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OTTAWA-CARLETON

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2005

A Stage 1-2 Archaeological Assessment of the Broughton  
Lands, Part of Lot 5, Con 1, March Township, City of Ottawa

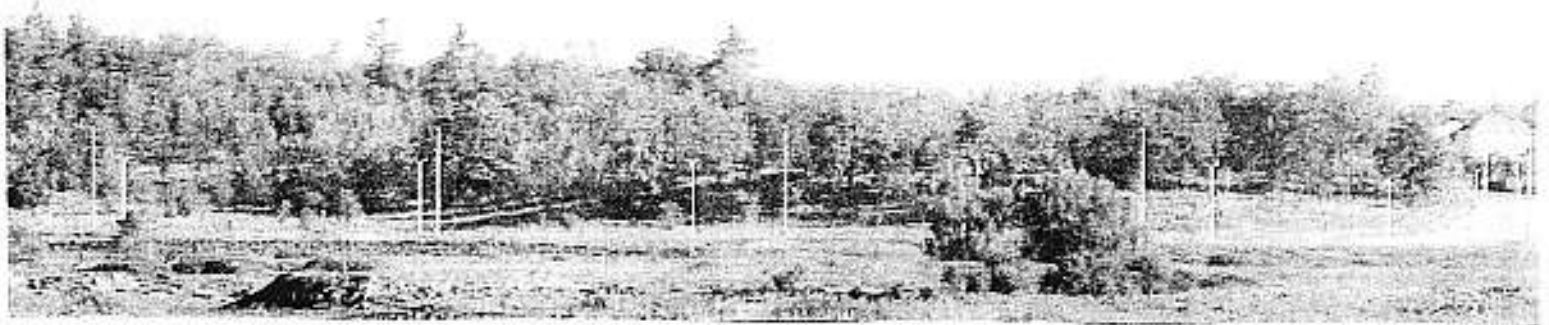
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**Register**

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A STAGE 1&2 ARCHAEOLOGICAL ASSESSMENT OF THE BROUGHTON  
LANDS, PART OF LOT 5 CONCESSION 1 MARCH TWP. (GEO)  
CITY OF OTTAWA



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Kinickinick Heritage Consultants, \_\_\_\_\_ ril 2006  
**STAGE 1&2 ARCHAEOLOGICAL ASSESSMENT OF THE BROUGHTON  
 LAND PART OF LOT 5 CONCESSION 1 MARCH TWP. (GEO)  
 CITY OF OTTAWA**

### Introduction

In August 2005 Kinickinick Heritage Consultants was engaged by \_\_\_\_\_ of Novatech Engineering Consults Ltd., Ottawa, to prepare a Stage 1&2 archaeological assessment, according to the standards and guidelines of the Ontario Ministry of Culture, of part of lot 5 concession 1 March township (Geo.), now in the City of Ottawa. According to the City of Ottawa predictive model, this property has archaeological potential and warrants assessment before the residential subdivision is constructed.

## *STAGE 1*

### 1.0 Description and Land Use History

The Broughton Land is located on the north bank of the Carp River, about 20 km southwest of the Chaudière Falls in Ottawa (Figure 1). The main part of the property, about 16 ha, is roughly triangular, about 600 m on each side, bounded by the Richardson Side Road on the north, Kanata Avenue to the east, and the partially completed Terry Fox Drive extension on the west. About 3.5 ha of the property, situated on the bottomlands between the Carp River and Terry Fox Drive, is designated flood control (Figure 2). The Broughton Land is a hillside situated on the 'toe' of the Carp Ridge, a prominent rocky lineation that extends, like a peninsula, into the sedimentary bedrock of the Ottawa-St. Lawrence Lowlands. The hillside has a sunny southwestern aspect and is sheltered from inclement north eastern winds. Along the north side it has 32 m relief, from 91 m on the Carp River bottomlands to 123 m at the communications tower at the top of the hill. The bedrock of the northern half of the property, above 110 m a.s.l., is composed of diorite, gabbro, anorthosite, and metagabbro. These form an intrusive, plutonic, "groundmass" of basic rocks made up largely of plagioclase feldspar and is dissected by several dykes of vein quartz (hyaline to white). The hill top, around the communications tower, is a dome of groundmass bedrock exposure with thin patches of soil with characteristic sedge growth. The dome is flanked by a middle terrace, with bedrock ridges and elongate lagoons along the north side that now contain organic terrain deposits. Below about 110 m a.s.l., in the southern part of the property, is metamorphic "country rock" bedrock, composed of quartzite, interlayered paragneiss, and quartzose paragneiss, and made, largely, of acidic minerals like quartz and plagioclase feldspar. The overall relief of the country rock terrain is not as great as the groundmass dome but there are abrupt bedrock exposures (ridges, ledges, and knobs) with patches of sandy loam, interspersed by channels and swales of silt and silty loam.

Historical land use of the Broughton Land began in 1828 when lot 5 was patented to Morgan. The Morgans were one of the first European pioneer families in what is now

Registered sites in the (greater) vicinity of the Broughton Land include: the Constance Bay catena of Archaic and Woodland deposits (BiGa-2-7), some excavated and reported by Watson (1972); the Leamy Lake series of sites (BiFw-6, 15-17, 25-28—Archaic to Historic) excavated by Laliberté (1995) at the mouth of the Gatineau River; the Sawdust/Marshall Bay sites on Lac Chats (Dacchsel 1981); and six small prehistoric find-spots (BiFw-1, 3-5, 10-11) in the Rideau River Valley—all unexcavated and incompletely reported on Borden Forms.

Reported but unsubstantiated archaeological discoveries in the Broughton Land vicinity include a discovery from lot 25 concession 10 Fitzroy township (Wintemberg, n.d.). This collection includes: a ground stone projectile point with a notched stem, an unfinished steatite pipe bowl with a stylistic animal motif, and other adzes. This collection, a gift of Heman Kedey in 1919, is curated at the Canadian Museum of Civilization, Accession 211, VIII-F-15664-15668.

During field work in 1943, Leechman (n.d.) located archaeological material in the Pontiac Bay area. No report or notes of this field work are on record, only his entry and remarks in the Old System accession books of the Canadian Museum of Civilization. Both of the sites mentioned below were probably in advanced states of erosion when Leechman made his surface collection—their present condition is unknown, but the prognosis is not good:

- The Leechman Site, located on a sandy point on the shore of the Ottawa River on lot E concession 10, has produced a chert projectile point, flakes and ceramic sherds—also at CMC, catalogue Nos. VIII-F-26779-267782, Acc. 627.
- The Whetstone Point site, also recorded by Leechman in 1943, is located on the shore of the Ottawa River just upstream from the Quyon ferry landing, on lot C concession 11. This site contained several chert projectile points and other chipped implements, chert flakes, ground stone tools and ceramic fragments (CMC catalogue Nos. VIII-F-26775-26778 and 26784-26787).

Other relevant archaeological discoveries recorded in the CMC Old System catalogue are:

- VIII-E-15450 long, cylindrical, pestle, or roller S½ lot 10 con 9 Torbolton collected by J. Hawkshaw, purchased Nov. 12 1896, Acc. 3187
- VIII-E-26783 a stone axe, lot 16 con. 2 Torbolton, collected by Wm. Penney, Woodlawn, Acc. 626 (1943)

Recent site discoveries in the Ottawa Valley by *Kinickinick Heritage Consultants* (Swayze 2003 a-d; 2004a-c; 2005a, b) are dated to the early Holocene age because of they are associated with relict littoral zones. These sites include: Oak Creek (BhFx-21-25), Bradley (BhFx-4-20), Cromdale (BaGi-31-53), Barrhaven (BhFw-9), Exhibition (BhFv-4 to 7), Fitzroy (BiGb-17-29), and Mohr's Corners (BiGb-30). These sites are at elevations present at the Broughton Land, 95 m a.s.l. to 110 m a.s.l.. The lithic archaeological material consists, largely, of disposable tools-of-expediency made from locally available material, such as quartz, quartzite, and *Kitchissippi* chert,



by the bipolar method of core reduction, often from cobble or pebble sources. Although formal, diagnostic, tools have not (yet) been found in the assemblages studied to date, these sites represent continuous activity of Late Palaeo-Indian, Early Archaic and Middle Archaic people with cultural links to the Great Lakes Palaeo-Indian Littoral Adaptation described by Julig (2002).

More germane to this study, the CRM Group recently reported the "Richardson Farm Site" (Stewart 2003:26-29) beside the southwest part of the Broughton Land during a Stage 2 assessment of the Terry Fox Drive ROW.

"Assessment of the area...yielded evidence of a 19<sup>th</sup> to early 20<sup>th</sup> century farmstead spread out along the flood plain, at the foot of the Carp Ridge. The majority of the features associated with the farmstead (masonry cellar foundation, dug well, barn complex and outbuildings) lie to the east of the footprint identified for Terry Fox Drive [in the Broughton Land]. However, clearly situated within the footprint are a well and an unidentified circular feature represented by a shallow depression (0.50 m) approximately 3.10 m in diameter. The majority (n=15) of positive shovel tests in the pasture were located within 25 metres of these two features.

Shovel testing in the pasture yielded a small (n=47) assemblage of Euro-Canadian artifacts from 24 positive shovel tests. The assemblage was dominated by faunal material (n=23) which included a variety of long bone fragments, lower appendage bones and teeth. Identified species include bovine and pig. The rest of the assemblage was made up of refined white earthenware (n=12) and coarse red earthenware (n=3) ceramics, a single pipe stem, a single sherd of bottle glass, 4 nails (1 square and 3 cut) and three unidentified scraps of metal.

Although a relatively small sample of material was recovered from the site, the absence of ironstone, a mid 19<sup>th</sup> century introduction, from the mix of ceramics is noteworthy. It would suggest that the artifacts clustered around the well and circular depression represent the early occupational years of the property by the Morgan family prior to its sale to Richardson in 1851." (Stewart 2003:26)

### 3.0 Surficial Geology and Post-Glacial Landscape Evolution

The following account references the dates of geological episodes to cultural time periods in order to underline the effect these processes had upon the relative attractiveness of the property for human use, either for habitation or specific resource exploitation activities. The cultural periods referred to, and their approximate dates before present (BP) are: Palaeo-Indian 11,500-10,000 BP; Early Archaic 10,000-6,000 BP; Middle Archaic 6,000-4,500 BP; Late Archaic 4,500-2,500 BP; Woodland 2,500 BP-1,600 AD and Historic 1600-1900 AD.

The most significant and dramatic effect of deglaciation in eastern Ontario was the creation of the Champlain Sea, which existed for millennia: first, as an arm of the North Atlantic Ocean, and then as a series of riverine lakes. Beginning about 12,700 BP the entire St. Lawrence Lowlands was submerged under the Champlain Sea (Gilbert 1994:6). The northwestern arm of this sea (Barnett 1988) occupied the upper

200,000 m<sup>3</sup>/s, or 200 times the average flow today! The floodwaters almost certainly had an effect upon the archaeological record of low lying areas, scouring some away, and deeply burying others.

After about 8,000 BP (in Middle Archaic times) post-glacial Lakes Agassiz and Barlow-Ojibway ceased to support recessional Lake Lampsilis in the Ottawa basin drainage. The upper Great Lakes still contributed to the flow of the Ancestral Ottawa until about 5,500 BP, when two other outlets also began to drain them to the south. By about 4,700 BP the flow over the Nipissing-Mattawa threshold ceased and the modern continental drainages—and environment—became established (Fulton and Richard 1987:28).

During this landscape evolution the Carp River Valley changed from a braided channel of the Ancestral Ottawa River, during the initial Champlain Sea recession, to become an embayment of Lake Lampsilis (Figure 5). During flood episodes, however, the Carp Embayment could swell until it captured the Jock River and became a braided channel once more.

Kenney (1964) discusses the history of marine soil deposits in the Ottawa area and notes that marine or estuarine clays are only found below 114 m a.s.l.; and below 99 m a.s.l. the predominant surface sediments are of non-marine origin, indicating a local change in the salinity of the water from brackish to fresh due to an influx of glacial melt water. The scouring indicated at about 99 m in Figure 6 was probably due to Agassiz 'slugs' as Teller (1988) predicted.

The Broughton Land probably began to emerge from the recessional Champlain Sea during the Early Palaeo-Indian cultural period. The GSC report a date (GSC-2448) of 11,300±120 BP, on shell, at an elevation of 130 m on the crest of a prominent esker, composed of ice-contact stratified drift, located 4 km southwest of Broughton (Figure 6). This formation has been removed, since GSC Map 1506A was printed, and has been replaced by the City of Ottawa dump. It had similar relief as the Broughton Land and it formed the south shore of the Carp Embayment during the Champlain Sea recessional period about 11,300 to 10,000 BP (Cheel 1982). GSC Map 1506A (Figure 6) indicates that at least ten beach ridges, each successively lower than the one preceding, from about 137 m to 122 m, were formed in the drift on the north and east flank of the esker and the near shore—beach—sediments that skirt it. Also illustrated in Figure 6 are the Hazeldean Beaches located on the north side of the Carp Embayment, about 2 to 3 km east of the Broughton Land. These nearshore sediments, which, unlike Broughton Land, lie over sedimentary bedrock, have four distinct beach ridge formations from 130 to 100 m a.s.l. Like the beaches on the esker they were formed by storm waves of the recessional Champlain Sea. The relative abundance of beach ridges on the south shore esker (n=10) compared to the Hazeldean Beaches (n=4) is probably due to the different parent materials at each location and because the north shore of the Carp Embayment would have been a lee shore, while the esker and south shore were on the windward side. These widespread beach formations marking the receding edges of the Carp Embayment demonstrate that the Broughton

water in the early Holocene and their sediments may preserve Late Palaeo-Indian artifacts—including ones made from organic material—as well as a depositional record of the local environment at that time.

In terms of predicted cultural affiliation, there is more potential for Late Palaeo-Indian deposits above 100 m a.s.l., increasing in age with elevation. Below 100 m the soil is heavier and the lower elevations are increasingly poorly drained. Still, between about 95 to 99 m a.s.l.—where various historical ruins are also located—there are low knolls, perhaps small sub-aqueous fans, that would have been a relatively stable littoral zone attractive to hunter-gatherers for some time into the Early Archaic, because the surficial geology and soil maps of this part of the Carp Embayment indicate that the deepest water was close to the Carp River. Although the terrain below about 95 m remained a wetland littoral zone since about 4,700 BP, its attractiveness to subsequent Late Archaic and Woodland peoples would be less than when it was an active shoreline in the early Holocene.

## STAGE 2

### 5.0 Purpose and Objectives of Stage 2 Field Assessment

A Stage 2 assessment as a field test to determine the presence or absence of archaeological material, or cultural features, in a development zone. The Ministry of Culture standards and guidelines for archaeological fieldwork (OMCL 2004) specify that the entire development zone should be assessed—except where poor drainage, exposed bedrock, *etc.* prohibit.

### 6.0 Method and Procedures

Permission to enter the property for the purpose of conducting Stage 2 field tests was obtained from Novatech Engineering Consultants Ltd. The field work was directed by \_\_\_\_\_ (Licence \_\_\_\_\_), assisted by \_\_\_\_\_. The field crew included \_\_\_\_\_

\_\_\_\_\_ and \_\_\_\_\_. The fieldwork took place from July 6<sup>th</sup> to 14<sup>th</sup> 2005. The collections were processed at *The Diefenbunker* by \_\_\_\_\_

and \_\_\_\_\_ sorted the collection drew the site plans and prepared the catalogue and tables. \_\_\_\_\_

\_\_\_\_\_ provided comments and insight. The artifacts will housed at the Algonquin Artifact Repository in Pikwákanagán.

