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Pushing the Limits: Testing, Magnetometry and Ontario Lithic Scatters

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Abstract

Lithic scatters, small ephemeral clusters of stone artifacts on cultivated surfaces, lie on the periphery of archaeology. These sites are often too ephemeral to be fully understood through standardized fieldwork methodologies mandated in Ontario CRM archaeology and yet, they are widely regarded as worth documenting with hundreds now recorded. In this thesis, it is argued that what are small artifact scatters on the surface can belie more complex subsurface finds of significant cultural and historical value. As such, there is a need to reconsider the approaches made to the investigation of these sites. Geophysical techniques applied early in a scatter's investigation, particularly magnetometry, have the ability to facilitate the extraction of more pertinent data about past peoples and their activities from such sites. Archaeological work was carried out at two sites near Kitchener, Ontario, in order to evaluate whether surface and excavated artifact densities correlate with preserved subsurface cultural deposits. This work also included a direct and positive attempt at one of the sites to test the utility of magnetometry in this process.

Keywords

Archaeology, Lithic Scatters, Geophysics, Magnetometry, CRM

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Any errors, omissions or mistakes are the sole responsibility of the author.

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Preface

"I can tell you that, deep down in my core, I know we aren't dealing with these sites properly". When I was seeking sites to carry out the investigations on my thesis I was reaching out to several archaeological consultation firms within Ontario. In my discussions with the leaders of these companies I heard the same refrain over and over again. Lithic scatters have meaning, but what is that meaning? Lithic scatters need to be investigated in a more meaningful way, but what is that methodology? Ever since the Innes site (Lennox 1986) was encountered in the early days of regulated Cultural Resource Management in Ontario there has been a general unease about how these sites are investigated, what cultural heritage value and interest is being placed on them, and how and where they fit into the Ontario Archaeological record. The 1996 Ontario Archaeology Society conference held a session dedicated to 'small sites' in which lithic scatters featured prominently (Pilon and Perkins 1997). Other jurisdictions, such as New York, Pennsylvania, Michigan, as well as England and Europe have all had conferences and conference sessions dedicated to lithic scatters in an attempt to understand how they should best be dealt with in a CRM environment (e.g., Beckerman 2002, EH 2000, Reith 2008, Smit 2012).

This thesis came about after almost 20 years of finding, excavating and thinking about lithic scatters across Ontario. One of the first sites I ever dug was in a heavy clay field in Oakville, Ontario, where we spent months collecting flakes out of clay that would barely go through our screens. When we had completed the excavation and collected the majority of the site from the ploughzone we shovel shined the subsoil for features, found none, and called a halt to the excavation. I was struck by trying to understand the site; what activities had created this site? How do we know we have found everything of value? Why was this site here? This thesis seeks to answer the questions by taking an expanded investigative and interpretive approach to lithic scatters. Can additional archaeological data be obtained from mundane sites through additional and different kinds of fieldwork, and can their place within the past occupation of Ontario be considered in a more meaningful manner?

Chapter 1 : Introduction and Background

1 Thesis Goal and Outline

The goal of this thesis is to critically examine the way lithic scatters are handled in a CRM context and to evaluate them through alternate and expanded testing methods than those normally employed. Specifically, the thesis examines the uses and benefits of exploring areas at lower artifact densities at the periphery of two sites (AiHd-159; AiHd-160), areas that would not be normally investigated under current CRM standard procedures. Aside from expanded site test excavation, a geophysical technique rarely used in the area, magnetometer survey, was employed at one of the sites to explore the usefulness of this technique in yielding significant archaeological information, including the site's extent and undetected subsurface cultural features.

1.1 Lithic Scatters

As with many site types, an over-arching definition of a lithic scatter is typically regionally based, and may reference the area, cultural and temporal affiliations of the site. In CRM Archaeology, with the industry's drive to accurately determine and record the presence of any archaeological site within a particular parcel of land slated for development, the term often serves as a convenient label for a high percentage of archaeological resources encountered by the industry (Bond 2010, 2011). The term itself in one which has been created very much from the CRM industry, and is associated primarily with archaeological survey work, as opposed to more investigative excavations (Reith 2008). Indeed the term lithic scatter denotes a lack of information that could be obtained from a site (Binzen 2008). The naming of a site 'type' is a requirement within Ontario, although there is very little standardization of what term is applied to what site (von Bitter et al. 1999). The very definition of a lithic scatter as a site type can be profoundly difficult as such definitions not only vary regionally but also differ depending on the biases of the researcher (Yarrow 2006).

Such sites may be minimally characterized as a somewhat ephemeral concentration or cluster of stone artifacts, but the problem becomes in defining just how ephemeral in terms of artifact yield a scatter has to be to remain a scatter and how one determines the spatial limits of a given example. Hence, most definitions will include a clause regarding the type of artifact, the overall area of the site, and the nature of 'scatter'. Reith (2008:1) summarizes several definitions of lithic scatter as consisting solely of chipped or knapped tools and debitage, having few or no subsurface cultural features and being of less than half an acre in size. Another presented definition describes these sites as having fewer than 30 flakes and fewer than five bifaces or formal tools or point types [encountered during the initial survey], and being smaller than 100 square metres *with no mention of features* (Beckerman 2002). Yet another definition contains even more restrictive clauses: it characterizes these sites organizationally as a scatter on the surface of a ploughed field, as restricted to a small area (≤30 metres square), and as having an overall low yield of artifacts (n=50) featuring few, if any formal tools, bifaces or ceramics (Reith 2008). In seeking a standardized definition, Ontario's 2011 *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011:166) offer a similar definition focusing on the site's organization and its artifact components; *a loose or tight concentration of stone flakes and tools resulting from the manufacture and sometimes the use of one or more stone tools.* This definition, unlike many of the others, does not feature a restriction on the overall size of the scatter, other than the fact these sites consist solely of stone artifacts including flaking debris. What is lacking in any of these definitions is a sense of the implication of the term lithic scatter and its definition, as it relates to the archaeological importance and value of these sites. The term is widely used within an archaeological survey context the term denotes the presence of a small pre-contact Indigenous site which can be implied to have no further investigative interest (Binzen 2008, Bond 2011, Reith 2008). In Ontario, the 2011 *Standards and Guidelines for Consultant Archaeologists* sets a threshold of surface scatter artifact density in order to determine if there is a need to conduct further investigation. However, sites which undergone further investigation tend to evolve from a lithic scatter, in identification and definition, to a more descriptive kind of site (campsite, tool manufacture site, butchery site etc…) (Binzen 2008, von Bitter et al. 1999).

For the purposes of this thesis, and unless otherwise noted, this thesis will follow a definition of a lithic scatter similar to that in the *Standards and Guidelines* as: *a grouping* *of artifacts, either dense or ephemeral, on the surface of a ploughed field with an unknown archaeological value*. The expansion of the final statement in this definition from the formal definition suggested within the *Standards and Guidelines* is purposeful by the author as it relates to the challenges discussed in Chapter 2. Lithic scatters often lack sufficient information obtained from a standard single-pass survey (Shott 1995).

Note that in this definition the "grouping" need not be an entire "site" as is implied in the *Guidelines* definition, but could only be a segment of a site. For the sake of this thesis, unless otherwise noted, the definition of 'site' is in the traditional archaeological sense as *an area which contains tangible/preserved evidence of past human occupation or activity*. However, sometimes in order to record sites as places on the landscape, investigators may pragmatically lump together several scatters in close juxtaposition as a single site. Hence, a single surface scatter and the site as a whole need not be coextensive, as a single site may consist of several scatters or scatters plus other kinds of finds. These locations will be called "registered" sites to make their meaning clear in subsequent discussions. Also, for various reasons discussed in detail in the next chapter, the surface scatter used to denote and delimit a site initially does not necessarily denote the actual spatial extent of the tangible evidence of past human activity. This disconnect may be because of the potential unreliability of single-pass surface collected scatters to accurately demarcate site limits, or the possibility of buried deposits undisturbed by cultivation that extend beyond the known surface scatter. Because the initially recorded site may not actually delimit its true extent, the term "actual" site is employed below to refer to its true limits.

1.2 Lithic Scatters in Ontario

Lithic scatters are ubiquitous across southern Ontario, and are one of the most recorded type of archaeological site encountered in southern Ontario and are typically held as one of the most commonly recorded sites in the archaeological record in most areas (Bond 2011; Reith 2008). This view is backed up by a random sample of 400 Borden entries that I reviewed in order to determine the frequency of recorded lithic scatter sites within the Ontario archaeological record (see Appendix A). The analysis of the Borden sample revealed that 208 sites are either described or classified as lithic scatters or, in some cases, campsites. The "campsites" were originally encountered as lithic scatters and it was only after additional investigations and excavations that a more formal site function was ascribed to the initially recorded scatter. This change in terminology is crucial in understanding how lithic scatters are understood in the CRM industry. Typically, as noted above, additional information obtained form more comprehensive investigation of the site will result in a new understanding of the archaeological value of said site, and the site changes from a lithic scatter to another type of site. In essence, further investigation meets the criteria set out in the definition of the lithic scatter presented for this thesis, in that the additional investigation has resulted in a determination of archaeological value, and a new term can be assigned to the site (Von Bitter et al 1999, Yarrow 2006).

This sample indicates that, at a minimum, over half of the Ontario archaeological record consists of lithic scatters. Table 1 indicates the full breakdown of site types encountered in the sample. It should be noted that the site types presented in this sample are the types entered into the archaeological record by the original researcher.

The scatters noted above were found predominantly during systematic surveys, usually carried out as part of the cultural resource (CRM) industry's required pre-development assessment for archaeological and heritage value of a particular parcel of land. Their ubiquity and their ephemeral nature often cast them as mundane or lacking in substantive cultural and archaeological content/information. Yet, despite this overall lack of archaeological content, they are almost universally recognized by descendant communities, archaeologists and regulators as having heritage value and as such are required to be registered and documented.

Table 1: A Sample Comparison of Archaeological Site Types in the OASD

Site Type	**Quantity**
Historic Euro-Canadian Sites	
Cemetery	2
Homestead	28
19th Century Industrial/ Transportation	2

Table 1: A Sample Comparison of Archaeological Site Types in the OASD

Site Type	Quantity
Pre-contact Sites	
Burial	7
Cabin	3
Cache	1
Cemetery	1
Findspot	98
Hamlet	3
Lithic Scatter	208
Longhouse	2
Midden	2
Ossuary	1
Undetermined	37
Village	6

Within an Ontario CRM context, the value of lithic scatters is determined by following a mandated set of procedures, the *Standards and Guidelines for Consultant Archaeologists* (MTC 2011). The exact nature of these procedures will be discussed more fully later (Chapter 2) but the systematic procedures for recording their presence outlined in these *Standards and Guidelines* has resulted, as implied above, in thousands of lithic scatters being documented. However, assessing the value of such sites has proven difficult within the current standardized methodologies. For example, by focusing on the spatial extent and concentrations of the surface artifact scatters *per se*, one limits the scope of investigation by not fully examining the context of these artifacts (Hey 2006; Reith 2008; Yarrow 2006). In essence, one assumes the surface scatter and the higher concentrations/relative artifact densities within it mirror the areas of use and intensities of use of the location by past peoples as well as the locations of preserved, contextually intact, subsoil remnants of features such as pits or hearths. Excavation of these sites, when it does occur, does not extend beyond the limit of the surface artifact scatter, indicating that there is an inherent assumption that the scatter extent is the whole occupation/use area and obviating any need to explore and seek to understand the locale in any more depth.

Attributing scatters to a specific date or culture is not always feasible, due to the lack of diagnostic artifacts obtained during their identification and collection. When diagnostics are obtained from these sites, they are often attributed to the Archaic Period in Pre-Contact Ontario (ca. 11,000-3,000 years ago), and it is often assumed that the vast majority of scatters without any diagnostics are also of that age (Reith 2008). This assumed Archaic cultural attribution along with the domination of the record by scatters, explains, in part, why the Archaic period as a whole is often seen as mundane and lacking in substantial archaeological data or value (Burgar 1997; Dodd 1997; Emerson and McElrath 2009; Fisher et al. 1997; Fisher 1997; Kenyon and Lennox 1997; Lennox 1986, 1997; Ramsden 1997; Sassaman 2010; Steiss, et al. 1997; Woodley 1990). Ellis et al. (2009a:790) note that an assumption of an Archaic affiliation is based on the fact the sites lack the ceramics of the subsequent Woodland period after 3000 BP and, given their antiquity, that Archaic sites are more unlikely to yield preserved surface organics. In addition, Archaic peoples are assumed by archaeologists to be very residentially mobile hunter-gatherers so these scatters are seen as the inevitable ephemeral evidence of the small, band-sized groups of hunter-gatherer/foragers moving frequently across the landscape (Emerson and McElrath 2009). They are assumed to be less settled than their Woodland counterparts who relied to some extent on domesticates and other means of manipulating environments to their own advantage. Finally, Archaic groups produced very few distinctive stone tool forms and did not often use stone materials exotic to a region unlike earlier, pre-11,000 year old, Paleoindian peoples (see Ellis and Poulton 2014). Hence, such scatters, deficient as they are in distinctive tools and utilizing more local materials, are Archaic rather than Paleoindian in age.

Generally, sites of note dating to the Archaic period are stereotyped as either the few dense habitation sites found in littoral areas and/or near major water sources or alternatively sites associated with the identification of formal artifact types such as weapon tips (see, for example, Ellis et al. 1990, 2009b). The vast majority of “Archaic” sites that are identified in Ontario government records actually are not given formal names and are referred to simply by their Borden Site System Number – they are recorded but assumed to be limited in what they can tell us about Archaic peoples. Such an attitude suggests that sites are undervalued by characterizing them as surface scatters; that they are of insufficient value to warrant further investigation. Too often CRM archaeologists, pressed for time and budget, adhere to the standards governing their work to make determinations on the resources they encountered, without stopping to consider them within a larger, archaeological framework. AiHd-159, discussed within this study, is one such site that lacked the required surface artifact density to warrant further investigation. Another site investigated in CRM, the Mt. Albert site (Forsythe 2016), was also considered ephemeral and lacking in sufficient artifact density to warrant further concern. Chapter 2 will also discuss the Innes site (Lennox 1986), amongst other examples, of lithic scatters which were initially found to have small, ephemeral artifact surface scatters but yielded much more significant finds during excavation (Kenyon and Lennox 1997). These sites were considered in a context beyond the mandated standards of practice, resulting in the documentation of culturally significant information and, in the case of the Mt. Albert site, notably good evidence for certain kinds of previously undocumented sacred ritual activities some 5000 years ago.

For the past twenty years, there has been a noted re-considering of the archaeological data that has been generated from forty years of CRM archaeology (Cain 2012). These data continue to increase and industry professionals and academics have all noticed the problem that has arisen from an ever increasing and inaccessible ‘grey literature’ of CRM archaeology. While lithic scatters still are documented almost exclusively in technical reports, in the past ten years there has been an increase in publication on lithic scatters in many areas (Cain 2012; Smit 2012; Reith 2008). Also, multiple regional archaeological conferences have featured sessions on these sites, all seeking to add to their value as archaeological resources. This work has been partially successful; more and more archaeologists in certain regions have begun to consider lithic scatters and the legislation and regulations regarding lithic scatters have changed to reflect the increased awareness and their potential value as markers of past peoples activities and habitations (Bond 2011).

This increased recognition is a laudable achievement and demonstrates how far the archaeological community has come to understand the limitations of older approaches and the need to confront the record in new ways rather than ignore it. Increased recognition/valuation though does not equal increased understanding. Currently, in Ontario the increased valuation of lithic scatters has meant only an increase in their excavation through the same artifact distribution and density focused approaches guided by the density and distribution of the original/initial surface collection. Lithic scatter reports, regardless of the archaeologist, feature an emphasis simply on artifact typology (i.e. what kind of tools are present, if any) and documenting flaking debris types type and their relative proportions. Usually high and low excavation unit yields, average artifact yields, and/or areas of a certain artifact density, are employed to demonstrate that a suitable majority of the artifacts were collected and that the scatter distribution itself has been thoroughly explored, including determining the spatial limits of tangible/preserved remnants of past human activity.

However, are surface scatter locations and artifact densities the most meaningful metric for understanding these particular sites and maximizing the information contained in them, for example by discovering intact feature remnants? As discussed more in the next chapter, a large and growing body of literature, in some cases extending back 30 years or more, suggests such an approach is unrealistic (e.g., Binford 1966; Hasenstab 2008; Lennox 1982; Shott 1987, 1995).

1.3 Scatters and Geophysical Surveys

There is a real need then, to try to develop better ways of assessing the value of the tremendous number of lithic scatters and improve how they are investigated. One means explored in this thesis is to employ geophysical survey. Geophysical survey has long been used as a prospection method of intra-site investigation. Its primary focus has been to detect subsurface deposits related to a possible archaeological site. It is a fast, accurate and reliable method of determining the quality and quantity of subsurface features.

Kvamme (2003) suggests that it could have an expanded role in anthropological archaeological perspectives by accessing more useful data. By changing the scale of the survey and notably by moving beyond the researcher determined spatial limits of the site founded on traditional excavation and survey methods, Kvamme (2003) was able to determine using geophysical means that the 'site' limits only encapsulated a portion of the overall archaeological deposits. In another study, Jones and Munson (2005) were able to differentiate between ephemeral Plains campsites that were situated in close spatial context through the use of multi-technique geophysical surveys. Nelson (2012) used geophysical survey to examine a Mississippian domestic site and used the data to gain a more nuanced understanding of the 'spaces in-between' the positive geophysical anomalies. Finally, and most relevant to this thesis, Eastaugh et al. (2013; Ellis et al. 2016) carried out geophysical surveys on the Davidson Site, a Late Archaic site in Ontario. They did so not only to prospect for potential subsurface deposits but also to gain a more nuanced understanding of the overall site structure and the site's changing use over time. These examples also illustrate the ability of geophysical survey to detect subsurface cultural features prior to excavation, allowing for detailed and focused ground-truthing of those features (Hargrave 2006; Kvamme 2006a).

Even in the case of lithic scatters, where subsurface cultural features may be insubstantial or have been impacted by land clearing and agricultural activities, geophysical surveys have been employed to detect similarly poorly preserved archaeological features (Dunlop et al. 2012; Jones and Munson 2005; Parkyn 2010; Venter et al. 2006). Indeed, when applied appropriately, geophysical survey methodologies have proven ideal for detecting features that otherwise could be missed or misinterpreted through standard excavation practices (Campana 2009; Dalan and Bevan 2002; Eastaugh et al. 2013; EH 2008; Gaffney 2008; Jones and Munson 2005; Jordan 2009; Lowe and Fogel 2010; Parkyn 2010; Prio et al. 2010; Watters 2009; Venter et al. 2006). Moreover, the use of geophysical surveys has been demonstrated to be useful within southern Ontario and on more ephemeral Archaic age sites, and there is a demand for further proven and appropriate applications of these techniques (Dunlop et al. 2012; Eastaugh et al. 2013; Ellis et al. 2009b, 2016; Johnson 2006; Peterson and Monaghan 2009).

1.4 Selection of Sites for Investigation

The goal of this thesis is to explore the utility of using magnetometer survey to maximize the relevant cultural/historical information contained in the ubiquitous lithic scatters dotting the landscape of Ontario and many other areas. This end will be achieved by surface collection, magnetometer survey and test pitting of thirteen surface scatters organized into two "sites" for government record keeping purposes, located outside the City of Kitchener, Ontario to compare information from magnetometer survey with a standardized approach. In order to achieve this goal it was of paramount importance that certain criteria fell into place: a) there should be a parcel, or parcels, of land within close proximity containing several lithic scatters were encountered; b) the assessment process should not have passed the Stage 2 assessment phase and the lithic scatters must be slated to undergo Stage 3 site-specific assessment; and c), permission to carry out this study would be granted by all stakeholders. Ultimately, these criteria were met at the Gehl Place development property in the City of Kitchener, Region of Waterloo, Ontario. The subject property features thirteen lithic scatters that were encountered during the Stage 2 property assessment and were recommended for Stage 3 site-specific assessment: AiHd-159, a single scatter site, and AiHd-160, a large site consisting of twelve discrete surface scatters.

However, Gehl Place, and sites AiHd-159 and AiHd-160, were not the preferred option as sites to test for this thesis. The optimal sites which would be investigated for this thesis were, at its inception, a series of lithic scatters recently encountered during an as yet completed Stage 2 property survey in a CRM context. Due to the challenges faced in the CRM industry such as project delay and cancellation, lack of support for research from proponents and a lack of permission to carry out this work, AiHd-159 and AiHd-160 became the first opportunity to investigate sites for this thesis after repeated attempts and requests for permission, extending from 2012 through 2014, to find a property which fit the requirements listed above. Requests were made to ASI, Archaeological Heritage Services and four other CRM firms within the province for access to lithic scatters. Despite interest and support from all the firms, the above mentioned obstacles persisted. As this thesis required testing of the sites between Stage 2 and Stage 3 assessments as well as all the other permissions, the Gehl Place property became the first suitable property to investigate for this thesis. Site AIHd-160, though, is problematic. As discussed in Chapter 4, despite the site consisting of twelve discrete surface scatters, it was readily apparent to the author that part, or all, of the site would require further investigation. As such, it does not fit the 'mundane' nature of a typical lithic scatter as not threatened with a lack of investigation. However, as no other suitable sites could be accessed and given the variability of the surface scatters encountered at AiHd-160, it was felt that at least part of this site would provide useful data for this thesis.

The Gehl Place property is owned by Mattamy Homes who consented to have all data recovered from the archaeological assessments of their property used in this thesis. All assessment work was carried out by ASI, Archaeological and Heritage Services Inc. who have given their permission to use all available data for this thesis. Finally, all work carried out for this thesis was done as part of the overall archaeological assessment process, which involved the full knowledge of the Six Nations of the Grand River and the Mississaugas of the New Credit.

A review of lithic scatters must be undertaken to thoroughly understand their significance and the problems in their interpretation. Chapter 2 will discuss in detail the archaeological concept of lithic scatters as a site "type" and what means are used to investigate these sites as mandated by the Ontario Standards and Guidelines. In turn, the potential challenges with using such an approach highlighted by other researchers and through examples from Ontario. These challenges are also evaluated through an analysis of a data base compiled from a sample of Ontario archaeological assessment reports. Chapter 3 will discuss the role of geophysical survey applications as a means of overcoming these potential challenges and will examine the suggested investigative methodology with the results of a similar geophysical survey carried out on the Davidson Archaic site in Ontario (e.g., Eastaugh et al. 2013; Ellis et al. 2016).

Chapter 4 will describe the two sites investigated for this thesis; AiHd-159 and AiHd-160. Their regional context shall be discussed, as well as their characterization as "sites" and the methodology of all fieldwork carried out for this thesis. That chapter also reviews the results of the geophysical survey and provides a discussion of the assessment results, which are fully documented in the technical licensing reports submitted to the Ministry of Tourism, Culture and Sport by ASI for these sites (ASI 2013, 2015 and 2016). Chapter 5 summarizes the conclusions of the thesis.

Chapter 2 : Lithic Scatters: Their Relationship with CRM Archaeology and Problems with Standard Approaches to their Investigation

2 Lithic Scatters

"Lithic scatter" has become a catch-all term for sites containing lithic artifacts found during survey. In many cases, the lithic artifacts are unsurprisingly the only source of data available on such sites, as they most often appear in the archaeological record as surface scatters of artifacts within a ploughed field context. Researchers are therefore required to rely on measures such as artifact yields, scatter area, artifact typology and diagnostic metrics when collecting what little data were available (Bond 2009, 2011). These commonly applied measurements were seen as offering the most effective means of gathering information about the past activities that occurred and created lithic scatters (Cowan 1999; Jones 2008; Kenyon and Lennox 1997). However, there is an acknowledgement that the focus on artifacts and scatters per se actually involves placing somewhat artificial researcher-imposed limits on the process of determining the nature and full area of past human activities (Bond 2009; Cain 2012; Hey 2006; Kenyon and Lennox 1997; Kvamme 2003; Shott 1995; Yarrow 2006).

2.1 CRM Standards and Guidance for Lithic Scatters in Ontario

In Ontario, the current CRM methodologies used to detect and investigate lithic scatters are set out in the *2011 Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). Under current CRM archaeology regulations for the province of Ontario, all properties undergoing development under one of several 'triggering' legislations require an assessment for the potential of impacts to archaeological resources prior to development or a Stage 1 archaeological assessment (Ferris 2007; MTCS 2011; Williamson 2011). If the Stage 1 assessment determines that there is the potential for impacts to archaeological resources then it will be followed by a Stage 2 archaeological assessment. Archaeological sites, including lithic scatters, are identified and documented during this Stage 2 Field Assessment (MTCS 2011: 27). The assessment involves the systematic survey of a property or study area at regular survey intervals, set at five metres. Although there are multiple means of carrying out surveys, the majority of lithic scatters are identified in ploughed field contexts (Banning 2002; Bond 2011), and so I outline the survey methodologies used for lithic scatters in ploughed field contexts in Ontario below.

The Stage 2 field assessment of cultivated surfaces consists of a single-pass pedestrian survey with a team of archaeologists continually visually inspecting the surface at set transect intervals (Banning 2002; MTCS 2011). When lithic artifacts are encountered, the transect interval is reduced from five metres to one metre for a radius of twenty metres beyond the scatter outliers. Scatters which meet certain criteria concerning artifact yield and spatial concentration require further investigation involving a Stage 3 Site-Specific Archaeological Assessment (MTCS 2011:40). These criteria include: 1) one diagnostic artifact or fire-cracked rock and two non-diagnostic lithic artifacts within a ten metre by ten metre area; or 2), in locations west and south of the Niagara Escarpment ten or more lithic artifacts (including diagnostic artifacts and fire-cracked rock) within a ten by ten metre area or 3), in locations east and north of the Niagara Escarpment five lithic artifacts within a ten by ten metre area. It should be noted that scatters that fall outside of the above-mentioned specifications may also be recommended for Stage 3 Site-Specific Archaeological Assessment, based on the judgment of the consultant archaeologist.

The Stage 3 Site-Specific Archaeological Assessment involves an additional pedestrian survey at one-metre intervals across the previously documented scatter area, as well as the excavation of one metre square test units at set intervals across the scatter area, either one every five metres or, if the site has already been determined to require full excavation or other form of mitigation, every ten metres (MTCS 2011:50). For sites which are tested at five metre intervals, an additional number of test units equal to 20% of the final number of grid units must be placed across the site area. For sites which are tested at ten metre intervals, this additional number of units must equal 40% of the overall number of grid units. Test units are excavated until the site limits have been determined. All soils excavated from all test units are screened through mesh with an aperture of six millimetres, although sites dating to the Paleoindian or Early Archaic or containing the potential for the recovery of specific artifacts such as trade beads require sampling using mesh with three millimeter apertures (MTCS 2011:49). There are no formal standards used to determine the limits of the sites, but the guidance offered within the 2011 Standards and Guidelines for Consultant Archaeologists notes that indicators of site limits may include repetitive low artifact yields from test units, natural barriers such as changes in topography, or typical characteristics of similar sites within a regional context (MTCS 2011:50). Finally, the conditions under which archaeological survey and site-specific investigations are carried out must allow for the easy identification of artifacts on the surface; fields must be recently ploughed and allowed to weather (i.e. several rainfalls) and must be demonstrably clear of crop debris and other hindrances; the surface of the fields must be 80% visible during all pedestrian surveys. These conditions are regulated in order to maximize the potential for the identification and recovery of surface artifacts (Banning 2002).

