L1P/L2C/A/L2P. The GNSS receiver is a dual frequency differential GPS (DGPS) capable of real time kinematic (RTK) corrections within the Can-Net Virtual Reference Station (VRS) network. The collected coordinates provide real time accuracy between 1 and 10 cm. Therefore, each survey observation can be considered a permanent and known datum point regardless of any future disturbance to the location of each observation.

Relevant UTM coordinates for all locations are presented in the Supplementary Documentation, separate from this report. The Supplementary Documentation also contains Tiles showing the specific site location.

3.0 RECORD OF FINDS

The Stage 3 assessment of the White Oak 1 site (AfHh-926) was conducted employing the methods outlined in Section 2.0 of this report. Section 3.1 provides a description of the location and the artifacts recovered, while Map 7 shows the location and distribution of the test units. The UTM coordinate reference marker (datum point) is listed in the Supplementary Documentation that accompanies this report as a separate attachment.

For a list of terms and definitions regarding the pre-contact Indigenous cultural material discussed in the present report, see Appendix A.

An inventory of the documentary record generated by the fieldwork at White Oak 1 (AfHh-926) is provided in Table 2 and a complete catalogue of all artifacts recovered during the Stage 3 Assessment is provided below in Appendix B.

Table 2: Inventory of Documentary Record

Document Type	Current Location of Document	Additional Comments
Field Notes	Golder Office in London	23 pages from original field book. Hard copies stored in project folder and digitally in project file.
Hand Drawn Maps	Golder Office in London	One map from original field book. Hard copy stored in project folder and digitally in project file.
Maps provided by Client	Golder Office in London	One map stored in project folder and stored digitally in project file.
Digital Photographs	Golder Office in London	94 photos stored in project folder and stored digitally in project file.

Material culture recovered from the Stage 3 Assessment of White Oak 1 (AfHh-926) has been washed, catalogued, and analyzed, and will be stored in one banker's box at Golder's office in London, Ontario.

3.1 White Oak 1 (AfHh-926)

A total of 126 pre-contact Indigenous artifacts were recovered during Stage 3 test unit excavation at the White Oak 1 site (AfHh-926), all of which were identified as pieces of lithic debitage. In addition, 62 historical Euro-Canadian artifacts were recovered, including: 30 brick fragments, 13 ceramic sherds, 12 shards of container glass and four shards of window pane glass, two plastic fragments, and one nail. These artifacts were recovered from an area measuring approximately 30 m east-west by 25 m north-south, with test units excavated at the site yielding from 0 to 14 artifacts. Table 3 presents a summary of the artifacts recovered and class is discussed in detail in sections below.

Table 3: White Oak 1 (AfHh-926) Artifact Summary

Artifacts	Frequency	%
<i>Pre-Contact Indigenous Artifacts</i>		
Lithic Debitage		
Biface Thinning Flake	54	28.57%
Flake Fragment	34	17.99%
Primary Thinning Flake	23	12.17%
Primary Reduction Flake	8	4.23%
Bipolar Flake	3	1.59%
Retouch Flake	2	1.06%
Potlid	1	0.53%
Spall	1	0.53%
Sub-Total	126	66.67%
<i>Historical Euro-Canadian Artifacts</i>		
Ceramics		
Refined White Earthenware	7	3.70%
Vitrified White Earthenware	4	2.12%
Yellowware	2	1.06%
Glass		
Container: Indeterminate	12	6.35%
Window Pane	4	2.12%
Metal		
Nail	1	0.53%
Other Artifacts		
Brick	30	15.87%

Artifacts	Frequency	%
Plastic	2	1.06%
Sub-Total	62	32.80%
<i>Faunal</i>		
Faunal Total	1	0.53%
Grand Total	189	100.00%

3.1.1 Lithic Artifacts

A total of 126 lithic artifacts were recovered, consisting entirely of lithic debitage. No formal or informal tools were recovered during the Stage 3 assessment of White Oak 1 (AfHh-926).