The principal method of assessment was testpits survey at 10 m intervals, where local conditions permitted. Bedrock surface exposures, eroded areas, and some areas of previous disturbance were visually inspected. Testpits were about 30 cm x 30 cm and were excavated by shovel and trowel to parent material or bedrock. The backdirt was passed through a 6 mm mesh and the screen and the soil profile were inspected for archaeological material or features. The historical farmstead component, identified



Table 1. BhFx-28 Lithic Collection

Category	Raw Material											Total	
	White Quartz	Blue Quartzite	Grey Quartzite	Feldspar	Granitic Quartzite	Marbled Quartzite	Hydln	Red Slate	Quartzitic Sandstone	Granite	Chert		
<b>* Detritus</b>													
Waste flakes	162	124	59	18	9	12	9	3	-	1	-	397	
Flake fragments	379	117	-	5	18	19	16	5	-	-	-	559	
Shatter	603	184	140	207	75	46	49	-	2	-	1	1307	
Split cobbles	-	-	1	-	-	-	-	-	1	-	-	2	
Blocks	8	-	41	-	-	-	-	-	-	-	-	49	
Sub-total	1152	425	241	230	102	77	74	8	3	1	1	2314	
<b>* Tools</b>													
Core fragments	20	10	2	-	-	6	6	-	-	1	-	45	
Cores	9	5	1	-	-	3	-	-	-	-	-	18	
Scrapers	2	3	4	2	1	1	-	-	-	-	-	13	
Biface preforms	4	1	5	1	1	-	-	-	-	-	-	12	
Retouched fragments	5	2	1	3	-	-	-	-	-	-	-	11	
Retouched flakes	5	-	4	-	-	-	-	-	-	-	-	9	
Wedges	6	-	1	-	-	-	1	-	-	-	-	8	
Biface fragments	2	1	2	2	-	-	-	-	-	-	-	7	
Side scrapers	4	2	-	-	-	-	-	-	-	-	-	6	
Perforators	1	1	3	-	-	-	-	-	-	-	-	5	
Blanks	-	-	3	-	-	1	-	-	-	-	-	4	
Gravers	1	-	3	-	-	-	-	-	-	-	-	4	
Notched flakes	1	2	1	-	-	-	-	-	-	-	-	4	
Worked blocks	-	-	4	-	-	-	-	-	-	-	-	4	
Adzes	1	-	1	-	-	-	-	-	-	-	-	2	
Planes	1	-	1	-	-	-	-	-	-	-	-	2	
Backed knives	-	-	2	-	-	-	-	-	-	-	-	2	
Endscrapers	1	1	-	-	-	-	-	-	-	-	-	2	
Micro-scrapers	2	-	-	-	-	-	-	-	-	-	-	2	
Uniface fragments	-	-	2	-	-	-	-	-	-	-	-	2	
Knife	-	-	-	1	-	-	-	-	-	-	-	1	
Chopper	-	-	1	-	-	-	-	-	-	-	-	1	
Knife-chopper	-	-	1	-	-	-	-	-	-	-	-	1	
Graver-scaper	-	-	1	-	-	-	-	-	-	-	-	1	
Drill	-	-	1	-	-	-	-	-	-	-	-	1	
Unifacial preform	-	-	1	-	-	-	-	-	-	-	-	1	
Used flake	1	-	-	-	-	-	-	-	-	-	-	1	
Tool fragment	1	-	-	-	-	-	-	-	-	-	-	1	
Hammerstone	-	-	-	-	-	1	-	-	-	-	-	1	
Subtotal	60	28	45	9	2	12	7	-	-	1	-	171	
Total	n	1206	453	286	239	104	89	81	8	3	2	1	2485
	%	49.05	18.23	11.51	9.62	4.19	3.58	3.26	0.32	0.12	0.08	0.04	100.0

Table 2. BbFx-29 Lithic Collection

Category	Raw Materials												Total	
	Marbled Quartzite	Blue Quartzite	Feldspar	Grey Quartzite	White Quartz	Granitic Quartzite	Quartzitic Sandstone	Hyalin	Granite	Micaceous Schist	Red Slate	Grey Chert		
• Detritus														
Waste flakes	403	359	19	28	51	22	6	1	1	-	-	-	890	
Flake fragments	1114	1034	54	71	71	26	-	9	-	-	-	-	2379	
Shatter	2495	1497	168	125	43	58	7	10	3	6	-	1	4413	
Split cobbles	-	1	-	-	-	-	1	-	-	-	-	-	2	
Cobble spalls	1	1	1	-	-	-	-	-	1	-	-	-	4	
Blocks	48	33	2	4	-	7	-	-	-	-	-	-	94	
Sub-total	4061	2925	244	228	165	113	14	20	5	6	-	1	7782	
• Tools														
Core fragments	35	28	-	1	1	-	-	-	-	-	-	-	65	
Cores	26	13	-	3	1	-	1	-	-	-	-	-	44	
Planes	12	9	-	4	-	2	4	-	-	-	-	-	31	
Biface preforms	10	13	-	-	-	-	-	-	-	-	-	-	23	
Retouched flakes	3	5	-	-	-	1	1	-	-	-	-	-	10	
Scrapers	2	5	-	-	1	-	1	-	-	-	-	-	9	
Blanks	2	6	-	-	-	-	-	-	-	-	-	-	8	
Adzes	2	4	-	-	-	-	1	-	-	-	-	-	7	
Endscrapers	1	5	-	-	-	-	-	-	-	-	-	-	6	
Retouched fragments	-	1	-	-	1	-	3	-	-	-	-	-	5	
Gravers	2	-	-	-	-	1	-	-	1	-	-	-	4	
Backed knives	1	2	-	-	-	-	-	-	-	-	-	-	3	
Choppers	-	1	1	1	-	-	-	-	-	-	-	-	3	
Unifacial preforms	1	1	-	1	-	-	-	-	-	-	-	-	3	
Used flakes	1	-	-	-	2	-	-	-	-	-	-	-	3	
Biface fragments	1	1	-	-	-	-	-	-	-	-	-	-	2	
Micro-scrapers	-	1	-	1	-	-	-	-	-	-	-	-	2	
Notched flakes	1	1	-	-	-	-	-	-	-	-	-	-	2	
Perforators	1	1	-	-	-	-	-	-	-	-	-	-	2	
Wedges	1	1	-	-	-	-	-	-	-	-	-	-	2	
Worked blocks	-	2	-	-	-	-	-	-	-	-	-	-	2	
Point stem	-	-	-	-	-	-	-	-	-	-	1	-	1	
Side scraper	-	1	-	-	-	-	-	-	-	-	-	-	1	
Burin	1	-	-	-	-	-	-	-	-	-	-	-	1	
Drill	-	-	-	-	1	-	-	-	-	-	-	-	1	
Notched spall	-	1	-	-	-	-	-	-	-	-	-	-	1	
Hammerstone	-	-	-	-	-	-	1	-	-	-	-	-	1	
Subtotal	103	102	1	11	7	4	12	-	1	-	1	1	240	
Total	n	4162	3025	245	239	172	117	26	20	6	6	1	1	8022
	%	51.91	37.73	3.05	2.98	2.14	1.46	0.32	0.25		0.16			100.0

Table 3. BhFx-30 Lithic Collection

Category	Raw Material													Total	
	Blue Quartzite	Marbled Quartzite	White Quartz	Feldspar	Grey Quartzite	Granitic Quartzite	Quartzitic Sandstone	Hyalin	Granite	Granitic sandstone	Chert	Slate	Undetermined		
▪ Detritus															
Waste flakes	323	25	33	6	7	-	9	7	-	4	2	1	-	417	
Flake fragments	246	10	45	5	1	-	-	-	-	2	1	-	-	310	
Shatter	1664	95	86	59	46	19	1	2	4	2	3	1	-	1982	
Split cobbles	4	1	-	-	-	-	1	-	-	-	-	-	-	6	
Cobble spalls	-	1	-	-	-	-	-	-	-	-	-	-	-	2	
Blocks	65	28	3	3	1	-	-	-	1	-	-	-	-	101	
Sub-total	2306	160	167	73	55	19	11	9	5	9	6	2	-	2818	
▪ Tools															
Cores	16	3	1	1	-	-	3	2	-	-	-	-	-	26	
Scrapers	9	2	-	-	2	-	3	-	-	-	-	-	-	16	
Core fragments	9	1	-	-	-	-	1	1	-	-	-	-	-	12	
Blanks	5	2	-	-	-	-	-	-	-	-	-	-	-	7	
Backed knives	3	2	-	1	-	-	-	-	-	-	-	-	-	6	
Worked blocks	2	1	1	-	1	1	-	-	-	-	-	-	-	6	
Biface fragments	2	1	-	-	1	-	-	-	1	-	-	-	-	5	
Wedges	5	-	-	-	-	-	-	-	-	-	-	-	-	5	
Retouched flakes	1	-	-	1	-	1	2	-	-	-	-	-	-	5	
Used fragments	2	-	-	-	2	-	-	-	-	-	-	-	1	5	
Biface preforms	1	2	-	-	-	1	-	-	-	-	-	-	-	4	
Planes	2	-	-	-	1	-	1	-	-	-	-	-	-	4	
Polished fragments	-	-	-	-	-	-	-	-	-	-	-	-	-	4	
Choppers	2	1	-	-	-	-	-	-	-	-	-	3	1	4	
Endscrapers	3	-	-	-	-	-	-	-	-	-	-	-	-	3	
Side scrapers	1	-	1	-	-	-	1	-	-	-	-	-	-	3	
Retouched fragments	-	-	1	-	-	1	-	-	-	-	-	-	1	3	
Used flakes	2	-	-	-	-	1	-	-	-	-	-	-	-	3	
Point stems	2	-	-	-	-	-	-	-	-	-	-	-	-	2	
Adzes	1	-	-	-	-	1	-	-	-	-	-	-	-	2	
Perforators	2	-	-	-	-	-	-	-	-	-	-	-	-	2	
Notched fragments	2	-	-	-	-	-	-	-	-	-	-	-	-	2	
Abraders	-	-	-	-	-	-	2	-	-	-	-	-	-	2	
Tool fragments	2	-	-	-	-	-	-	-	-	-	-	-	-	2	
Adze preform	-	-	-	-	1	-	-	-	-	-	-	-	-	1	
Blade	1	-	-	-	-	-	-	-	-	-	-	-	-	1	
Graver	1	-	-	-	-	-	-	-	-	-	-	-	-	1	
Point preform	-	-	-	-	-	-	-	-	1	-	-	-	-	1	
Notched block	1	-	-	-	-	-	-	-	-	-	-	-	-	1	
Subtotal	77	15	4	3	8	6	13	3	2	-	-	3	3	137	
Total	n	2379	175	171	76	63	25	24	12	7	9	6	5	3	2955
	%	80.51	5.92	5.79	2.57	2.13	0.85	0.81	0.41	0.24	0.30	0.20	0.17	0.10	100.0

Table 4. BhFx-31 Lithic Collection

Category	Raw Material										Total	
	Blue Quartzite	Grey Quartzite	Marbled Quartzite	White Quartz	Granitic Quartzite	Feldspar	Quartzitic Sandstone	Hydric	Granite	Syenite		
• Detritus												
Waste flakes	8	4	6	1	2	1	-	-	-	-	22	
Shatter	178	188	110	49	33	29	3	3	1	-	594	
Blocks	13	1	19	-	2	6	-	-	-	-	41	
Sub-total	199	193	135	50	37	36	3	3	1	-	657	
• Tools												
Planes	2	2	-	-	-	-	-	-	-	-	4	
Retouched fragments	-	2	-	-	1	-	-	-	-	-	3	
Scrapers	1	-	-	-	-	-	1	-	-	-	2	
Perforators	2	-	-	-	-	-	-	-	-	-	2	
Wedges	2	-	-	-	-	-	-	-	-	-	2	
Cores	2	-	-	-	-	-	-	-	-	-	2	
Core fragments	-	1	-	-	-	-	-	-	-	-	1	
Adze	1	-	-	-	-	-	-	-	-	-	1	
Backed knife	1	-	-	-	-	-	-	-	-	-	1	
Notched fragment	1	-	-	-	-	-	-	-	-	-	1	
Worked block	1	-	-	-	-	-	-	-	-	-	1	
Hammerstone	-	-	-	-	-	-	-	-	-	1	1	
Sub-total	13	5	-	-	1	-	1	-	-	1	21	
Total	n	212	198	135	50	38	36	4	3	1	1	678
	%	31.27	29.20	19.91	7.37	5.60	5.31	0.60	0.44	0.15	0.15	100.0

sediments at the base of crevices. Organic artifacts and plant macrofossils may be preserved in peat or anaerobic conditions in the organic terrain.

- *Artifact and feature density* – Artifact density is very high.
- *Human Remains and Burials* – Human bone would not preserve that length of time, unless calcined or charred by cremation.

Summary: BhFx-28 is a significant archaeological site because of its age, rarity, and artifact density. There is good potential for organic preservation in crevices and in the organic terrain.

#### BhFx-29

- *Historic Association* – does not apply.
- *Representativeness* – geochronological data and the palaeolithic assemblage indicate a Late Palaeo-Indian occupation, about 10,000 to 10,500 BP.
- *Type/Function* – quartzite extraction area, workshops.
- *Rarity* – archaeological sites of this age are rare in the archaeological record, provincially, nationally, and internationally.
- *Integrity* – Integrity is good.
- *Preservation* – The lithic artifacts are well preserved but organic remains were not observed and would not be expected to preserve for that length of time unless calcined or charred. Organic preservation may exist in the sediments at the base of crevices.
- *Artifact and feature density* – Artifact density is very high.
- *Human Remains and Burials* – Human bone would not preserve that length of time, unless calcined or charred by cremation.

Summary: BhFx-29 is a significant site because of its age, rarity, and artifact density.

#### BhFx-30 Pre-Contact Component

- *Historic Association* – does not apply.
- *Representativeness* – geochronological data and the palaeolithic assemblage indicate a Late Palaeo-Indian occupation, about 10,000 to 10,500 BP.
- *Type/Function* – quartzite extraction area, workshops.
- *Rarity* – archaeological sites of this age are rare in the archaeological record, provincially, nationally, and internationally.
- *Integrity* – Integrity is good although there is some mixing in the area of the Morgan-Richardson historical component.
- *Preservation* – The lithic artifacts are well preserved but organic remains were not observed and would not be expected to preserve for that length of time unless calcined or charred. Organic preservation may exist in the sediments at the base of crevices.
- *Artifact and feature density* – Artifact density is very high.
- *Human Remains and Burials* – Human bone would not preserve that length of time, unless calcined or charred by cremation.



## 9.0 Conclusion and Recommendations

The Stage 2 assessment has determined the presence of widespread, significant, archaeological deposits on the Broughton Land that are threatened by the planned subdivision construction. The best management practice is to adjust the development construction plan to avoid impacts to the archaeological sites, or significant portions of them. Unfortunately, the preferred planning response is only feasible in Block 155, the "Park", and is not an option for the archaeological deposits throughout the rest of the Broughton Land. Mitigation, in the form of Stage 3, Stage 4, and Stage 3½ archaeological excavation, is necessary before any construction can begin.

According to the standards and guidelines of the Ministry of Culture (OMCL 2004), Stage 3 is a site specific assessment carried out to document the nature of the archaeological deposit and its cultural affiliations; gather a representative sample of artifacts; determine the level of heritage value; and plan appropriate Stage 4 mitigation strategies. Stage 4 is essentially a site removal, that converts the archaeological deposit into excavation records and artifact collections. A Stage 3½ is a streamlined site removal procedure, whereby Stage 3 excavations are extended until the archaeological deposit is removed—in effect Stage 3 assessment becomes a Stage 4 salvage removal.

The archaeological work at the Broughton Land will take place in phases to mitigate, and clear of heritage concern, parts of the property in sequence, so that construction may begin in the blocks cleared first, while archaeological deposit removal continues in others. Since the subdivision construction plan has three phases, the archaeological assessment steps will be the same.

1. The first step in the mitigation plan is to carry out Stage 3 assessments of BhFx-28, BhFx-29, and BhFx-30, where they overlap the Phase 1 and Phase 1A construction zones. In addition to the purposes described above, a practical objective of this work will be to clear of heritage concern: Block 154, a commercial lot on the north side of Terry Fox Drive; and a buffer of land along the south side of Kanata Avenue. The Stage 3 report will include Stage 4 site removal plans for the sites studied.
2. The second step is to carry out a Stage 3½ archaeological assessment of the Morgan-Richardson farmstead, the historical component of BhFx-30. Because the nature and extent of this deposit is well known, Stage 3 excavations can be extended until the deposit has been removed. A practical objective of this operation will be to clear Block 153 of heritage concern.
3. The third step will be Stage 4 site removals of BhFx-28, BhFx-29, and BhFx-30. The assessment of BhFx-28 will concentrate on the part that lies outside of Block 155 "Park". The excavations will include the organic terrain in Phase 1A. The wetlands will then be drained to permit Stage 3½ excavation of the organic terrain.

4. The fourth step will be a Stage 3 site monitoring at that part of BhFx-28 that occurs in Block 155, the "Park", when the communications tower is dismantled and removed.
5. The last step will be a Stage 3<sup>14</sup> site removal of BhFx-31 in Construction Phase 2.

Summary: BhFx-30 Pre-Contact is a significant site because of its age, rarity, and artifact density.

#### BhFx-30 Morgan-Richardson Historical Component

- *Historic Association* – Associated with the Morgans and Richardsons, both Carp Valley pioneer families with descendants still in the vicinity.
- *Representativeness* – The Morgan component dates to the early Euro-Canadian settlement of the Ottawa area.
- *Type/Function* – farmstead with Morgan house, used until mid-19<sup>th</sup> century, and the outbuildings, used until 20<sup>th</sup> century by Richardson.
- *Rarity* – Sites of this period are rarely recorded in the City of Ottawa and although highly visible they are few in number and will become increasingly rarer.
- *Integrity* – Although there is some modern garbage dumped in the house foundation, integrity is good.
- *Preservation* – Faunal remains from testpits are well preserved and other organic materials (wood, leather, textile) may also be expected.
- *Artifact and feature density* – Artifact and feature density are high.
- *Human Remains and Burials* – There are no indications of Euro-Canadian human remains but an unapproved burial is possible.

Summary: BhFx-30 The Morgan-Richardson Component is a significant historical archaeological site because of its historical association, representativeness, rarity, integrity, preservation, and artifact/feature density.