2.2 Challenges Arising from the Standardized Approaches

Challenges have been identified in the manner with which the standardized process outlined above is used by CRM archaeologists and there are clear implications as to how these challenges bear on lithic scatters. First, there is the challenge of the initial single-pass survey carried out during the Stage 2 assessment. Most Stage 2 surveys (or their equivalent in other jurisdictions) are carried out on a single day and sites are rarely surveyed more than a single time (Hasenstab 2008; Nolan 2017; Shott 1995). The difficulty lies in obtaining sufficient information from a single visit to understand if these scatters are representative of a more substantial site from which cultural features and other archaeological resources may be obtained or if they are simply a small, ephemeral scatter of debitage on the surface (Bond 2010; Kenyon and Lennox 1997; Lennox 1997, Nolan 2017; Shott 1995). Shott (1995) stresses that single pass surveys are unreliable as collection strategies as they only provide a single instance of sampling and are more reliant on and representative of the conditions under which the survey was carried out, such as the kind of ploughing, surface weathering and lighting, than on the actual archaeological resources represented by the detected scatter. Such implications extend to the nature of the soil matrices found within the sites; archaeological sites located within deeper contexts may only be partially impacted by ploughing and are hence underrepresented by a surface scatter (Banning 2002; Shott 1987). Depending on the depth reached by ploughing, the relatively small amount of material brought to the surface could be a poor indicator of more deeply buried archaeological remains (Shott 1987). It is this first challenge which causes the greatest concern with regards to the identification of sites as lithic scatters. In Ontario, a lithic scatter can be deemed sufficiently tested through a single pass (Stage 2) survey. However, when considering the definition of brought forward by the author of a lithic scatter for this thesis, there is a concern that sites are being overlooked without having their archaeological value fully understood. By using the term lithic scatter, CRM archaeologists are linking their finds more to their survey activities then to any pontifical archaeology that may be represented by the observed surface scatter.

The second challenge regarding lithic scatters within a CRM context involves the determination of actual site limits versus scatter limits. In Ontario, this challenge most often presents itself when transitioning from Stage 2 (initial documentation after a single pass survey) to Stage 3 (Site-specific intensive sampling). Standardized Stage 3 assessment strategies focus on the Stage 2 results, which introduces a level of researcher bias by creating an artificial boundary around what then becomes known as the 'site', while in reality it remains the 'scatter' and may not be the "actual" site (Binzen 2008; Bond 2011; Hasenstab 2008; Hey 2006; Reith 2008; Zvelebil et al. 1992). The 2*011 Standards and Guidelines for Consultant Archaeologists* require a second surface survey during the Stage 3 assessment in order to confirm the results of the first surface survey. However, as previously noted, the unreliability of single pass surveys may result in a lack of finds or the second survey may not exceed the limits of the first survey, thus producing a 'double-negative' result for the areas surrounding the site. Based on field studies, this second surface survey is also as unreliable as the first survey at detecting subsurface cultural material not represented by the surface scatter (e.g., Shott 1987).

This factor presents a challenge in interpreting the site structure represented by the lithic scatter: the lithic scatter is representative mainly of knapping and tool production activity, which may, or may not be part of a larger occupation site (Binzen 2008; Keeley 1982;

Morgan and Andrews 2016; Schiffer 1972). By focusing solely on the scatter the site can be readily interpreted as a small tool production area, forgoing the necessity to investigate if the tool production area was related to a larger, still undetected habitation area. Binford (1980) presents a certain settlement model in his discussion of the lifeways apparent in hunter-gatherer archaeology. Habitation/everyday domestic activities are carried out at a centrally placed site, theoretically represented by a higher concentration of the diverse kinds of artifacts produced by such use. These major camps are surrounded by smaller sites (logistical sites) occupied by specific task groups to carry out a limited range of activities (Banning 2002; Cowan 1999; Perazio 2008). This presents a challenge to a CRM archaeologist. Does a given lithic scatter constitute either a small logistical encampment site or is it part of a potentially larger habitation site? Interpreting lithic scatters based solely on the scatter itself creates a situation where significant archaeological resources, related to activities beyond tool production and use, can be lost. Such might include areas related to specific activities carried out by women and children that may not be related to the manufacture of lithic tools (Gero 1991; Keeley 1982; Woodley 1990, 1996). It has further been noted in several studies that knapping creates waste products (debitage) which would contaminate and render habitation areas unsafe. Hence there is a need to carry out these activities away from the main occupation and food storage areas (Grills 2008; Morgan and Andrews 2016; Rinehart 2008). These ideas further reinforce the notion that the observed surface scatters, dominated as they are by lithic debitage, often represent only a portion of the area of past human activity. They are the knapping areas, located some distance from areas of other activities (Grills 2008; Morgan and Andrews 2016; Rinehart 2008).

A third challenge related to the interpretation of single pass detected lithic scatters relates to the previous two challenges and concerns the reliability of surfaces scatters as reliable indicators of subsurface, undetected cultural material. As previously noted, surface scatters are more representative of the conditions in which these sites are found than the actual cultural remains present. This incongruity between subsurface deposits and surface scatter can relate to several factors. These factors include: 1) as just discussed, site composition and structure; 2) the strong potential for an insufficient sample of subsurface deposits to be brought to the surface during cultivation (Shott 1987); and 3), the unreliability of standardized survey and assessment methodologies to detect subsurface cultural features (c.f. Banning 2002:68; Krakker et al. 1983:471; Shott 1987:367).

Standardized survey intervals seek to balance the constraints of a budget for any CRM archaeological investigation versus the need to find, or effectively sample, a site (Barker 2010). However, numerous analyses have all demonstrated the inefficiency of placing standardized test pits or units as a meaningful way of detecting subsurface cultural features (Banning 2002; Keeley 1982; Kvamme 2003; Shott 1987). The lack of a reliable method for balancing the budgetary concerns versus accurately identifying and interpreting the nature of a site related to a surface scatter, is the strongest argument for including geophysical surveys to archaeological investigations. This concept is fully examined in Chapter 3. The 2011 *Standards and Guidelines for Consultant Archaeologists* provides an intensive sampling methodology or requires additional units to be excavated in areas of interest across the site (either 20% or 40% of all gridded units, depending on the assessment strategy) (MTCS 2011:51). However, the challenge for the archaeologist is to determine what the areas of interest are on any specific site or scatter; areas of high or low artifact concentrations? Areas without artifacts? As previously discussed within the first two challenges, the unreliability of a surface scatter to represent subsurface cultural remains creates a significant problem for archaeologists in determining the placement of their test units. Furthermore, by the time archaeologists are excavating test units they have carried out several surface surveys and are basing their strategies on the results they have at hand, as opposed to interpretations based an expanded understanding of the potential for a larger, or more complex, site (Shott 1995; Nolan 2017). As such, test units are used to test the surface lithic scatter, not the potential site that extends well beyond that tangible surface scatter.

This problem is compounded by the continued collection of more desirable, or diagnostic, artifacts from sites prior to their formal investigation (Nolan 2017). Some sites are well known to relic collectors and/or they have been farmed for decades and become sources of curiosity for non-archaeologists who find projectile points, bifaces, and formal tools in their fields while they work the land (Nolan 2017). While some of these finds are registered, the majority of them are not (Nolan 2017). Also, even if a site is registered, the extent of the material that has been removed from the site by collectors and others over decades could be considerable. An example is the DeRyk site south of St. Thomas, Ontario (Borden No. AeHf-21; Chris Ellis: personal communication, December 10, 2017). This site was recorded by archaeologist Dana Poulton in the *Ontario Archaeological Sites Database* for Ontario based on a single 1980 surface survey. A small artifact yield of six lithic flakes plus some fire-cracked rock was reported – it could be seen as simply a lithic scatter. However, the site record indicates there are at least two avocational collections from the site and that "lots of points" have been recovered. One of these collections, assembled by non-professional George Connoy, is now housed at the University of Western Ontario. It contains two banker's boxes with hundreds of artifacts from the site that indicate, among other things, a very substantial Late Woodland (Middleport) occupation. Without access to the complete collection of artifacts removed from the surface, archaeologists must interpret their findings based solely on their single pass survey results or limited surface scatter information. It becomes more and more difficult for an archaeologist to make the necessary inferences regarding the archaeological sites they are investigating and they base their sampling strategies on unreliable data (Nolan 2017; Shott 1987). A small, disparate scatter of debitage has more in common with the logistical/special purpose sites discussed above in the central habitation model, than expected finds at a more substantial occupation site (Perazio 2008).

In Ontario, a specific Archaic site, the Innes site, has been used to argue for more rigorous survey and sampling methodologies (Kenyon and Lennox 1997). The extension of Highway 403 through central-southern Ontario and, more importantly through the Grand River watershed, was one of the first times that standardized survey techniques, considerations of archaeological and heritage value, and intensive investigation were carried out in advance of development. Upon the completion of archaeological investigations, the Innes site yielded significant cultural data and insights pertaining to the Late Archaic occupation of Ontario. These data/advances included refinement of Small Point Late Archaic projectile point typologies. As well radiocarbon dates were obtained from subsurface cultural features and the thousands of artifacts recovered and spatial data revealed significant details about site organization and use (see Kenyon and Lennox 1997; Lennox 1986).

The original identification of the site was made through a standardized single–pass surface survey of a ploughed field, and was originally described as a small, discrete and loose scatter of flakes across the surface of that field (Lennox 1986). Following standard practices, this yield would have resulted in no further need to investigate this scatter beyond the initial single pass collection (Kenyon and Lennox 1997). The site was found prior to the formal adoption of any standards for survey and sampling in Ontario. As Lennox (1986) stresses, at the time of initial documentation many sites with a surface scatter size similar to that of the Innes site would have been ignored and otherwise left undocumented, resulting in their loss to development.

The notion that lithic scatters should not be considered solely on their surface yields, was not a novel concept in archaeology. However, at the time very little data had been collected in Ontario to fully analyze and interpret the relationship between surface lithic scatters and underlying cultural features and the resulting data yields. Like other jurisdictions, prior to the introduction of standardized cultural resource management practices, lithic scatter identifications in Ontario predominantly served as markers across a landscape and were seldom investigated beyond a cursory collection of artifacts on the surface. Again, the sites were stereotyped as representing the small, logistical encampments associated with a larger, central habitation site located within the general vicinity.

The Innes site provided a key focus for the debate regarding lithic scatters in Ontario and is representative of the challenges outlined above; the surface scatter was not representative of either the overall area of the site, the activities which took place at the site, the nature of the subsurface deposits or of course, the value of the site in cultural interpretation. Researchers conducting excavations and CRM assessments throughout Ontario continued to test and probe lithic scatters of varying sizes for further information regarding their structure and to attempt to determine whether or not there was a relation between surface scatter artifact density and the presence of subsurface cultural features (cf. Fisher et al. 1997; Lennox 1986; Steiss et al. 1997; Woodley 1996). This strategy has proven difficult within a CRM context as this often involves ‘selling’ the idea of doing more work than required to proponents (Barker 2010).

2.3 Lithic Scatters in Ontario

In order to evaluate more fully the validity in an Ontario context of the above challenges to how scatters are investigated and interpreted, an analysis of lithic scatters that have undergone extensive excavation in the CRM industry in Ontario was made. The goal was to determine the rate at which excavations yielded results beyond the typically described and defined scatter (e.g., a scatter of lithic artifacts in the ploughzone lacking any other archaeological context). The sites used in the analysis were selected from the report database and library at Archaeological Services Inc., Toronto, as well as a search of accessible technical reports and Borden forms within the MTCS online database platform Past Port (www.pastport.mtc.gov.on.ca). The selection of these sources was in an effort to examine the ‘grey literature’ of the CRM industry.

The search parameters for the data consisted of sites that were identified as a lithic scatter, unknown or undefined pre-contact Indigenous sites, or Archaic sites. The sites also must have undergone complete excavation (known as Stage 4 mitigation). The search parameters were selected in order to filter out earlier Paleo-Indian sites and later Woodland period sites as these sites can contain features and are investigated using distinct methodologies from Archaic sites and lithic scatters (MTCS 2011). Also, sites which did not continue beyond an earlier assessment stage, or were subject to partial excavation or protection and avoidance, were not selected as they did not have sufficient recorded data to be included within the sample.

The sampling included five characteristics of the sites and their excavation. These include the site area (the total scatter area for the artifacts on the surface of the site in m^2); artifact density (artifacts per m^2 from all stages of excavation); the presence or absence of formal tools in the artifact assemblage; the presence or absence of cultural features at the site; the number, if any, of cultural features encountered at each site; the proximity or spatial relationship between cultural features and dense artifact clusters at each site; the percentage of the site excavated; and the artifact yield cut-off for ceasing excavation of each site. These characteristics were selected as they represent the most frequent ways lithic scatters are delimited and investigated within technical reports and academic discussions (Bond 2009, 2011; MTCS 2011; Kenyon and Lennox 1997; Lennox 1986, 1997; Reith 2008; Rensink and Bond 2013; Smit 2012).

The sample size for this analysis was 40, so that a meaningful statistical analysis could be carried out (Drennan 1996). A larger sample size was sought; however, it was observed during the data sampling that very few sites from the target population met the sampling requirements. Many such sites are interpreted as lacking sufficient interest for full excavation and many others, encountered during infrastructure projects, were avoided or only partially excavated. Therefore, the overall population that met these sample requirements is very small, despite the fact that, as noted above, lithic scatters comprise a majority of the archaeological record in Ontario.

For this analysis the null hypothesis is that the presence of cultural features is factor-dependent on site area and artifact density, as these are two site characteristics which are based on data obtained from surface scatters and which are often used to guide the test unit sampling strategies. It is often assumed that the areas of greatest surface lithic artifact density will correspond to feature locations and that the larger a site is the more features will be present. As discussed previously, this assumption has been demonstrated in previous studies elsewhere to be faulty. A single alternate hypothesis is that cultural features are not dependent on any given site's area or artifact density measured as total number of formal tools and debitage, in keeping with the challenges discussed above.

An ordinary least squares multiple linear regression test was conducted in an attempt to understand if there was a statistically significant relationship among the test variables. Our independent variables were site area and artifact density and our dependent variable was the number of features recorded at each site (Appendix B). All calculations were carried out in Excel.

Table 2: Results of the OLS Multiple Linear Regression Test: Site Area and Artifact Density as Variable Determinants of Cultural Features

Significance level (alpha)	5%	
R Square	0.038073263	
Observations	40	
	Coefficients	*P-value*
Intercept	0.492340465	0.106311
Site Area	7.05592E-06	0.960056
Artifact Density	0.007661239	0.233919

As noted in Table 2, at the .05 (five percent) significance level this test indicates that neither site area nor artifact density are significant predictors of the number of features present on any site population from which the sample was collected: lithic scatters, undetermined/unknown pre-contact Indigenous sites, and Archaic sites. The results showed a p-value of 0.96 and 0.233 for site area and artifact density, respectively. These results do not allow for a rejection of the alternative hypothesis in favour of the null hypothesis. Essentially, area and artifact density do not statistically impact the number of features found on a lithic scatter or similar site. This result supports the conclusions reached by numerous researchers mentioned above such as Shott (1995) and Lennox (1986) and suggests that these characteristics may not be essential in determining whether a lithic scatter is associated with undetected archaeological deposits. Furthermore, site area and artifact density exhibit an inverse relationship of -0.051. This relationship suggests that even as independent variables they are correlated, which in turn indicates that there are other explanatory factors that may serve as an indicator of the presence of cultural features within a site.

A second linear regression analysis was done in order to test the possibility that cultural features, and hence more archaeological data, are located within the sites, outer spatial limits, or areas which were not excavated. For this second test a null hypothesis was posited that the percentage of the site area excavated was a factor in the presence of identified cultural features. As the excavation of lithic scatters and similar sites is focused on the main area of highest artifact density, cultural features may be located within portions of the site that did not warrant excavation under the *Standards and Guidelines* (MTCS 2011), or essentially in areas at the site periphery that had low artifact yields.

Table 3: Results of the OLS Linear Regression Test: Percentage of Site Excavated as a Variable Determinant of Presence of Cultural Features

Significance level (alpha)	5%	
R Square	0.048044	
Observations	40	
	Coefficients	*P-value*
Intercept	1.006359	0.004416
% of site area excavated	0.169194	0.174177

As the p-value for this test results in 0.17 at the .05 level of significance, this second test also fails to reject the alternative hypothesis in favour of the null hypothesis and suggests that the percentage of the site area excavated is not significant in determining the number of features found. However, a p=0.17 suggests there may be some structure to these data as opposed to the results from the site area and the area density tests. This result may suggest that the percentage of the site area excavated is more important in locating cultural features than site area and artifact density. In sum, it is not surprisingly a sampling and overall population size problem.

Other characteristics collected from the data sample were determined to be too problematic to be used in the analysis. Only four sites (10% of the data sample) did not yield formal tools or diagnostic artifacts, indicating that these types of artifacts are fairly common on such sites although the sample is biased to sites that were investigated more fully by excavation. Such sites are more likely to yield tools and diagnostics than the average lithic scatter as the mere presence of such artifacts can favour more investigation. However, as noted in Nolan (2017) and discussed above, this result may be a product of surface collection by others prior to formal investigation such as collectors who focus on points and other diagnostic artifacts. Finally, the cut off point for excavation unit yields had a median of 10 artifact recoveries and a mean of 12, which suggests that this characteristic was not statistically significant to determine its impact on the excavation of the sites.

Overall, and in line with previous work discussed above, these analyses suggest that the site area and artifact density of lithic scatters in Ontario are not significant characteristics in predicting the presence or absence of cultural features. The percentage of the site area that underwent excavation may be a more meaningful characteristic, but is still not a significant variable.

The above discussion indicates there is a clearly identified need to approach lithic scatters with alternative investigative methods. The assumed link between subsurface cultural feature locations and the site area spatial limits determined by the distribution of surface recoveries and/or artifact density, is highly suspect. This result, in turn, affects the researchers' ability to determine the archaeological significance of the site without having to resort to an expansive excavation, which may yield little to no significant data.

These results, and the cautionary tales of sites like Innes speaks to the need to probe beyond the regulatory imposed spatial limits of surface scatters. It demonstrates the problem of relying on existing standardized scales of investigation. Revising or going beyond those standards may result in a more nuanced understanding of the nature of the site and the activities carried out within it. As noted, excavation by itself can be an inefficient means of testing the site limits or boundaries. Geophysical survey methodologies, on the other hand, present a unique approach to archaeological site investigation and serve as a means of quickly and more fully extracting useful landscape information from lithic scatters.

Chapter 3 : Geophysical Survey Applications in Ontario and in CRM Archaeology

3 Geophysical Survey to Maximize Cultural/Historical Data

Geophysical survey applications have predominantly served as a prospection technique within archaeological sites, used to identify targets for investigation, such as buried structural remains and cultural features (Gaffney and Gater 2003). They have been in use as archaeological investigative techniques for well over fifty years; however they have not been widely applied to sites within Ontario. This limited use is often attributed to the more ephemeral nature of archaeological sites within the province compared to those in Europe (Nobes 1994). When geophysical surveys were carried out in the 1970s and 1980s in Ontario, the results were underwhelming and the most success was on post-contact Euro-Canadian sites with their more extensive structures (Doroszenko 2011, MTCS 2010, Nobes 1994).

However, technological advances over the past 25 years have resulted in increased resolution and reliability that can now detect the sites which, in contrast to the Roman and Medieval sites originally targeted by geophysical survey in Europe, are also typically found in Ontario. In particular, wide ranging use of geophysical surveys on earlier dating, more ephemeral, European Mesolithic sites in recent years indicates that these techniques would be useful within Ontario (Arias et al. 2015; Schmidt et al. 2015). This utility has been demonstrated in multiple studies published over the past five years, which are providing a strong argument for the successful application of geophysical surveys on pre-contact archaeological sites in Ontario (Birch 2016; Dunlop 2014; Dunlop et al. 2012; Eastaugh et al. 2013; Kellogg 2014; Martelle et al. 2014; Venovecs et al. 2015).

3.1 Applications of Geophysical Survey within an Archaeological Context

Geophysical survey techniques use a series of active and passive methods for detecting variation in subsurface deposits (Gaffney and Gater 2003). These techniques detect the variations in archaeological deposits based on their physical and chemical structures (Conyers 2010). These variations are often the subsurface cultural features and structural remains that make up portions of an archaeological site (Gaffney and Gater 2003). The practical application of geophysical survey within archaeological investigations have expanded incredibly since their inception in the 1950s in England, and are now a standard investigative approach for many archaeologists (Aitken 1958; Clark 1990; Gaffney 2008; Gaffney and Gater 2003; Johnson 2006; Scollar et al. 1990). Geophysical survey techniques are appealing to archaeologists given their unintrusive nature. Archaeological excavation is, by nature, a destructive method and so the ability to collect data without having to either excavate or otherwise remove any archaeological deposits from their *in situ* context has wide appeal.

Although there are upwards of a dozen different geophysical survey techniques, there are five major techniques which are most commonly applied to archaeological investigations and make up over 98% of all documented geophysical surveys. They include: magnetometry/gradiometry, electrical resistivity, ground-penetrating radar (GPR) magnetic susceptibility and electromagnetics (Gaffney 2008). Of these five, magnetometry is by far the most commonly used, constituting approximately 80% of all geophysical surveys. Magnetometry is also the only passive method listed; meaning that it does not require interactions of any kind with soil in order to record its findings. Electrical resistivity requires the insertion of probes into the ground and the passing of a current between them, and GPR, electromagnetics and magnetic susceptibility all require the passing of an electromagnetic wave at a set frequency through the soils. The popularity of magnetometry is due to its ability to detect deposits that have an altered magnetic signature compared to the surrounding soil.

Such alterations would include pits, ditches and features which have been dug out and filled, foundations and trenches which have been purposely placed into the ground, and hearths, campfires, kilns and all other features that have been exposed to heat or include fire-cracked rock concentrations such as middens (Gaffney and Gater 2003; Jones and Munson 2005; Kvamme 2006a). There are three main processes which affectively alter the magnetic signature of buried deposits, making them detectable through magnetometer survey (Gaffney and Gater 2003: 36). First, the cultural features created through heating in particular tend to feature an abrupt and noticeable change in their magnetic signature due to a process known as thermoremance, wherein the magnetic signature of a material is reset due to heat exposure (Gaffney and Gater 2003; Kvamme 2006a). The second process which affects the magnetic signature of cultural features is a fermentation biological-pedological process where the breakdown of iron oxides in topsoils resulting from organic activity results in a detectable difference in magnetic signature from the underlying, or surrounding sterile subsoils (Gaffney and Gater 2003, Kvamme 2006). These processes are further enhanced in middens, where the bacteria encourages this organic breakdown of iron oxides (Hodgetts and Eastaugh 2017). Finally, the anthropogenic activities which create cultural features also contribute to the creation of the variability in magnetic signatures. Pits, trenches and other such features dug into lower sterile soils and filled with magnetically stronger topsoils are an immediate influence on the detection of these subsurface features (Gaffney and Gater 2003). These abilities of magnetometry make it the most applicable for the more ephemeral, less pronounced deposits found on lithic scatters and other pre-contact indigenous sites in Ontario in ploughed field contexts, where hindrances such as trees do not occur (Eastaugh et al. 2013; Jones and Munson 2005; Nobes 1994).

Despite these strength, magnetometry, as a survey technique, is not free of obstacles. There is no way of determining the nature of a subsurface deposit, nor its depth, and magnetometry only offers a single plan view of the subsurface, as opposed to more depth-sensitive techniques such as resistivity and ground penetrating radar (Gaffney and Gater 2003). Further obstacles, such as the geology of any particular study area, can also greatly interfere with magnetometer readings. Areas rich in igneous, high-ferrous rock, such as the Canadian Shield, create stronger magnetic signatures than most subsurface cultural features, greatly hindering the usefulness of magnetometry in these areas (Kvamme 2006). For this thesis, the study area is located on a glacial till moraine, a mix sediment created through glacial retreat (Karrow and Warner 1990). The nature of the till is an uneven sand and gravel mix, with high-ferrous bearing rocks mixed into the soil matrix. The highly variable nature of the sediments wherein the site is located can create false positives and provide some interference for the equipment (Gaffney and Gater

2003). Finally, the presence of any modern metal within the study area can further obscure readings and create false positives with magnetometer survey (Gaffney and Gater 2003). Chapter 4 will discuss the steps taken during the fieldwork for this thesis as to how these obstacles were identified and mitigated for this study.

The other four major geophysical survey techniques have various attributes that make them less appropriate for such survey. Electrical resistivity is the next most commonly applied technique for such sites (Somers 2006), as it detects the variation in the rate at which an electrical charge passes from probes inserted into the soil itself. Although electrical resistivity has advanced considerably since its inception to become much easier and efficient to employ, it still lacks the versatility and resolution afforded to magnetometry (Somers 2006; Watters 2009). Ground penetrating radar (GPR) has become the fastest adopted geophysical survey technique, first in North America and now globally (Conyers 2010). It has benefitted the most in technological advances and certain instruments have given rise to a high level of ease of use, which have made it far more attractive for archaeological investigations. GPR is best suited to Euro-Canadian sites for which the typical deposits reflect the radar waves passing through the ground in a much greater degree than buried hearths and pits (Conyers 2010; Venovcecs et al. 2015). Electromagnetics and magnetic susceptibility are seeing a rapid uptake in their application, however they are most effective at determining a presence or absence of subsurface deposits, and lack the high degree of resolution offered by magnetometry (Dalan 2006; Dalan and Bevan 2002; Eastaugh et al. 2014).

Geophysical survey applications to archaeology are predominantly a means of within site prospection and are used to identify ‘targets’: anomalies within the readings that are indicative of potential subsurface archaeological deposits including cultural features (Gaffney 2008; Gaffney and Gater 2003). These surveys generally focus on areas of interest, such as artifact concentrations or perhaps within the locale of mapped historical buildings or graves (cf. Conyers 2010; Gaffney 2008; Venovcecs et al. 2015). Geophysical surveys have also been applied in larger scale archaeological surveys, used as a means of detecting archaeological sites themselves beyond standard visual and shovel testing methods of survey (Banning 2002; Johnson 2006). These methods are still gaining acceptance as it is more difficult to positively identify sites based solely on geophysical survey results, and, in order to ensure that all sites, ranging from lithic scatters and Archaic campsites to larger Late Woodland villages are encountered, the survey interval is often inefficiently small (U.S. Army Engineer Corps 2007, Gaffney and Gater 2003). Finally, geophysical surveys are also used to test the limits of archaeological sites by determining the extent of the buried deposits (Eastaugh et al. 2013, Gaffney 2008). This application is most relevant to this thesis as it provides the most efficient means of answering the challenges presented in Chapter 2.