Lithic Debitage

A total of 126 pieces of lithic debitage were recovered from the Stage 3 test unit excavations. An analysis of the debitage is presented in Table 4. The majority of the debitage assemblage consists of biface thinning flakes (42.86%) (Image 8), flake fragments (26.98%), primary thinning flakes (18.25%) (Image 9), with smaller percentages of primary reduction flakes (6.35%), bipolar flakes (2.38%), retouch flakes (1.59%) potlids (0.79%) and spalls (0.79%) (Image 10 and Image 11). Regarding chert type, the debitage primarily consists of Onondaga chert (77.78%), with smaller and more similar percentages of Selkirk chert (8.73%) and Kettle Point chert (5.56%), along with two instances of both Ancaster chert (1.59%) and Devonian Till Chert (1.59%), one instance of Haldimand chert (0.79%), and five instances of indeterminate chert (3.97%). A total of 13 pieces of debitage, including eight biface thinning flakes, three flake fragments, one primary thinning flake and one potlid, were identified as heat-treated or burnt, consisting of 10% of the lithic debitage assemblage and 7% of the total artifact assemblage for the site. The heat-treated flakes exhibited potlid scars and/or colour change that may suggest either deliberate or unintentional exposure to high heat, such as a hearth.

Table 4: White Oak 1 (AfHh-926) Classification of Lithic Debitage

Chert Type	Primary Reduction		Primary Thinning		Biface Thinning		Retouch		Bipolar		Flake Fragment		Potlid		Spall		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Onondaga	3	2.38%	15	11.90%	43	34.13%	2	1.59%	3	2.38%	30	23.81%	1	0.79%	1	0.79%	98	77.78%
Selkirk	2	1.59%	3	2.38%	3	2.38%	0	0.00%	0	0.00%	3	2.38%	0	0.00%	0	0.00%	11	8.73%
Kettle Point	0	0.00%	1	0.79%	5	3.97%	0	0.00%	0	0.00%	1	0.79%	0	0.00%	0	0.00%	7	5.56%
Ancaster	1	0.79%	1	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	2	1.59%
Haldimand	0	0.00%	0	0.00%	1	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	0.79%
Till Chert	0	0.00%	1	0.79%	1	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	2	1.59%
Indeterminate	2	1.59%	2	1.59%	1	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	5	3.97%
TOTAL	8	6.35%	23	18.25%	54	42.86%	2	1.59%	3	2.38%	34	26.98%	1	0.79%	1	0.79%	126	100.00%

3.1.2 Historical Euro-Canadian Artifacts

A total of 62 historical Euro-Canadian artifacts were recovered from the Stage 3 assessment of the White Oak 1 site (AfHh-926), including: 13 ceramic artifacts, 16 glass artifacts, one metal artifact, two plastic fragments and 30 brick fragments.

Ceramic

A total of 13 ceramic sherds were recovered. The historical ceramic assemblage consisted entirely of tableware, specifically seven sherds of refined white earthenware, four sherds of vitrified white earthenware and two sherds of yellowware (Image 12).

Refined white earthenware (RWE) is slightly porous, white-pasted earthenware with a near colourless glaze that replaced earlier near white ceramics, such as pearlware and creamware, by the early 1830s. First developed in 1805, this ware type declined considerably in popularity by the 1840s with the introduction of ironstone and vitrified white earthenware (Miller 2000:10, 13). Of the seven RWE sherds recovered, five were plain or undecorated and one exhibited an indeterminate cobalt blue decoration.

Vitrified white earthenware, also known as white granite, graniteware, white stone ironstone, or simply ironstone is a variety of white bodied earthenware with a white to greyish-white fabric that is usually thick and heavy beneath a thick, hard clear glaze with a white, greyish or bluish tint. Vitrified white earthenware was first developed in the 1840s but did not become popular until the second half of the 19th century. Its popularity continued into the 20th century and it is still in use to some extent today. A total of four pieces of vitrified white earthenware were recovered from the White Oak 1 Site, all of which were plain or undecorated.

Yellow ware is earthenware made from naturally coloured buff/yellow clay, covered with a clear glaze. Glazed wares vary from brownish mustard to light yellow (Sussman 1997:77). This ware type was primarily used for food preparation and storage, and dates from 1830 to 1940 (Miller 2000:12), with its peak popularity after 1850 (Burke 1991:35). One of the two pieces of yellowware recovered was plain/undecorated and the other exhibited a banded brown decoration.

Glass

A total of 12 glass shards were recovered during the Stage 3 assessment, including 12 pieces of indeterminate container glass and four pieces of window pane glass. The container glass fragments range in colour from largely olive (n=4), clear/colourless (n=3) and green (n=3), along with one instance of both manganese-tinted and brown. Three glass window pane fragments were clear/colourless and the remaining was aqua coloured (Image 13).