#### BhFx-31

- *Historic Association* – does not apply.
- *Representativeness* – geochronological data and the palaeolithic assemblage indicate a Late Palaeo-Indian occupation, about 10,000 to 10,500 BP.
- *Type/Function* – quartzite extraction area, workshops.
- *Rarity* – archaeological sites of this age are rare in the archaeological record, provincially, nationally, and internationally.
- *Integrity* – Integrity is good.
- *Preservation* – The lithic artifacts are well preserved but organic remains were not observed and would not be expected to preserve for that length of time unless calcined or charred. Organic preservation may exist in the sediments at the base of crevices.
- *Artifact and feature density* – Artifact density is high.
- *Human Remains and Burials* – Human bone would not preserve that length of time, unless calcined or charred by cremation.

Summary: BhFx-31 is a significant site because of its age, rarity, and artifact density.

BhFx-31 consists of 678 pre-contact lithic artifacts collected from 51 positive testpits distributed over an area of bedrock knob, terrain about 140 m x 80 m (Figure 18). The site is located in the \_\_\_\_\_

on a broad rock terrace characterized by a steep cliff, with a good view of the Carp Valley, beside a ramp-like alluvial fan that would have made a good landing place for watercraft. Testpits #1 to #25 are located within 10 m of an abrupt bedrock ledge at elevation of 114 m to 115 m a.s.l. Testpits #26 to #51 form two loose concentrations, at an elevation of 107 m to 109 m a.s.l. on a bedrock terrace overlooking the alluvial bottomlands below. The majority of the artifacts collected are detritus, shatter mainly, with some blocks and waste flakes. The lithic materials represented are primarily quartzites (called "blue", "marbled", and "grey") although quartz and feldspar were used in smaller frequencies. Three shatter fragments of quartzitic sandstone were manuported to the Broughton Land from some other shore of the recessional Champlain Sea. Twenty-one specimens (3%) are classed as tools, such as: planes, retouched flake fragments, scrapers, perforators, wedges, cores, core fragments, and an adze, a backed knife, a notched fragment, and a hammerstone. Some of these artifacts are illustrated in Figures 27&28.

## 8.0 Results

The significance of the extant historical sites is evaluated below, followed by the archaeological discoveries made in the course of the Stage 2 assessment. Each resource is rated according to the following eight criteria: 1) *Historical association* links the site to famous people, or events. 2) *Representativeness* refers to a site which exemplifies a broad or typical cultural pattern. 3) *Type/Function* of a site exemplifies a particular cultural activity, or an activity not previously well expressed. 4) *Rarity* may be due to a site's age, function, location, size, etc. 5) *Integrity* refers to sites that have not been disturbed since they were deposited. 6) *Preservation* refers to good preservation of organic material, or cultural features 7) *Artifact/Feature Density* refers to abundance of data. 8) *Human Remains and Burials* are always significant.

### BhFx-28

- *Historic Association* – does not apply.
- *Representativeness* – geochronological data and the palaeolithic assemblage indicate a Late Palaeo-Indian occupation, about 10,500 to 10,800 BP.
- *Type/Function* – quartz and quartzite extraction area and workshop.
- *Rarity* – archaeological sites of this age are rare in the archaeological record, provincially, nationally, and internationally.
- *Integrity* – although affected by the communication tower construction and erosion, integrity is good where there are surficial deposits.
- *Preservation* – The lithic artifacts are well preserved but organic remains were not observed and would not be expected to preserve for that length of time unless calcined or charred. Organic preservation may exist in the

BhFx-30 has a widespread pre-contact lithic component (n=2,955) represented by 101 positive testpits that are distributed for 200 m east-west, along the relict Carp River bank at about 95 m a.s.l., and inland for up to 200 m onto higher terraced bedrock knob terrain, as far as the south shore of the organic lagoon at about 112 m a.s.l. (Figures 15&19A). A small number of lithic artifacts were collected from disturbed contexts on the bike paths that run down the hill at the west end of the site (*ibid.*, Area A) and 1,038 lithic artifacts were found with historic artifacts in the Morgan-Richardson farmstead component. The majority of the artifacts (n=2818) are detritus—mostly shatter, waste flakes and flake fragments—of “blue” quartzite which is prevalent in the local bedrock, however other quartzites (“marbled”, “grey”, and “granitic”) and quartz are represented in smaller frequencies (see Table 3). Quartzitic sandstone, slate, and chert are manuported materials, that although not exotic, are not naturally present on the Broughton Land. The small proportion classified as tools (n=137) includes cores, core fragments, scrapers, blanks, backed knives, biface fragments, retouched flakes and flake fragments. Some of these tools are illustrated in the artifact plates below (Figures 25&26).

BhFx-30 the historic Morgan-Richardson farmstead component was identified by Stewart (2003). Since various cultural features are visible on the surface, a grid of one metre square units, 150 x 50 m, was superimposed over the historical component and testpits were excavated at 2 m intervals throughout (Figure 16). Three broad distribution patterns are apparent. The largest concentration of positive testpits is located in the south end of the area tested and centred (radius about 30 m) around the Morgan house foundation. Another concentration, about 30 x 35 m, is located at the west end of the historic component and is associated with a barn foundation and a semi-subterranean stone foundation believed to be the dairy, or creamery (Figure 17). The artifact collection from the western concentration of positive testpits contains more wire nails and large mammal bones and may relate to the later Richardson tenure of the property. The artifact collection from the eastern concentration of positive testpits contains cut nails, kaolin tobacco pipe fragments, cast iron stove parts, and ceramics common to the late 19<sup>th</sup> century (including ironstone). Some of the materials recovered include: ceramics (grey stoneware, white earthenware, white ironstone), kaolin pipe fragments, iron (many cut nails and cast iron pieces), bone (large mammal and bird), small quantities of red brick and mortar, glass container sherds (clear, green, brown), and windowpane glass. A third, smaller, concentration of positive testpits is located about the middle of the historical component. This artifact collection contains cut nails, cast iron parts, nuts and bolts and may indicate the remains of an outbuilding.



BhFx-29 consists of 153 positive testpits distributed over a peninsular terrace of bedrock knobs and ledges, between 100 to 109 m a.s.l., an area roughly 275 x 150 m (Figure 14), that produced 8,018 pre-contact lithic artifacts and a small number (n=11) of historical artifacts (see artifact catalogue, below). Very few positive testpits occurred in the silty soil below 100 m a.s.l., most are between 103 and 106 m a.s.l., at the southwest end of the Carp Ridge terrain (Figure 19B). Most of the lithic collection consists of detritus, largely shatter fragments, flake fragments, and waste flakes. Quartzite ("marbled" "blue" "grey" and "granitic") derived from the country rock is the most common lithic material followed, in much smaller frequencies, by quartz and feldspar. Several pieces of quartzitic sandstone, and specimens of chert and red slate, are manuported materials, although not exotic. Only 240 specimens are classified as tools and slightly more than 100 of these are cores and core fragments (see Table 2). Common tool categories from BhFx-29 include planes, biface preforms, retouched flakes and flake fragments, scrapers, blanks and adzes. Other categories represented include: graters, backed knives, choppers, biface fragments, perforators, and wedges. Some examples are illustrated in the artifact plates below (Figures 23&24).

BhFx-28 consists of 101 positive testpits, over an area roughly 100 m x 150 m (Figure 13), that produced a total collection of 2,485 pre-contact lithic artifacts (see Table 1). Positive testpits (#1 to #20) occur above 115 m a.s.l., on \_\_\_\_\_

Other positive testpits (#21 to #40) are grouped between \_\_\_\_\_

Of particular interest is a stone tool workshop where the large quartz vein is exposed (Figure 13, area A). This midden has been disturbed recently by youths who have built a "tree-fort" nearby (Figure 20). The organic terrain was water saturated at the time of assessment and was not tested. Such areas are known to have potential for archaeological and palaeo-environmental remains but are untestable by conventional methods of terrain assessment. Very few positive testpits occur in the silty soil below 110 m a.s.l. On the east side of the site, between the \_\_\_\_\_

positive testpits (#45 to #61 and #75 to #85) where watercraft could have been landed out of the current on a lee shore. There are other groups of positive testpits on the terraces and ledges that overlook these sloped beaches. White quartz, and to a lesser extent hyaline quartz, make up the majority of the lithic detritus and about half of the tools in the collection (Table 1). About half of the tools in the collection are made from quartzite (called "blue", "grey", "granitic", or "marbled"), feldspar, or schist, that occur naturally below the escarpment, in the form of stones, cobbles, boulders, and bedrock. Also present, in small frequencies, are red slate, quartzitic sandstone, and chert. These materials are not natural to the Broughton Land terrain and must have been manuported from some other shore of the recessional Champlain Sea. The most abundant artifacts are detritus (n=2,314), while tools (n=171) are less frequent and many of these are core fragments and cores. Tool categories represented by 4 to 6 specimens include: biface preforms, retouched flakes and flake fragments, wedges, and sidescrapers. Other tool classes, represented by one or two specimens each, include scrapers, biface fragments, perforators, gravers, notched flakes, backed knives, adzes and planes, a chopper and a drill. Some of these are illustrated in artifact plates below (Figures 21&22).

earlier by Stewart (2003), was testpitted intensively at 2 m intervals according to an established grid.

### 7.0 Observation and Description

A total of 16,204 artifacts (historical and pre-contact) were recovered from the Stage 2 testpits. Except for 11 specimens from four isolated testpits, the historical Euro-Canadian artifacts (n=2,057) were collected from the farmstead site identified by Stewart (2003). A total of 14,136 pre-contact lithic artifacts were collected, the majority of them (n=13,039) from 406 positive testpits. About 96% of these are detritus, while only 4% have been classed, during the cleaning and cataloguing process, as tools. Fifty-nine lithic artifacts were found in disturbed contexts associated with the dirt-bike course and 1,038 pre-contact artifacts were recovered with historical artifacts from the Morgan-Richardson component. These artifact discoveries have been subdivided into four designated archaeological sites, BhFx-28, BhFx-29, BhFx-30, BhFx-31, based on broad patterns of positive testpit distribution associated with geographic area and elevation (Figure 12). Appendix 1 contains the artifact catalogues for each site. BhFx-30 has a pre-contact and a historical component and, although the artifacts occurred in the same units, they have been catalogued as separate collections. BhFx-29 has a very small collection of Euro-Canadian artifacts.

Land, too, must have experienced falling water-levels from its peak at 123 m, at perhaps 10,500 BP, to about 100 m a.s.l., at about 10,000 BP.

The soil of the Broughton Land has been classed as *Anstruther* loamy sand or sandy loam (Schut and Wilson 1987) that has developed, on ledges and terraces, from a parent material of shallow drift and/or lacustrine/riverine deposits, that lie on igneous or metamorphic bedrock. *Anstruther* soil is "friable, dark reddish brown to brown, sandy, wave washed drift material derived from... *Grenville* type till...[that] have been completely reworked leaving a very a thin weathered drift material with only a very small proportion of the original limestone and dolomite stone content. Thickness varies between 10 and 25 cm and the drift material is generally less compact than the thicker Nepcan and Farmington associations...

#### 4.0 Archaeological Potential of the Broughton Land

According to the *Archaeological Resources Potential Mapping Study* (ASI and Geomatics 1999), a predictive model used by the City of Ottawa to determine if proposed developments warrant an archaeological assessment, the Broughton Land has archaeological potential (Figure 10). The City's model is based on proximity to water and every major shoreline has a 300 m buffer—terrestrial and subaqueous—that indicates an area of archaeological potential. The model does not estimate the relative potential (i.e., "low", "moderate", or "high") of the littoral zone; nor does it estimate the cultural periods that could be represented (i.e., "Palaeo-Indian", "Late Woodland", or "synchronic", meaning all time periods). The City's model also applies to the 300 m major shoreline buffer to the terrestrial side of all wave-cut escarpments because they indicate relict shorelines. The City's model also establishes a 200 m buffer along streams and wetlands—where the shores have well (or, imperfectly) drained soil—as well as a 100 m radius buffer around registered archaeological sites and historical roads.

Figure 10 illustrates the City of Ottawa archaeological potential model as it has been applied to the Broughton Land and vicinity. The north side of the property has been captured by a 100 m wide buffer along the Richardson Side Road—because it is a historical route—and the west side has about 200 m of the buffer that has been applied to the Carp River. But the City of Ottawa model "paints with a broad brush" and it overlooks the fact that, in the Early Holocene, the Carp Embayment shoreline fell steadily down the hillside. The model also fails to account for the poorly drained *North Gower* clay that has been, mistakenly, included in the 300 m Carp River buffer. The historical ruins, associated with the Morgans, Richardson's and Acres, are located at the interface of the Carp Ridge and the bottomlands—not in proximity to the Richardson Side Road, as Figure 10 predicts.

In reality, almost all of the Broughton Land has moderate archaeological potential, except for escarpments and patches of poorly drained soil (Figure 11). This estimate includes the organic terrain ponds of the middle terrace—although such areas are not normally tested at the Stage 2 level of assessment—for they were potable sources of

Ottawa Valley. The maximum extent of the Champlain Sea has been radio-carbon dated (from shells) to 11,400 BP, at 170 m a.s.l. near Shawville, and to 11,000 BP, at 160 m near Martindale in the Gatineau Valley—dates are approximate—and at Almonte and Rigaud, the high water level has been dated to 11,200 BP, at 154 m, and 160 m a.s.l., respectively (Fulton and Richard (1987: Table 7). Thus, the period of maximum extent of the Champlain Sea corresponded with the early Palaeo-Indian period.

The recessional period of the Champlain Sea began about 11,000 BP, when global sea-levels dropped due to renewed glacial advances, and continued until about 10,000 BP. As the sea-level rose, the Ottawa Valley rebounded from the weight of the ice-sheet until, by Late Palaeo-Indian/Early Archaic, the Ancestral Ottawa River flowed into, an early Holocene freshwater body of water. Recession continued until about 4,700 BP, due to isostatic rebound. The Ottawa Valley was only inundated once by marine water (Kenney 1964) but there were periods of stasis when riverine/lacustrine lakes prevailed. The first, beginning about 10,000 BP occupied the Lac Chats and Lac Deschênes basins, the second, Lake Lampsilis, ponded the Lac Deschênes basin. Lake Lampsilis was still much higher than the modern Ottawa River. According to Fulton and Richard (1987:25) the lake-level was still as high as 94 m a.s.l. at Deschênes in 10,100 BP. Lake Lampsilis has been dated from three locations in the Ottawa vicinity to between 7,870 BP and 8,830 BP at 60 to 70 m a.s.l. (*ibid.*: Table 7).

There is evidence, however, that the entire Ottawa Valley may have been an unpleasant and dangerous environment for intervals from the Late Palaeo-Indian to the Middle Archaic cultural period. As Teller (1988) points out, this evidence has come to light relatively recently, and earth scientists, and others, have not yet considered the impact of those catastrophic years on the environment of the Ottawa/St.Lawrence River basin, let alone their effect on human populations and archaeological deposits. There is growing evidence to support the theory of Lake Agassiz 'slugs' in the form of "gullies" and "sand waves" on the bed of Lac Deschênes, as revealed by acoustic profiles and cores (see Schilts 1994 in, Gilbert 1994:58-61).

During the Palaeo-Indian and Early Archaic periods, the entire Upper Great Lakes, and northern Ontario and northern Québec, drained through the Ottawa Valley, first debouching solely through the Barron and Petawawa Rivers, and later also via the North Bay/Mattawa route. The volume of water through the Ottawa system was enormous—almost inconceivable—relative to today. This gargantuan flow was compounded at intervals, between 10,800-10,000 BP and again between 9,500-8,000 BP, by 'slugs' of flood water from post-glacial Lake Agassiz, which then occupied much of the prairie provinces (Teller 1988). These 'slugs', with additional volumes of 500 km<sup>3</sup> to 4,000 km<sup>3</sup> (!), would obviously have been catastrophic in nature, and would have affected the habitability of the shorelines of the recessional stages of the Champlain Sea and the Ancestral Ottawa River. Lewis and Anderson (1989) have estimated that the flow of the Ancestral Ottawa River during one of these slugs was



the City of Ottawa and they occupied the site until 1851 when it was bargained and sold to T. Richardson who occupied the adjacent farmstead on the north side of the Richardson Side Road. The property remained in the Richardson Family until 1950s when it was bargained and sold to Acres (who had occupied a farmstead located near the southeast corner of the Broughton Land. *The Illustrated Historical Atlas of Carleton County* (Belden 1879) illustrates buildings on lots 4, 5, and 6 concession 1 March associated with dwellings of Geo. Acres, G. Richardson, and T. Richardson respectively but they are not accurately plotted with respect to roads or the Carp River.

According to technical drawings from the late 19<sup>th</sup> century, curated by the Huntley Historical Society, pioneer families along the Carp River, received an "award" that made them responsible for dredging and straightening the stream bed to specific grades and bearings that engineers of the period reckoned would mitigate seasonal flooding problems. Figure 8, from historical aerial photograph A18057-8 taken in 1945, illustrates the canalization of the Carp River through the Broughton Land and irregularly spaced tile drainage ditches, that run north to south from the edge of the Carp Ridge, in the vicinity of the Morgan/Richardson farmstead ruins, to a former channel of the Carp River. In modern aerial photograph A28148-109, from 1994, the Broughton Land appears more densely treed and the ruins of the Acres farmstead are visible (Figure 9). These ruins were destroyed by construction of Kanata Avenue.