The applicability of geophysical surveys for small scale, more ephemeral archaeological sites has been questioned many times (Gaffney 2008; Gaffney and Gater 2003; Jones 2009; Somers 2006). However, surveys carried out prior to the 1990s were indeed promising and seemed to suggest that magnetometry and earth resistivity surveys held the most promise for detecting subsurface deposits related to these types of sites (Kvamme 2003; Nobes 1994). Yet, many of these surveys lacked any real definition or resolution (cf. Nobes 1994) and hence were viewed as an unnecessary expense by many archaeologists (Johnson 2006). In many more cases, the deposits were too ephemeral for the equipment of the day to detect, and they were seen as failures (Aspinall et al. 2008). In this way, geophysical survey applications fell away in Ontario and across most of North America, but remained popular in Europe, where more robust sites generated continued positive survey results, enabling a continued regular use of the techniques.

By the turn of the 21st century, geophysical survey methods were again becoming popular as precision in the equipment increased and more portable computer and GIS technology came into the fore. Even increased battery power made geophysical surveys faster, cheaper, more effective and more accurate (Aspinall et al. 2008). This increase in resolution and decrease in cost gave researchers cause to consider these methodologies once more for pre-contact Indigenous and other such ephemeral sites (Jones and Munson 2005; Jordan 2009; Lowe and Fogol 2010; Parkyn 2010). By this time in Britain, there had been sufficient data collected on the archaeological application of geophysical surveys that the regulatory body, English Heritage, began examining their application to the country’s CRM industry (EH 2008; Jordan 2009). Many CRM archaeologists had been incorporating geophysical survey into their survey and site excavation methodologies for years. The results of several regional studies (cf. Jordan 2009) indicated that, when used appropriately, geophysical surveys provided an excess of 90% success during survey and prospection. The key note in this statement is appropriate use, which harkens back to the misapplication of these techniques on sites which feature adverse conditions. Many survey results were never published as a negative result was seen as a failure and not a learning opportunity (Aspinall et al. 2008). Regardless, geophysical survey had, by this time, been widely adopted in Europe and was now being regulated as part of the CRM industry in Britain and across Europe (Kamermans et al. 2014).

In North America, use of archaeogeophysics was more limited (Conyers 2004; Johnson 2006). The perceived lack of resolution and ability to detect the ephemeral pre-contact Indigenous sites had limited its growth as an alternative to standard survey and excavation (Johnson 2006; Somers 2006). In the United States, the U.S. Army Corps produced a set of standards on the use of geophysical surveys for use on federal lands (U.S. Army Engineer Corps 2007). This document followed a similar concept to that of its European counterparts, although it was more limited in standardized and specific methodologies. As there were few published studies available, the standards relied on technical reports produced by the National Parks Service, as well as grey literature results from academics and the CRM industry (Johnson 2006). In Canada, and specifically in Ontario, the adoption of geophysical survey for use in archaeological investigations remained limited (Dunlop 2014). This result clearly was due to a lack of reliable insights from earlier surveys, especially on pre-contact sites (Nobes 1994), and from the prevailing attitude of the CRM industry that sites were to either undergo complete excavation or be deemed to have no archaeological value (Williamson 2011). This viewpoint was compounded by the relative lack of available and appropriate equipment for many archaeologists, as the equipment was typically located in other departments at universities (and not usually appropriate for archaeological applications) or advertised solely to the mining and construction industries (Gaffney 2008). Given this viewpoint, there was limited demand for a methodology that favored non-intrusive approaches and which would only add cost to an assessment (Lockhart and Green 2006).

Regardless, the technology persisted in its adoption as attitudes towards the value and approach to the assessment of small scale, pre-contact indigenous sites across North America began to accept that standard survey and excavation methodologies were not recognizing the full extent of sites (Kvamme 2003). Site scales, based on surficial artifact scatters were not fully capturing the extent of the buried subsurface cultural features, particularly in the Plains region of North America, where a highly mobile society persisted throughout the exclusive indigenous occupation of this region. However, as with lithic scatters, there was no firm grasp as to how best to address this concern (Lowe and Fogol 2010). Geophysical survey methodologies began to be sought out as a means of quickly and reliably surveying these smaller sites (Jones and Munson 2005; Kvamme 2003; Lowe and Fogol 2010). These surveys produced positive results, and, a better understanding of the appropriate conditions under which they can be applied. Methodologies on how to carry out geophysical surveys on pre-contact indigenous sites began to see wider and wider adoption (Dunlop 2014; Eastaugh et al. 2013; Johnson 2006; Kvamme 2003).

3.1.1 Geophysical Survey and CRM Archaeology

This study focuses on improving lithic scatter studies within CRM archaeology. The role of geophysical survey, as it is applied to CRM archaeology, is very much dependent on the specific jurisdiction and set of regulations governing the CRM industry in each jurisdiction. CRM archaeology is most often described as a highly prescriptive and regulated approach to a problem, the archaeological resource, for which a standardized approach is rarely effective (Barker 2010; Williamson 2011). Ontario's *2011 Standards and Guidelines for Consultant Archaeologists* does not provide any standard approaches to geophysical survey but does provide guidance about when these applications can be used during the archaeological assessment process (during Stage 2 and Stage 3 assessments) (MTCS 2011). As the procedures governing CRM industries are prescriptive, many CRM archaeologists do not carry out fieldwork that goes beyond the prescribed regulation and procedures (Barker 2010; Ferris 2007). As such, the industry is governed by a set of procedures that do not always produce accurate results or maximize the interpretive potential of sites (Barker 2010).

Geophysical survey applications have been a useful addition to CRM archaeology for several reasons (Gaffney and Gaffney 2014; Jordan 2009; Lockhart and Green 2006). First, as their cost has diminished they have become a welcome alternative to standard survey approaches (Banning et al. 2006; Lockhart and Green 2006). Although this application has gained little acceptance within the CRM industry, due perhaps to the perceived unreliability of these techniques (Gaffney 2008), improved technologies and reviews of surveys carried out in regulatory jurisdictions in Europe have indicated that geophysical survey methodologies are highly reliable (Jordan 2009).

Second, despite there being no standardized method for approaching geophysical surveys, there are many published methodologies related to best practices, conditions and external factors that may impact geophysical surveys (cf. U.S. Army Engineer Corps 2007; Conyers 2004; Dalan 2006; EH 2008; Kvamme 2006b, c; Somers 2006; Watters 2009). As a result, there is no reason that these techniques cannot easily be entered into the rote-practices of the CRM industry, enabling their rapid implementation and inclusion within an already established regulatory and procedural system.

Finally, as geophysical survey methodologies are capable of detecting archaeological resources non-intrusively, they are also useful in detecting and in turn, avoiding disturbance to archaeological sites, or parts thereof, throughout the development process. An example of the practical application of geophysical survey methodologies within a CRM context is examined in a study of the BREBEMI project in Italy, a large scale infrastructure project (highway) which involved a high degree of archaeological investigation (Campana 2009). Archaeology was a consideration at the onset of the project and geophysical surveys were carried out across a majority of the study area in order to assist in identifying archaeological sites (Campana 2009). The results assisted in the planning of the project to avoid major archaeological finds and allowing for their continued preservation. Geophysical survey allowed for rapid, effective and reliable means of identifying the archaeology in advance of development, and therefore allowed for these resources to be considered within the planning phases of the project. It is these abilities of geophysical survey that most appeals to the CRM industry and, when combined with some standardized fieldwork, work to create a means of accessing more information and interpretive value from the sites documented within that industry (Ferris 2007).

3.2 Geophysical Applications to the Ontario Archaeological Record

Although geophysical surveys have been carried out in an archaeological context in Ontario since the 1970s, very few of them have been published or disseminated beyond personal conversations (Dunlop 2014). The use of these techniques within Ontario follows a similar pattern to other parts of North America; early adoption in the 1970s and 80s, frustration with the ambiguous, unreliable or inaccurate results, followed by a general distrust of the techniques and a belief that they 'do not work in Ontario' (Dunlop 2014; Nobes 1994). When surveys were carried out, they were limited to specific, typically urban settings, such as to probe beneath parking lots for graves and historic structures (Dunlop 2014).

Geophysical survey studies have predominantly focused on sites that favour good results (Aspinall et al 2008). This bias is due to the need to continually demonstrate the accurate applications of these techniques to archaeologists, although where these methodologies have become more established, such as England and Italy, the expansion of their use to other types of sites is becoming more common (Gaffney and Gaters 2003; Jordan 2009). In this regard, the applications of geophysical survey in Ontario strove to copy the European model of success by focusing on larger, more substantial sites yielding structural and architectural remains (Doroszenko 2011; Dunlop 2014). Later in time, as the techniques underwent their technical renaissance, they began a period of testing within the province to determine the overall applicability.

In Ontario, there still has been a disproportionate number of surveys have been carried out on later dating sites, either Euro-Canadian sites or Late Woodland village sites as these sites offered the greatest opportunities for successful positive results and were always subject to more extensive investigation (Birch 2016; Doroszenko 2011; Dunlop 2014; Dunlop et al. 2012; Eastaugh et al 2014; Kellogg 2014; Martelle 2014; Venovcevs et al. 2015) -- no one is willing, for example, to write off an Iroquoian village without extensive investigation. Moreover, geophysical surveys of Indigenous sites have been limited largely to villages and cabin sites as these denser, richer sites for survey would predict greater positive results.

Overall, these surveys are indicative of what Gaffney (2008:50) calls the resurgence of geophysical survey within the 21st century. Although the overall number of surveys within Ontario remains small, the number of published and presented surveys has increased from nil in 2005 to over 30 by 2015 (Dunlop 2014[1]). Of these surveys, six have been carried out on portions of Late Woodland villages and all of them have involved magnetometer/gradiometer survey. Half of these studies have also included magnetic susceptibility surveys (Birch 2016; Dunlop 2014; Eastaugh et al 2014; Kellogg 2014). As is the case with many published geophysical surveys, the results were significant and positive, with at least some portion of the buried archaeological deposits detected and targeted for excavation.

3.2.1 The Davidson Site

The exception to the pattern of previous geophysical survey applications in Ontario is the survey conducted on the Davidson site, a Late Archaic Broad Point and Small Point site (ca. 4500-3000 cal. BP) located on the Ausable River in southwestern Ontario (Eastaugh et al. 2013; Ellis 2006, 2015; Ellis et al. 2009b 2014a, 2014b, 2015, 2016). The work at the Davidson site was not carried out as part of a CRM investigation but rather as an academic investigation of the site using geophysical survey methodologies. One of the goals of the research conducted at the Davidson site was to test the effectiveness of geophysical survey methodologies on sites within Ontario.

Originally identified in the late 1970s through some salvage excavation of an eroding riverbank paleosol, the Davidson Site was characterized as a predominantly Late Archaic Broad Point site. The northwestern site area was buried under a meter and a half of alluvial deposits deposited by overbank river flooding over the past 200 years, but the

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[1] This number is reflective of a continued monitoring of all published surveys since the paper discussing the upward trend in geophysical survey applications in Ontario was first presented in 2014.

rest of the site was shallow and in an area invaded by cultivation (Ellis et all 2009b; Eastaugh et al. 2013). Archaeological investigations at the site resumed in 2006 and continued until 2015. The site is larger in size than many Archaic sites in the province, with a surface scatter(s) extending over 1.9+ ha (Ellis et al. 2014a, 2014b). This information, combined with its many complex features, such as houses and location adjacent to a major river, suggests that the site was a semi-sedentary seasonal habitation site (Ellis 2006; Ellis et al. 2009b, 2014a, 2014b, 2015).

During the archaeological investigations at the Davidson site an initial magnetometer survey was conducted across the site in order to determine its' overall layout and its spatial limits. The results of the magnetometer survey were highly successful and identified hundreds of often large and complex subsurface features/magnetic anomalies. These results indicated a far richer and more complex site than had been previously interpreted based on the surface scatter alone (Eastaugh et al. 2013). Subsequent survey and excavation reinforced these conclusions (Ellis et al. 2014a, 2014b). This example is the Innes site cautionary tale writ large; the interpretations of a surface scatter collected some years ago identified this site as a Late Archaic campsite or smaller scale occupation along the river and while there is no doubt that an excavation would have identified the subsurface features, it would have required a far more expansive excavation program than previously considered to document their density and full spatial distribution/area of preservation. Although not carried out as part of a CRM investigation, the challenges pertaining to the relationships and interpretations of lithic scatters (and Archaic sites) is clearly illustrated at the Davidson site, and confirms that such challenges extend beyond the CRM industry and have implication for all such sites.

The problem-based geophysical survey application at the Davidson site was used to understand the relationship between the 'scatter' and the 'site'. As noted in Chapter 1 there is a distinction between these two archaeological concepts. Until the discussed investigations took place at Davidson, it was a scatter, although registered and considered a site. However, the scatter was not representative of the overall nature of the actual site, which was only discovered through multiple controlled surface collections over several years, excavation and geophysical survey. Due to the overall nature of the site, a semipermanent habitation site, the questions asked by the researchers were focused not just on boundaries but also on documenting internal site structure and the understanding of the temporal and spatial organization of the site. When compared to the problem of lithic scatters, their structure and their limits/edges vis a vis past human activities, there is an apparent sameness to the study conducted on the Davidson site. Geophysical survey applications were applied to ask spatial and anthropological questions regarding the site, and its overall layout and boundaries. The results reinforce the notion that the acceptance of the surface scatter as representative and as marking the actual site boundary is faulty and not reflective of the actual nature of the cultural deposits located therein (Hey 2006; Shott 1995). They can be applied to lithic scatters in order to gain a more nuanced understanding of their extent and organization. It is also notable that continuing work at the site has actually targeted for excavation gradiometer anomalies associated with Broad Point related finds, low yield, surface, artifact concentrations in the less densely occupied southern part of the site. These successfully exposed a series of features associated with those anomalies including one that yielded a Broad Point age radiocarbon date of 3750 +/-30 RCYBP (ICA 17C/0120; Ellis 2015; Ellis et al. 2016 and personal communication).

Chapter 4

4 AiHd-159 and AiHd-160, Site Identification and Archaeological Investigations

In order to fully investigate the challenges facing archaeologists and their interpretations of lithic scatters under a standardized CRM framework and in order to validate the comparative site analysis of recorded sites carried out in Chapter 2, an on-going archaeological assessment project carried out by Archaeological Services Inc. was used as a field case for examination. The fieldwork was carried out on two "lithic scatters" located within close proximity to each other: 1) a single, very large 'site', which actually consisted of 12 different recognizable lithic scatters across a ploughed field registered as AiHd-160; and 2) a smaller site located 50 m to the east and co-extensive with a single isolated spatial lithic scatter, registered as AiHd-159.

As noted in Chapter 1, sites AiHd-159 and AiHd-160 were not the optimal choice of site for this thesis and it was apparent from the primary Stage 2 survey findings that at least some part of AiHd-160 would require further investigation. Ultimately it was fully included in this thesis not only because it was the first site for which permission had been granted but that components of the site exhibited characteristics of lithic scatters rendering it suitable for inclusion within this thesis. Notably, within the confines of the AiHd-160 'site' it contained both the spatial scatters and their surrounding areas which would be subject to assessment and comparison in order to address the challenges outlined in Chapter 2. The following sections shall discuss: the site; the rationale behind its registration as a single site for record keeping purposes despite the presence of 12 lithic scatters within it; the archaeological fieldwork carried out as part of the archaeological assessment; and the geophysical survey carried out across approximately half of the site.

4.1 AiHd-159 and AiHd-160 and their Archaeological Assessment

AiHd-159 and AiHd-160 were both documented in May 2013 as part of the Stage 1 and 2 archaeological assessment of a development property on the southwest edge of the City of Kitchener, Ontario. For the property within which AiHd-160 is located, the archaeological survey consisted of a single visual pedestrian surface survey of the entire property, all ploughed fields, at five metre intervals. This approach was in keeping with the 2011 *Standards and Guidelines for Consultant Archaeologists*.

AiHd-159 and AiHd-160 were encountered along a high lying ridgeline, which extends north-south across the property adjacent to two kettle lakes (Figures 1 and 2). AiHd-159 is located approximately 50 m east of AiHd-160 on the edge of the terrace and on the opposite side of the largest, easterly, kettle lake. AiHd-160 is also bounded, to the southwest, by the development property limit, thus limiting the site area to lands inclusive of only ploughed agricultural fields; one of the kettle lakes to the southwest of the site was located within a protected woodlot and it was clear, based on the proximity of surface finds to this woodlot, that the site extends into it for an unknown distance.

AiHd-159 was identified as a diffuse cluster of fourteen lithic artifacts across an area 40 m by 60 m (ASI 2015). The diffuse nature of the scatter presented an artifact concentration of 0.005 artifacts per square metre and would not immediately qualify the site for further investigation. There were no artifacts found on the surface of this site that could attribute it to any particular temporal use or cultural affiliation.

AiHd-160 was identified as a site with high cultural heritage value and interest and it was suggested that it may represent an Archaic component (ASI 2015). The assessment process required that the site undergo further investigation (MTCS 2011) consisting of a Stage 3, site-specific assessment. As discussed earlier, this level of assessment involves the testing of a site through the excavation of one metre-square test units in order to achieve two goals: to provide a sample of artifacts in order to understand the site's cultural affiliation and to determine the extent of the site. The site actually consists of twelve scatters, given field designations P05, P12, P21, P22, P23, P24, P27, P35, P39, P48 and P49 and 26 isolated finds located between and around those scatters (Figure 2).

The scatters were identified as areas of artifact concentration and it was debated how to classify and record them. Should it be considered a single registered site? Or should each scatter be registered as a separate site? Or should the finds be divided into thirds, with P12, P21, P22, P48 and P49 as a grouping/registered site including the northernmost scatters, P27, P35, P39 and P41 as a central grouping/registered site of scatters, and P05, P23 and P24 as a southern group/registered site of scatters?

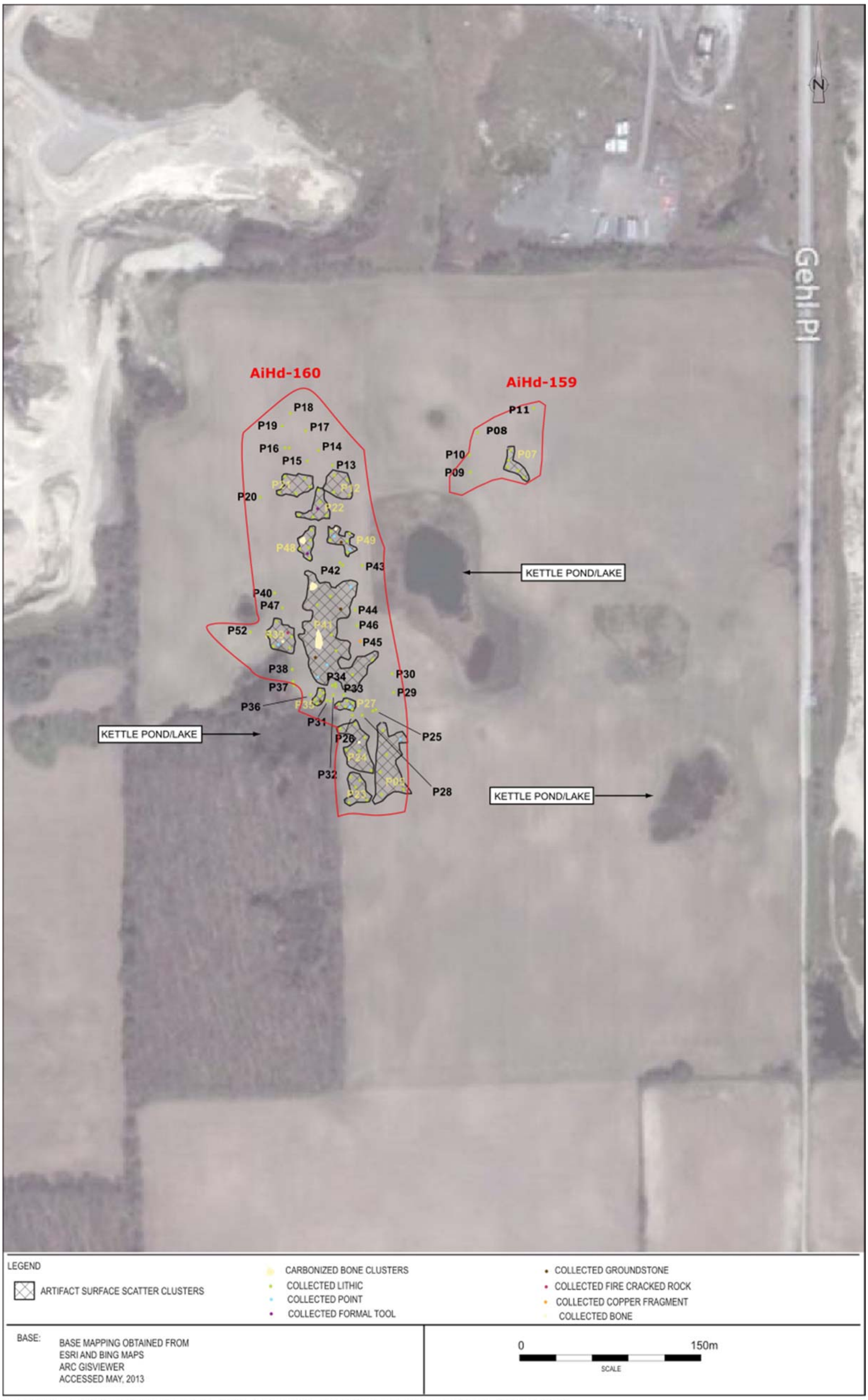
Figure 1: The General Location of Sites AiHd-159 and Aihd-160

However, the additional 26 isolated finds in the area suggested that the occupation/site extended beyond the limits of the artifact clusters and given the overall proximity of the finds, the location was considered as a single site.

Two Brewerton Points, one Innes Point and one Nettling Point were all recovered from the surface of AiHd-160; the Nettling Point, dating to the Early Archaic period (9,500-8,900 RCYBP) was found in in Scatter P22, the northernmost scatter in AiHd-160. The two Brewerton points, dating to the Middle Archaic period (5,500-4,500 RCYBP) each were isolated finds from between the largest and most central scatter and the adjacent kettle lake. Finally the Innes point, dating to the Small Point Late Archaic period (3,500-2,900 RCYBP) was found in scatter P27, located centrally. As there were no diagnostic artifacts or other indicators that would assist in dividing the surface finds by cultural tradition, this factor also led to the area being treated as single site and it was interpreted, along with AiHd-159, as a continuation of Archaic occupations located along the ridgeline.

Given the proximity of both sites along the ridgeline and through the engagement of representatives of descendant Indigenous communities from the Six Nations of the Grand River and the Mississaugas of the New Credit with the proponent, it was determined that both sites would be subject to Stage 3 archaeological assessment in order to determine if the smaller AiHd-159 was a continuation of the larger AiHd-160. This work would also present an opportunity to test the idea of two different 'sites' and evaluate the overall thirteen discrete scatters interpretation for this thesis.

The Stage 3 assessments of AiHd-159 and AiHd-160 commenced in 2014. Both assessments would meet the standardized strategies as per the Standards *and Guidelines for Consultant Archaeologists* (MTC 2011), but, as indicated in Chapter 2, these would be augmented with some additional field testing in the form of geophysical survey and some additional fieldwork including more extensive test excavation for the purposes of this thesis. Work continued through the 2014 field season; however due to scheduling issues the process was halted by the development proponent at the end of the 2014 field season and the permission to continue further archaeological work within the property was withheld until a later date, which was undetermined at that time. This event resulted in a halt to the overall data collection for this thesis although recently (Fall 2017), excavation was continued at the site.



Location of AiHd-159 and AiHd-160, based on the Stage 2 surface finds (ASI 2013).

Figure 2: The Stage 2 Surface Collection and Organization of AiHd-159 and AiHd-160

4.1.1 AiHd-159 and AiHd-160 Spatial Organization

AiHd-159, as previously discussed, consisted of a single scatter of fourteen lithic artifacts across an area approximately 40 metres by 60 metres. It is located approximately 50 m east of AiHd-160 and on the opposite side of a large (approximately 40 metres in diameter) kettle lake.

As noted, site AiHd-160 was originally observed in the field as a series of twelve discrete artifact scatters with an additional 26 isolated finds located in and around the twelve clusters, extending across the ridgeline in an area roughly 275 m by 150 m. An overall count of 520 artifacts was observed on the surface of the site. If considered as a single site, this diffuse scatter of artifacts produces approximately 0.01 artifact per square metre, which is not suggestive of a particularity rich occupation location. However, as discussed, the site consisted of twelve denser concentrations across the surface and as such, the artifacts obviously were not uniform in their distribution.

The decision to group all scatters into a single registered “site” for the purposes of government records, as opposed to treating each one individually, was made by the author. It was done purposefully, not only to take into account factors discussed above but also to address the central hypothesis examined within this thesis: that the distribution of surface artifacts and their relative densities in and of themselves doe not necessarily reliably measure what specifically is the actual site (e.g., the whole area with significant, tangible remnants of past human activities). In essence, by grouping all twelve scatters into a single unit they could be investigated and assessed as a whole, thus incorporating the adjoining internal edges of each scatter into the site area investigated. This strategy would allow the opportunity to test the areas outside the limits of each scatter and provide insights as to the nature of the site and whether those areas of low density were lacking in significant archaeological information such as features.

The characterization of both sites as two separate entities was due to the distance and orientation of each site around the kettle lake. The twelve scatters and other more diffuse isolated surface finds that were incorporated into AiHd-160 were grouped together as they had only approximately 20 m in distance between them. AiHd-159 was much further away, and was located on its own on the other side of a kettle lake, so it was designated as a separate site for recording purposes.

4.1.2 Regional Context of AiHd-159 and AiHd-160

As noted, sites AiHd-159 and AiHd-160 were encountered along the top of a ridgeline, extending along the western extent of a development property outside of the City of Kitchener, Ontario (Figure 1). This ridgeline comprises the eastern edge of the Waterloo Moraine, a large band of glacial sediments consisting of ice-contact sandy soils and Port Stanley till with a depth ranging from 30 to 100 m (MNR 1984). The moraine consists of sand, gravel and bedrock boulder sediments deposited during the retreat of the Laurentian ice sheet 20,000 BP (Karrow and Warner 1990). The ridgeline where the two sites are located sits on the very eastern edge of the Moraine and provides a commanding view of the Grand River watershed valley to the east (Figure 1).