Metal

One machine cut nail was recovered from the Stage 3 assessment of the White Oak 1 Site (AfHh-926) (Image 14). Cut nails were machine cut from flat sheets of iron creating a nail that is of even thickness when viewed from the side, not tapered on all sides like hand-made nails, with a square and flat head. Invented about 1790, cut nails were in common use from the 1830s until the 1890s (Adams et al. 1994: 94).

Other Artifacts

Other artifacts recovered from the White Oak 1 site (AfHh-926) include 30 red brick fragments and two indeterminate plastic fragments (Image 14).

3.1.3 Fauna

One faunal element was recovered from White Oak 1 (AfHh-926), specifically a proximal long bone fragment of a medium to large mammal (Image 14).

3.1.4 Stratigraphy and Cultural Features

The soil stratigraphy across the White Oak 1 site (AfHh-926) was predominately medium grey-brown clay-loam topsoil over red-brown / yellow-brown clay subsoil (Image 15 and Image 16). However, some test units in lower slope positions or depressions, located in the north and west areas of site, tend to exhibit distinct mottles, particularly at the interface and sometimes into the subsoil (Image 17 to Image 19). This mottling varied in depth and thickness across the site, and was typically not artifact-bearing, containing one or no artifacts compared to the topsoil. A few units also exhibited irregular black organic staining at interface, which would at times continue within the B-horizon subsoil (Image 20 and Image 21). This is believed to be a part of the natural soil layers, as it is characteristic of Muriel Association soils, particularly Gobles and Kelvin soils, which are known to contain distinct, prominent mottles in the upper B-Horizons due to imperfect drainage and perched water tables. Muriel soils are found on upper slope positions and Goble and Kelvin soils are found in mid to lower slope positions (Hagerty and Kingston 1992).

Ephemerally high-water tables result in the formation of gleysols (soils formed under anaerobic conditions) where the water table is perched. Gleysols are characteristically varying colours of dark greys and blues. Because the water tables in Gobles and Kelvin soils fluctuate, alternating illuviation (leaching of material across a soil profile) and capillary action (upward movement of material when evaporation exceeds precipitation) creates the turbulent appearance of this layer (MLURI 2017).

No cultural features were identified during the Stage 3 test unit excavations of the White Oak 1 site (AfHh-926).

4.0 ANALYSIS AND CONCLUSIONS

The Stage 3 Archaeological Assessment of the White Oak 1 site (AfHh-926) resulted in the recovery of 126 pieces of lithic debitage and 62 historical Euro-Canadian artifacts. When included with the artifacts collected during the Stage 2 assessment (one projectile point, one scraper and four pieces of lithic debitage), a total of 132 artifacts have been recovered from the site to date.

The higher incidence of primary thinning and biface thinning flakes in the Stage 2 and 3 assemblages indicates that the latter stages of tool production, as well as tool maintenance were carried out at the site, while the relatively low number of primary reduction flakes indicates that the early stages of lithic reduction were not frequently performed at the site.

Diagnostic artifacts recovered from the White Oak 1 site (AfHh-926) are limited to the projectile point and scraper found during the Stage 2 assessment. The point was manufactured on Kettle Point chert and identified as a Late Archaic Crawford Knoll 'corner-notched' projectile point (ca. 1500 – 500 BC) (Kenyon 1980). The point measured 33.66 mm long, 17.9 mm wide, and 6.25 mm thick. The scraper was also manufactured on Kettle Point chert, and measures 28.22 mm long, 18.48 mm wide, and 8.4 mm thick.

An examination of the Stage 3 test unit counts suggests that there is one concentrated area of activity at the site, located from 310 to 315 east-west and 505 to 515 north-south on the site grid (Map 7). This area of the site yielded the highest artifact counts.

A search of the OASD reveals that no sites have been registered in a 1 km circumference around White Oak 1 (AfHh-926). This is likely a result of a lack of archaeological assessment or survey of the surrounding areas, rather than an actual lack of archaeological sites.

Based on the results of the Stage 2 and Stage 3 assessments, the White Oak 1 site (AfHh-926) appears to represent an occupation dating to the Late Archaic Period (ca. 1500 – 500 B.C.). The limited quantity of the cultural material identified at White Oak 1 (AfHh-926) suggests that it represents a small, briefly occupied, campsite. The lithic tools and debitage suggest latter stage tool production and maintenance were carried out at this site.