## 2.0 Previous Research and Known Archaeological Sites

Charles Borden (1952) designed a site registration system that is used throughout Canada. A "Borden Block" is ten degrees latitude (long) and ten degrees longitude (wide) is named by a co-ordinate system, which uses upper and lower case letters. Canadian archaeologists refer to "Borden Blocks" and "Borden Numbers" and "Bordenize" sites when they register them. Sites within a Borden Block are numbered sequentially. The Broughton Land is in the BhFx Borden Block.

Like most of eastern Ontario, the archaeology of the Ottawa region is poorly known, a result, primarily, of the lack of systematic archaeological surveys but this picture is changing as more compliance archaeological assessments are completed and an outline of prehistoric settlement patterns emerges. A potential mapping study, or predictive model, of archaeological resources is now used by the City of Ottawa and it has expedited the heritage assessment process (ASI and Geomatics 1999).

The potential mapping study noted that—current to 1998—there were only 35 archaeological sites registered in the City of Ottawa and the former County of Carleton. About 100 more sites were reported, but unsubstantiated, (only 54 have sufficient provenience to be plotted on a map). A large percentage of sites, both known and unsubstantiated, were discovered—and destroyed—accidentally during the course of development activities. Others were discovered because the archaeological material was in an actively eroding environment.

**A STAGE 1&2 ARCHAEOLOGICAL ASSESSMENT OF THE BROUGHTON LAND, PART OF LOT 5 CONCESSION 1 MARCH TWP. (GEO), CITY OF OTTAWA**

In August 2005 Kinickinick Heritage Consultants was engaged by Novatech Engineering Consults Ltd., Ottawa, to prepare a Stage 1&2 archaeological assessment of part of lot 5 concession 1 March township (Geo.), in the City of Ottawa. The Broughton Land is located on the north bank of the Carp River, about 20 km southwest of the Chaudière Falls in Ottawa. The main part of the property, about 16 ha, is roughly triangular, about 600 m on each side. It is a sunny hillside with a southwestern aspect sheltered from inclement winds. It has 32 m relief, from 91 m to 123 m. The bedrock of the property above 110 m a.s.l. is an intrusive "groundmass" dome dissected by a quartz vein. Below 110 m a.s.l. it is metamorphic "country rock", composed of quartzite, interlayered paragneiss, and quartzose paragneiss. The overall relief of the country rock terrain is less but there are abrupt bedrock ridges, ledges, and knobs with patches of sandy loam, interspersed by channels and swales of silt and silty loam.

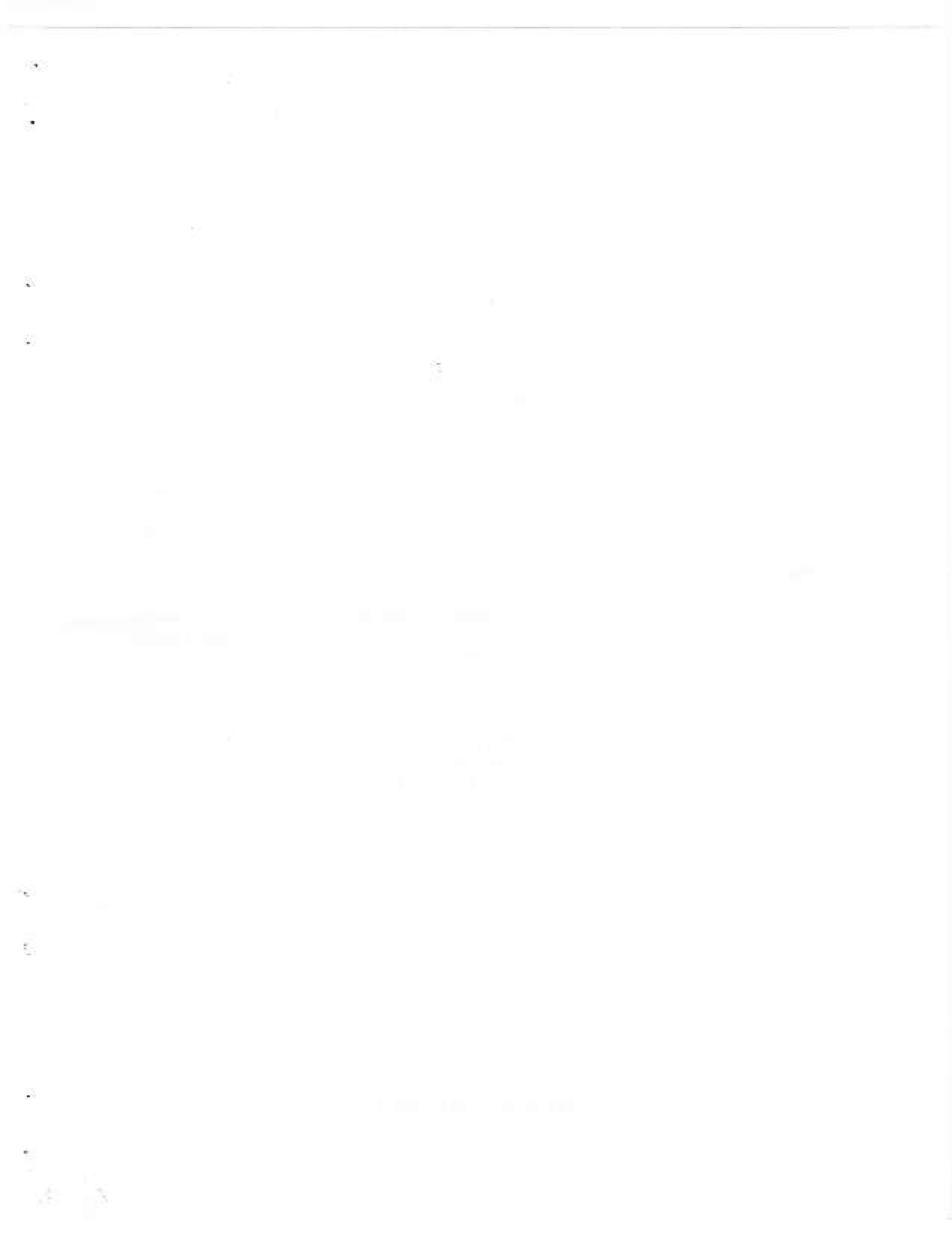
The Broughton Land emerged from the recessional Champlain Sea in the Palaeo-Indian cultural period and it experienced falling water-levels from its peak at 123 m, at perhaps 10,500 BP, to about 100 m a.s.l., at about 10,000 BP. The Broughton Land has moderate archaeological potential, except for escarpments and patches of poorly drained soil. This estimate includes the organic terrain ponds of the middle terrace. A Stage 2 assessment as a field test to determine the presence or absence of archaeological material, or cultural features. The principal method was testpit survey at 10 m intervals, where local conditions permitted.

A total of 16,204 artifacts were recovered from the testpits. Except for 11 specimens, the Euro-Canadian artifacts, n=2,057, were collected from the farmstead site. A total of 14,136 pre-contact lithic artifacts were collected, the majority of them, n=13,039, from 406 positive testpits. About 96% of these are detritus, while only 4% have been classed as tools. Fifty-nine lithic artifacts were found in disturbed contexts associated with the dirt-bike course and 1,038 pre-contact artifacts were recovered with historical artifacts from the Morgan-Richardson component. These artifact discoveries have been designated BhFx-28, BhFx-29, BhFx-30, BhFx-31. Appendix 1 contains the artifact catalogues for each site. BhFx-30 has pre-contact and historical components and, although the artifacts occurred in the same units, they have been catalogued as separate collections.

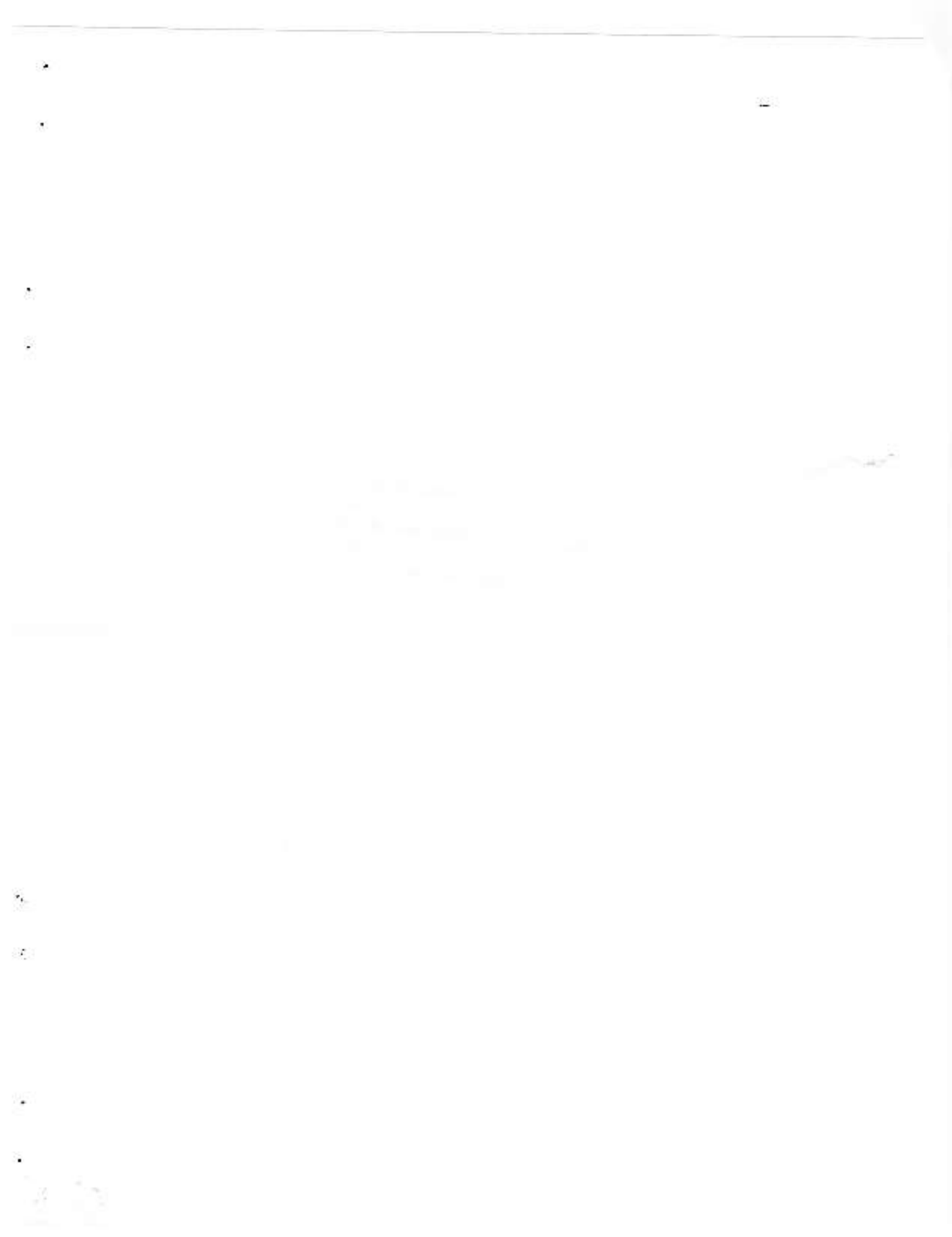
The Stage 2 assessment has determined the presence of widespread, significant, archaeological deposits. Mitigation, in the form of Stage 3, Stage 4, and Stage 3¼ archaeological excavation, is necessary before any construction can begin.

According to OMCL standards and guidelines, Stage 3 is a site specific assessment to document the nature of the archaeological deposit and its cultural affiliations; gather a representative sample; determine heritage value; and plan Stage 4 mitigation. Stage 4 is essentially a site removal, that converts the archaeological deposit into excavation records and artifact collections. A Stage 3¼ is a streamlined site removal procedure, whereby Stage 3 excavations are extended until the archaeological deposit is removed.

The archaeological work at the Broughton Land will take place in phases to mitigate, and clear of heritage concern, parts of the property in sequence, so that construction may begin in the blocks cleared first, while archaeological deposit removal continues in others. Since the subdivision construction plan has three phases, the archaeological assessment steps will be the same. The first step in the mitigation plan is to carry out Stage 3 assessments of BhFx-28, BhFx-29, and BhFx-30, where they overlap the Phase 1 and Phase 1A construction zones. The second step is to carry out a Stage 3¼ archaeological assessment of the Morgan-Richardson farmstead, the historical component of BhFx-30. The third step will be Stage 4 site removals of BhFx-28, BhFx-29, and BhFx-30. The assessment of BhFx-28 will concentrate on the part that lies outside of Block 155 "Park". The excavations will include the organic terrain in Phase 1A. The wetlands will then be drained to permit Stage 3¼ excavation of the organic terrain. The fourth step will be a Stage 3 site monitorship at that part of BhFx-28 that occurs in Block 155, the "Park", when the communications tower is dismantled and removed. The last step will be a Stage 3¼ site removal of BhFx-31 in Construction Phase 2.









## 10.0 References

ASI and Geomatics International Inc.

- 1999 "The Archaeological Resource Potential Mapping Study of the Regional Municipality of Ottawa-Carleton" Planning Report submitted to the Regional Municipality of Ottawa-Carleton.

Barnett, P.J.

- 1988 "History of the northwestern arm of the Champlain Sea", In; Gadd, NR. (ed.) *The Late Quaternary Development of the Champlain Sea Basin, Geological Association of Canada, Special Paper 35*, pp. 25-36.

Belden, H. & Co.

- 1879 *Illustrated Historical Atlas of Carleton County* H. Belden & Co., Toronto.

Bond, C.C.J.

- 1966 "The Hudson's Bay Company in the Ottawa Valley" *The Beaver* Outfit 286, Spring 1966, pp. 4-21.

Borden, C. E.

- 1952 "A Uniform Site Designation Scheme for Canada" *Anthropology in British Columbia* vol. 3:44-48, Victoria.

Buehrle, A.

- 1998 "Phytolith Analysis at the Sandy Ridge and Halstead Sites: Late Pleistocene Microenvironments" In, "The Sandy Ridge and Halstead Paleo-Indian Sites: unifacial tool use and Gaincy phase definition in South-Central Ontario" Museum of Anthropology, University of Michigan Memoirs Number 32, Ann Arbor, Michigan.

Callahan, E.

- 2001 "The Bipolar Technique: the simplest way to make stone tools for survival" In, Wescott, D. *Primitive Technology II Ancestral Skills* pp. 217-220. Gibbs Smith Publisher. Salt Lake City

Cheel, R.J.

- 1982 "The Depositional History of an esker near Ottawa, Canada" *Canadian Journal of Earth Science* v. 19:1417-1427.

Dadswell, M.J.

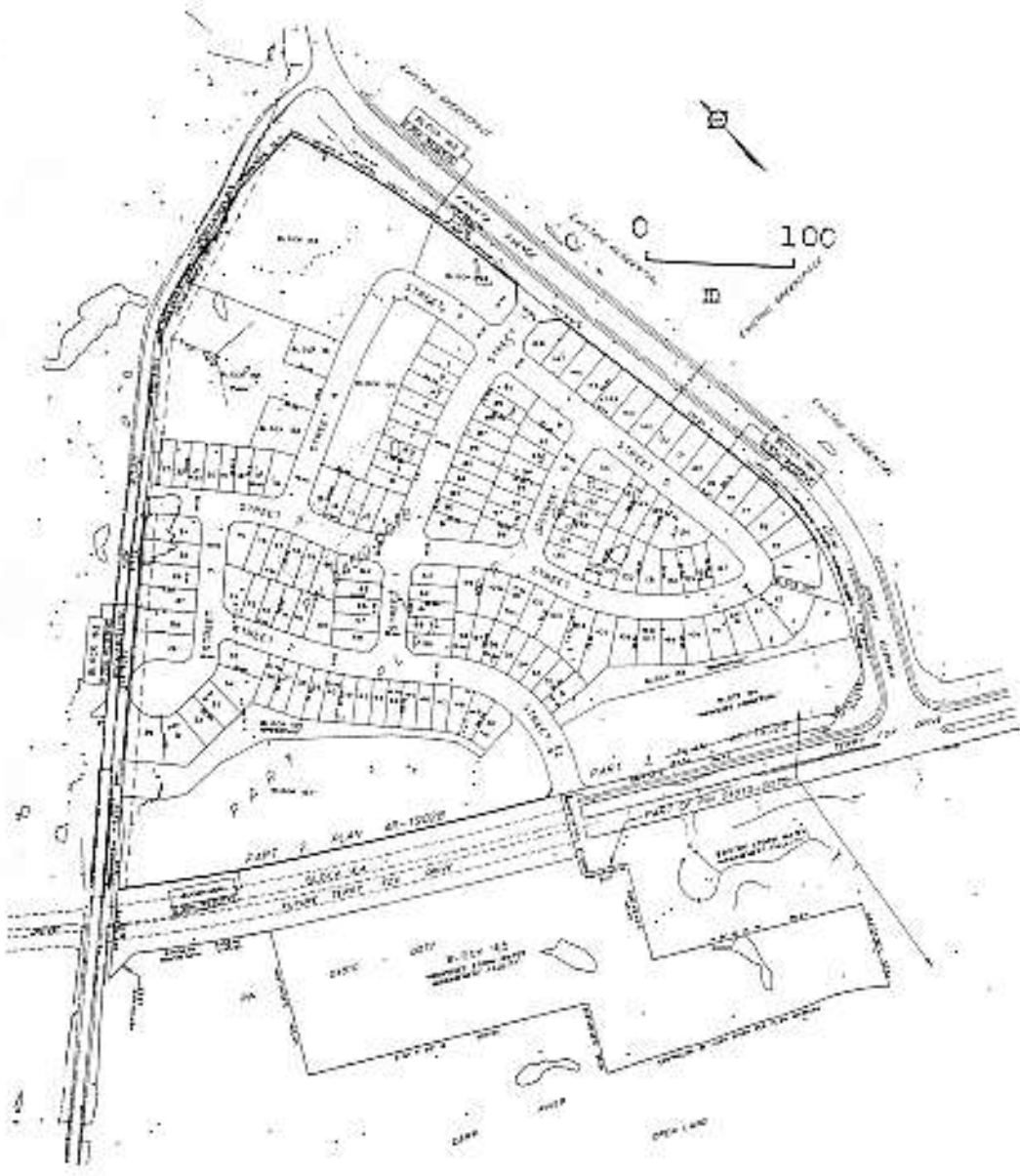
- 1974 "Postglacial Geological History" In, McAlister, D.E. and B.W. Coad *Fishes of Canada's National Capital Region*

Daechsel, Hugh

- 1981 "Sawdust Bay 2: The Identification of a Middle Woodland Site in the Ottawa Valley" Unpublished MA Thesis, McMaster U.