AiHd-160 is bounded on three sides by kettle lakes; deep bodies of water created when large concentrations of glacial ice or glacial runoff became submerged in the sediments within the recently formed moraine, creating a void, which filled with water and some sediment. AiHd-159 is located northeast of the kettle lake which bounds AiHd-160 to the east.

Despite sitting some distance outside of the general predictive modelling buffers of watercourses and pre-contact Indigenous sites in Ontario (MTCS 2011; Williamson 2011), kettle lakes appear to have been an attractive destination for the pre-contact Indigenous populations, as demonstrated in other extensive site clusters around the Westminster Ponds in London and Wilcox Lake in Richmond Hill. Both systems are larger and feature a more extensive series of kettles. Nevertheless, the kettles in proximity to AiHd-159 and AiHd-160 would have provided some of the necessary resources required for an extensive occupation (Walker 2015).

To place the sites within a regional context, data were obtained from the on-line *Ontario Archaeological Sites Database*. It was accessed in 2014 to obtain the location and basic cultural affiliation data of sites within a five kilometer radius around site AiHd-160, which was used as a central point for the data search. Seventy-seven pre-contact Indigenous sites have been registered within this region (Figure 3). The majority of the sites are clustered around Strasburg Creek, a major tributary of the Grand River. There are several other sites clustered around Alder Lake and its tributaries; however the database search is somewhat inconclusive as areas west of site AiHd-159 and AiHd-160 are not yet available for development and have not been intensively surveyed in CRM projects. This limitation is a critical point in understanding the regional context of these sites; while areas to the far east of the five kilometer radius underwent development prior to the standardized surveys of CRM archaeology, the sites within the western portion of the five kilometer radius are known through academic and avocational endeavors and so contain researcher bias in what is identified and recorded.

Sites dating to the Archaic period abound within this region of Ontario as noted in Figure 4. Sites dating to the entire range of the Archaic period are featured within proximity to the ridgeline, although none have been registered in the unexplored area to the west. Woodland Period sites are also plentiful as Strasburg Creek features many sites dating to the Middle and Late Iroquoian period (750-500 RCYBP) (Figure 5). Despite the richness of the regional archaeological record, none of the other sites are similar to AiHd-160 in terms of its use through time. All other sites within the region are relatively discrete in time, each having a single cultural component. So the multi-component nature of AiHd-160 suggests that this ridgeline was a place of return, or a persistent place, for groups over an extended period of time.

4.1.3 Field Investigations

Considering the challenges discussed in Chapter 2, in doing the Stage 2 assessment of the sites, several strategies were developed based on the comparative analysis discussed in that earlier chapter and the related identified problems. First, both sites would be subject to a standard Stage 3 assessment. AiHd-159 would undergo an additional surface survey and collection followed by the excavation of one metre units across a set grid at five metre intervals, along with an additional 20% of the total of the gridded units in places of interest. For AiHd-160, as it was clear from the initial survey that it would require full excavation, a broader sampling strategy was created for its Stage 3 assessment involving an additional surface survey and one metre square test units excavated at ten metre intervals across a set grid.

A geophysical survey consisting of a gradiometer survey of a portion of AiHd-160 was devised as a means of investigating the areas around the 12 surface scatters contained within the site in a rapid and low impact manner. Additionally, a series of one metre square units was excavated at five metre intervals for a distance of ten metres around the surface scatter limits of AiHd-159 in order to determine if standardized approaches could be expanded in order to address the challenges set out in Chapter 2. This latter strategy was based on the results of the comparative analysis of presence of cultural features and percentage of site area excavated discussed in Chapter 2 and to address the challenge that the scatter was not representative of the overall site area.

The distance of 10 m was selected based on the results of the comparative analysis and as a measure of seeking to balance the additional amount of fieldwork versus the continual budgetary concerns typical of CRM work (Barker 2010).

4.1.1 AiHd-160 Geophysical Survey

The geophysical survey of site AiHd-160 consisted of three survey grids oriented the same as the assessment grid set up across the site. The goal of these initial grids was to test areas inside and outside of the general site area, the surface artifact clusters within the site, and the peripheries of these clusters. The original plan was to assess the results and return to the field to survey a greater area of the site and its periphery in 2015. However, as noted previously, access to the site was withheld by the development proponent and further work was not achieved. Grid 1 was 100 metres north-south by 25 metres, oriented in grid lines 330 to 430 (north-south) and 230 to 255 (east-west). Grid 1 was positioned to cover the central portion of surface scatters P05, P23, P24 and P27, as well as an area to the south, outside the finds area. Grid 1 was surveyed on July 1, 2014 (Figure 10).

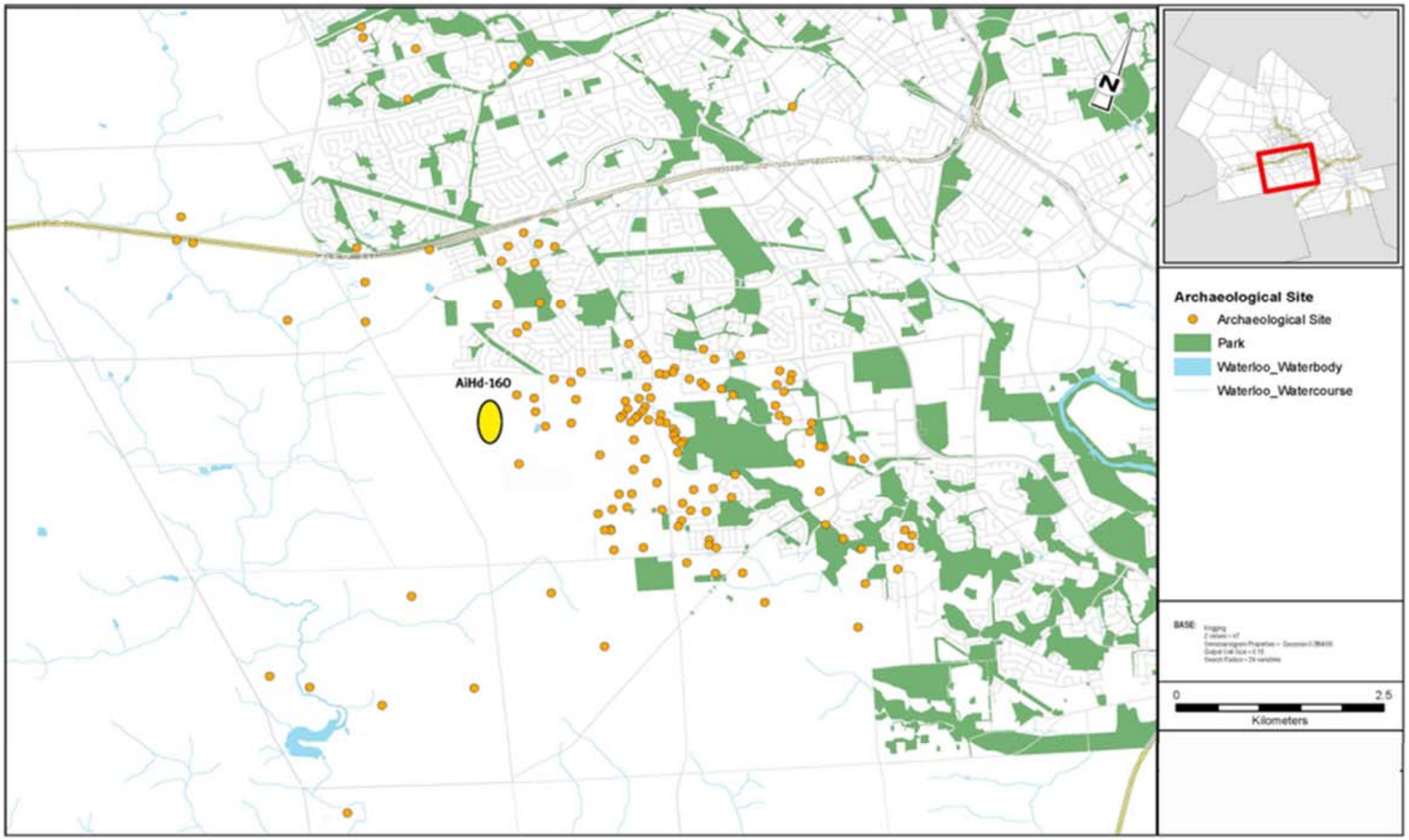


Figure 3: General location of all Registered Archaeological Sites within 5 km of AiHd-159 and AiHd-160

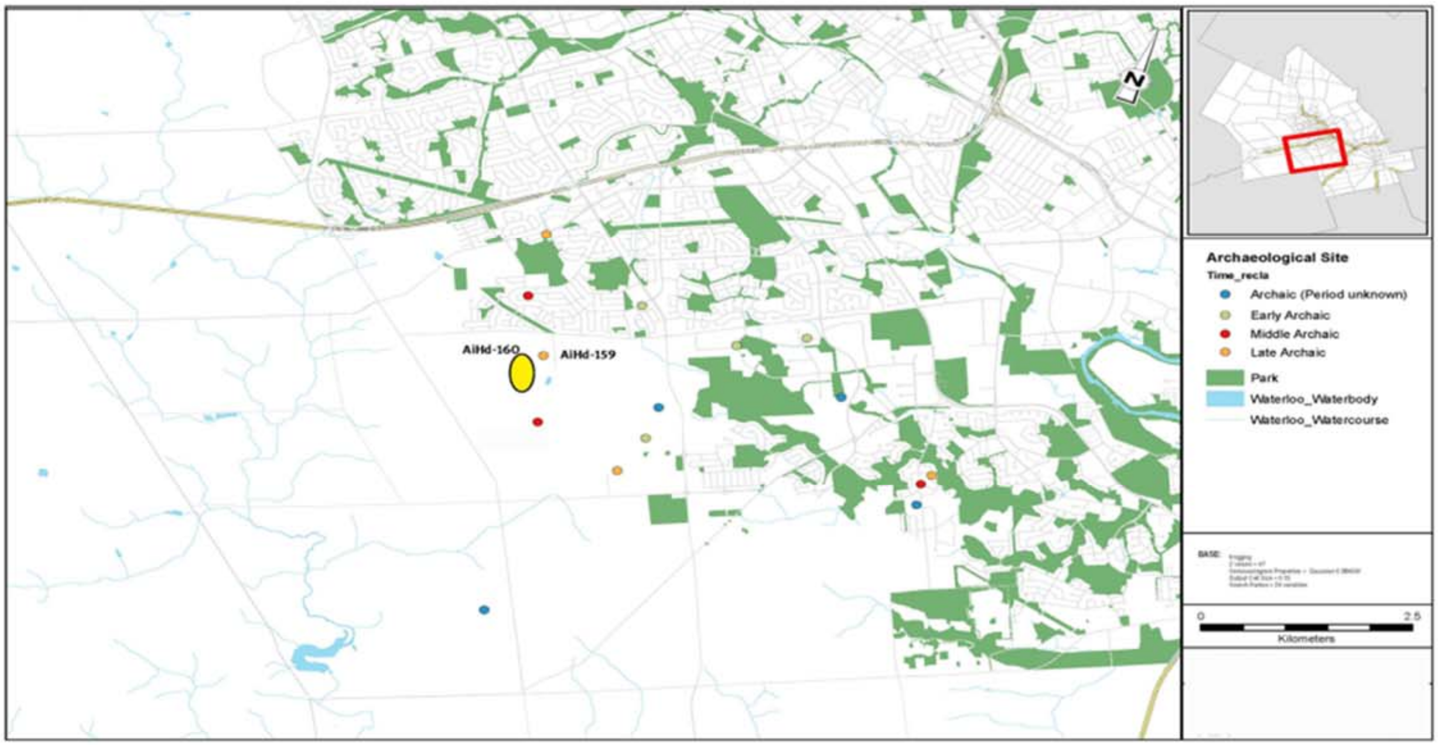


Figure 4: General location of all Archaic Period Sites within 5 km of AiHd-159 and AiHd-160

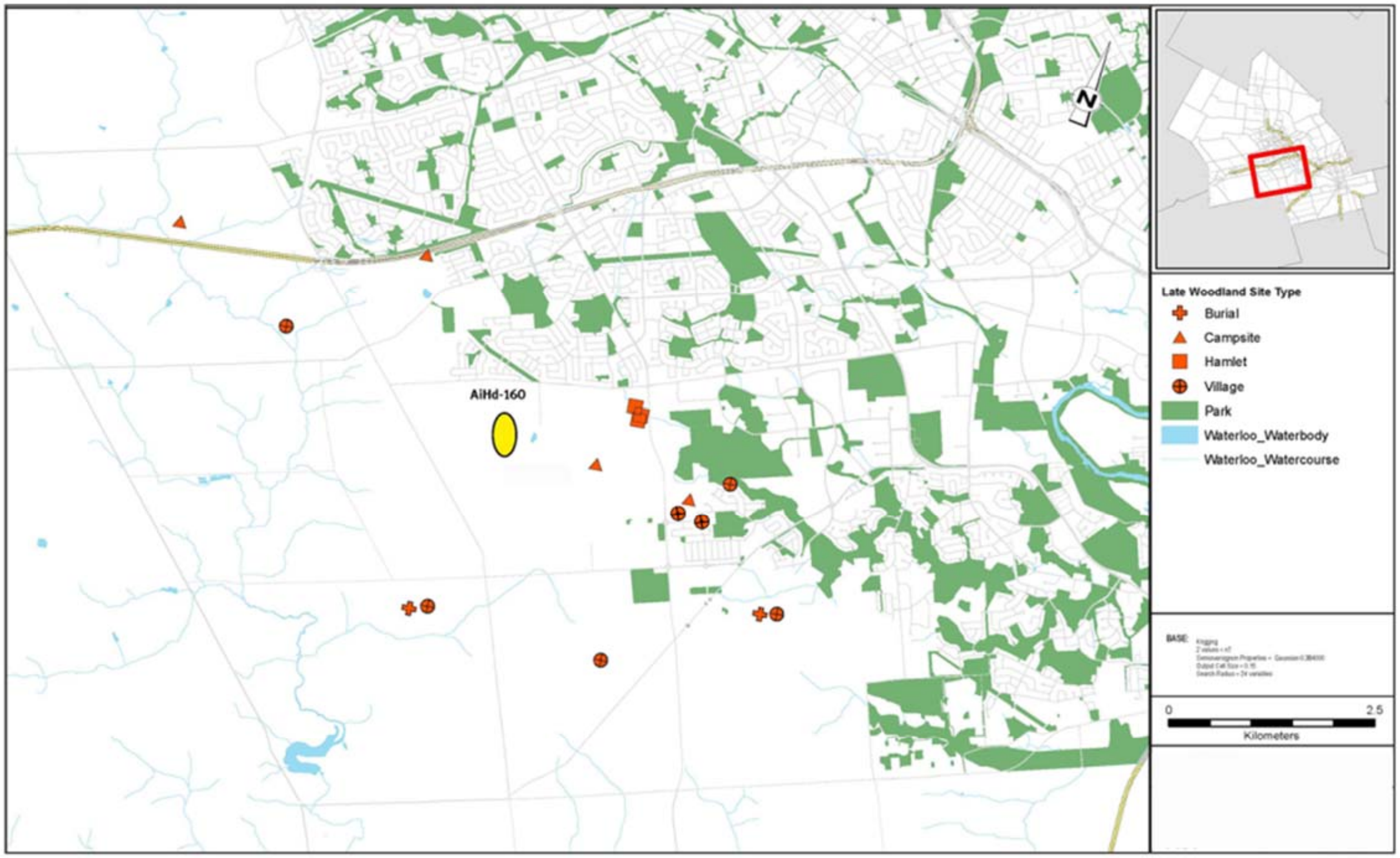


Figure 5: General location of all Late Woodland sites within 5 km of AiHd-159 and AiHd-160

Grid 2 was located north of Grid 1 and was 60 metres by 65 metres, oriented in grid lines 435 to 495 (north-south) and 220-285 (east-west) and extended across the eastern portion of surface cluster P41 and its eastern periphery, towards the kettle lake. Grid 3 was located immediately west of Grid 2 and extended 85 m by 60 m oriented in grid lines 465 to 550 (north-south) and 160 to 220 (east-west) (Figure 10). Girds 2 and 3 were both collected on July 22, 2014. Overall, the entire gradiometer survey at AiHd-160 encompassed an area of 9000 m^2.

The survey conditions were ideal for magnetometer survey. The summer season of 2014 saw more precipitation than normal and thus, allowed for staggering of the survey in order to ensure that the soil moisture content was most appropriate (Kvamme 2006b). Soil moisture is a consideration that must be kept in mind during all geophysical surveys as the amount of moisture within the soil affects its conductivity. As previously discussed, while magnetometer/gradiometer is a passive technique and not reliant on the conductivity of soil, an increased or decreased soil moisture content can ‘smear’ the results and introduce potential error in the data collection (Kvamme 2006b). Given the nature of the soil (loam to clay loam), the moisture content of the soil was determined through the ‘feel method’ of pinching a small sample to determine its malleability or friability.

The geophysical survey was carried out using a GSM-19 Overhauser walking gradiometer equipped with a differential GPS. The equipment was calibrated prior to the initiation of each survey and the equipment was set to ‘walking mode’ meaning that it would take continual readings and that the grid could be walked in a zig-zag pattern without having to correct the data after the survey was complete. It should be noted that this functionality is only achievable when the equipment is connected to the GPS, otherwise it assumes that each survey transect begins at the zero line on the grid.

The GSM-19 Overhauser equipment was selected for this survey for two reasons. First, it can be connected to a differential GPS with an accuracy of less than 10 centimetres which allows for faster geo-referencing of the data. Second, it allows for a zig-zag interval collection methodology, and it also has the capacity for grid surveys in the range of 100 m by 100 m, allowing for fewer separate survey grids across the site, resulting in a lessening of the amount of edge matching and 'piecing together' of the different survey grids' data.

All personnel measures were taken to ensure that there would be no interference caused by the on-going archaeological work on site as follows; the geophysical surveyors were bereft of any metallic or electronic items on their person and all grid areas were subject to a metal detector survey at one metre intervals in order to determine if there were any other sources of interference such as ferrous-rich rocks, modern metals, or any areas of significant magnetic interference within the study area, as discussed in Chapter 3. During this survey it was determined that the kettle lake located west of the site, inside the woodlot but outside our recorded site area, had been subjected to several modern dumping events, including large metal drums. It was therefore determined to set the survey grids up at a distance of 25 m from this area in order to avoid these identified sources of interference. No other sources of interference were identified prior to initiating the survey.

The sensors on the Overhauser walking magnetometer/gradiometer were set to collect a reading every 0.5 seconds, and all three grids were surveyed at 0.5 metre transect intervals. This resulted in approximately four readings per metre squared. All equipment was set up according to the directions as set out in the accompanying manual (Gem Systems 2008). The overall preparation and set up work for the geophysical survey including the field conditions assessment and instrument set up took approximately one to one and a half hours, with some work such a GPS calibration happening in concert with other preparatory activities. However, it should be noted that the author has extensive experience with the Overhauser magnetometer and was able to configure and calibrate the equipment quickly and competently. Calibration of the sensors was the most crucial step in preparing the equipment and took approximately half an hour. This was carried out in tandem with the GPS calibration and condition inspection for the sake of efficiency. The grid setup was also quickly accomplished and took less than an hour, although this was due to the access to 100 m measuring tapes and the fact that the Overhauser magnetometer could process grids of 100 m. It should be noted that some geophysical surveys are carried out on smaller grid sizes (e.g. 20 m by 20 m or 50 m by 50 m), and the setup of each smaller grid would have added some time to the overall fieldwork.

As previously noted in Chapter 3, there are no standardized methods for conducting geophysical surveys and survey design and strategy should be based on several factors; the nature of the archaeological site and the deposits, the attributes of the local geology and soils and any other environmental factors that may impede or otherwise effect the outcome of the survey (EH 2008, Gaffney and Gater 2003).

All of these factors were taken into consideration when designing the geophysical survey strategy for AiHd-160. Given that the site had presented as a series of lithic scatters with diagnostic artifacts from the Archaic period, it was presumed that any cultural features encountered would consist mainly of small pits and hearths. However given the extent of the site, it was recognized that possibly some features associated with occupation/habitation such as post molds or semi-subterranean houses might be encountered (Eastaugh et al. 2013; Sassaman 2010). As discussed in Chapter 3, magnetometer/gradiometer surveys are most effective at detecting such features, as evidenced at the Davidson site specifically, but also at many other similar sites (Eastaugh et al. 2013; Jones and Munson 2005; Kellogg 2014; Kvamme 2003). The grid set up and survey intervals used were consistent with standard practices for geophysical surveys of pre-contact Indigenous or similar sites in other jurisdictions (EH 2008; Johnson 2006). The typical features encountered on pre-contact Indigenous sites, specifically ones dating to the Archaic period, tend to consist of pits and hearths that present as amorphously shaped cultural features (Ellis et al. 2009a). Hence, magnetometry presents the ideal method of geophysical survey that can be used to detect these features (EH 2008:14 and Table 3).

4.1.2 Geophysical Survey Data Processing

Data Processing is the most technically challenging aspect of geophysical survey (Kvamme 2006c). While there are obstacles and technical challenges that must be considered and taken into account during the field survey, the data itself cannot be interpreted until it has been processed. The greatest strength of data processing is that, given the modern capabilities of even the most basic computers, these data can be saved at each step, different methods can be applied, and the data can be virtually tested in order to determine its reliability. There are many software packages available that can carry out all manner of data correction and processing automatically. For the purposes of this study a more basic and manual approach was taken in order to ensure that the data integrity remained high and that any inconsistencies encountered in the final interpreted results were due to the processor/author and not virtual error; that is, any error introduced into the results was not the result of computer applications but rather the author. Therefore, this added a significant amount of time to the data processing, which was carried out over three days from September 8 to 10, 2014 and then processed a second time from the original data download April 24 and 25, 2017. This second data processing event was done to check each step of the data processing and compare the results against the original processing. Finally, it should be noted that, as discussed previously, this processing was time consuming and there are multiple applications such as ArcGIS, Geometrics and MagSurvey 3D which are capable of carrying out many of these corrections and processing tasks at a much faster rate. In most instances, results can be processed and viewed in a matter of minutes, even in the field, which can be extremely valuable should significant errors or unforeseen interference cause problems with the survey. The balance for the CRM industry, as noted in Johnson and Haley (2006) is the need to balance the cost of a geophysical survey including equipment and software costs, versus the efficiency and speed of obtaining results in the field.

All gradiometer data was downloaded from the onboard computer onto the author's personal computer. GSM systems download all data as standard text (.txt) files, and so all data was then imported from text file into Microsoft Excel for processing. In total, 35,009 data points were collected from all survey grids. The data was sorted by GPS coordinate and evaluated for three errors; de-staggering, un-bunching and de-spiking.

De-staggering errors result from differentials in the speed at which the survey is carried out. The equipment was set up to collect a reading every 0.5 seconds, therefore when the speed of the survey is slowed then the result will be a 'staggering' or duplicate effect on the data. Although most pronounced in linear features, it can create false readings especially if the equipment is left to continue collecting in a single location for more than three or more reading intervals (1.5 seconds). As the equipment was set to continually record and the surveyor required several seconds to align themselves with a new grid transect there was significant staggering and duplication of readings along these survey grid edges. This error was further increased by allowing the equipment to 'rest' for two reading cycles at the beginning of each interval path, in order to reduce a second error of reading bunching. This error factor could have been controlled by setting the equipment to a different survey setting, which would have involved having the surveyor manually turn the equipment on and off at the beginning and end of each survey transect. However, in the personal experience of the author, this procedure often results in some transects being lost due to human error (i.e., the surveyor forgot to manually control the equipment). As discussed below, the surveyor is required to pay attention to multiple aspects of the equipment to ensure functionality, therefore it was determined by the author that correcting staggering (as well as bunching; see below) errors in the data were preferable to introducing collection error in the field. The process for eliminating the introduced staggered errors, or de-staggering the data, was to sort the data set by GPS coordinate, define each set of duplicates, compare the *nt* values collected, determine the mean of the *nt* values, and replace all duplicates with a single mean value for that reading. This procedure resulted in the correction of approximately 1500 readings.

Bunching errors can be caused by the rapid alteration of the sensor heading when carrying out a survey in a zig-zag pattern. These alterations cause a reading error in the sensors. In order to mitigate this predicted error in the field, the equipment was allowed to 'rest' at each interval beginning for two readings (one second) in order to eliminate it. Although this process increased the staggering error in the data this error was accounted for and corrected as discussed above. Un-bunched errors were corrected by eliminating readings from the same UTM coordinates. This correction was done by sorting the data in Excel and identifying duplicate X and Y coordinates pairs. All readings with duplicate X and Y coordinates were deleted, with the exception of the reading that represented the average *nt* value for that set of coordinate pairs. Approximately 600 readings were eliminated due to unbunching.

In the GSM-19 equipment, there is a further error similar to un-bunching that results in minor sensor error: the result of a loose wire or pinching of wires during survey. This error is identified in the data when it is downloaded by a sensor accuracy reading taken whenever the sensors take a measurement, and is represented by a percentage value. GEM-systems advise that anything above 75% in value is reliable data (GEM-systems 2008). However, given the predicted ephemeral nature of the anomalies being surveyed, only readings with a value of 99% were accepted for this study, resulting in the deletion of approximately 200 readings.

Finally, the data were subject to de-spiking, which was only carried out once de-staggering and un-bunching was complete. De-spiking gradiometer data involves identifying the outliers in the data, which are often not produced by actual anomalies or features of interest. These readings may represent a minor reading error, such as the lower sensor accidently making contact with the ground, or a small random metallic object in the field, which is not contextual (a nail, or small fragment of scrap metal). This process must be carried out very carefully, as eliminating data readings can impact the interpretable data. For this study, only readings which lay outside the third standard deviation of approximately 7000 *nt*, were excluded from the data. This procedure resulted in the removal of approximately 80 data readings.

After the data set was corrected, each survey grid was uploaded to Surfer 8 software, gridded, and mapped into a greyscale contour map. Contouring effects were smoothed, which had several effects on the data. It allowed for background ‘noise’ and distortion to be removed from the plotted data, allowing for an easier visual identification of anomalies. However, the smoothing also caused a blurring of the anomalies, resulting in a visualized data plot that indicated the presence of an anomaly but may have subtly distorted areas where several anomalies were located in close proximity to each other. As the goal of this study was not prospection, such as the identification and interpretation of intra-site anomalies and features (Eastaugh et al. 2013; Gaffney and Gater 2003; Kvamme 2003), but rather a survey carried out to detect the presence or absence of any anomalies, the decrease in overall detail in the plotted data was an acceptable loss against the identification of anomalies.