The presence of high artifact-yielding test units (e.g., ≥ 10 artifacts) indicates that the White Oak 1 site (AfHh-926) has further cultural heritage value or interest. This conclusion is consistent with Section 3.4.1, Standard 1a of the MTCS's *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

The 62 historical Euro-Canadian artifacts found at White Oak 1 (AfHh-926) were intermixed with the pre-contact Indigenous material across the site and are interpreted as incidental domestic debris that was introduced to the site area through cultivation. The artifact assemblage dates to the late 19th to early 20th century, and possibly relates to the house structure depicted centrally within Lot 20, Concession 6 when George Johnston owned the land parcel in the late 19th century (Map 6). Given the relatively low artifact counts, late occupation date, and random distribution of the artifacts across site, the historical Euro-Canadian component from the White Oak 1 site (AfHh-926) is considered to have no further cultural heritage value or interest.

5.0 RECOMMENDATIONS

Based on the results of the Stage 3 Archaeological Assessment, the White Oak 1 site (AfHh-926) is interpreted as a small, briefly occupied, Late Archaic campsite and it is concluded that the site has further cultural heritage value or interest and will require Stage 4 mitigation prior to development impacts. This recommendation is based on four Stage 3 test units that produced greater than 9 artifacts, all of which were lithic debitage. These findings satisfy standard conditions under Section 3.4.1 of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011) that trigger a requirement for Stage 4 mitigation because they have cultural heritage value or interest. Section 3.4.1, Standard 1a, states that small or diffuse sites with one or more Stage 3 test units yielding 10 or more artifacts require Stage 4 mitigation.

The MTCS's preferred method of Stage 4 mitigation is through avoidance and protection. Through discussions with the proponent and engagement with Indigenous communities, it has been determined that the White Oak 1 site (AfHh-926) can be avoided. As such, Stage 4 mitigation by long-term avoidance and protection is recommended for the White Oak 1 site (AfHh-926). Further records of the engagement between Golder, the proponent and interested First Nations communities are contained in the Supplementary Documentation.

As per Section 4.1.1 of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011a) the avoidance and protection strategy for the White Oak 1 site (AfHh-926) will involve the establishment of a "no-go" zone consisting of a 10-metre protective buffer around the extent of the site as defined by the results of the Stage 3 assessment (Map 7). A temporary fencing barrier will be erected to clearly delineate the 10-metre protective buffer around the site. A construction monitoring schedule will be established whereby a licensed archaeologist would be present to monitor any construction activities that extend to the edge of the protected area. The protected area and the location of the temporary barrier will be shown on all contract drawings and be labeled as a "no-go" zone where construction activities will not be permitted. Instructions will be provided to all construction staff to stay outside of this area and to ensure that it is appropriately monitored by a licensed archaeologist during any construction which takes place within 10 m of the protected area. After completion of construction, the area will be inspected and the effectiveness of the monitoring and avoidance strategy for the site will be reported on by the licensed consultant archaeologist. If any archaeological resources turn up during monitoring and construction, the archaeologist must be permitted sufficient time to assess these resources and mitigate as required.

Plans for the avoidance and long-term protection of the White Oak 1 site (AfHh-926) have been provided to the City of London as the proponent and approval authority of this project. These plans include a commitment that any ground alterations will avoid the archaeological site and its protective buffer area. As well, if the City of London or any other future land owner determines at a later date that the White Oak 1 site (AfHh-926) will be altered in any way, either temporarily or permanently, then Stage 4 mitigation will be required. This includes even minor forms of soil disturbance such as tree removal, minor landscaping, and utilities installation.

The City of London has agreed to the long-term avoidance and protection plan (see Supplementary Documentation).

There are no further concerns for impacts to archaeological sites in the remainder of the Study Area outside the 10 m buffer. The MTCS is asked to review the results and recommendations presented herein, accept this report into the Provincial Register of archaeological reports and issue a standard letter of compliance with the Ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licencing.

6.0 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 1990b). 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 regards 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 1990b).

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 1990b).

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 (Government of Ontario 1990).

7.0 BIBLIOGRAPHY

Adams, Nick, Ian Kenyon, Dena Dorszenko

1994 *Field Manual for Avocational Archaeologists in Ontario*. Ontario Archaeological Society Inc., Archaeological Stewardship Project.