- Laliberté, M  
 1995 "Les recherches archéologiques de 1994 dans le parc du Lac Leamy, Hull"  
*La Société d'Histoire de l'Outaouais*.
- Leechman, D.  
 n.d. "untitled"—notes on field work in the Ottawa area 1943 in the archives of  
 the CMC.
- Lewis C.F.M. and T.W. Anderson  
 1989 "Oscillations of levels and cool phases of the Laurentian Great Lakes  
 caused by inflows from glacial Lake Agassiz and Barlow-Ojibway"  
*Journal of Palaeolimnology* v.2:99-146.
- Marois, Roger  
 1982 "Rapport des fouilles effectués dans un soi-disant monticule funéraire  
 (BiGb-3) à Quyon, 1982" Ms #2137 in the archives of the CMC, Hull,  
 Québec.
- Ontario, Ministry of Culture (OMCL)  
 2004 Draft Standards and Guidelines for Consultant Archaeologists:  
 Archaeological Fieldwork (including Appendix A, The Discovery of  
 Human Remains—Best Practices) Ontario Ministry of Culture, Heritage  
 Policy and Program Development Branch, 400 University Avenue,  
 Toronto.2005 *Draft Standards and Guidelines for Consultant*  
 2005 *Archaeologists: Standards and Guidelines for Artifact Documentation*  
*and Analysis, Standards and Guidelines for Reporting Archaeological*  
*Fieldwork* Ontario Ministry of Culture, Heritage Policy and Program  
 Development Branch, 400 University Avenue, Toronto
- Schut L.W. and E.A. Wilson  
 1987 "The soils of the Regional Municipality of Ottawa-Carleton" *Ontario*  
*Institute of Pedology*, Report No. 58 pp. 1-118, Map sheets A, B and C  
 1:50,000
- Schilts, W. W.  
 1994 "STOP 17 Lac Deschênes acoustic profiles and cores" In: Gilbert, R.  
 (compiler) 1994 "A Field Guide to the Glacial and Postglacial Landscape  
 of Southeastern Ontario and Part of Québec" *Geological Survey of*  
*Canada*, Bulletin 453, Ottawa Canada
- Smith, H.I. and W.E. Wintemberg  
 n.d. "An Archaeological Survey of the Ottawa, Madawaska, and Bonnechere  
 Rivers, in 1917" unpublished manuscript in the Archives of the CMC,  
 Gatineau.

- 2005b "CIF P039-053 A Stage 1&2 Archaeological Assessment of the proposed Russett Pit on parts of lots 19&20 concession 6, Fitzroy twp. (Geo.) City of Ottawa. Report on file with OMCL, Toronto.
- Teller, J.T.  
1988 "Lake Agassiz and its Contribution to Flow Through the Ottawa -St. Lawrence System", In Gadd, N.R. (ed.) *The Late Quaternary Development of the Champlain Sea, Geological Association of Canada Special Paper 35*, pp. 281-289.
- van Courtland, Edward  
1853 *The Canadian Journal* Vol 1 No.7, 1853 February, pp. 160-161, Toronto
- Watson, G.D.  
1972 "A Woodland Indian Site at Constance Bay, Ontario" *Ontario Archaeology* 18:1-24.
- Wintemberg, W. J.  
n.d "untitled"—notes on archaeological discoveries from Carleton County, in the archives of the CMC, Hull, Québec.
- Wright J.V.  
1995 *A History of the Native People of Canada*, vols. I-III *Mercury Series* vol. 152, Archaeological Survey of Canada, Canadian Museum of Civilization, Hull.



THIS PLAN IS SUBMITTED IN PART OF LOT 2  
 COMM. ROAD 1  
 ECONOMIC INDEMNITY OF NORTH  
 SOUTHERN CITY OF KENYA  
 MAP IN THE CITY OF NAIROBI  
 DATE: 1/2004  
 SCALE: 1:500

**APPLICANT'S DECLARATION**  
 I, the undersigned, being the owner of the land shown on this plan, do hereby declare that the information furnished herein is true and correct to the best of my knowledge and belief, and that I am not aware of any facts which would render the same misleading or deceptive.

**APPLICANT'S SIGNATURE**  
 \_\_\_\_\_  
 \_\_\_\_\_

- NOTICE TO APPLICANT REGARDING THE PLAN**
- 1. The plan is subject to the provisions of the Land Use Act, 1995.
  - 2. The plan is subject to the provisions of the Land Use Regulations, 1995.
  - 3. The plan is subject to the provisions of the Land Use (General) Regulations, 1995.
  - 4. The plan is subject to the provisions of the Land Use (Subdivisions) Regulations, 1995.
  - 5. The plan is subject to the provisions of the Land Use (Zoning) Regulations, 1995.
  - 6. The plan is subject to the provisions of the Land Use (Development) Regulations, 1995.
  - 7. The plan is subject to the provisions of the Land Use (Infrastructure) Regulations, 1995.
  - 8. The plan is subject to the provisions of the Land Use (Miscellaneous) Regulations, 1995.
  - 9. The plan is subject to the provisions of the Land Use (Amendment) Regulations, 1995.
  - 10. The plan is subject to the provisions of the Land Use (Revocation) Regulations, 1995.

**NOTICE TO APPLICANT REGARDING THE PLAN**

The plan is subject to the provisions of the Land Use Act, 1995, and the Land Use Regulations, 1995, and the Land Use (General) Regulations, 1995, and the Land Use (Subdivisions) Regulations, 1995, and the Land Use (Zoning) Regulations, 1995, and the Land Use (Development) Regulations, 1995, and the Land Use (Infrastructure) Regulations, 1995, and the Land Use (Miscellaneous) Regulations, 1995, and the Land Use (Amendment) Regulations, 1995, and the Land Use (Revocation) Regulations, 1995.

**NOVATECH ENGINEERING**  
 CONSULTANTS  
 P.O. BOX 1000  
 NAIROBI, KENYA  
 TEL: 011-254-20-222222  
 FAX: 011-254-20-222222  
 E-MAIL: info@novatech.co.ke