4.1.3 Archaeological Excavations: AiHd-159 and AiHd-160

As the fieldwork investigations for AiHd-159 and AiHd-160 were being carried out as part of an archaeological assessment in advance of development, the standardized approaches for the fieldwork were implemented discussed in Chapter 2 following the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). As the locations were in a ploughed field context the approaches consisted of a controlled surface pick-up of all artifacts across the surface of both sites, followed by the excavation of one metre square test units across the whole artifact scatter area (or across the 12 recognized scatter areas within AiHd-160). Test units were excavated in a standardized fashion, with soil matrices excavated at arbitrary layers through the ploughzone (every 10 cm for this study) and units excavated five centimeters into sterile subsoil, with all walls and surfaces troweled and examined for cultural features. All soils are screened in order to collect all the archaeological unit material. For this study, a screen with a six millimeter aperture was used.

For AiHd-159, a small lithic scatter with no diagnostic artifacts, the standards require that a controlled surface pick-up of every artifact on the surface be carried out, followed by one metre square test units excavated every five metres across the overall artifact scatter area on an excavation grid. An additional 20% of the total number of these gridded units is to be excavated in areas of interest across the site. This methodology seeks to carry out an intensive testing of the site as it is not immediately apparent that further investigation will be required. Therefore, as much cultural data as possible should be collected at this stage of the assessment.

For this project the test units were extended for ten metres along each grid line around AiHd-159 in order to test the peripheral areas of scatter. These units were additional investigations carried out in excess of the required units under the *Standards and Guidelines for Consultant Archaeologists*. As discussed in Chapter 2, there is not a strong correlation between artifact scatter concentrations and subsurface cultural features within ploughed field lithic scatter sites in Ontario, as well as elsewhere, and for many potential reasons. Furthermore, the focus on artifact densities within the standards for field investigations focuses on the artifact as the chief purveyor of cultural data to the detriment of potentially significant subsurface features that may be present in those less dense scatter areas. Therefore, a total of 200 test units were excavated across the scatter area and a 10 m periphery around AiHd-159 (ASI 2015) (Figure 6).

For AiHd-160, it was understood that, given the size of the site and its perceived complexity it would require complete mitigation, either full excavation or protection from further impacts, based on the results of the Stage 3 assessment. The methodology for the Stage 3 assessment would be a controlled surface pick-up of all artifacts across the surface of the site area, followed by the excavation of one metre square units at ten metre intervals across the entire site. As AiHd-160 consisted of an amalgamation of twelve surface scatters, it was determined that the standardized excavation of one test unit every ten metres, combined with the gradiometer survey, would be sufficient to test the overall site area, which consists of the surface scatters and the spaces between them. As illustrated on Figure 2, the 'site' area of AiHd-160 consisted of the twelve surface scatters and additional isolated finds, as well as the spaces between the surface finds. The site area did not extend outward from the surface scatter limits, in keeping with the standard practice of defining a site in a CRM context. However, unlike single scatter sites, this procedure allowed for both the gridded test units and the gradiometer survey to test the areas within and between the surface scatters. It effectively addressed the challenges discussed in Chapter 2, specifically the challenges that a site extends beyond the limits of a surface scatter and that surface scatters are not reliable indicators of subsurface cultural remains. The gradiometer survey in particular is an effective means of addressing both these challenges, as discussed in Chapter 3. A total of 451 test unit were excavated across the site area of AiHd-160 (ASI 2015) (Figure 7).

4.1.4 AiHd-159 Field Investigation Results

A total of 57 lithic artifacts were collected from AiHd-159 during the controlled surface pick-up with a further 259 artifacts recovered during the test unit excavation, for a total of 316 artifacts (See Appendix B for full catalogue). The artifact assemblage consists of three projectile points, all found during excavation; one Genesse point, one Adder Orchard point and one incomplete untyped broad point. All three points date to the Late

Archaic Broad point period (4000-3400 RCYBP) (Ellis et al. 2009a: 814). Additional material recovered from AiHd-159 includes one biface, one core, or core fragment, 11 biface fragments, eight primary thinning flakes, 15 primary reduction flakes, 62 fragments of shatter, 114 flake fragments and 66 secondary knapping flakes (ASI 2015). Furthermore, two potential subsurface features were encountered within the site periphery, outside of the overall surface scatter area (Figure 8). Feature 1 was located in unit 463-203 and consists of an irregularly shaped blackened soil and ash deposit, which was partially exposed during the excavation of the unit. Feature 2 is located within unit 491-179 and consists of a mottled ash and dark brown sandy clay soil. Feature 2 was also partially exposed during the excavation of the unit. The test unit yields were very low, with only one unit yielding ten or more artifacts.

4.1.5 AiHd-160 Surface Collection and Test Unit Results

A total of 1,312 artifacts were collected from the surface of AiHd-160, including 1,271 chipped lithic artifacts, five groundstone artifacts and 36 fauna remains. The artifacts encountered aligned to the surface clustering encountered during the initial field survey and did not alter the initial suggestions of the site spatial organization in any way. An additional 1,962 artifacts were recovered from the 451 test units excavated across the entirety of AiHd-160, including 1, 721 chipped lithic artifacts, 4 groundstone artifacts, 218 fragments of pottery and 19 faunal artifacts. The overall total number of artifacts collected from the Stage 3 assessment of AiHd-160 was 3,274. Diagnostic point types recovered during the Stage 3 assessment include four Nanticoke side-notched points, dating to the Late Woodland period (600-400 RCYBP), a Levanna point which also dates to Late Woodland period (1,300-350 RCYBP), an Early Woodland (2,600-2,200 RCYBP) Adena point, and an Innes point and a Crawford Knoll point, both of which date to the Late Archaic Small Point tradition (3,500-2,900 RCYBP) (ASI 2016). The artifacts recovered during the Stage 3 surface collection and test unit excavation, notably the abundant Woodland material, dramatically shift the interpretation of the cultural and temporal associations of AiHd-160. As discussed earlier, they also show how misleading single surface collected assemblages can be. Care then, must be taken in understanding where the artifacts were collected across the site in order to determine whether or not certain surface clusters, or groups of clusters, may be associated with different components. The Innes Point and Crawford Knoll points were both collected from the surface of the site within the area of surface cluster P41 (Figure 7).

The Nanticoke points were clustered within the southern portion of the site, with three points being found on the surface, within the P05-P23-P24 cluster area, and another point coming from unit 400-240, located in the same portion of the site (Figure 7). The Adena point and Levanna point were both recovered from the western extent of the site with the Adena point coming from the surface west of P39 and the Levanna point collected from unit 460-210 (Figure 7). Other lithics recovered from the site include 48 bifaces and biface fragments, seven cores, and five scrapers. Debitage, ranging from primary reduction flakes, through primary and secondary knapping flakes and trimming and retouch flakes were all found in abundance within the assemblage.

The pottery recovered from AiHd-160 was recovered entirely from the test unit excavation, and was predominately clustered towards the southern end of the site, with 171 artifacts (78% of the overall pottery assemblage) originating south of the 400 north-south grid line, within the P05-P23-P24 surface cluster area. Identified ceramic types within the assemblage include Huron Incised, Pound Necked, Lawson Opposed and Ontario Horizontal indicating an association with the Middle-Late Ontario Iroquoian phase (750-500 RCYBP); 88% (n=192) of the ceramic assemblage consisted of unanalyzable sherds (ASI 2016).

The groundstone artifacts recovered from AiHd-160 consisted primarily of axes, adzes and celt fragments made of chloride schist. Of note was a single steatite bead, which was encountered in the P27 scatter, located centrally within the overall site. Finally, the faunal remains consisted of a mix of wild and domesticated animals, including horse, deer, dog and smaller animals such as turtle, squirrel and chipmunk. Given the presence of domesticated animal remains, the faunal assemblage is indicative of the continued use of the site area well into the 19th and 20th centuries.

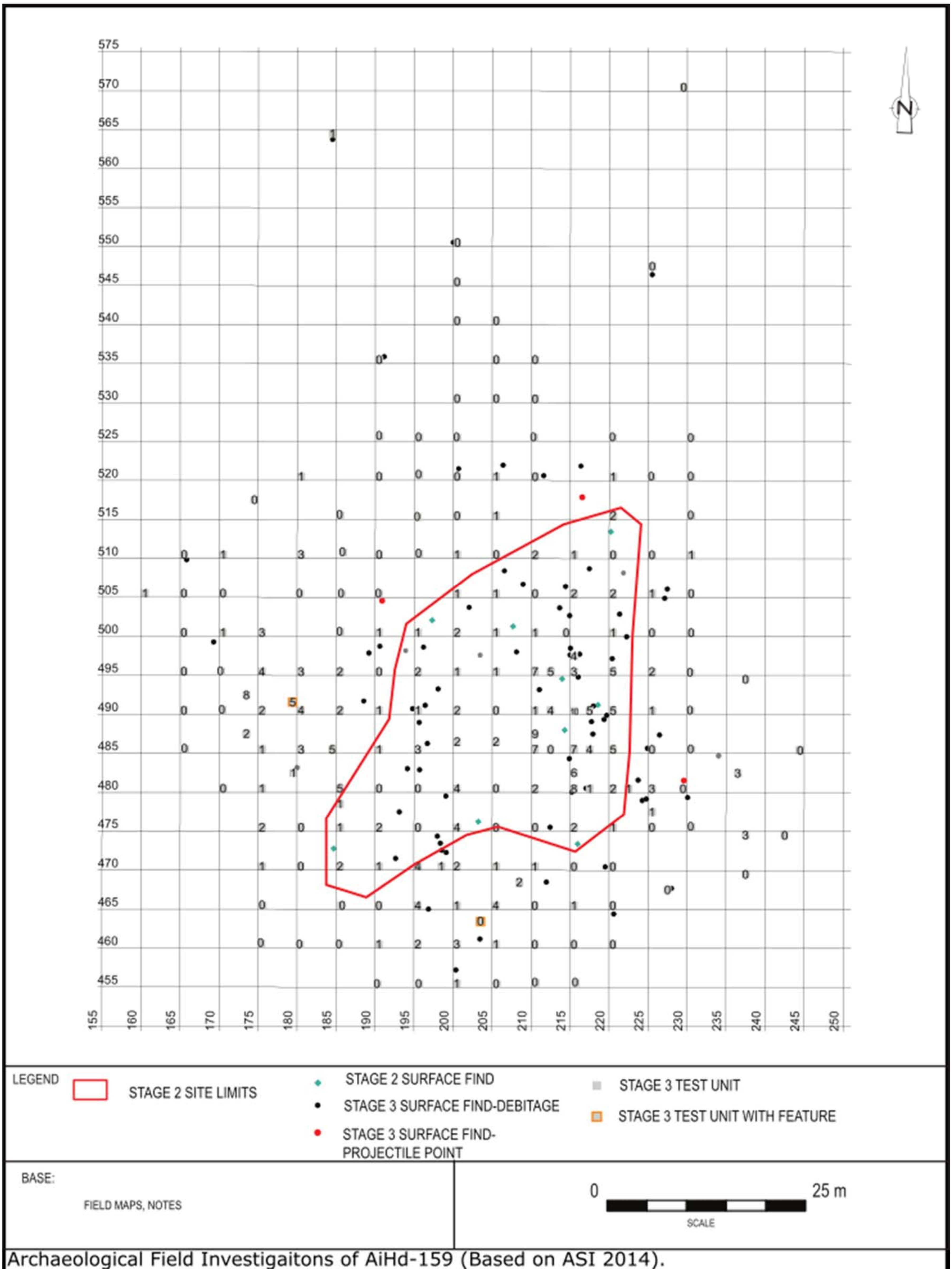


Figure 6: Stage 3 Field Investigations at AiHd-159

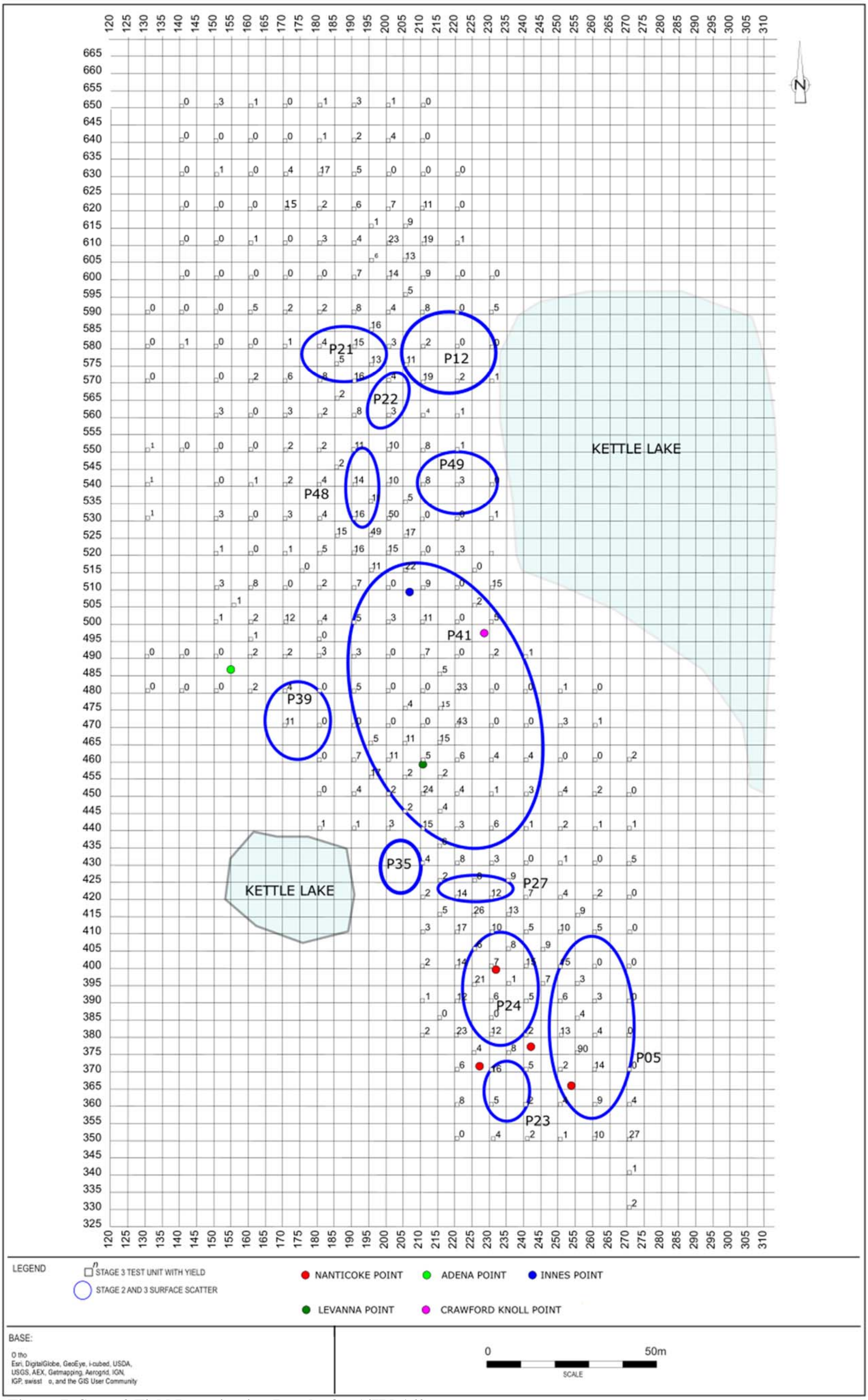


Figure 7: Stage 3 Field Investigation Results for AiHd-160

Units with high yields were determined using the standards pertaining to the archaeological assessment process for lithic scatters, with units yielding ten or more artifacts considered high. 42 units or approximately 10% of the units excavated across AiHd-160, yielded artifact counts of 10 or greater. The diffuse nature of the artifact concentrations is most likely the result of the continued ploughing of the site as opposed to these yields being a reliable indicator of areas of archaeological interest. This is noteworthy as illustrated in Figure 9, where there are areas of high artifact-yielding units outside the surface scatter areas, specifically between P48 and P41, and north of the P12, P21-P22 scatter area.

Table 4: **Cultural Features Encountered at AiHd-160**

Unit	Description	Exposure
590-200	Very dark gray loam	32 cm x 29 cm
575-205	Black and dark reddish-gray silty loam with charcoal inclusions	Incomplete exposure
570-200	Very dark grayish-brown silty loam	Incomplete exposure
570-210	Yellowish brown sandy loam with ash	Incomplete exposure
535-195	Very dark brown and black sandy loam	Incomplete exposure
530-180	Dark brown silty loam with gray sand	Incomplete exposure
525-205	Black sandy loam with dark reddish compact silty loam	Incomplete exposure
520-200	Very dark brown silty loam	Incomplete exposure
520-210	Black sandy loam	Incomplete exposure
510-180	Very dark brown sandy loam with grey sand	Incomplete exposure
510-190	Very dark brown and grey loam with reddish silty loam	Incomplete exposure
480-220	Dark brown silty sand and black sandy loam with charcoal	Incomplete exposure
475-205	Black silt with heavy charcoal inclusions	Incomplete exposure
475-215	Dark brown and gray silty loam with charcoal inclusions	Incomplete exposure
465-205	Dark brown silty loam with charcoal inclusions	Incomplete exposure
460-200	Dark brown silty loam	Incomplete exposure
455-195	Black and very dark brown silty loam	Incomplete exposure
450-260	Yellowish-brown silty sandy soil with charcoal	Incomplete exposure
410-220	Dark brown silty loam mottled with ash	Incomplete exposure
380-220	Very dark brown loam mottled with black sandy loam and ash	Incomplete exposure
380-230	Yellowish-brown sand with ash	Incomplete exposure
350-270	Light brownish-gray sand mottled with charcoal	18 cm by 14 cm

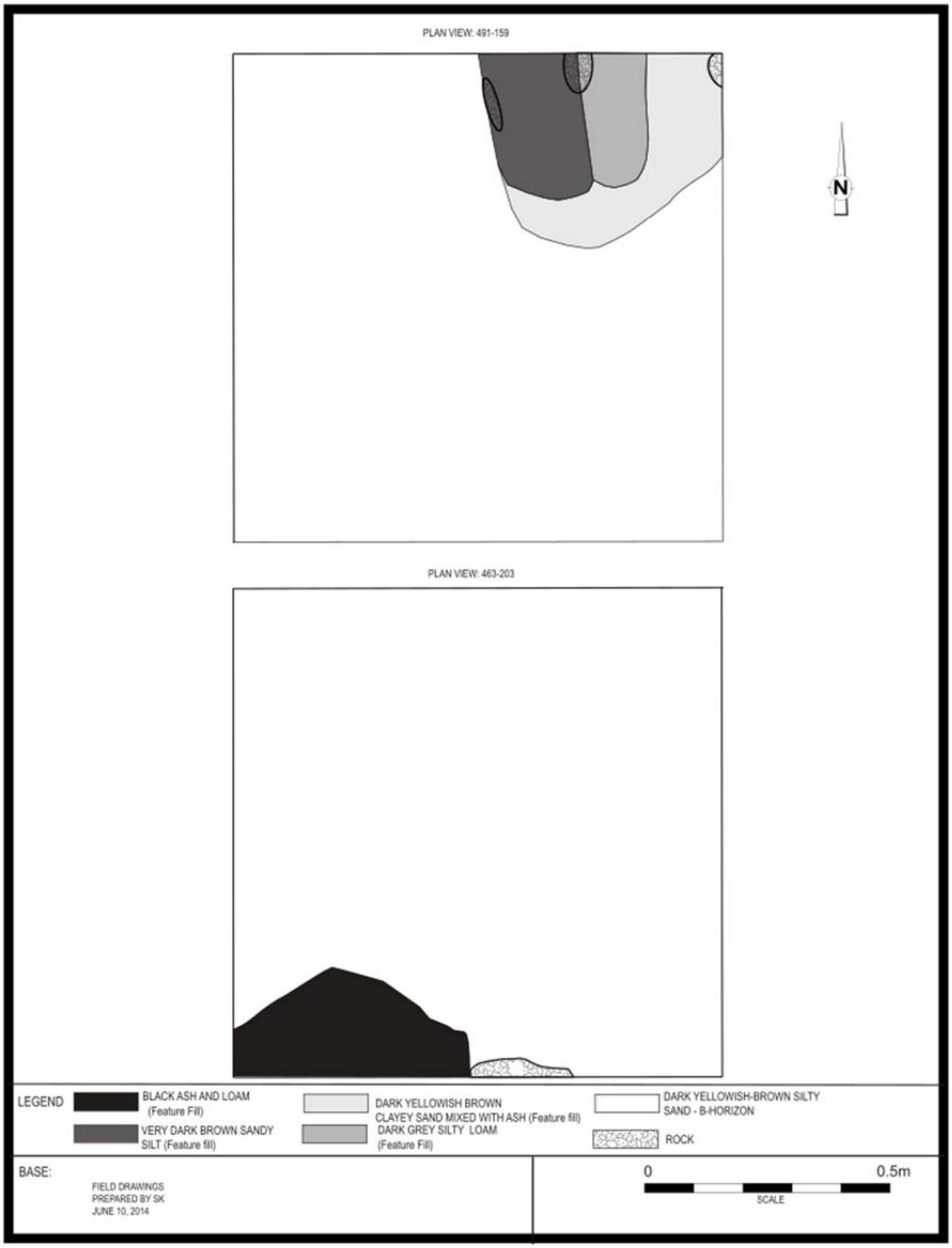


Figure 8: Cultural Features Encountered at AiHd-159

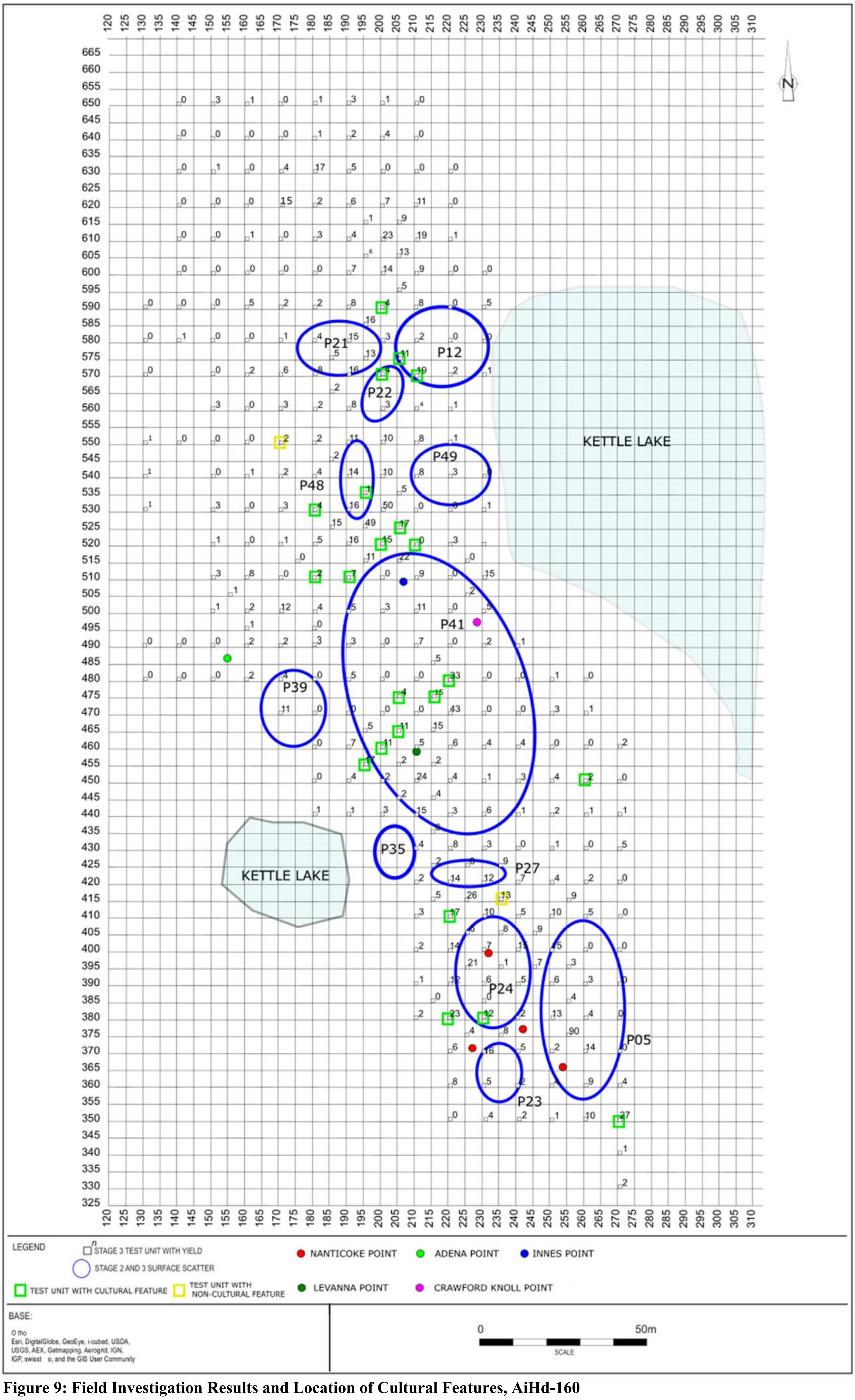


Figure 9: Field Investigation Results and Location of Cultural Features, AiHd-160

4.1.6 AiHd-160 Geophysical Survey Results

The Gradiometer survey detected a total of 63 visually identified anomalies of varying size and magnitude (Figure 10). As previously mentioned, the plotted gradiometer data was smoothed during the analysis and so each anomaly does not represent a single subsurface feature but may suggest a cluster or many small or tightly grouped subsurface features. Therefore, a direct correlation cannot be made between the presence of an anomaly and the presence of a subsurface feature and if these are cultural in origin or not. Ground-truthing is a requirement of all geophysical surveys (Hargrave 2006), as an anomaly represents simply a difference in the magnetic signature of these deposits. There are natural phenomena and characteristics that may create false positives (rocks, tree throws, root systems, changes in soil characteristics). Therefore, ground-truthing at least a portion of all anomalies is crucial in understanding the success and accuracy of any geophysical survey.

In order to test the results of the survey, the plotted geophysical data were compared to the test unit excavation in order to determine if there was a correlation between some or all of the anomalies and the exposed cultural features identified in the preceding section (Figure 11). The ground-truthing of the geophysical survey results was carried out 'blind' from the test unit excavation, in that the presence or absence of anomalies did not affect the placement of test units. Although this procedure resulted in a limited positive ground-truthing correlation between identified cultural features in test units and identified anomalies, it also presented a thorough testing of the areas free of anomalies. This strategy provided a critical way of testing the efficacy of the geophysical survey. Notably, every cultural feature identified in a test unit that was located within a geophysical survey grid, was correlated to an identified anomaly. This matching strongly indicates not only that the technique works in identifying subsoil features but also shows that the procedures involved in processing the geophysical data used herein have produced meaningful results (Figure 11).