Anderson, Jacob

2009 *The Lawson Site: An Early Sixteenth Century Neutral Iroquoian Fortress*. Museum of Ontario Archaeology, Special Publication No. 2. London.

Archaeologix Inc.

2005 *Archaeological & Built Heritage Assessment (Stage 1), W12A Landfill Area Study, City of London, County of Middlesex, Ontario*. Report on file with the Ontario Ministry of Tourism, Culture and Sport, Toronto.

Bostwick, John

1821 *Survey Map of the Westminster District of London, Sheet B12*. John Bostwick, Yarmouth.

Brock, Daniel and Muriel Moon

1972 *The History of the County of Middlesex, Canada*. Mika Studios, Belleville, Ontario.

Burke, Charles Alexander

1991 *Nineteenth Century Ceramic Artifacts from a Seasonally Occupied Fishing Station on Saddle Island, Red Bay, Labrador*. Thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts. The School of Graduate Studies, Memorial University of Newfoundland, St. John's, Canada.

Burwell, Mahlon

1857 *Township of Westminster Patent Plan*, Ontario Archives Reference Code RG 1-100-0-0-4142

Canadian Atlas Online, The

2015 *Mixedwood Plains Ecozone*. Electronic document:

http://www.canadiangeographic.ca/atlas/themes.aspx?id=mixedwood&sub=mixedwood_basics_ecozones. Last accessed August 29, 2018

Chapman, Lyman John and Donald F. Putnam

- 1984 *The Physiography of Southern Ontario*. 3rd ed. Ontario Geological Survey Special Volume 2. Ontario Ministry of Natural Resources, Toronto.

Delaware & Westminister Townships History Book Committee (DWTH)

- 2006 *Delaware and Westminister Townships, Honouring Our Roots, Together in History*. The Westminister Township Historical Society, Delaware, Ontario.

Dodd, Christine F., Dana R. Poulton, Paul A. Lennox, David G. Smith and Gary A. Warrick

- 1990 The Middle Ontario Iroquoian Stage. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 321-360.

Eley, Betty E. and Peter H. von Bitter

- 1989 *Cherts of Southern Ontario*. Royal Ontario Museum, Toronto.

Ellis, Chris

- 1984 *Gainey Fluted Points*. KEWA 84-7.

Ellis, Chris J. and D. Brian Deller

- 1990 Paleo-Indians. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 37-64.

Ellis, Chris J., Ian T. Kenyon and Michael W. Spence

- 1990 The Archaic. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 65-124.

Ellis, Chris J. and Neal Ferris (editors)

- 1990 *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5.

Ferris, Neal

- 2009 *The Archaeology of Native-Lived Colonialism: Challenging History in the Great Lakes*. University of Arizona Press, Tucson.

Foreman, Lindsay Judith,

- 2011 *Seasonal Subsistence in Late Woodland Southwestern Ontario*. Unpublished thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy. The School of Graduate and Postdoctoral Studies, University of Western Ontario London, Ontario, Canada.

Fox, William A.,

- 1990 The Middle Woodland to Late Woodland Transition. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 171-188.
- 2009 Ontario Cherts Revisited. In *Painting with A Broad Brush. Papers in Honour of James Valliere Wright Ed. David L. Keenlyside and Jean-Luc Pilon. Mercury Series Archaeology* pp. 339-354. Canadian Museum of Civilization, Gatineau.

Golder Associates Ltd

- 2018 *Stage 1-2 Archaeological Assessment; W12A Landfill Site, Cells 9 and 10, Part of Lot 20, Concession 6, Former Township of Westminster, Middlesex County, Now City of London, Ontario*. Report on file with Ministry of Tourism, Culture and Sport, Toronto.

Government of Ontario

- 1990a *The Environmental Assessment Act*. Electronic document: <https://www.ontario.ca/laws/statute/90e18>
- 1990b *The Ontario Heritage Act*. Electronic document: <http://www.search.e-laws.gov.on.ca/en/isysquery/22cb421e-c632-498a-a9d8-0fe5ff80454f/1/doc/?search=browseStatutes&context=#hit1>
- 2002 *Funeral, Burial and Cremation Services Act*. Electronic document: <http://www.search.e-laws.gov.on.ca/en/isysquery/4df81715-b552-4fa4-8098-d72607430cdb/1/doc/?search=browseStatutes&context=#hit1>
- 2010 *Engaging with Aboriginal Communities in Archaeology*. Ontario Ministry of Tourism, Culture and Sport, Toronto.
- 2011 *Standards and Guidelines for Consultant Archaeologists*. Ontario Ministry of Tourism, Culture and Sport, Toronto

Hagerty, T. P. and M. S. Kingston

- 1992 *The Soils of Middlesex County, Volume 1*. Soils Report No. 56 at the Ontario Centre for Soil Resource Evaluation. Resources Management Branch, Ontario Ministry of Agriculture and Food, Guelph.