**PROFESSIONAL ENGINEER**  
 REG. NO. 12345  
 EXP. DATE: 12/31/2004

Figure 2: Draft Plan of subdivision

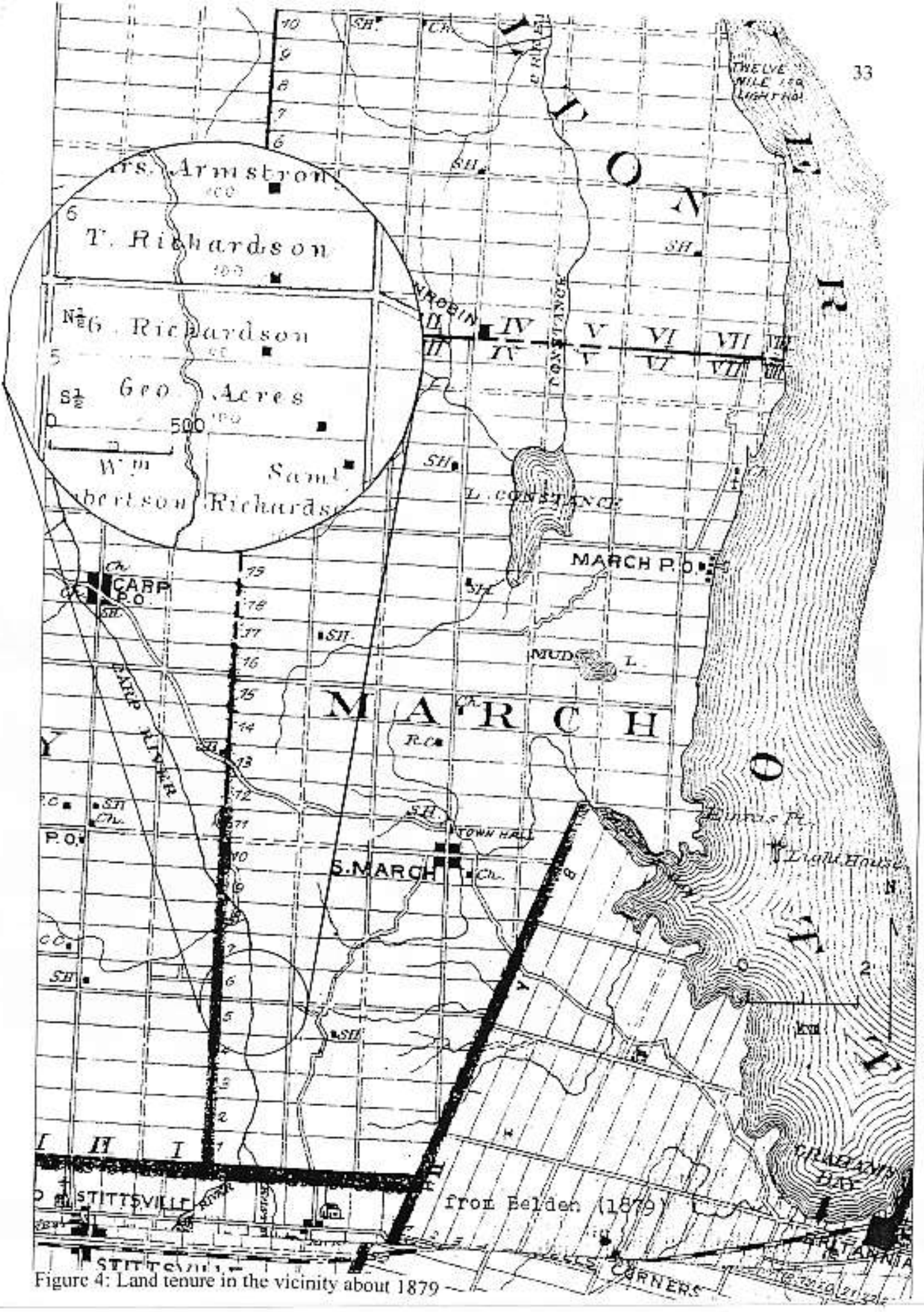


Figure 4: Land tenure in the vicinity about 1879



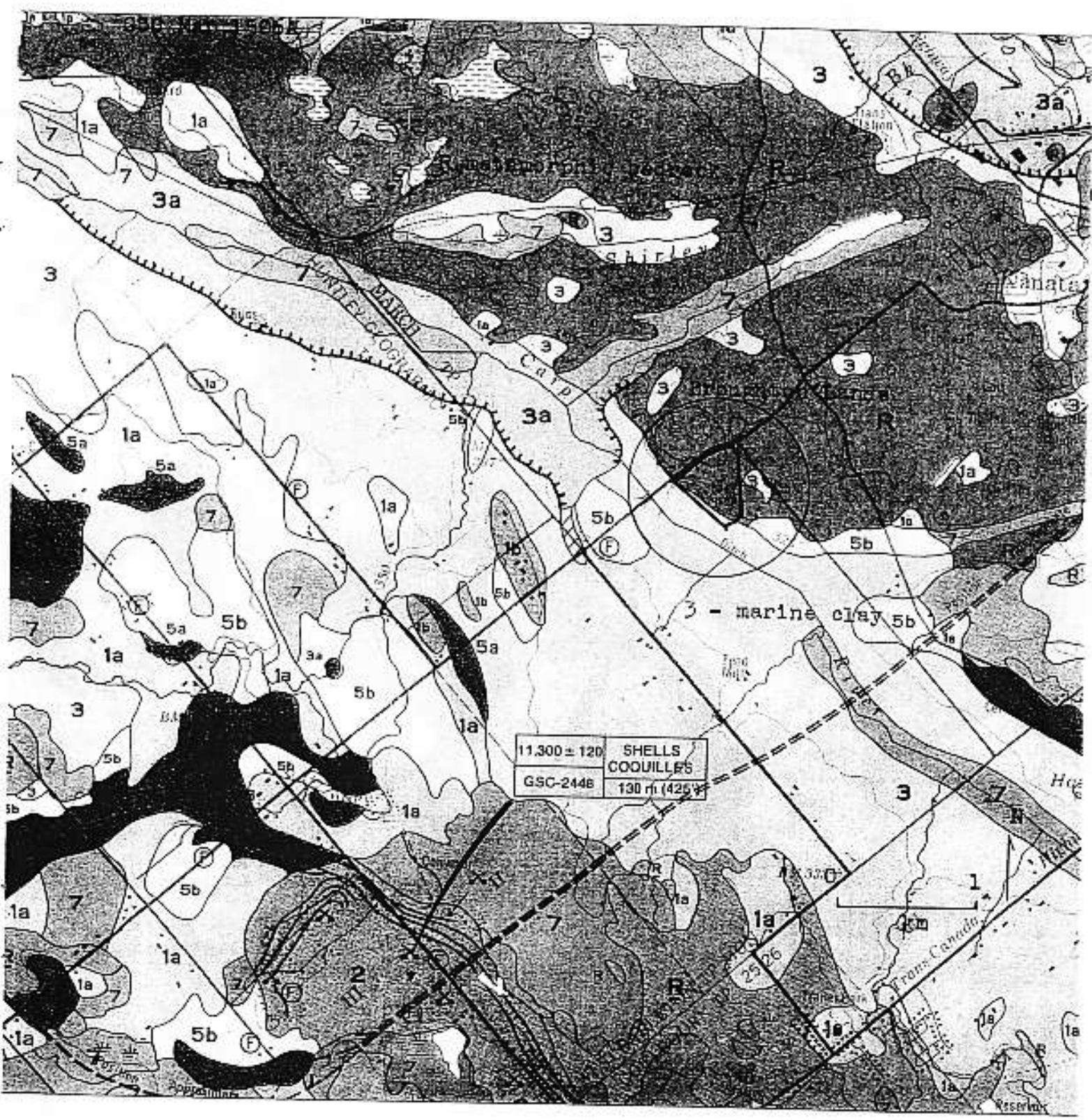


Figure 6: Surficial geology and early Holocene study area situation



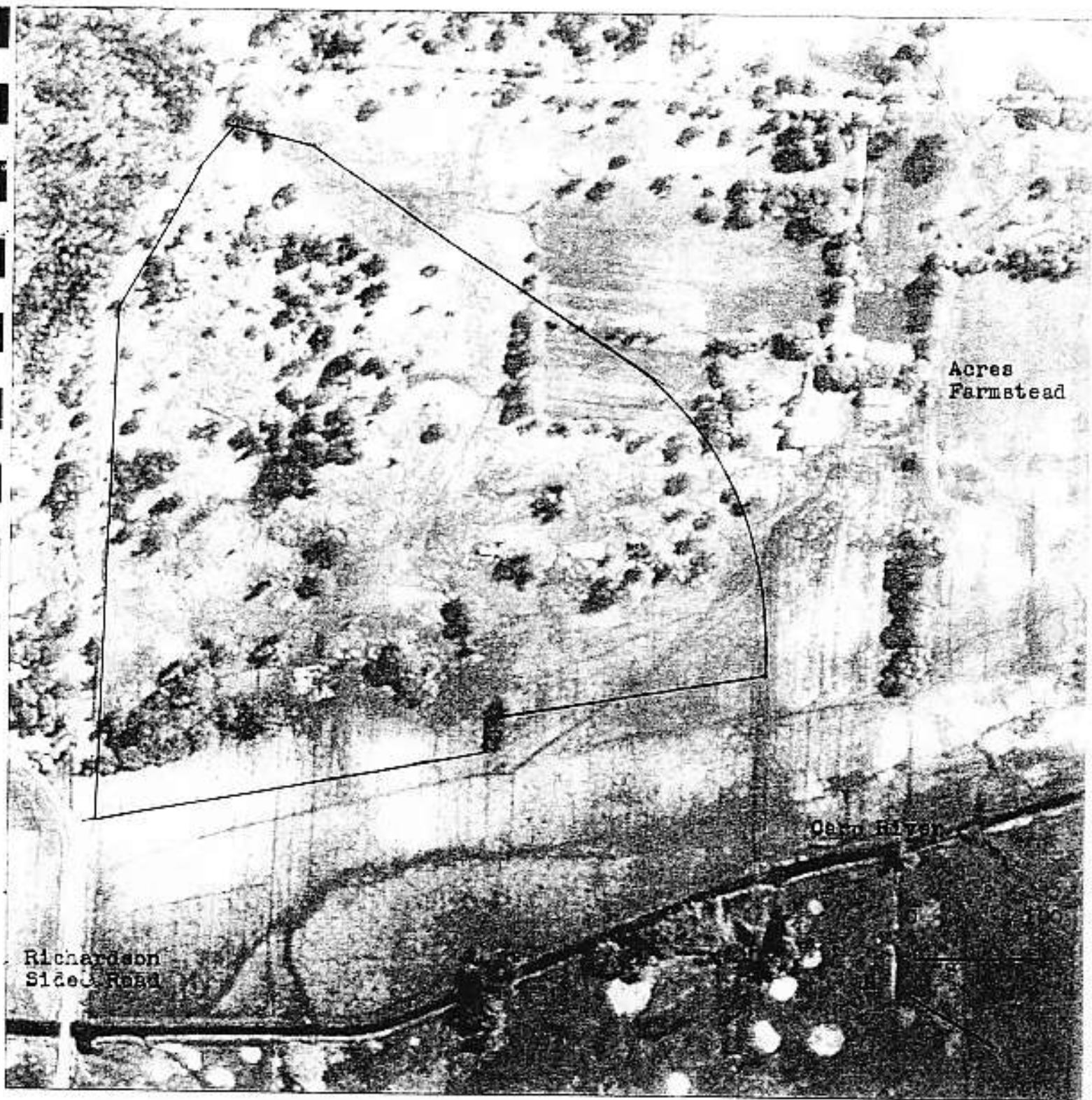


Figure 8: Historical aerial photograph A18057-8, 1945

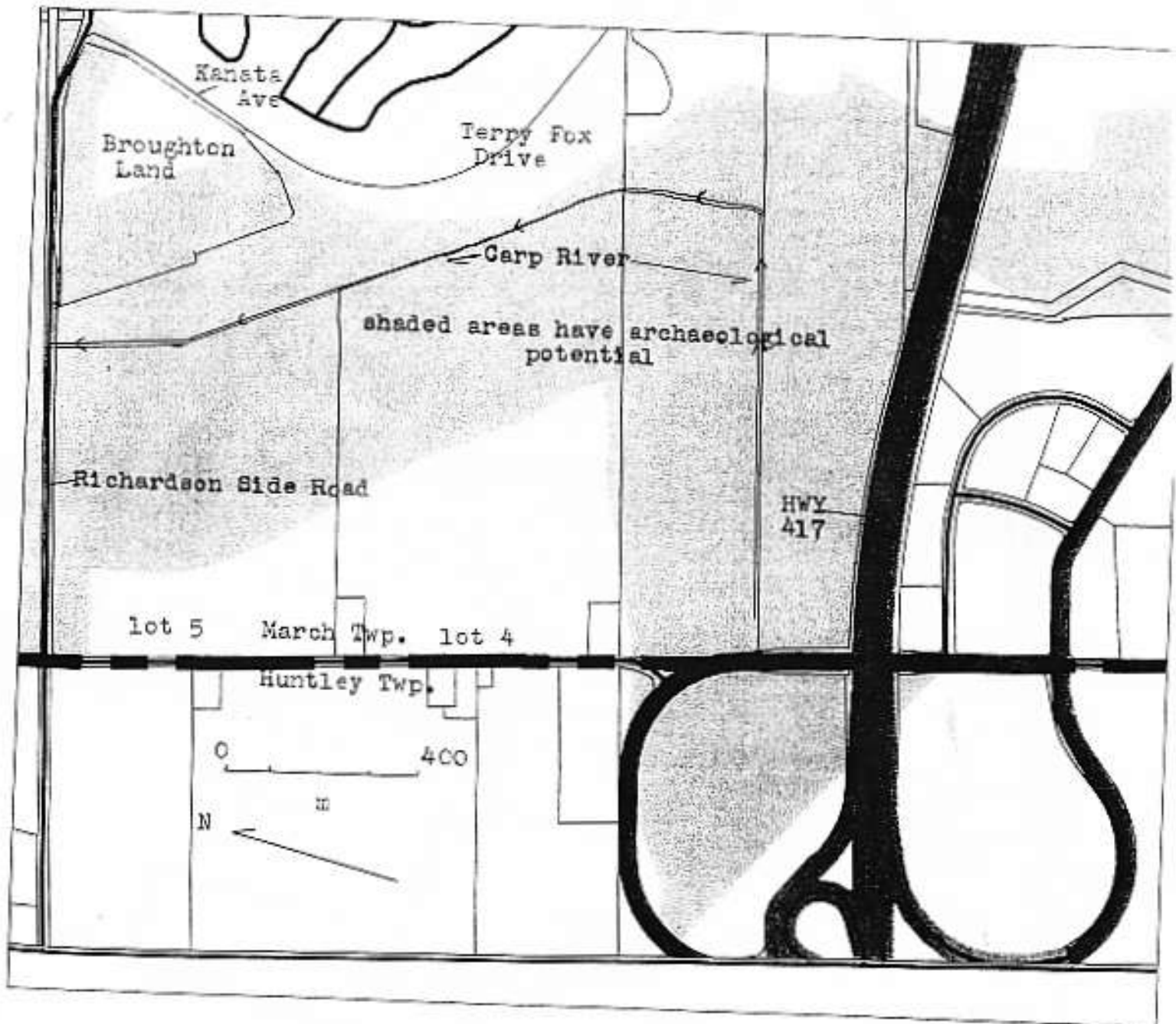


Figure 10: Archaeological potential, City of Ottawa model

Figures 12 through 18 removed as they contained direct site location information.

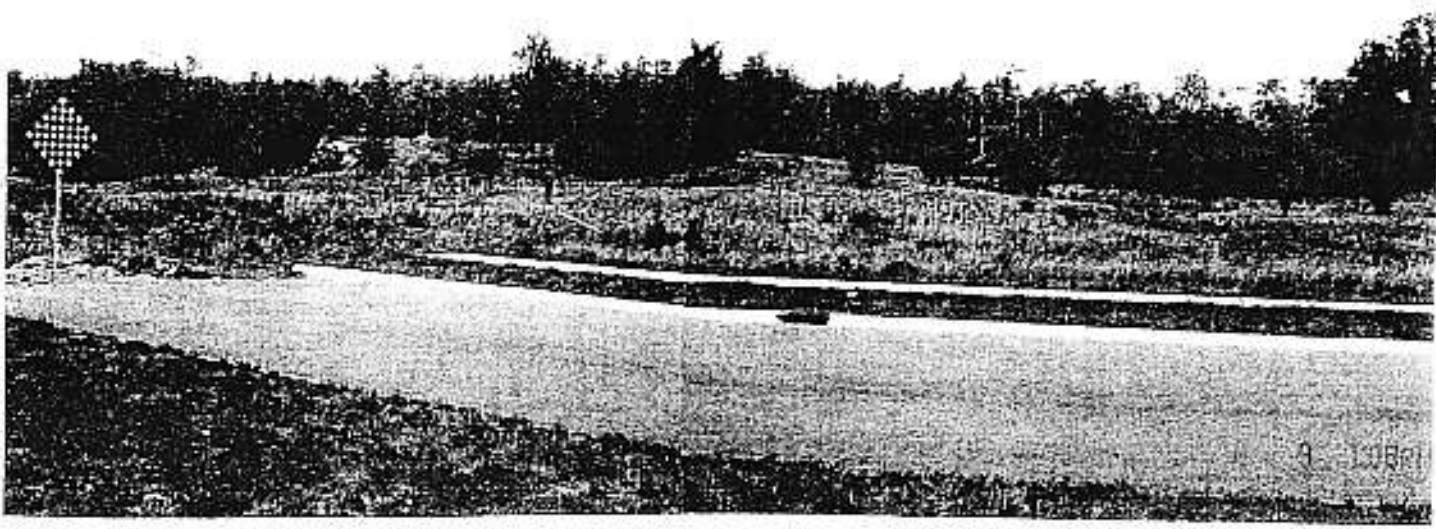


Figure 19A:

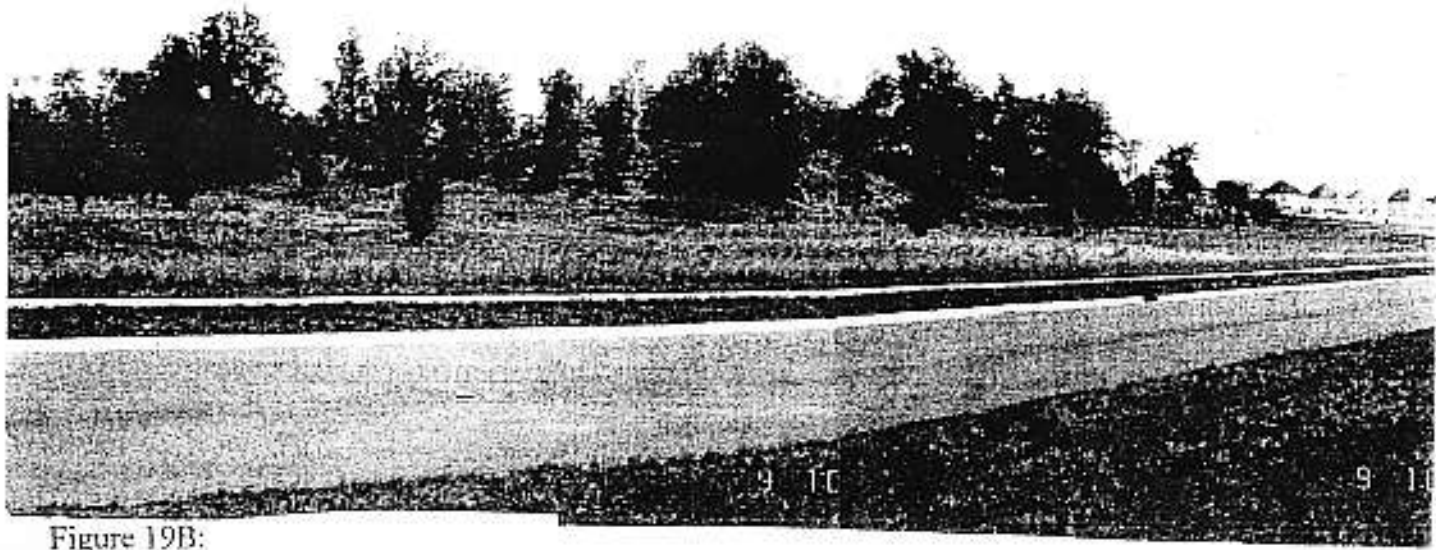


Figure 19B:

Figure 19: Photographs of [redacted] from Terry Fox Drive



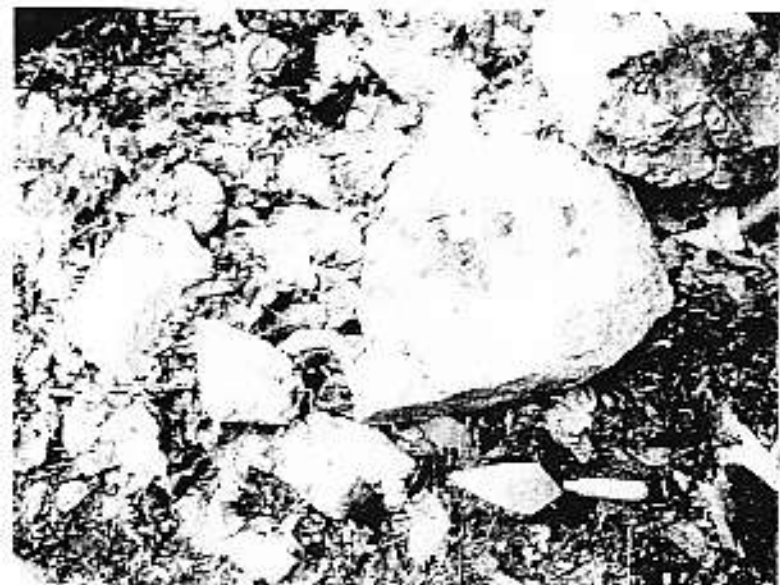


Figure 20A: Two views of the Palaeo-Indian midden, note disturbed condition.

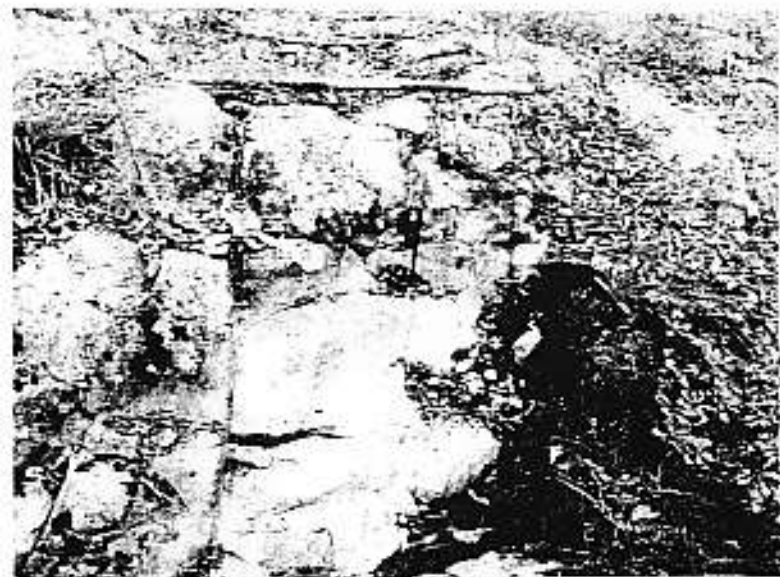


Figure 20B: Two views of surface exposures of the quartz vein

Figure 20: Photographs of the quartz vein : —————

1140

1116

1160

51

retouched  
quartz  
flake frag.

quartz wedges

shattered biface

pot  
lid

1143

1207 heat altered  
biotite  
schist

graver  
spur

1142

1183

1205  
alternately  
unifacially  
beveled

bifacial flake frag.

retouched flake

1177

1199

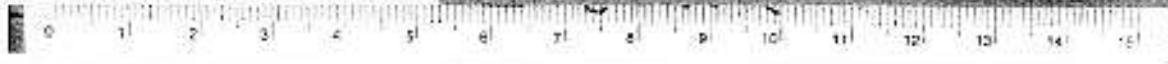
1208

quartzitic  
sandstone  
flake  
fragment

bifacially  
retouched  
flake  
fragment

quartz  
bifacial  
knife

Figure 22: BhFx-28, Artifact Plate 2





19



quartzite  
biface preform

174



1258



quartzite scrapers

1305



quartzite plane

quartzite  
multi-purpose  
tool

198

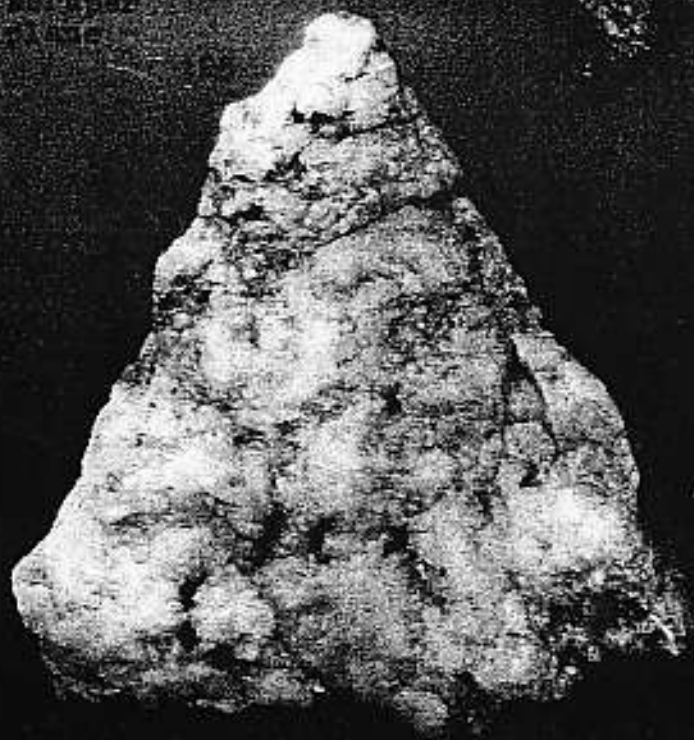
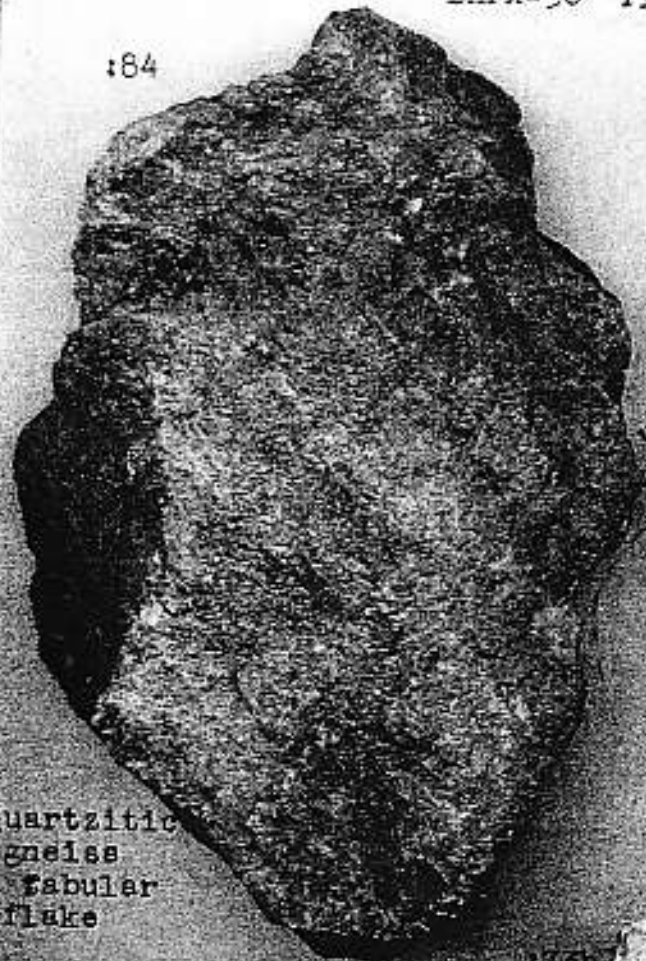