Overall, the correlated results between the test unit excavation and geophysical survey shows an overlap of 43 units located within the same location as an identified

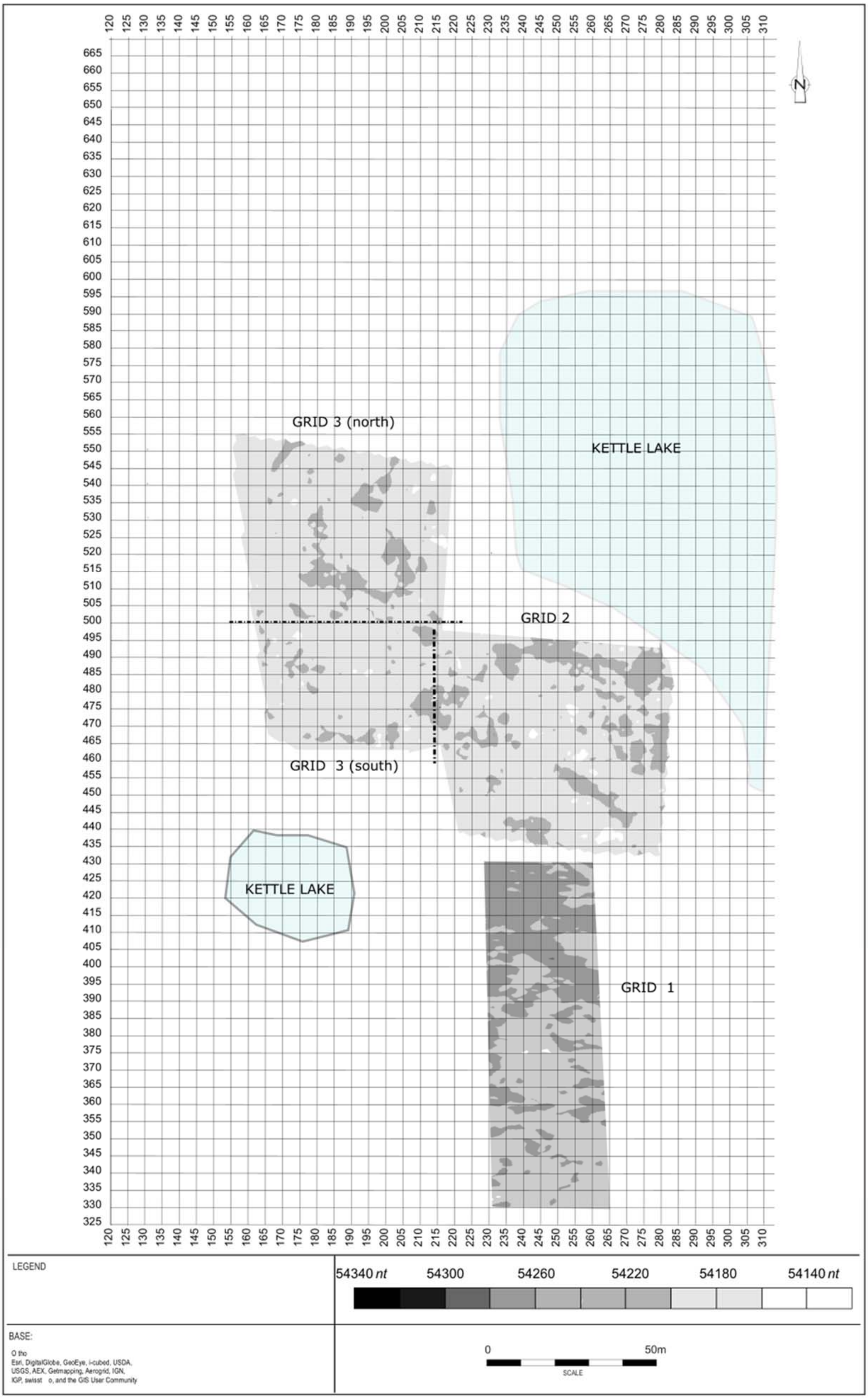


Figure 10: Gradiometer Survey Results for Aihd-160

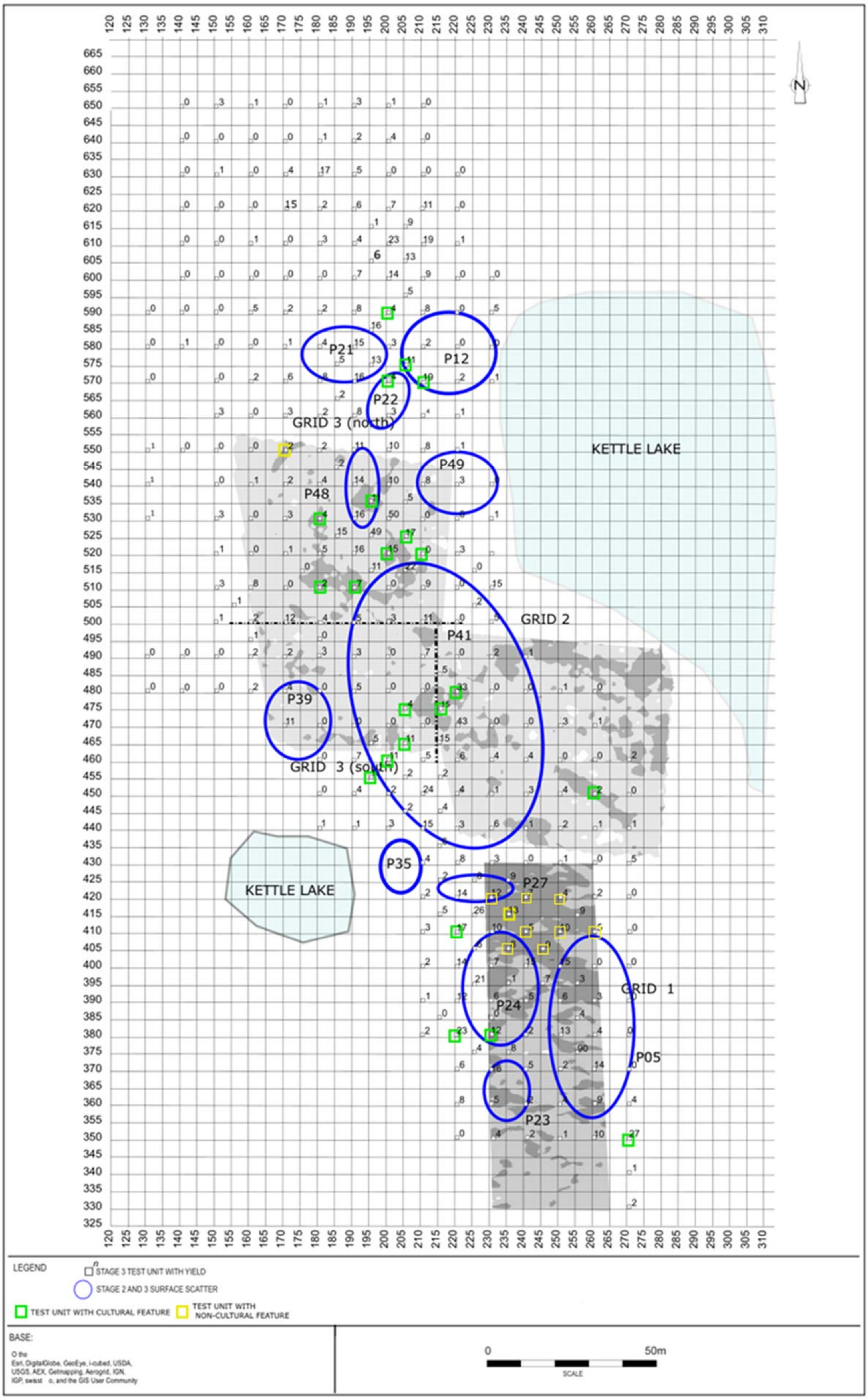


Figure 11: Gradiometer Survey Results and Archaeological Excavation Results, AiHd-160

anomaly (Figure 11). Of those 43 units, ten units were found to correlate with cultural features, one unit correlated to modern infrastructure, and nine units correlated to a change in soil composition. These results are further discussed below. The remaining 23 units which correlated with anomalies did not result in the identification of any observed subsurface deposits, which would readily indicate the presence of a feature, cultural or natural. These anomalies then are considered false-positives. As noted above, false-positives are common challenges related to geophysical survey and can be created in several ways. They may represent cultural features which have been obliterated through ploughing, or may represent areas of activity for which no tangible feature is left in the soil. Both such instances are documented by Kvamme (2003) in his interpretation of open spaces and plazas and in Dunlop et al. (2012) where the 'living floor' of a Late Woodland longhouse was identified in the magnetometer data but was not visually or physically identified during the excavation of the longhouse interior. These false-positives may also represent natural occurrences, remnant tree root systems or geological features, such as ferrous-rich rocks (Hargraves 2006). The probability of such geology within a moraine further increases the chances of having a varied geology within the soil matrix. It is also possible that given the ground-truthing through restricted test units that some remnant subsoil anomalies were missed – at the Davidson Archaic site discussed earlier, successful ground-truthing of anomalies required opening several adjacent one metre units (see Ellis et al. 2016). Finally, the manner with which the data was processed, as previously discussed, did contribute to the smearing of results. Although anticipated, this may have over exaggerated the size and orientation of some of the stronger anomalies. The detected anomalies are located across the entirety of the three geophysical survey grids and are described in four areas related to the survey grids: Grid 1, Grid 2, Grid 3 north and Grid 3 south (Figures 10 and 11).

The anomalies in Grid 1 are dominated by a large, strong anomaly across the northern portion of the grid. This anomaly is one of two which were ground-truthed to confirm that, based on its size and shape, it was unlikely to be a cultural feature. This anomaly instead aligned with an area of deep clay deposits, which were encountered and noted in nine units; 420-230, 420-240, 420-250, 410-240 410-255, 410-260, 400-250, 395-235 and 390-250 (Plate 1). These units are located inside this anomaly and were found to consist of a clay soil with a depth of 82 and 91 cm, respectively.

Plate 1: Depth of Deep Clay deposit encountered at AiHd-160

Surrounding units featured shallower deposits more in keeping with standard topsoil depths (30-50 cm) but all units excavated within this anomaly featured a much higher clay content (approximately 90%) than the balance of the site. The clay deposit was noted as extending from approximately the 430 E-W line down to the 385 E-W line. Only one anomaly detected in Grid 1 aligned with a detected subsurface archaeological feature encountered during the test unit excavation, unit 380-230 (Figure 12). Another nine units are located within proximity or within the area of an anomaly, excluding those encountered within the clay deposit anomaly.

There were two distinct patterns observed in the anomalies detected in Grid 2 (Figure 10). There is a large grouping of anomalies in a semi-circular pattern extending from grid point 490-230 to 460-280, and another grouping which begins at a cluster of anomalies at grid point at 470-215 and extends south east, ending at 435-230. The first, semi-circular grouping tends to conform to the site’s topography around the bend, at the top of bank down to the adjacent kettle lake.

This portion of the site was not subject to any excavated “in-fill” units and so only three test units were excavated in proximity to these features. None of these units detected any cultural features; however the units are located on the edges of the plotted anomalies and may have missed their edges. The second grouping of anomalies in Grid 2 features five anomalies over which test units were excavated. Two of these anomalies have been positively identified through test unit excavation, with cultural features reported in units 480-220, 475-215 and 450-260 (Figure 11). These three units are all located well inside the anomalies, indicating that while the geophysical data corresponds positively to a cultural feature, the cultural feature may have been impacted and spread from years of ploughing, or it may be the result of the smoothing of the geophysical data. This result may indicate that other units excavated near the edges of anomalies may not be indicators of false positive anomalies but may instead be misaligned from the actual location of the cultural features indicated by the identified anomalies, a problem noted in other studies (e.g. Ellis et al. 2016).

Grid 3 is divided into Grid 3 north and Grid 3 south by grid line 500 (Figure 10). Grid 3 south has the lowest concentration of anomalies, as they are all fairly small and grouped around the exterior 15 m of survey area. Only three anomalies were located within the vicinity of excavated test units. Two of these anomalies correlate with encountered cultural features (475-205 and 465-205) with the other unit is located only on the edge of the plotted anomaly.

Grid 3 north features three large concentrations of anomalies with other, smaller anomalies scattered throughout. None of the smaller anomalies were correlated with the excavated test units, and the three larger anomalies and grouping of anomalies were all identified in test units.

Plate 2: Limestone drain encountered in unit 550-170

The large linear anomaly in the northwest corner of the survey grid was found to consist of a remnant limestone drain, in unit 550-170 (Plate 2). Such a large feature would be expected to be historic and it reinforces the idea that the magnetometer survey can detect areas that may have been significantly disturbed by more modern use and limit the areas requiring excavation mitigation. The other two large anomalies corresponded with cultural features identified (unit 535-195 and units 520-200, 510-180 and 510-190).

The fieldwork carried out for this study and the overall archaeological assessment of the development property comprised the archaeological testing of AiHd-159 and AiHd-160 and the geophysical survey of portions of AiHd-160. This work resulted in the collection of several thousand artifacts, dating from the Late Archaic through to the Late Woodland period, as well as the documentation of multiple cultural features at each site. Based on the sampling results of correlating encountered cultural features in test units with geophysical anomalies, there is a confirmed direct and positive correlation between the anomalies and the cultural features.

Finally, there is a small cluster of anomalies located in the southernmost portion of Grid 1, where the test unit excavation did not extend. These anomalies, bordered by grid lines 345 to the north and 230 and 255 to the east and west, are similar in orientation and amplitude to those of documented Late Woodland longhouses (Dunlop et al 2012, Kellogg 2014). No ground truthing had been carried out within this portion of the site, however the concentrated presence of Late Woodland material in the ploughzone within proximity to these features is indicative of a potentially significant Late Woodland occupation area.

4.2 Interpreting AiHd-159 and AiHd-160

The archaeological investigations at AiHd-159 and AiHd-160 have produced a substantial data set. While data are limited because the field project was not allowed to go to its completion during the author’s participation, here I summarize some archaeological conclusions that can be generated.

AiHd-159 is a single component, Late Archaic Broad Point site, located on the edge of the Waterloo Moraine, adjacent to a kettle lake. AiHd-159 is one of four Late Archaic sites within the region (Figure 4). However, it is the only Late Archaic site with a Broad Point component, making it somewhat unique within the landscape. The site's position is unique in that artifacts dating to almost every other cultural affiliation of Ontario's pre-contact Indigenous occupation was encountered on the nearby AiHd-160, save for Broad Point artifacts. They remain separated spatially from the rest of the documented pre-contact occupations along the ridgeline landscape. This result is perhaps not surprising because previous work on Broad Point sites shows they stand out as unusual within the southern Ontario Late Archaic record. Besides the use of overly large bifaces, often on coarser-grained rocks little used by other groups, and the fact they have stylistic ties to the east/southeast rather than the western Great Lakes/Midwest, the unusually large size of some components such as the 1.9 ha Davidson site is also notable (Ellis et al. 2014a, 2014b). These differences suggest very different histories and land use patterns by Broad Point producing peoples versus those of other recognized Late Archaic peoples.

The AiHd-159 site consists of a fairly small collection of artifacts with low unit yield across the site. If not for the additional units placed around the ten metre extent of the surface scatter limits, it is notable that the two cultural features encountered within the site would have remained undetected. The detection of these features though, was an intensive investigation; an additional 70 units were excavated at AiHd-159 within the 10 m buffer around the observed surface scatter area and involved a greater number of test units beyond the required amount of excavation. This level of effort should be considered in terms of the return for that effort; although the two cultural features contain the potential of further archaeological data, they may also prove to yield little more than a larger artifact assemblage, resulting in a low return on the effort of examining the area surrounding the surface scatter. However, it is entirely possible that they could have been detected by a prior gradiometer survey, hence obviating the need for such an extensive test pitting to locate them initially.

The cultural features are located closer to the kettle lake, away from the rest of the site. As the features were not fully excavated as part of this study, their context within the site is still unclear. However, the presence of the features, be they pits, hearths or remnants of occupation areas, indicate that the site, despite the ethereal nature of the surface scatter, represents a more complex range of activities than simple tool production. Storage, or short-term habitation would have taken place at the site- activities which should not have been observed based solely on the debitage surface scatter first documented.

Tool manufacture and knapping events occurred further away from the features. This strategy may have been done to keep detritus from tool manufacture away from other activity areas, or it may have been a result of multiple activities such as skinning, butchering, cooking and so forth taking place simultaneously within the landscape. The artifact assemblage from AiHd-159 contained a core, and core fragments, as well as a considerable number of primary reduction flakes (4.4% of the overall assemblage).

This evidence suggests that cobbles of chert were being reduced at this site. Other debitage categories, including primary and secondary knapping flakes, and secondary retouch flakes, are further indicative of tool production taking place at the site. Cowan (1999) suggests that Late Archaic technologies and site assemblages were highly influenced by the mobility of the occupants; artifact assemblages such as those found at AiHd-159 are more indicative of interior, or inland, residential camps (Cowan 1999: 597). Tools specific to resource procurement; points, scrapers and such, tend to be manufactured on sites that feature a more logistical and procurement emphasis. Biface manufacture and the relatively low number of points recovered is further evidence that the site had a more residential, rather than hunting or gathering, focus.

Malleau (2015) and Ellis et al. (1990) note that most, but perhaps not all, groups of Late Archaic peoples tended to aggregate in the spring-summer months in littoral zones, along major waterways and lakes, breaking apart into smaller, band sized groups and moving in-land for the fall and winter. AiHd-159, located as it is on top of a moraine, some distance from the preferred littoral zones, may reflect this model and may represent a smaller, inland, autumn-winter band camp, although the location of the site, on the edge of a moraine, leaves the residents somewhat exposed to the harsher, winter elements.

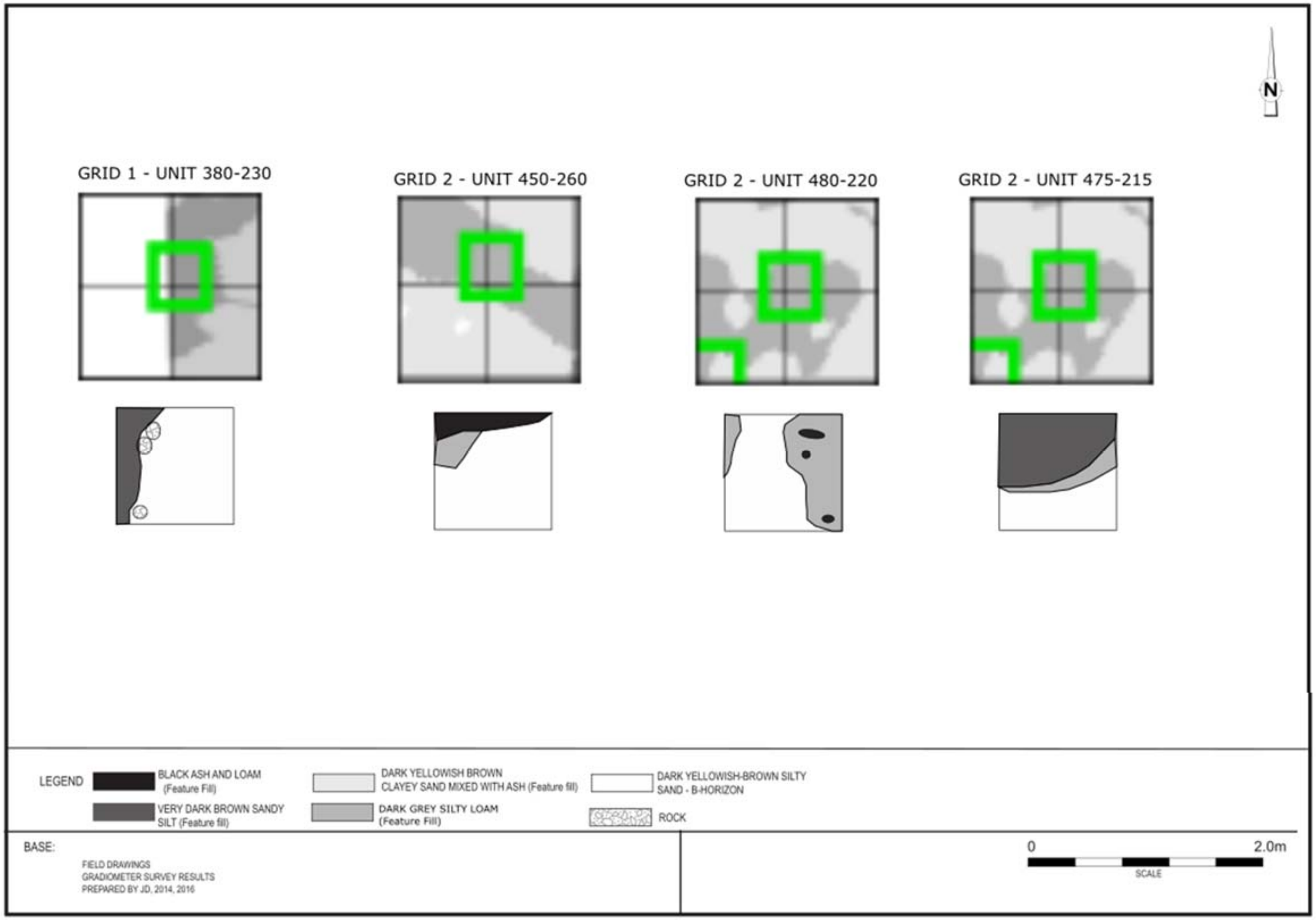


Figure 12: Geophysical Anomalies and Cultural Features in Grids 1 and 2, AiHd-160

Figure 13: Geophysical Anomalies and Cultural Features in Grid 3, AiHd-160

Wind breaks, and other such landscape modifications may have been employed to provide shelter.

The positioning of the features towards the kettle lake is also an indicator that there was a residential aspect to this site. During archaeological investigations at another Indigenous site outside of Brantford, Ontario, the author was engaged in a discussion with representatives of the Six Nations of the Grand River on the orientation of a residential feature, which faced a creek in very close proximity. It was noted by the Indigenous peoples that there has been a tradition of winter residences always facing and closer to the water, as it meant the shortest distance to travel for that resource. Houses facing the water have been observed within the archaeological record in Ontario, notably at the Davidson Site (Ellis et al. 2015) and the Davisville 2 Site (Horsfall and Warrick 2003). This knowledge was considered during the interpretation of AiHd-159, as it suggests that the lithic debitage, located away from the features and the kettle lake, may indicate tool production took place away from the residential part of the site.

By understanding the challenges discussed in Chapter 2, that a single pass detected surface lithic scatter may not be representative of a larger site and that scatter locations are not representative of all activities that could have taken place within a site, further data were obtained from AiHd-159. Although it remains unclear as to why the Late Archaic Broad Point-making peoples chose to camp on the opposing side of the kettle lake than almost everyone else, their presence has been identified, investigated, a more detailed interpretation of their site has been achieved.

The field investigations and geophysical survey carried out at AiHd-160 yielded a substantial amount of archaeological data, significantly altering the previous interpretations of the site, its scatters and its place within the archaeological record.

First, the presence of Late Woodland artifacts, not encountered during the preliminary (Stage 2) surface collection and only minimally encountered during the second survey collection, widen the temporal use of the site, and broaden its cultural significance. With the exception of several isolated points encountered during the second surface collection, the majority of the Late Woodland artifacts were found within the southernmost surface cluster, which corresponds to approximately one-third of the overall site. The pottery recovered from this area has been interpreted as dating to the Middle and Late Iroquoian period (Ferris and Spence 1995; MacNeish 1952). When considered within a larger regional perspective, there are multiple sites located within the area, which temporally match the Late Woodland component of AiHd-160 (Figure 5). There are several significant settlements along Strasburg Creek, 1.5 kilometers east of the ridgeline that date to the same period, indicating that the Late Woodland component of AiHd-160 may be a smaller cabin or settlement on the periphery of these larger settlements (Birch and Williamson 2012). The unit yields and geophysical survey results also indicate that the site extends further south, into the adjacent agricultural fields that were not included within the original development property. As previously noted, there is a series of unexcavated anomalies which are oriented in a manner very similar to finds related to longhouses on other Late Woodland sites. These anomalies, in relation to the artifacts, indicate that there is a significant Late Woodland occupation within the southern confines of AiHd-160.

The northern two-thirds of AiHd-160 retain a predominantly Archaic period use, based on the artifacts recovered from the field investigations. The artifact assemblage for this portion of the site is not as informative as that of AiHd-159, given the multi-component nature of the site. Parsing the Late Woodland, potential Early and Middle Woodland and Archaic components from each other within the ploughzone is not a realistic endeavor, given the amount of mixing these soils may have undergone over the past two centuries. Regardless, several observations regarding the nature of the lithic assemblage can be made, as it speaks directly to the activities taking place within AiHd-160. As with AiHd-159, the lithic assemblage is indicative of tool manufacture and repair, as well as biface production, indicating a more residential focus to the site.

The presence of a substantial number of subsurface features extending across the entirety of AiHd-160 is a further indication of the residential nature of the site. The test unit excavation across the site identified 22 cultural features, although the results of the geophysical survey indicate the potential for many more, upwards of 50 or so. The excavation of these features will provide further context as to the activities taking place within the site and their detection again provides a mean to assess and estimate better the amount of work (and costs!) that would be needed to significantly mitigate the location. The low spatial correlation between the surface artifact clusters and the subsurface cultural features identified through test unit excavation corresponds to the findings previously reported at AiHd-159 and sites elsewhere regarding the questionable relationship between surface scatters/densities and subsurface features. Only eight of the 22 units featuring subsurface cultural features are located within the surface scatter clusters.

The geophysical survey of portions of AiHd-160 further enhances the understanding of the surface scatter and subsurface features. The gradiometer survey revealed a significant number of anomalies (n=63). The correlation of cultural features encountered within test units and these anomalies as revealed by ground-truthing, indicates a positive result for the survey. This result means that the anomalies detected during the survey can generally be considered to relate to subsurface cultural features as was also suggested at the Davidson site (Eastaugh et al. 2013; Ellis 2015; Ellis et al. 2016), although it must be cautioned that, large, inconsistent and abnormally strong anomalies, such as the limestone drain and the clay deposit, were also detected during the survey. Identifying them through ground-truthing was a crucial step in order to interpret the results of the gradiometer survey as a whole but as stressed, it shows such survey results can also potentially help determine in advance mitigation strategies by identifying and avoiding disturbed areas.