Heritage Property INdex

- 2018 *Heritage Property INdex*. Electronic document: <http://ontario.heritagepin.com/>.

Hewitt, D.F.

1972 *Paleozoic Geology of Southern Ontario*. Geological Report No. 105, Ontario Division of Mines, Toronto.

Kenyon, Ian T.

1980 The Satchell Complex in Ontario: A Perspective from the Ausable Valley. In *Ontario Archaeology of Eastern North America* 8:11-28.

Lennox, Paul A. and William R. Fitzgerald

1990 The Culture History and Archaeology of the Neutral Iroquoians. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 405-456.

Miller, George

1991 A Revised Set of CC Index Values for Classification and Economic Scaling of English Ceramics from 1787 to 1880. In *Historical Archaeology* Volume 25:1, 1-25.

2000 Telling Time for Archaeologists. In *Northeast Historical Archaeology* 29:1-22.

Ministry of Tourism, Culture and Sport (MTCS)

2018 Sites within a One Kilometre Radius of the Project Area Provided from the Ontario Archaeological Sites Database, July 31, 2018.

Morris, J.L.

1943 *Indians of Ontario*. 1964 reprint. Department of Lands and Forests, Government of Ontario.

Page, H.R. and Co.

1878 *Illustrated Historical Atlas of Middlesex County*. H.R. Page & Co., Toronto.

Pearce, Robert J.

2010 *Southwestern Ontario: The First 12,000 Years*. Web site developed by Museum of Ontario Archaeology, London with funding from Department of Canadian Heritage. Electronic document: <http://www.diggingontario.uwo.ca>.

Schmalz, Peter S.

1991 *The Ojibwa of Southern Ontario*. University of Toronto Press, Toronto.

Smith, David G.

- 1990 Iroquoian Societies in Southern Ontario: Introduction and Historical Overview. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 279-290.

Spence, Michael W., Robert H. Pihl and Carl Murphy

- 1990 Cultural Complexes of the Early and Middle Woodland Periods. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 15-170.

Sussman, Lynne

- 1977 Changes in Pearlware Dinnerware, 1780-1830. In *Historical Archaeology* 11:105-112.

Tremaine, George R.

- 1862 *Tremaine's Map of Upper Canada*. George C. Tremaine., Toronto.

Upper Thames River Conservation Authority (UTRCA)

- 2012 *Dingman Creek 2012 Watershed Report Card*. UTRCA, London.

Williamson, Ronald F.

- 1990 The Early Iroquoian Period of Southern Ontario. In *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5: 291-320.

Wilson, Jim and Malcolm Horne

- 1995 *The City of London Archaeological Master Plan*. Department of Planning and Development, Planning Division, City of London, Ontario.

8.0 IMAGES



Image 1: White Oak 1 (AfHh-926); Stage 3 excavations in progress; facing south, June 18, 2018.



Image 2: White Oak 1 (AfHh-926); Stage 3 excavations in progress; facing southeast, June 25, 2018



Image 3: White Oak 1 (AfHh-926); Stage 3 test unit; facing south, June 15, 2018



Image 4: White Oak 1 (AfHh-926); Stage 3 test unit; facing east, June 20, 2018



Image 5: White Oak 1 (AfHh-926); Stage 3 backfilling; facing south, June 28, 2018



Image 6: White Oak 1 (AfHh-926); Stage 3 backfilling; facing south, June 28, 2018



Image 7: White Oak 1 (AfHh-926); Stage 3 excavations complete, site backfilled; facing southeast, June 28, 2018



Image 8: White Oak 1 (AfHh-926); Representative example of lithic debitage (top to bottom); biface thinning flakes (5), burnt or heat-modified biface thinning flakes (4).



Image 9: White Oak 1 (AfHh-926); Representative example of lithic debitage (top to bottom); primary thinning flakes (4), flake fragment (4).



Image 10: White Oak 1 (AfHh-926); Representative example of lithic debitage (top to bottom); primary reduction flakes (3), bipolar flakes (2).