Figure 24: BhFx-29 Artifact Plate 2



:84



quartzitic  
gneiss  
fabular  
flake

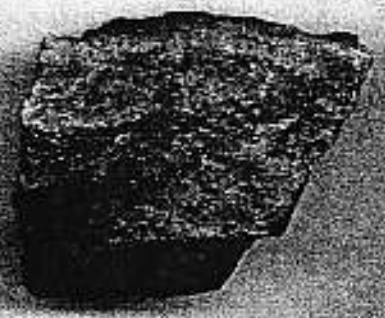
:74a

hyaline quartz  
retouched flakes



:74b

:41



steep-bitted  
scraper, quartzite



flaked  
chamber



:73c

perforator



:73b

retouched quartzite  
flakes with knives or  
protuberances

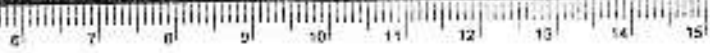


:73



quartzite sandstone/plaster

Figure 26: BhFx-30 Artifact Plate 2





quartzitic sandstone  
scraper

:88



:75 white quartz shatter, TP 21



:75a retouched  
quartz flake



:75b quartz  
punch



platform

:128



:195



:163



quartzite blank  
with a knife-on-a-  
protuberance

quartzite  
knife-on-a-  
protuberance

quartzitic sandstone  
retouched flake

Figure 28: BhFx-31 Artifact Plate 2



28  
BbFr-29 Stage 2  
Artifact Catalogue

:54



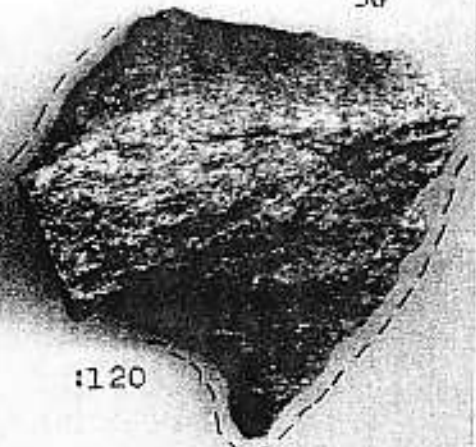
perforator

:122



notched fragment

:120



retouched flake

all artifacts are blue-grey quartzite

:53



bifacial chopper

:50



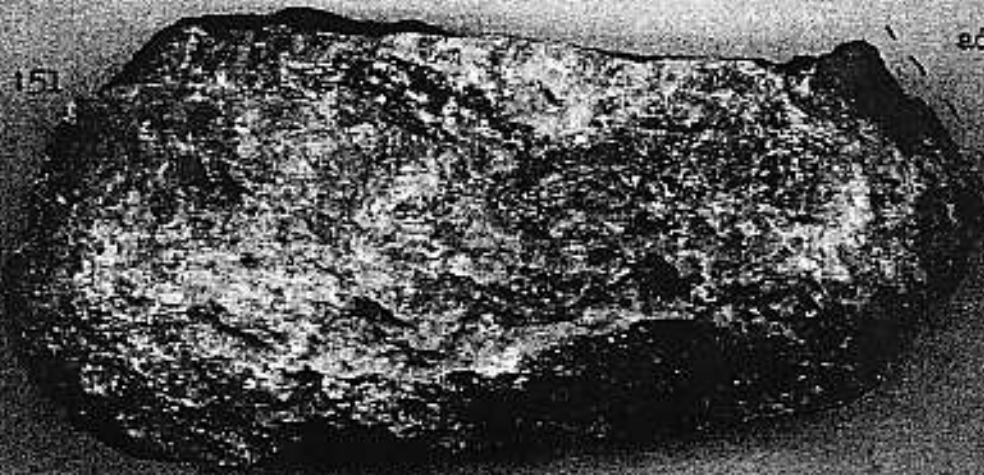
sidescraper

:55



perforator

:51



edze bit

Figure 27: BhFx-31 Artifact Plate 1





:95



bifacially retouched edge, quartzite

:40



spurred quartzite flake

:44



"corner-struck" quartzite flake, used

:96



retouched flake knife/scrapper quartzite

:43



retouched quartzite flake fragment denticulate edge

:61



polished groundstone tool frag.

:71



retouched shatter backed knife

:48



:42



:15



obverse edge

Figure 25: BhFx-30 Artifact Plate 1



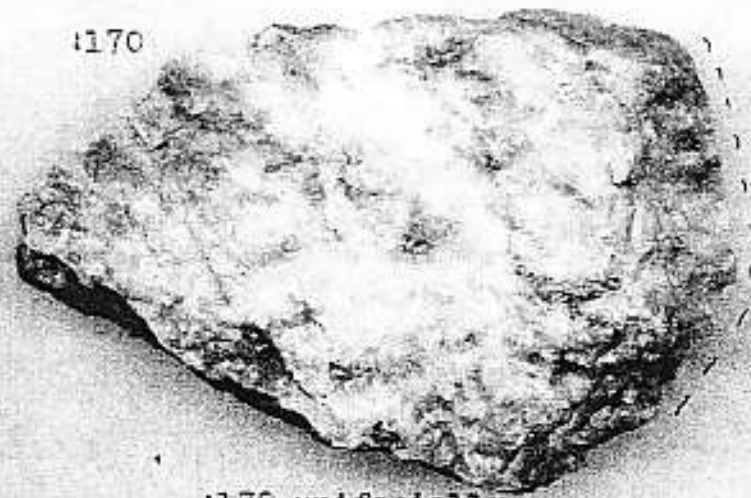


1307



quartz scraper

1170



1170 unifacially retouched flake frag. white quartz

1732



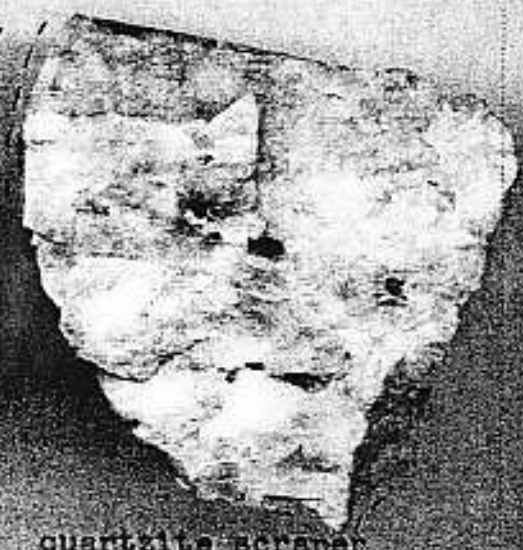
slate scraper

1434



quartzite scraper/blank

1257



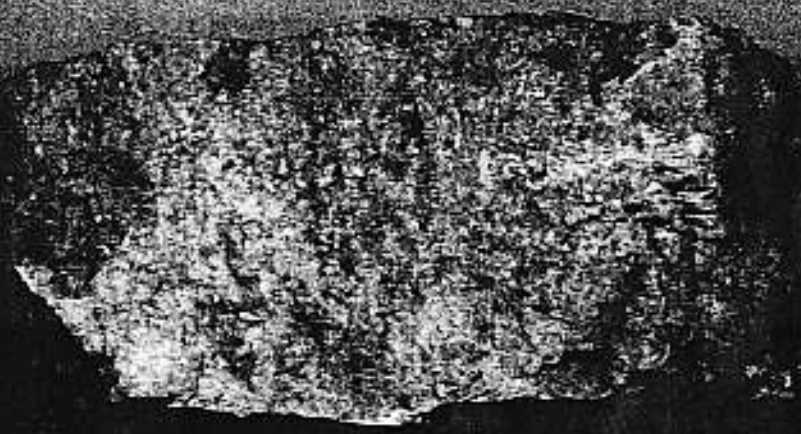
quartzite scraper

1308



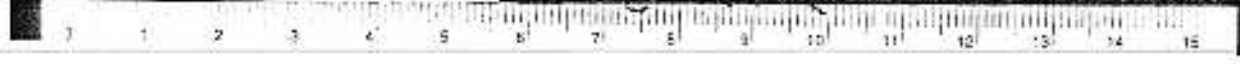
quartzite scraper

1224



quartzite blank/blank

Figure 23: BhFx-29 Artifact Plate 1



170 quartz flks.

185

104

161

50

quartz flake

retouched flake

spurred quartz flake

162

190

11

193

163

108

wedge

quartz perforator

spurred scraper

perforator

biface edge frag

perforator

179

199

192a

192b

192c

192d

192 four retouched quartz flks.