The plotted geophysical anomalies are located across all three survey grids. Their relationship with the surface scatter offers further insights as to the overall correlation between subsurface features and surface scatters. Their positioning verifies that some features are located within, or within close proximity to, surface artifact scatters, but there are a substantial number, approximately 50%, that are located outside the scatter limits and a significant distance (beyond five metres) from these scatters. This distance is a significant one; as noted at AiHd-159, the features were encountered at approximately the same distance from the surface scatter. As Stage 3 assessment utilize a sampling interval of five metres for the placement of test units, and expansion of the test unit excavation by a single interval beyond the surface scatter may result in the further identification of cultural features associated with the surface scatters. The anomalies encountered within Grid 1, with the exception of the large, non-cultural, clay deposit, are rather small and fit the patterning encountered on geophysical surveys of other Late Woodland sites (Kellogg 2014), whereas the anomalies encountered within Grids 2 and 3 are indicative of either larger features or, as is evidenced by the exposed portions of cultural features encountered in the test units, a series of moderate and smaller features grouped together (e.g., a feature cluster, examples of which are common on Archaic sites (see Eastaugh et al. 2014; Williamson and MacDonald 1997). Of particular note is the grouping of anomalies extending in the semi-circular pattern in Grid 2, which follow the general shape of the adjacent kettle lake. These anomalies were located well away from any surface scatters but are some of the more extensive anomalies detected. There is most likely a relationship between the lack of surface finds within this portion of the site and the topography that slopes down into the kettle lake rather steeply. As a result many surface finds may have been lost to erosion over time – yet another factor that can make surface find distributions unreliable in detecting subsurface archaeological evidence. However, the significant concentration of anomalies, or good candidates for features, that are all facing/closer to the kettle lakes, speaks to a similar site organization as noted in AiHd-159. Artifact scatters are located behind the features, indicating some spatial organization to the activities taking place within this site.

Finally, it should be noted that the geophysical results, test unit yields and surface scatters all seem to indicate that there are three foci within the overall site area: a northern focus including the northernmost part of gradiometer Grid 3 north and surface clusters P12, P21, P22, P48 and P49; a central focus around P41 and P39 and gradiometer Grid 2 and Grid 3 south; and a southern, Late Woodland focus, around surface cluster P05, P23 and P24. These three foci each feature significant artifact yields and geophysical anomalies which, on their own, could each be classified as an archaeological site in the traditional sense as a discrete locus with evidence of past human activity. Regardless, the overall area of AiHd-160 was a persistent place for pre-contact Indigenous people for millennia, with, based on current evidence, the notable exception of people of the Broad Point Late Archaic tradition.

Chapter 5

5 Conclusions

Based on the results of the gradiometer survey of the one “site” examined herein, such surveys are, when applied appropriately, an effective means of addressing the challenges faced by CRM archaeologists in addressing lithic scatter finds. As noted in Chapter 4, the results of the geophysical survey demonstrate that AiHd-160 extends beyond the surface scatters and beyond the high yielding test units that are typically used as determinants of site boundaries within a standard CRM practice.

Geophysical survey acts in a complementary fashion to more standardized approaches involving the collection and interpretation of archaeological data. If, for example, the number of anomalies detected at AiHd-160 were low then the site could have been interpreted as more of a hunting ground or of a place of very short occupation but very frequent activity, akin to the open spaces and plazas encountered in larger and later sites (Kvamme 2003; Venter et al. 2006) and the estimates of how much mitigation work would be required would be reduced. However, the presence of anomalies assisted the interpretation of the sites as presented and suggests that this site may require much more work before it can be written off. Such a perspective has been confirmed by more recent excavation work at the site in the fall of 2017 by ASI, which has determined that there is a significant Late Woodland occupation within the southern area of the site related to the identified longhouse anomaly discussed in Chapter 4 (ASI, personal communication, November 16, 2017). Although the fieldwork related to this more recent excavation is still under analysis, these results further support the critical review of single-pass surveys as discussed in Chapter 2, as the initial surface survey of AiHd-160 did not yield any Late Woodland finds.

This thesis has clearly demonstrated that lithic scatters are representative of archaeological sites but are not archaeological sites in and of themselves. Although there are certainly scatters that are representative of smaller and less intensive activity or occupation then AiHd-159 and AiHd-160, it is clear that surface scatters should always be used as indicators of archaeology, rather than archaeological sites in and of themselves.

This thesis has also demonstrated that geophysical survey is a reliable means of obtaining site structure data on archaeological sites and determining the presence and location of potentially significant sub-ploughzone features. Carrying out a geophysical survey within and beyond the surface scatter limits is a demonstrably effective methodology of gaining further understanding as to the relationship between surface scatters and underlying cultural deposits. As discussed, earlier, some sites that normally would have been written off because of low yields have, upon more extensive investigations than those required by current CRM standards, proven to yield significant archaeological information. These notably include rarely reported Archaic features such as at the Innes (Lennox 1986) and Mt. Albert (Forsythe 2016) sites. However, gradiometer survey after the initial surface collection probably would have revealed the presence of the radiocarbon datable features at Innes or the large complex subsurface cultural feature cluster at Mt. Albert. It may even have revealed anomalies/potential features beyond the areas investigated at the Innes site, focused as that project was on the area of denser lithic finds. In turn, simple targeted testing of the anomalies would indicate a need, even a mandate, for additional fieldwork. The survey results from AiHd-160 indicate that by testing the margins of a lithic scatter through geophysical survey, more and better data can be collected on such sites.

It should also be kept in mind that, despite the potential for geophysical activities in general and specifically magnetometer/gradiometer surveys, there are obstacles and sources of interference which must be kept in mind while planning such surveys. As discussed in Chapter 3, magnetometer surveys are hindered by the geology of any particular study area. In the case of this thesis the soils consisted of a glacial till which potentially contained high-ferrous content rocks randomly mixed into the soil matrix. Areas dominated by igneous rock, such as the Canadian Shield, would mask any anomalies representing cultural features and so magnetometry surveys in these areas are not appropriate for archaeological investigations.

When the AiHd-160 results are compared to the number of units excavated at AiHd-159 to recover a similar amount of archaeological data, the efficacy of geophysical survey for this type of investigation is immediately apparent. The results of such surveys reported elsewhere (Eastaugh et al. 2013; Jones and Munson 2005; Kvamme 2003) and as discussed and illustrated in this study, demonstrates the strength of this investigative technique. The relationship between CRM archaeology and lithic scatters is symbiotic. Lithic scatters, by their nature, do not seemingly hold enough archaeological data to be of interest to academic or avocational archaeologists. The relative cost to equipment and applications versus the overall speed at which a surface scatter could undergo geophysical survey demonstrates the efficiency of these processes. As discussed in Chapter 4, the author took opted to conduct the geophysical survey and data processing work in a high-labour manner, opting to do several tasks manually as opposed to allowing computer applications to carry out these functions in much less time. Even at this high-labour pace, the pace at which results, the identification of subsurface cultural features, were obtained through geophysical survey at AiHd-160 was much faster than through standardized testing methods at AiHd-159. However, the required rapid determinations of cultural heritage value and interest for these sites are highly reliant on these easy to measure characteristics of the sites.

The work carried out at AiHd-159 also demonstrates the need to continually consider what lies beyond the limit of the surface scatter and the need for archaeologists to think critically about the context in which sites are found and the boundaries that are placed on them. Although the results of AiHd-160 demonstrate that geophysical survey is a much preferred methodology for investigation of these sites these techniques are still slow in their widespread adoption in Ontario. As such, archaeologists are encouraged to consider expanding the standardized techniques to test the boundaries of lithic scatters. As noted in Chapter 4, both features at AiHd-159 were found within five metres of the surface scatter limits, indicating that a minimal and easily standardized practice of expanding gridded test units for one standard interval beyond the surface scatter limits may results in the documentation of previously undetected cultural deposits. The cautionary tale of the Ontario Archaic sites mentioned above suggest that quantifiable characteristics such as lithic artifact frequency and density are not significant indicators of a sites' cultural heritage value or interest and that alternate factors may contribute to the archaeological significance of these sites.

This thesis sought critically examine the manner in which lithic scatters are examined in a CRM archaeological context. As a result of the positive outcomes there are several steps for future considerations and excavations:

- Lithic scatters are not merely geographic markers of past human activity on the landscape but are a single representation of this past activity. As such, they should not be considered archaeological sites in and of themselves, but should be considered aspects, or part, of a site;
- Pre-contact indigenous sites are suitable candidates for successful geophysical surveys in Ontario. Despite the physical and chemical limitations present in some field conditions these methodologies should be considered as effective and efficient;
- The use of geophysical survey in CRM archaeology can greatly assist the planning of site excavation and is a rapid and cost-effective means of obtaining reliable information about archaeological site; and
- Caution must be exercised by CRM archaeologists when considering the archaeological value of a surface scatter based on a single-pass survey. Where possible, an abundance of information, such as multiple surveys or additional investigations, should be obtained prior to determining the value and interest of such sites.

Furthermore, the continuation of the work set out in this thesis should be as follows:

- An increased range of lithic scatters, varying in both area and density, should undergo similar geophysical and peripheral testing to understand the relationship between surface scatters and archaeological sites; and

- The results of any further studies should be used by the CRM industry to further refine their methods for determining archaeological value and interest in sites represented by surface lithic scatters.

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Appendices

Appendix A: Site data of 400 randomly selected Archaeological Sites from the Ontario Archaeological Sites Database

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHd-9	Goettling	Buiral	Undetermined	Undetermined
AgHb-19	Cooper Cemetery	Burial	Late Woodland	EOI
AiHd-8	Suraras Springs Village	Burial	Late Woodland, MOI (13th-14th C.)	Neutral
AiHc-20	Van Ordt-Duerrstein	Burial	Late Woodland, MOI (13th-14th C.)	Neutral
AgHb-144	Zamboni Cemetery	Burial	Transitional Woodland	Princess Point
AiHd-10	Smith	Burial	Undetermined	Undetermined
AkHk-2	Morpeth	burial	Woodland	
AgHb-241	Davisville 1	Cabin	Historical Aboriginial	Iroquoian
AgHb-2	Mohawk Chapel	Cabin	Late Woodland	
AgHb-242	Davisville 2	Cabin	LOI Late Woodland	
AiHd-97	Detzler	Cache	Middle Woodland	Middle Woodland
AgHb-137	Colborne St.	Cache	Middle Woodland	
AcHk-3	Morpeth South	Campite	Archaic to Woodland	
AiHc-28	Good	Campsite	Early Archaic to Princess Point-Late Woodland	
AbHl-10	Rondeau Bay 2	Campsite	Early Woodland	
AbHl-11	Rondeau Bay 3	Campsite	Early Woodland	
AiHc-289	No Name	Campsite	Late Archaic	
AbHn-19	Raleigh Substation Precontact	Campsite	Late Archaic	
AgHb-427		Campsite	Late Paleo to Late Woodland	
AiHc-389		Campsite	Late Woodland	Undetermined
AiHd-88	Equus	Campsite	Late Woodland	Iroquoian
AiHd-23	Mannheim 2	Campsite	Late Woodland, MOI (13th-14th C.)	Neutral
AgHb-190	Hardy Road	Campsite	Middle and Late Archaic	Narrow Point

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHd-156		Campsite	Middle to Late Woodland	Middle Woodland/Iroquoian
AgHb-134	Arabic	Campsite	Middle Woodland	
AgHb-14	OXBOW FLATS 1	Campsite	Middle Woodland	
AgHb-467		Campsite	Middle Woodland	Saugeen
AiHd-75	Alder Creek	Campsite	Paleoindian	Paleoindian
AiHc-295	No Name	Campsite	Princess Point-Late Woodland	
AiHd-75	Alder Creek	Campsite	Transitional Woodland	Princess Point
AgHb-50	Stratford Flats	Campsite	Transitional Woodland	Princess Point
AiHc-13	Roseville	Campsite	Undetermined	Undetermined
AiHc-41	Huron Business Park 10	Campsite	Undetermined	Undetermined
AiHc-299	No Name	Campsite	Undetermined Precontact	
AiHc-303	No Name	Campsite	Undetermined Precontact	
AgHb-265		Campsite	Woodland	
AbHn-15	BME Cemetery	Cemetery	Historic Euro-Canadian	
AbHn-15	BME Cemetery	Cemetery	Historic Euro-Canadian	
AbHn-17	First Union Church Cemetery	Cemetery	Historic Euro-Canadian	
AbHn-21	Sommerville	Contradictory data		
AiHc-92	Bleams Road-Corduroy Road	Corduroy Road	Historic Euro-Canadian	Euro-Canadian
AbHm-14	--	Dump	Historic Euro-Canadian	
AkGw-320	Stopover 5	Findspot	Indigenous	
AkGw-237	McCarthy	Findspot	Indigenous - Woodland	
AkGw-332		Findspot	Indigenous – Woodland	
AiHc-90	Breslau Farms III	Findspot	Archaic	Archaic
AiHc-45		Findspot	Archaic	Archaic
AiHc-202	Goodview	Findspot	Early Archaic	
AiHc-291	No Name	Findspot	Early Archaic	
AiHd-96	Bruly	Findspot	Early Archaic	Early Archaic

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHc-86	Huron Business Park 2	Findspot	Early Archaic	Early Archaic
AiHc-33	Huron Business Park 2	Findspot	Early Archaic	Early Archaic
AgHb-454		Findspot	Early Woodland	Meadowood
AgHb-462		Findspot	Early Woodland	Meadowood
AgHb-486		Findspot	Early Woodland	Meadowood
AiHd-52		Findspot	Early Woodland	Meadowood
AgHb-217	Findspot 2	Findspot	Euro-Canadian	
AiHc-297	No Name	Findspot	Late Archaic	
AgHc-63		Findspot	Late Archaic	
AgHc-54		Findspot	Late Archaic	
AgHb-196		Findspot	Late Archaic	
AgHb-351		Findspot	Late Archaic	
AgHb-352		Findspot	Late Archaic	
AbHn-26	T24 Precontact	Findspot	Late Archaic	
AbHn-6	Drew 1	Findspot	Late Archaic	
AgHb-264		Findspot	Late Archaic-Early Woodland	
AgHb-473		Findspot	Late Woodland	
AgHb-197		Findspot	LOI Late Woodland	
AiHc-293	No Name	Findspot	Meadowood-Early Woodland	
AiHc-53	Rockway 1	Findspot	Middle Archaic	
AhHb-113	McNeil-Barcham 9	Findspot	Middle Archaic	
AgHc-49		Findspot	Middle Archaic	
AgHb-350		Findspot	Middle Archaic	Brewerton
AiHc-43		Findspot	Middle Archaic	Middle Archaic
AiHd-104		Findspot	Middle Archaic	Middle Archaic
AgHb-135	Cyrillic	Findspot	Middle Woodland	
AiHc-296	No Name	Findspot	Undermined Precontact	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AhHb-114	McNeil-Barcham 10	Findspot	Undetermined	
AgHc-52		Findspot	Undetermined	
AgHc-112		Findspot	Undetermined	
AgHb-353		Findspot	Undetermined	
AgHb-419		Findspot	undetermined	
AgHb-422		Findspot	Undetermined	
AgHb-475		Findspot	undetermined	
AgHb-476		Findspot	Undetermined	
AgHb-437		Findspot	undetermined	
AgHb-438		Findspot	Undetermined	
AgHb-439		Findspot	Undetermined	
AgHb-477		Findspot	Undetermined	
AgHb-478		Findspot	Undetermined	
AgHb-479		Findspot	undetermined	
AgHb-481		Findspot	Undetermined	
AgHb-484		Findspot	Undetermined	
AgHb-468		Findspot	Undetermined	
AgHb-469		Findspot	Undetermined	
AgHb-485		Findspot	Undetermined	
AiHc-163	Lujan	Findspot	Undetermined	Undetermined
AiHc-359		Findspot	Undetermined	Undetermined
AiHc-360		Findspot	Undetermined	Undetermined
AiHc-369		Findspot	Undetermined	Undetermined
AiHd-150		Findspot	Undetermined	Undetermined
AiHd-93	Tarbox	Findspot	Undetermined	Undetermined
AiHd-94	Nutria	Findspot	Undetermined	Undetermined
AiHc-119		Findspot	Undetermined	Undetermined

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHc-121		Findspot	Undetermined	Undetermined
AiHc-22		Findspot	Undetermined	Undetermined
AiHc-23		Findspot	Undetermined	Undetermined
AiHd-37	Highland West 5	Findspot	Undetermined	Undetermined
AiHd-38	Highland West 6	Findspot	Undetermined	Undetermined
AiHc-37	Huron Business Park 6	Findspot	Undetermined	Undetermined
AiHc-38	Huron Business Park 7	Findspot	Undetermined	Undetermined
AiHc-39	Huron Business Park 8	Findspot	Undetermined	Undetermined
AiHc-40	Huron Business Park 9	Findspot	Undetermined	Undetermined
AiHc-42	Huron Business Park 11	Findspot	Undetermined	Undetermined
AiHc-71	Aberdeen I	Findspot	Undetermined	Undetermined
AiHd-53		Findspot	Undetermined	Undetermined
AiHd-54		Findspot	Undetermined	Undetermined
AiHc-85	Huron Business Park 1	Findspot	Undetermined	Undetermined
AiHc-87	Huron Business Park 3	Findspot	Undetermined	Undetermined
AiHc-91	Breslau Farms IV	Findspot	Undetermined	Undetermined
AiHd-39	Highland West 7	Findspot	Undetermined	Undetermined
AiHc-32	Huron Business Park 1	Findspot	Undetermined	Undetermined
AiHc-34	Huron Business Park 3	Findspot	Undetermined	Undetermined
AiHc-35	Huron Business Park 4	Findspot	Undetermined	Undetermined
AiHc-44		Findspot	Undetermined	Undetermined
AiHc-57	Off Corridor	Findspot	Undetermined	Undetermined
AiHc-48	Glencairn I	Findspot	Undetermined	Undetermined
AiHc-49	Glencairn 2	Findspot	Undetermined	Undetermined
AiHc-50	Glencairn 3	Findspot	Undetermined	Undetermined
AiHc-104		Findspot	Undetermined	Undetermined
AiHc-110		Findspot	Undetermined	Undetermined

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHc-111		Findspot	Undetermined	Undetermined
AbHm-11	T40 Access Road	Findspot	Undetermined	
AbHm-12	T44 Turbine	Findspot	Undetermined	
AiHc-100	Grand River III	Findspot	Undetermined Precontact	
AiHc-101	Grand River IV	Findspot	Undetermined Precontact	
AiHc-294	No Name	Findspot	Undetermined Precontact	
AiHc-298	No Name	Findspot	Undetermined Precontact	
AiHc-54	Rockway 2	Findspot	Undetermined Precontact	
AiHc-203	Challenger	Findspot	Undetermined Precontact	
AiHc-292	No Name	Findspot	Undetermined Precontact	
AiHc-416		Hamlet	Late Woodland	Undetermined
AiHc-424		Hamlet	Late Woodland	Undetermined
AiHc-427		Hamlet	Late Woodland	Undetermined
AiHc-414		Hamlet	Undetermined	Undetermined
AkGw-15	Clearbrook	Homestead	Euro-Canadian	
AkGw-16	Mellow Gardens	Homestead	Euro-Canadian	
AkGw-88	Bartholomew Snell Homestead	Homestead	Euro-Canadian	
AkGw-107	Elias Snell Pioneer Homestead	Homestead	Euro-Canadian	
AkGx-48	Kilmanagh Crossroads	Homestead	Euro-Canadian	
AkGx-49	Caesar	Homestead	Euro-Canadian	
AbHn-1	Centre Road 1	Homestead	Historic Euro-Canadian	
AbHn-2	Centre Road 2	Homestead	Historic Euro-Canadian	
AbHn-3	Middle Road 1	Homestead	Historic Euro-Canadian	
AbHn-4	Middle Road 2	Homestead	Historic Euro-Canadian	
AbHn-22	Burns	Homestead	Historic Euro-Canadian	
AiHc-425		Homestead	Historic Euro-Canadian	Euro-Canadian

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHc-358	Borsch	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHd-92	Gehl	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-118		Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-14	New Aberdeen	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-65	Caryndale	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHd-56	Haist	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-89	George Israel	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHd-40	Highland West 8	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-55	Williamsburg I	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-56	Williamsburg II	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHd-46	Highland Green Historic	Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-430		Homestead	Historic Euro-Canadian	Euro-Canadian
AiHc-336	Loc.1	Homestead	Historic Euro-Canadian	
AiHc-337	Loc.2	Homestead	Historic Euro-Canadian	
AgHb-282		Homestead	Historic Euro-Canadian	
AgHb-283		Homestead	Historic Euro-Canadian	
AkGx-57		Homestead	Euro-Canadian Indigenous	
AkGw-295	Heart Lake Garden	Lithic Scatter	Indigenous – Archaic	
AcHm-22	Durfy 1	Lithic Scatter	Archaic	
AcHm-23	Durfy 2	Lithic Scatter	Archaic	
AcHk-4	Morpeth “A”	Lithic Scatter	Archaic	
AiHd-3	Stoltz	Lithic Scatter	Archaic	Archaic
AgHb-3	CAMERON	Lithic scatter	Archiac	
AhHb-117	McNeil-Barcham 13	Lithic scatter	Early and Middle Archaic	
AiHc-368		Lithic Scatter	Early Archaic	Early Archaic
AgHb-238	Bluebox	Lithic scatter	Early Archaic	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AgHc-60		Lithic scatter	Early Archaic	Nettling
AhHb-110	McNeil-Barcham-6	Lithic scatter	Early Archaic	Nettling
AgHc-109		Lithic scatter	Early Archaic	Nettling
AhHc-139		Lithic scatter	Early Archaic	Nettling
AbHn-13	Smoulder's 4	Lithic Scatter	Early Woodland	
AcHl-7	Morpeth 5	Lithic Scatter	Early Woodland	
AcHl-8	Morpeth 6	Lithic Scatter	Early Woodland	
AiHd-155		Lithic Scatter	Early Woodland	Meadowood
AiHc-108		Lithic Scatter	Early Woodland	Meadowood
AgHc-107		Lithic scatter	Early Woodland	
AgHb-223		Lithic Scatter	Early Woodland	Meadowood
AgHb-446		Lithic scatter	Early Woodland	Meadowood
AiHc-417		Lithic Scatter	Late Archaic	Late Archaic
AiHc-361		Lithic Scatter	Late Archaic	Late Archaic
AiHd-101		Lithic Scatter	Late Archaic	Late Archaic
AiHc-47	MacIntosh	Lithic Scatter	Late Archaic	Late Archaic
AiHd-159		Lithic Scatter	Late Archaic	Late Archaic
AgHc-82	TCGA	Lithic scatter	Late Archaic	Crawford Knoll
AgHc-45		Lithic scatter	Late Archaic	Crawford Knoll
AgHb-155		Lithic scatter	Late Archaic	
AgHb-216	Findspot 1	Lithic scatter	Late Archaic	
AhHb-107	McNeil-Barcham 3	Lithic Scatter	Late Archaic	Small Point
AgHb-225		Lithic Scatter	Late Archaic	
AgHb-245		Lithic Scatter	Late Archaic	
AgHb-354		Lithic scatter	Late Archaic	
AgHb-434		Lithic scatter	Late Archaic	
AgHb-436		Lithic scatter	Late Archaic	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AgHb-443		Lithic scatter	Late Archaic	
AgHb-444		Lithic scatter	Late Archaic	
AgHb-445		Lithic scatter	Late Archaic	
AgHb-459		Lithic scatter	Late Archaic	Small Point
AgHb-483		Lithic scatter	Late Archaic	Small Point
AgHb-483		Lithic scatter	Late Archaic	Small Point
AgHb-472		Lithic scatter	Late Archaic	
AbHm-8	T30 Turbine	Lithic Scatter	Late Archaic to Woodland	
AbHn-12	Smoulder's 3	Lithic Scatter	Late Archaic to Woodland	
AgHb-423		Lithic scatter	Late Archaic to Woodland	
AgHb-474		Lithic scatter	Late Archaic to Woodland	
AhHb-106	McNeil-Barcham 2	Lithic scatter	Late Archaic, Middle and Late Woodland	
AgHb-239	Snowhill	Lithic scatter	Late Paleo-Indian	Hi-Lo
AgHb-240	Hampton Estates 3	Lithic scatter	Late Paleo-Indian	Hi-Lo
AbHn-11	Smoulder's 2	Lithic Scatter	Late Woodland	
AcHl-9	Rondeau Bay 1	Lithic Scatter	Late Woodland	
AiHc-115		Lithic Scatter	Late Woodland	Undetermined
AgHb-449		Lithic scatter	Late Woodland	
AhHb-109	McNeil-Barcham 5	Lithic scatter	Middle and Late Archaic	
AgHb-418		Lithic scatter	Middle and Late Archaic	
AgHb-421		Lithic scatter	Middle and Late Archaic	
AbHn-10	Smoulder's 1	Lithic scatter	Middle and Late Archaic	
AcHl-6	Morpeth "B"	Lithic scatter	Middle and Late Archaic	
AiHc-417		Lithic Scatter	Middle Archaic	Middle Archaic
AiHd-161		Lithic Scatter	Middle Archaic	Middle Archaic
AhHb-108	McNeil-Barcham 4	Lithic scatter	Middle Archaic	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AgHc-110		Lithic scatter	Middle Archaic	Brewerton
AgHb-247		Lithic Scatter	Middle Archaic	
AgHb-424		Lithic scatter	Middle Archaic	
AgHb-432		Lithic scatter	Middle Archaic	
AgHb-440		Lithic scatter	Middle Archaic	
AgHb-458		Lithic scatter	Middle Archaic	Brewerton
AgHb-460		Lithic scatter	Middle Archaic	Brewerton
AcHk-5	Morpeth "D"	Lithic scatter	Middle Archaic and Late Woodland	
AgHb-471		Lithic scatter	Middle to Late Archaic	
AiHc-36	Steckle	Lithic Scatter	Paleoindian	Paleoindian
AiHc-113		Lithic Scatter	Undetermined	Undetermined
AiHc-114		Lithic Scatter	Undetermined	Undetermined
AiHc-364	Becker Estates	Lithic Scatter	Undetermined	Undetermined
AiHc-413		Lithic Scatter	Undetermined	Undetermined
AiHc-415		Lithic Scatter	Undetermined	Undetermined
AiHc-419		Lithic Scatter	Undetermined	Undetermined
AiHc-420		Lithic Scatter	Undetermined	Undetermined
AiHc-421		Lithic Scatter	Undetermined	Undetermined
AiHc-422		Lithic Scatter	Undetermined	Undetermined
AiHc-423		Lithic Scatter	Undetermined	Undetermined
AiHc-426		Lithic Scatter	Undetermined	Undetermined
AiHc-428		Lithic Scatter	Undetermined	Undetermined
AiHc-429		Lithic Scatter	Undetermined	Undetermined
AiHc-164	Keyoke	Lithic Scatter	Undetermined	Undetermined
AiHc-363	Becker Estates	Lithic Scatter	Undetermined	Undetermined
AiHc-370		Lithic Scatter	Undetermined	Undetermined
AiHc-394	Wards Pond II	Lithic Scatter	Undetermined	Undetermined