Image 11: White Oak 1 (AfHh-926); Representative example of lithic debitage (top to bottom, left to right); retouch flakes (2), potlid, spall.

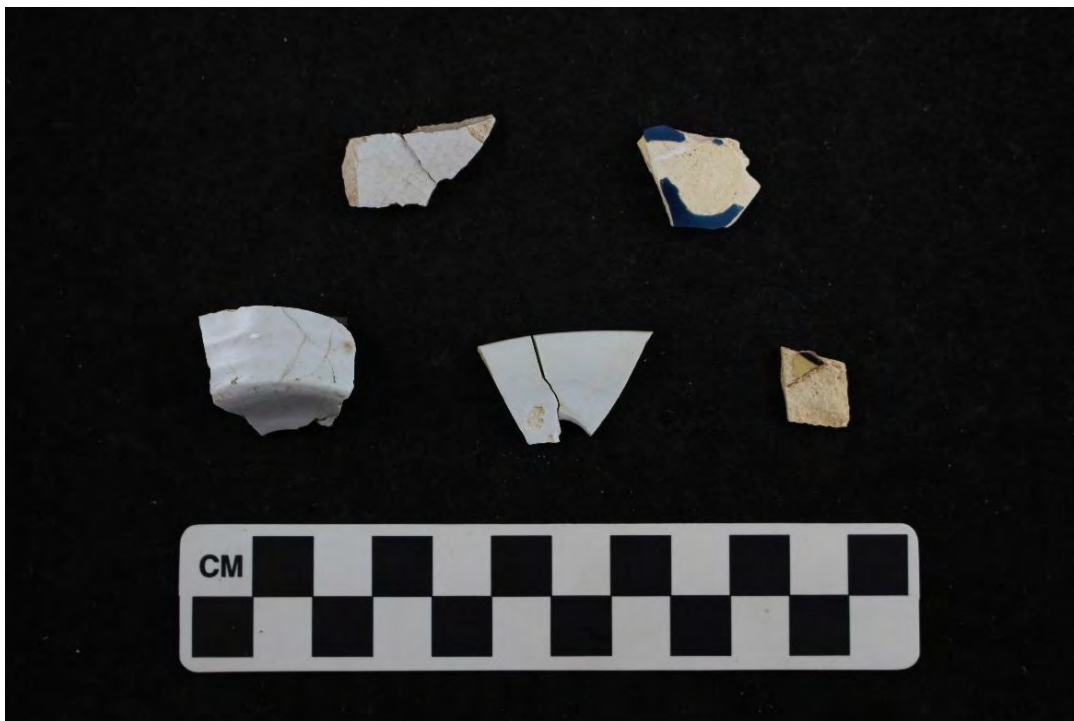


Image 12: White Oak 1 (AfHh-926); Representative example of historical Euro-Canadian ceramic artifacts (top to bottom, left to right); plain/undecorated refined white earthenware (RWE), indeterminate blue decor RWE, plain/undecorated vitrified white earthenware (2), banded yellowware.



Image 13: White Oak 1 (AfHh-926); Representative example of historical Euro-Canadian glass artifacts (top to bottom, left to right); indeterminate container glass (olive, green, clear/colourless, manganese-tinted, brown) (5), window pane glass (aqua, clear/colourless) (2).



Image 14: White Oak 1 (AfHh-926); Representative example of other historical Euro-Canadian artifacts (top to bottom, left to right); red brick (2), cut nail, plastic fragment, medium to large mammal bone.



Image 15: A representative example of stratigraphy found at White Oak 1 (AfHh-926); facing east, June 15, 2018.



Image 16: A representative example of stratigraphy found at White Oak 1 (AfHh-926); facing east, June 20, 2018.



Image 17: A representative example of mottling found at interface at White Oak 1 (AfHh-926); facing north, June 21, 2018.



Image 18: A representative example of mottling found within subsoil at White Oak 1 (AfHh-926); facing north, June 15, 2018.



Image 19: A representative example of mottling in profile at White Oak 1 (AfHh-926); facing south, June 15, 2018.



Image 20: A representative example of mottling/organic staining found within subsoil at White Oak 1 (AfHh-926); facing north, June 19, 2018.



Image 21: A representative example of mottling/organic staining in profile at White Oak 1 (AfHh-926); facing south, June 19, 2018.