152

retouched

107

retouched quartz flake

beaded scraper

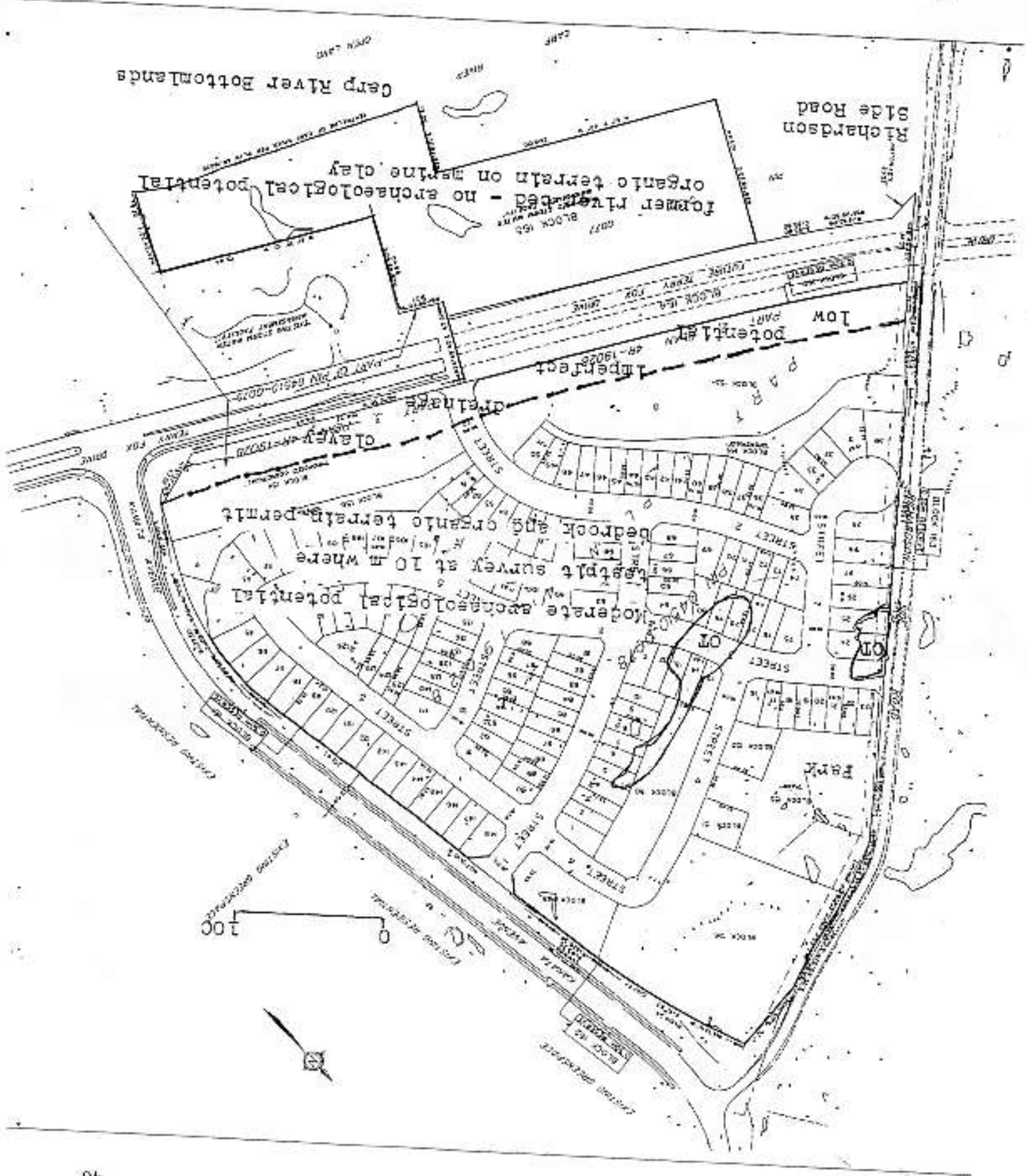
retouched quartz

Figure 21: BhFx-28, Artifact Plate 1





Figure 11: Archaeological potential and area tested by Stage 2





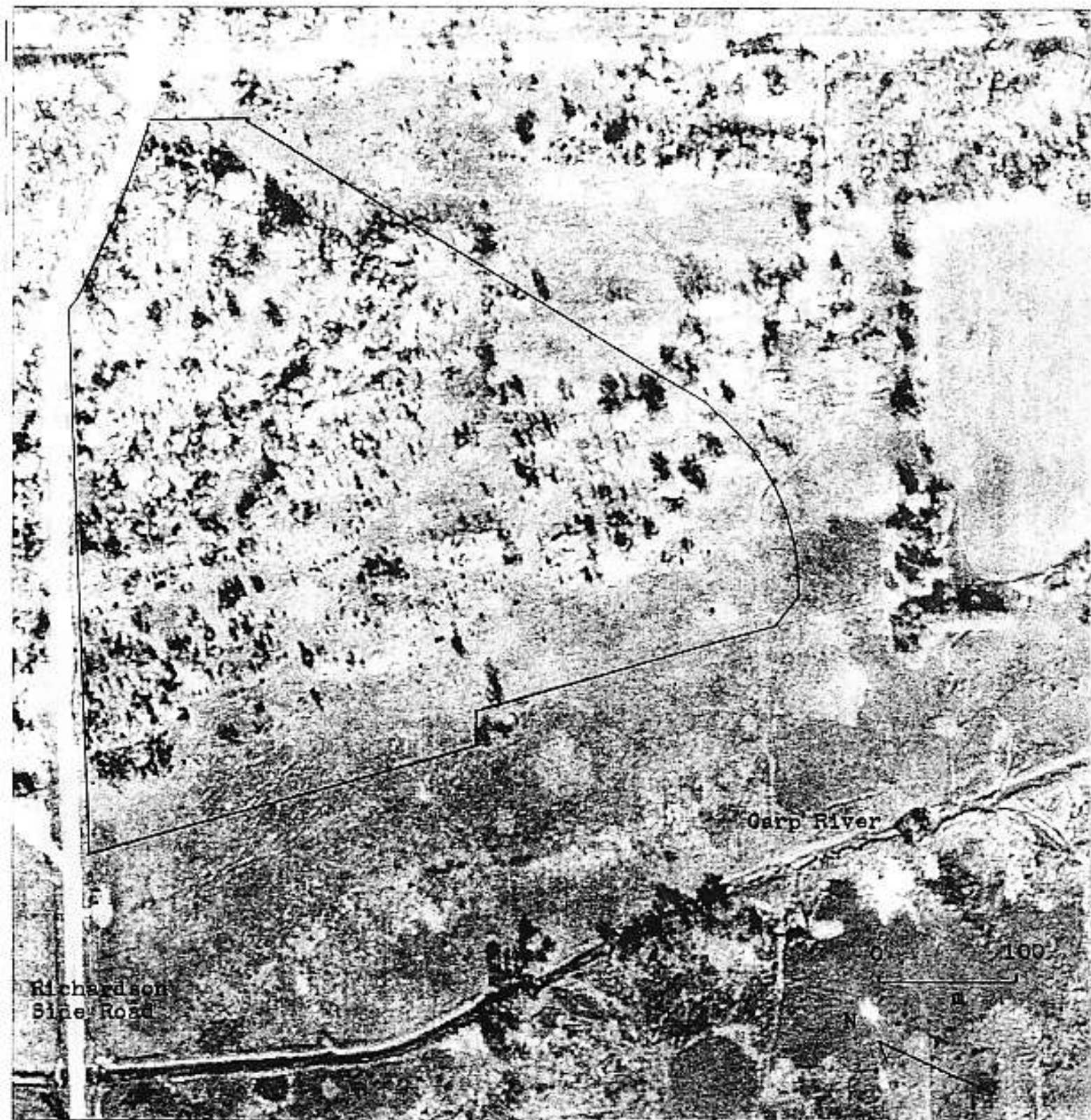


Figure 9: Modern aerial photograph A28148-109, 1994





Figure 7: Bedrock geology of Broughton Lands and vicinity

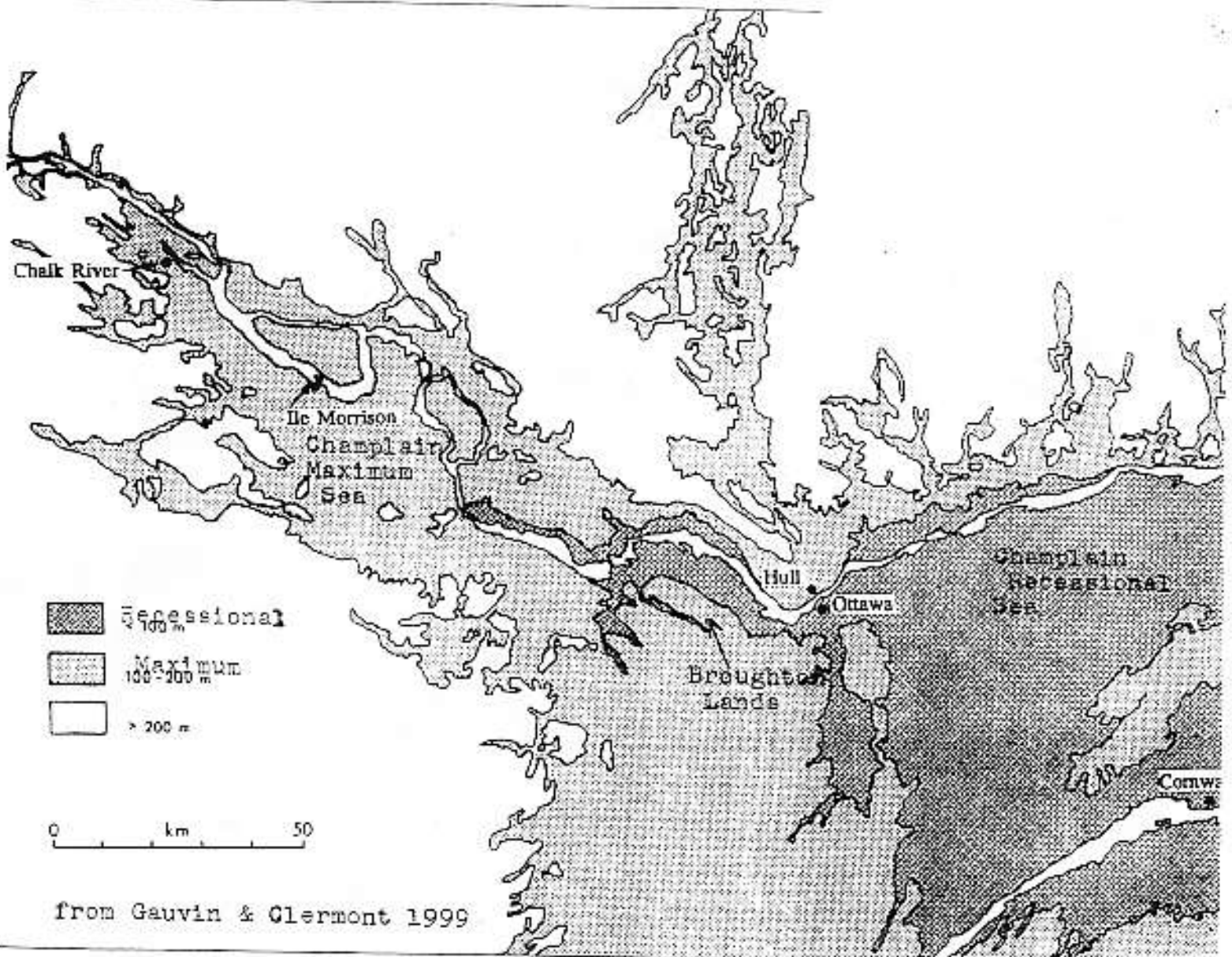


Figure 5: Relation to the recessional Champlain Sea

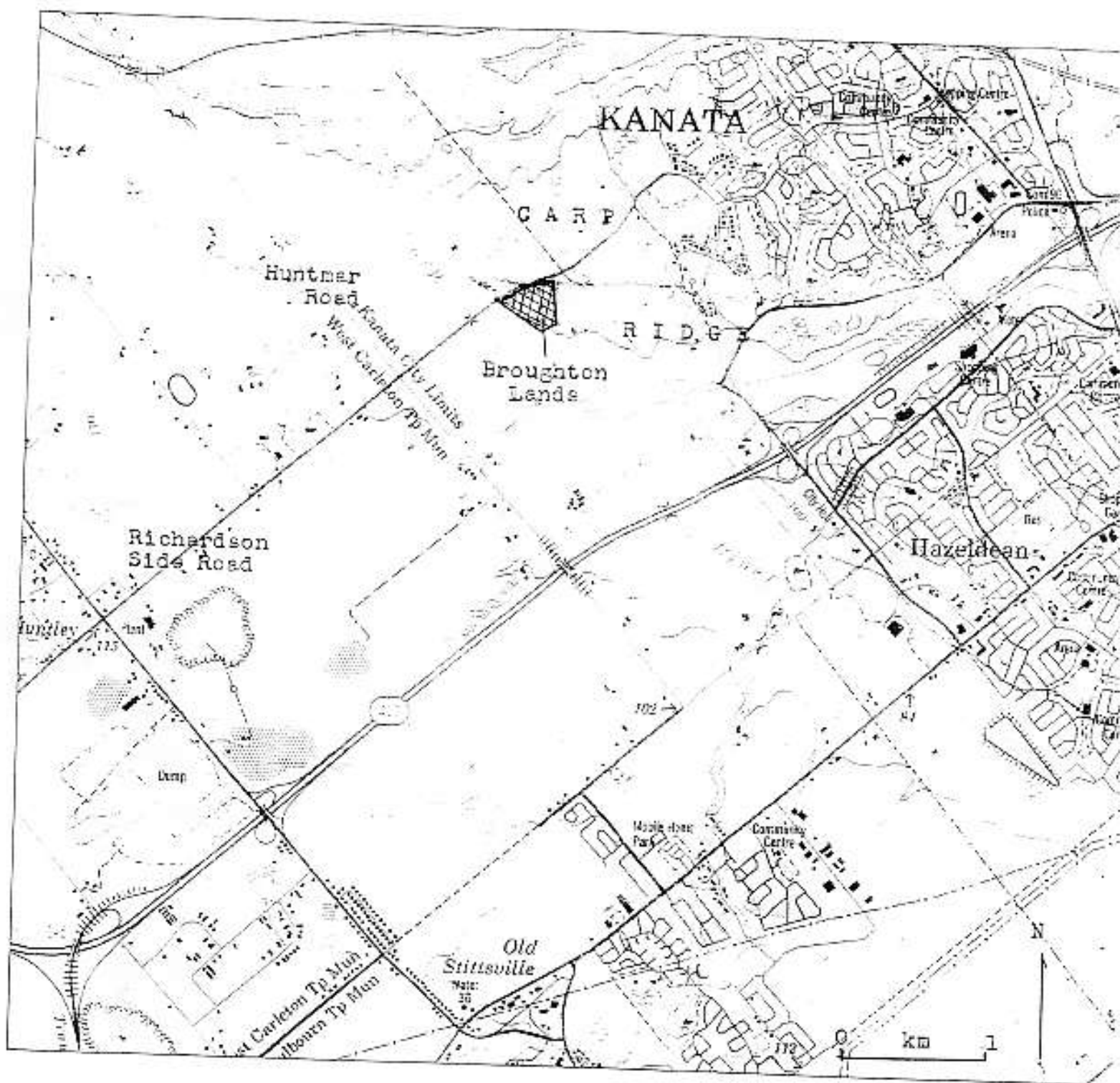


Figure 3: Situation and vicinity, from NTS 31 G/5

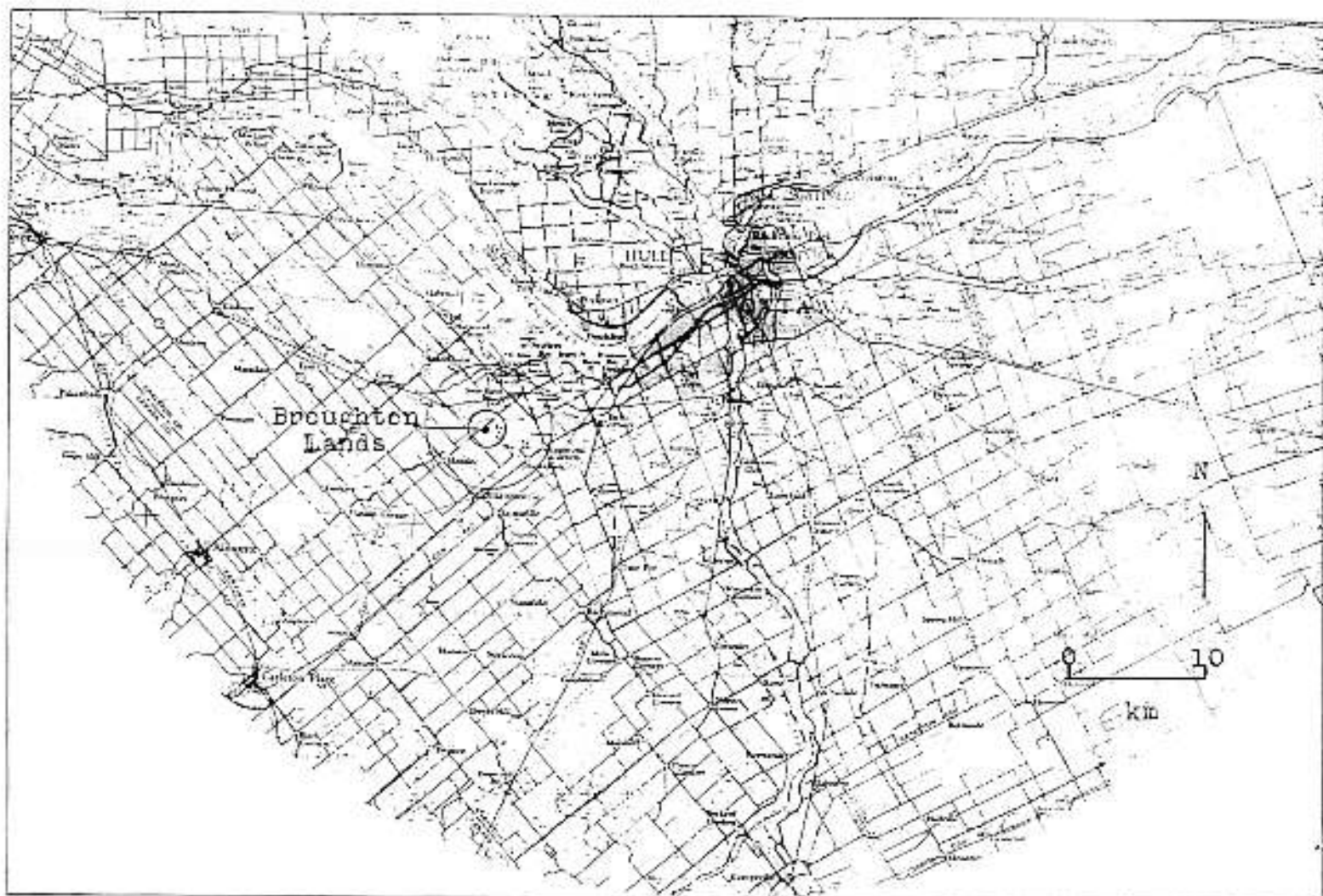


Figure 1: Regional location of the Broughton Lands



Sowter, T.W.E.

- 1901 "Prehistoric Camping Grounds Along the Ottawa River" *The Ottawa Naturalist* 15(6):141-151.
- 1909 "Algonkin and Huron Occupation of the Ottawa Valley" *The Ottawa Naturalist* Vol 28:61-81.
- 1915 "The Highway of the Ottawa" Ontario Historical Society Vol 13:42-52, Toronto

Stewart, W. Bruce

- 2003 "CIF 2002-010-001 Archaeological Assessment Terry Fox Drive Extension South of Richardson Side Road to March Road Kanata: Stages 1&2 archaeological assessment report" *Cultural Resource Management Group Ltd.*, Fall River, Nova Scotia.

Swayze, K.

- 2003a "CIF P039-01 A Stage 1&2 Archaeological assessment of the Richardson Farm, a proposed Subdivision on parts lots 7&8 Concession 3 Huntley Township (geo), City of Ottawa" Report on file with OMCL, Toronto
- 2003b CIF P039-012 A Stage 1&2 Archaeological assessment of the Bradley Lands lot 24 Concession 12 Goulbourn Twp. (geo), City of Ottawa" Report on file with OMCL, Toronto
- 2003c CIF P039-009 A Stage 1&2 Archaeological assessment of Cromdale Park a proposed subdivision on part of lot 3 concession 10 Fitzroy Twp. (geo), City of Ottawa" Report on file with OMCL, Toronto
- 2003d CIF P039-026 A Stage 1&2 Archaeological assessment of Woodroffe Estates a proposed subdivision on north half of lot 16 Concession 2 RF Nepean Twp. (geo), City of Ottawa" Report on file with OMCL, Toronto
- 2004a "CIF P039-30 A Stage 1&2 archaeological assessment of part of lot 12 concession 4 Torbolton twp, Constance Bay, City of Ottawa" report on file with OMCL, Toronto
- 2004b "CIF P039-27 A Stage 1&2 archaeological assessment of part of lot 2&3 concession 4 Torbolton twp., Constance Creek, City of Ottawa" report on file with OMCL, Toronto
- 2004c "CIF P039-34 A Stage 1&2 Assessment of part of proposed Central Canada Exhibition, Albion Road Site, on parts of lots 24&25 concession 3 Gloucester Township (geo), City of Ottawa" report on file with OMCL,
- 2005a "CIF P039-035 A Stage 1&2 Archaeological Assessment and Cultural Resources Inventory of Fitzroy Provincial Park", part lots 25, 26 & 27 Fitzroy twp. (Geo.), City of Ottawa. Report on file with OMCL, Toronto.



- Fiedel S.J.  
1999 "Older Than We Thought: implications of corrected dates for Paleo-Indians" *American Antiquity* v64(1):95-116.
- Fulton, R.J. and S.H. Richard  
1987 "Chronology of Late Quaternary Events in the Ottawa Region" In: *Geological Survey of Canada Paper* 86-23.
- Gadd, N. R.  
1977 "Ottawa-Hull surficial deposits" Geological Survey of Canada, Map 1425A, Ottawa
- Gauvin, F. and N. Clermont  
1999 "Les Polissoirs Archaiques de L'île Morrison" *Canadian Journal of Archaeology* vol. 22(2):127-138.
- Gilbert, R. (compiler)  
1994 "A Field Guide to the Glacial and Postglacial Landscape of Southeastern Ontario and Part of Québec" *Geological Survey of Canada, Bulletin* 453, Ottawa Canada.
- Helweg, P.  
2001 "Easy to Make "Pebble" Tools" In, Wescott, D. *Primitive Technology II Ancestral Skills* pp. 221-224. Gibbs Smith Publisher. Salt Lake City
- Julig, P. J.  
2002 "The Sheguiandah Site: archaeological, geological and palaeobotanical studies at a Paleoindian site on Manitoulin Island" *Mercury Series Paper* 161 Archaeological Survey of Canada, Canadian Museum of Civilization, Gatineau.
- Keegan, B.  
2001 "Sticks and Stones Will Make My Bow" In, Wescott, D. *Primitive Technology II Ancestral Skills* pp. 97-103. Gibbs Smith Publisher. Salt Lake City
- Kennedy, C. C.  
1976 "Champlain Sea and Early Ottawa River Shoreline Studies, 1975" prepared for the Ottawa Valley Historical Society, on file at MCL Toronto.
- Kenney, T. C.  
1964 "Sea-Level Movements and the Geologic Histories of the Post-Glacial Marine Soils at Boston, Nicolet, Ottawa and Oslo" *Géotechnique* vol. 14:203-230.