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHd-131	Higgins I	Lithic Scatter	Undetermined	Undetermined
AiHd-95	Sacalait	Lithic Scatter	Undetermined	Undetermined
AiHc-393	Wards Pond I	Lithic Scatter	Undetermined	Undetermined
AiHc-116		Lithic Scatter	Undetermined	Undetermined
AiHc-117		Lithic Scatter	Undetermined	Undetermined
AiHc-120		Lithic Scatter	Undetermined	Undetermined
AiHc-122		Lithic Scatter	Undetermined	Undetermined
AiHd-76	Badenwald	Lithic Scatter	Undetermined	Undetermined
AiHd-102		Lithic Scatter	Undetermined	Undetermined
AiHd-103		Lithic Scatter	Undetermined	Undetermined
AiHc-64	Breslau Farms	Lithic Scatter	Undetermined	Undetermined
AiHd-55		Lithic Scatter	Undetermined	Undetermined
AiHd-66	Sandrock	Lithic Scatter	Undetermined	Undetermined
AiHc-88	Huron Business Park 4	Lithic Scatter	Undetermined	Undetermined
AiHd-108		Lithic Scatter	Undetermined	Undetermined
AiHd-26	Code	Lithic Scatter	Undetermined	Undetermined
AiHc-46		Lithic Scatter	Undetermined	Undetermined
AiHc-105		Lithic Scatter	Undetermined	Undetermined
AiHd-106		Lithic Scatter	Undetermined	Undetermined
AiHd-107		Lithic Scatter	Undetermined	Undetermined
AiHc-106		Lithic Scatter	Undetermined	Undetermined
AiHc-107		Lithic Scatter	Undetermined	Undetermined
AiHc-109		Lithic Scatter	Undetermined	Undetermined
AiHd-130		Lithic Scatter	Undetermined	Undetermined
AiHc-223	Norris-Sternberg	Lithic Scatter	Undetermined	Undetermined
AiHc-112		Lithic Scatter	Undetermined	Undetermined
AiHd-157		Lithic Scatter	Undetermined	Undetermined

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AiHd-158		Lithic Scatter	Undetermined	Undetermined
AgHc-48		Lithic scatter	Undetermined	
AgHc-50		Lithic scatter	Undetermined	
AgHc-51		Lithic scatter	Undetermined	
AgHb-221	Mitchell	Lithic scatter	Undetermined	
AgHc-53		Lithic scatter	Undetermined	
AgHc-57		Lithic scatter	Undetermined	
AgHc-58		Lithic scatter	Undetermined	
AgHc-59		Lithic scatter	Undetermined	
AgHc-61		Lithic scatter	Undetermined	
AgHc-62		Lithic scatter	Undetermined	
AgHc-83	TCGB	Lithic scatter	Undetermined	
AgHc-55		Lithic scatter	Undetermined	
AgHc-56		Lithic scatter	Undetermined	
AgHc-99		Lithic scatter	Undetermined	
AgHc-85	TCBD	Lithic scatter	Undetermined	
AgHb-243	Davisville 3	Lithic scatter	Undetermined	
AgHc-84	TCGC	Lithic scatter	Undetermined	
AgHb-276	D'Aubigny Park	Lithic scatter	Undetermined	
AgHc-103	TCG Materials 4	Lithic scatter	Undetermined	
AgHc-44		Lithic scatter	Undetermined	
AgHc-46		Lithic scatter	Undetermined	
AgHc-47		Lithic scatter	Undetermined	
AgHb-263		Lithic scatter	Undetermined	
AgHb-218	Findspot 3	Lithic scatter	Undetermined	
AgHb-219	Findspot 4	Lithic scatter	Undetermined	
AgHc-104	TCG Materials 5	Lithic scatter	Undetermined	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AgHc-106		Lithic scatter	Undetermined	
AgHc-108		Lithic scatter	Undetermined	
AgHc-111		Lithic scatter	Undetermined	
AgHc-114		Lithic scatter	Undetermined	
AgHb-20	Ava	Lithic scatter	Undetermined	
AgHb-222		Lithic Scatter	Undetermined	
AgHb-224		Lithic Scatter	Undetermined	
AgHb-246		Lithic Scatter	Undetermined	
AgHb-420		Lithic scatter	Undetermined	
AgHb-426		Lithic scatter	Undetermined	
AgHb-428		Lithic scatter	Undetermined	
AgHb-429		Lithic scatter	Undetermined	
AgHb-430		Lithic scatter	Undetermined	
AgHb-431		Lithic scatter	Undetermined	
AgHb-433		Lithic scatter	undetermined	
AgHb-435		Lithic scatter	Undetermined	
AgHb-441		Lithic scatter	Undetermined	
AgHb-442		Lithic scatter	Undetermined	
AgHb-447		Lithic scatter	Undetermined	
AgHb-448		Lithic scatter	Undetermined	
AgHb-450		Lithic scatter	Undetermined	
AgHb-451		Lithic scatter	Undetermined	
AgHb-480		Lithic scatter	Undetermined	
AgHb-452		Lithic scatter	Undetermined	
AgHb-453		Lithic scatter	Undetermined	
AgHb-455		Lithic scatter	Undetermined	
AgHb-456		Lithic scatter	Undetermined	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AgHb-457		Lithic scatter	Undetermined	
AgHb-463		Lithic scatter	Undetermined	
AgHb-465		Lithic scatter	Undetermined	
AgHb-482		Lithic scatter	Undetermined	
AgHb-466		Lithic scatter	Undetermined	
AgHb-470		Lithic scatter	Undetermined	
AbHn-14	Drew 4	Lithic scatter	Undetermined	
AbHn-25	P. McKeon	Lithic scatter	undetermined	
AcHm-24	Durfy 3	Lithic scatter	Undetermined	
AiHc-391	Huber 1	Lithic scatter	Undetermined Precontact	
AiHc-98	Grand River I	Lithic scatter	Undetermined Precontact	
AiHc-99	Grand River II	Lithic scatter	Undetermined Precontact	
AiHc-102	No Name	Lithic scatter	Undetermined Precontact	
AiHc-103	No Name	Lithic scatter	Undetermined Precontact	
AiHc-256	Fischer-Hallman	Longhouse	Late Woodland	Undetermined
AiHc-257	Cornfield	Longhouse	Late Woodland	Undetermined
AiHc-418		Midden	Historic Euro-Canadian	Historical Euro-Canadian
AiHc-362	Hewitt Farm Dump	Midden	Historic Euro-Canadian	Euro-Canadian
AgHb-131	Rogers Ossuary	Ossuary	Late Woodland	
AbHn-20	T25 Turbine Precontact	Pre-contact	Camp site	
AbHn-27	T26 Precontact IF	Pre-contact	Isolated find	
AbHn-8	Drew 3	Undetermined	Early Archaic, Early Woodlnd	
AbHn-7	Drew 2	Undetermined	Early Archaic, Early Woodlnd	
AgHb-6	TUTELA	Undetermined	EOI Late Woodland	Princess Point
AgHb-220	Findspot 5	Undetermined	Euro-Canadian	
AkGx-58		Undetermined	Euro-Canadian Indigenous	
AaHn-2	--	Undetermined	Historic Euro-Canadian	

Borden	Site Name	Site Type	Cultural/Time Period	Culture
AaHn-3	--	Undetermined	Historic Euro-Canadian	
AgHb-283		Undetermined	Historic Euro-Canadian	
AgHb-282		Undetermined	Historic Euro-Canadian	
AbHn-9	Vandale 1	Undetermined	Late Archaic	
AgHb-215	Waste Not	Undetermined	MOI Late Woodland	
AgHb-266	Ruijs & Kirchberger	Undetermined	Multi-Component-Early to Late	
AgHb-1	Porteous	Undetermined	Transitional Woodland	Princess Point
AgHb-34	Bow Park	Undetermined	Transitional Woodland	Princess Point
AcHm-12	Molson	Undetermined	Undetermined	
AcHm-19	Loews 1	Undetermined	Undetermined	
AcHm-20	Loews 2	Undetermined	Undetermined	
AcHm-25	Jenner	Undetermined	Undetermined	
AcHm-26	Hellerman	Undetermined	Undetermined	
AkGw-14	Allison	Undetermined	Undetermined	
AkGw-309	Stopover 2	Undetermined	undetermined	
AkGw-310	Stopover 3	Undetermined	Undetermined	
AkGw-311	Stopover	Undetermined	Undetermined	
AkGw-312	Stopover 4	Undetermined	Undetermined	
AiHc-456		Undetermined	Undetermined	Undetermined
AcHm-21	Richardson	Undetermined	Undetermined	
AbHm-27	Stewart 1	Undetermined	Undetermined	
AiHd-15	Mannheim	Village	Late Woodland	Undetermined
AgHb-18	Cooper	Village	Late Woodland	EOI
AiHc-2	Moyer	Village	Late Woodland, MOI (13th-14th C.)	Neutral
AiHc-255	Strasburg Creek	Village	Late Woodland, MOI (13th-14th C.)	Neutral
AiHd-8	Suraras Springs Village	Village	Late Woodland, MOI (13th-14th C.)	Neutral
AiHc-20	Van Ordt-Duerrstein	Village	Late Woodland, MOI (13th-14th C.)	Neutral

Appendix B: Sample of Pre-Contact Indigenous sites in Ontario

Borden Number	Distance to water (m)	Area (m^2)	Artifact Density (per m^2)	Formal Tools/ Diagnostics (Y/N)	Presence of Features (Y/N)	# of Features	Features in concentration of artifacts (Y/N)	Percentage of site area excavated	Artifact yield cut off
AlGu-58	100	745	1.1	1	0	0	0	100%	unknown
BaGt-19	300	875	2.5	0	1	1	0	25%	10 per unit
AiHb-140	50	375	5	1	1	1	1	33%	10 per unit
AbHm-19	25	3750	5.2	1	0	0	0	2%	10 per unit
AiHb-235	100	2025	6.9	1	1	1	1	14%	10 per unit
AiHb-62	100	2500	9	1	0	0	0	2%	unknown
AiHb-272	50	2250	10.5	1	1	1	0	8%	10 per unit
AiHb-132	100	600	11	1	0	0	0	32%	10 per unit
AgHb-280	25	400	12.5	1	0	0	0	38%	10 per unit
AiHb-124	50	1250	13	1	1	1	1	6%	20 per unit
AbHm-21	100	450	13.48	1	0	0	0	27%	10 per unit
AhGv-39	25	625	14.2	1	0	0	0	40%	10 per unit
AbHm-23	25	2500	19.4	1	1	4	0	14%	10 per unit
AhGs-22	100	1100	22	1	1	1	1	18%	10 per unit
AhGx-97	100	400	24	0	0	0	0	20%	20 per unit
AiHc-194	150	1050	29.5	1	0	0	0	13%	20 per unit
AhGx-397	200	5000	37.5	1	1	1	1	1%	20 per unit
AhGx-163	50	1225	60.7	1	1	5	1	22%	20 per unit
AgHb-240	100	1000	92	1	1	1	1	40%	25 per unit
AgHb-238	25	700	168	1	0	0	0	20%	25 per unit
AeHh-149	100	5200	10.3	1	0	0	0	1%	10 per unit
AgHb-461	50	4200	6.93	1	0	0	0	2%	10 per unit
AgHb-443	50	1200	2	1	0	0	0	60%	10 per unit
AgHb-459	25	400	0.25	1	0	0	0	4%	10 per unit
AgHb-418	25	525	7	1	0	0	0	50%	10 per unit
AgHb-442	25	225	24.5	1	1	2	1	95%	10 per unit
AgGx-450	25	1000	0.55	1	0	0	0	0.50%	10 per unit
AgGx-466	25	1500	0.15	1	0	0	0	0.10%	10 per unit
AlGv-187	100	300	1	1	0	0	0	80%	10 per unit
BaGt-40	150	400	5.5	1	1	1	1	17%	10 per unit
AfGt-201	250	325	12.5	1	1	4	0	50%	10 per unit
AgGt-227	300	1350	5.75	1	0	0	0	25%	10 per unit
AfHa-921	200	800	0.3	0	0	0	0	3%	10 per unit
AfHa-917	150	300	0.3	0	0	0	0	5%	10 per unit
AgGu-214	100	4125	1.3	1	0	0	0	17%	10 per unit
AgGx-548	50	1575	1.5	1	0	0	0	13%	10 per unit
AgGx-539	50	600	0.07	1	0	0	0	3%	10 per unit
AfHa-901	50	300	2.1	1	0	0	0	12%	10 per unit
AfHa-903	100	600	0.175	1	0	0	0	3%	10 per unit
AlGq-135	100	3500	0.25	1	1	1	1	3%	10 per unit

Appendix C: Artifact Catalogue from Site AiHd-159

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L46	Surface	1	Shatter	Bois blanc				
L38	Surface	1	Shatter	Bois blanc				Cortex
L39	Surface	1	Secondary knapping flake	Bois blanc				
L51	Surface	1	Flake fragment	Haldimand				
L64	Surface	1	Flake fragment	Haldimand				
L42	Surface	1	Biface fragment	Onondaga	36	13.1	5.9	Refined edge fragment
L44	Surface	1	Biface fragment	Onondaga	32.9	25	7.6	Refined tip, possible point fragment
L75	Surface	1	Biface fragment	Onondaga	19.7	20.5	6	Refined medial fragment
L25	Surface	1	Flake fragment	Onondaga				
L29	Surface	1	Flake fragment	Onondaga				
L30	Surface	1	Flake fragment	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L32	Surface	1	Flake fragment	Onondaga				
L33	Surface	1	Flake fragment	Onondaga				
L41	Surface	1	Flake fragment	Onondaga				
L43	Surface	1	Flake fragment	Onondaga				
L49	Surface	1	Flake fragment	Onondaga				
L53	Surface	1	Flake fragment	Onondaga				
L61	Surface	1	Flake fragment	Onondaga				
L62	Surface	1	Flake fragment	Onondaga				
L66	Surface	1	Flake fragment	Onondaga				
L68	Surface	1	Flake fragment	Onondaga				
L76	Surface	1	Flake fragment	Onondaga				
L79	Surface	1	Flake fragment	Onondaga				
L69	Surface	1	Projectile point	Onondaga	51.1	26	8.4	Late Archaic Adder Orchard point

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L34	Surface	1	Primary reduction flake	Onondaga				Waterworn cobble fragment
L70	Surface	1	Primary reduction flake	Onondaga				
L71	Surface	1	Primary reduction flake	Onondaga				
L73	Surface	1	Primary reduction flake	Onondaga				
L74	Surface	1	Primary reduction flake	Onondaga				
L48	Surface	1	Primary thinning flake	Onondaga				
L59	Surface	1	Primary thinning flake	Onondaga				
L65	Surface	1	Primary thinning flake	Onondaga				
L37	Surface	1	Shatter	Onondaga				
L52	Surface	1	Shatter	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L54	Surface	1	Shatter	Onondaga				
L55	Surface	1	Shatter	Onondaga				
L67	Surface	1	Shatter	Onondaga				
L26	Surface	1	Secondary knapping flake	Onondaga				
L28	Surface	1	Secondary knapping flake	Onondaga				
L31	Surface	1	Secondary knapping flake	Onondaga				
L35	Surface	1	Secondary knapping flake	Onondaga				
L50	Surface	1	Secondary knapping flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L63	Surface	1	Secondary knapping flake	Onondaga				
L72	Surface	1	Secondary knapping flake	Onondaga				
L77	Surface	1	Secondary knapping flake	Onondaga				
L80	Surface	1	Secondary knapping flake	Onondaga				
L47	Surface	1	Secondary retouch flake	Onondaga				
L57	Surface	1	Secondary retouch flake	Onondaga				
L58	Surface	1	Secondary retouch flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L78	Surface	1	Projectile point	Selkirk	54.4	36.8	10.5	Large Archaic stemmed point missing tip
L81	Surface	1	Projectile point	Selkirk	53.1	26.5	9.4	Late Archaic Adder Orchard point
L40	Surface	1	Secondary knapping flake	Selkirk				
L27	Surface	1	Shatter	Trent Valley				
L56	Surface	1	Shatter	Haldimand				
L36	Surface	1	Flake fragment	Onondaga				
L45	Surface	1	Secondary knapping flake	Onondaga				
L60	Surface	1	Secondary knapping flake	Onondaga				
L82	455-200	1	Primary reduction flake	Onondaga				
L83	460-190	1	Flake fragment	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L84	460-195	1	Flake fragment	Bois blanc				
L85	460-195	1	Flake fragment	Onondaga				
L86	460-200	1	Biface fragment	Flint Ridge chalcedony	10	7.1	2.5	Small, refined edge fragment
L87	460-200	2	Shatter	Onondaga				
L92	460-205	1	Shatter	Onondaga				
L90	465-195	1	Shatter	Onondaga				
L88	465-195	2	Secondary knapping flake	Onondaga				
L89	465-195	1	Secondary retouch flake	Onondaga				
L91	465-200	1	Flake fragment	Onondaga				
L94	465-205	1	Flake fragment	Bois blanc				
L95	465-205	1	Flake fragment	Onondaga				
L93	465-205	1	Primary reduction flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L96	465-215	1	Secondary retouch flake	Onondaga				
L97	468-208	1	Primary thinning flake	Bois blanc				
L98	468-208	1	Flake fragment	Onondaga				
L99	470-175	1	Flake fragment	Onondaga				
L100	470-185	1	Secondary knapping flake	Onondaga				
L101	470-185	1	Flake fragment	Onondaga				
L102	470-190	1	Flake fragment	Onondaga				
L106	470-195	1	Primary thinning flake	Onondaga				
L105	470-195	1	Shatter	Onondaga				
L103	470-195	1	Secondary knapping flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L104	470-195	1	Secondary retouch flake	Onondaga				
L107	470-198	1	Biface fragment	Onondaga	24.5	19.5	6.2	Refined tip, possible point fragment
L109	470-200	1	Flake fragment	Onondaga				
L108	470-200	1	Secondary retouch flake	Onondaga				
L110	470-205	1	Secondary retouch flake	Onondaga				
L111	470-210	1	Flake fragment	Onondaga				
L113	474-237	1	Shatter	Onondaga				
L112	474-237	2	Secondary knapping flake	Onondaga				
L114	475-175	2	Secondary knapping flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L115	475-185	1	Secondary knapping flake	Onondaga				
L116	475-190	2	Secondary retouch flake	Onondaga				
L117	475-200	1	Primary reduction flake	Bois blanc				
L120	475-200	1	Shatter	Bois blanc				
L119	475-200	1	Shatter	Onondaga				
L118	475-200	1	Secondary knapping flake	Onondaga				
L121	475-215	2	Flake fragment	Onondaga				
L122	475-220	1	Shatter	Onondaga				
L123	477-225	1	Primary reduction flake	Onondaga				
L124	478-185	1	Secondary knapping flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L125	480-175	1	Shatter	Onondaga				
L126	480-185	1	Biface fragment	Bois blanc	26.5	20.5	4.8	Crude tip, made from large flake, minimally worked on ventral face
L128	480-185	1	Shatter	Onondaga				
L127	480-185	3	Secondary knapping flake	Onondaga				
L131	480-200	2	Flake fragment	Onondaga				
L130	480-200	1	Shatter	Onondaga				
L129	480-200	1	Secondary knapping flake	Onondaga				
L133	480-210	1	Flake fragment	Onondaga				
L132	480-210	1	Secondary retouch flake	Onondaga				
L135	480-215	3	Flake fragment	Onondaga				
L137	480-215	1	Flake fragment	Onondaga				
L136	480-215	1	Shatter	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L134	480-215	3	Secondary knapping flake	Onondaga				
L138	480-217	1	Shatter	Onondaga				
L139	480-220	2	Shatter	Onondaga				
L140	480-222	1	Primary reduction flake	Onondaga				
L143	480-225	1	Flake fragment	Bois blanc				
L141	480-225	1	Biface fragment	Onondaga	33	23	6.5	Crude fragment
L142	480-225	1	Flake fragment	Onondaga				
L144	482-179	1	Flake fragment	Onondaga				
L147	482-215	3	Flake fragment	Onondaga				
L145	482-215	1	Secondary knapping flake	Onondaga				
L146	482-215	2	Secondary retouch flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L148	482-236	1	Secondary knapping flake	Kettle point				
L150	482-236	1	Flake fragment	Onondaga				
L149	482-236	1	Secondary knapping flake	Onondaga				
L151	485-175	1	Secondary knapping flake	Onondaga				Modified along both ventral margins
L152	485-180	1	Primary reduction flake	Haldimand				Waterworn cobble fragment
L153	485-180	1	Secondary retouch flake	Onondaga				
L155	485-184	2	Flake fragment	Onondaga				
L154	485-184	3	Shatter	Onondaga				
L156	485-190	1	Secondary retouch flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L159	485-195	1	Shatter	Onondaga				
L157	485-195	1	Secondary knapping flake	Onondaga				
L158	485-195	1	Shatter	Bois blanc				
L160	485-205	1	Shatter	Onondaga				
L161	485-205	1	Secondary retouch flake	Onondaga				
L165	485-210	1	Biface fragment	Onondaga	20.8	16.7	5.6	Semi-refined edge fragment
L164	485-210	2	Flake fragment	Onondaga				
L166	485-210	1	Flake fragment	Onondaga				
L163	485-210	1	Shatter	Onondaga				
L167	485-210	1	Shatter	Onondaga				
L162	485-210	1	Secondary knapping flake	Onondaga				
L170	485-215	1	Flake fragment	Bois blanc				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L171	485-215	1	Flake fragment	Onondaga				
L172	485-215	1	Flake fragment	Onondaga				Modified along one ventral edge
L168	485-215	1	Secondary knapping flake	Onondaga				
L169	485-215	3	Shatter	Onondaga				
L173	485-217	1	Primary thinning flake	Bois blanc				
L175	485-217	2	Shatter	Onondaga				
L174	485-217	1	Secondary retouch flake	Onondaga				
L178	485-220	1	Flake fragment	Bois blanc				
L177	485-220	2	Flake fragment	Onondaga				
L176	485-220	2	Secondary retouch flake	Onondaga				
L179	486-200	1	Biface	Onondaga	44	32.5	12.7	Crude, ovate
L180	486-200	1	Shatter	Onondaga				
L182	487-173	1	Shatter	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L181	487-173	1	Secondary knapping flake	Onondaga				
L185	487-210	7	Flake fragment	Onondaga				
L184	487-210	1	Shatter	Onondaga				
L183	487-210	1	Secondary retouch flake	Onondaga				
L187	490-175	1	Flake fragment	Onondaga				
L186	490-175	1	Secondary knapping flake	Onondaga				
L188	490-180	1	Primary reduction flake	Bois blanc				
L190	490-180	1	Shatter	Onondaga				
L189	490-180	2	Secondary knapping flake	Onondaga				
L192	490-185	1	Flake fragment	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L191	490-185	1	Secondary retouch flake	Onondaga				
L193	490-190	1	Flake fragment	Onondaga				
L194	490-195	1	Shatter	Onondaga				
L195	490-200	1	Flake fragment	Onondaga				
L196	490-200	1	Shatter	Onondaga				
L197	490-210	1	Secondary retouch flake	Onondaga				
L199	490-212	1	Shatter	Onondaga				
L198	490-212	3	Secondary knapping flake	Onondaga				
L201	490-215	6	Flake fragment	Onondaga				
L202	490-215	3	Shatter	Onondaga				
L200	490-215	1	Secondary knapping flake	Onondaga				
L203	490-217	4	Flake fragment	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L204	490-217	1	Secondary knapping flake	Onondaga				
L205	490-220	3	Flake fragment	Onondaga				
L206	490-220	2	Secondary retouch flake	Onondaga				
L207	490-225	1	Secondary knapping flake	Onondaga				
L208	491-179	3	Flake fragment	Onondaga				
L209	491-179	2	Secondary knapping flake	Onondaga				
L212	492-173	1	Core/Core fragment	Onondaga				
L210	492-173	2	Flake fragment	Onondaga				
L213	492-173	2	Flake fragment	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L211	492-173	1	Secondary knapping flake	Onondaga				
L214	492-173	2	Secondary knapping flake	Onondaga				
L215	495-175	1	Secondary knapping flake	Haldimand				
L216	495-175	3	Flake fragment	Onondaga				
L217	495-180	1	Flake fragment	Onondaga				
L218	495-180	1	Secondary knapping flake	Onondaga				
L219	495-180	1	Shatter	Onondaga				
L221	495-185	1	Flake fragment	Onondaga				
L220	495-185	1	Primary thinning flake	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L223	495-195	1	Shatter	Onondaga				
L222	495-195	1	Secondary retouch flake	Onondaga				
L224	495-200	1	Flake fragment	Bois blanc				
L225	495-205	1	Secondary knapping flake	Onondaga				
L230	495-210	1	Biface fragment	Onondaga	20	11	5.9	Refined edge fragment
L229	495-210	1	Flake fragment	Onondaga				
L228	495-210	2	Shatter	Onondaga				
L226	495-210	2	Secondary knapping flake	Onondaga				
L227	495-210	1	Secondary retouch flake	Onondaga				
L235	495-212	2	Flake fragment	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L233	495-212	2	Primary reduction flake	Onondaga				
L234	495-212	1	Secondary retouch flake	Onondaga				
L231	495-215	2	Flake fragment	Onondaga				
L232	495-215	1	Shatter	Onondaga				
L236	495-220	1	Flake fragment	Onondaga				
L237	495-220	4	Shatter	Onondaga				
L239	495-225	1	Shatter	Onondaga				
L238	495-225	1	Secondary knapping flake	Onondaga				
L241	497-215	2	Flake fragment	Onondaga				
L240	497-215	2	Secondary retouch flake	Onondaga				
L242	500-170	1	Secondary retouch flake	Onondaga				
L244	500-180	2	Shatter	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L243	500-180	1	Secondary knapping flake	Onondaga				
L245	500-190	1	Secondary retouch flake	Onondaga				
L246	500-195	1	Secondary retouch flake	Onondaga				
L248	500-200	1	Flake fragment	Onondaga				
L247	500-200	1	Primary thinning flake	Onondaga				
L249	500-205	1	Secondary knapping flake	Onondaga				
L250	500-210	1	Secondary knapping flake	Onondaga				
L251	500-220	1	Secondary retouch flake	Selkirk				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L270	505-160	1	Shatter	Onondaga				
L252	505-200	1	Secondary retouch flake	Onondaga				
L253	505-205	1	Secondary retouch flake	Onondaga				
L254	505-215	2	Flake fragment	Onondaga				
L255	505-220	1	Flake fragment	Onondaga				
L269	505-225	1	Biface fragment	Bois blanc	17.8	17.5	5.2	Refined medial fragment, possible
L266	510-170	1	Flake fragment	Onondaga				
L267	510-180	1	Flake fragment	Onondaga				
L268	510-180	2	Secondary knapping flake	Onondaga				
L262	510-210	1	Secondary knapping flake	Onondaga				
L263	510-210	1	Shatter	Onondaga				

Cat #	Context	Qty	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Comments
L260	510-215	1	Secondary knapping flake	Onondaga				
L256	510-230	1	Flake fragment	Onondaga				
L259	515-205	1	Flake fragment	Onondaga				
L257	515-220	2	Flake fragment	Onondaga				
L258	520-180	1	Biface fragment	Onondaga	33.2	8.3	8.8	Crude edge fragment
L261	520-205	1	Primary reduction flake	Onondaga				
L265	520-220	1	Shatter	Onondaga				
L264	564-184	1	Flake fragment	Onondaga				

Appendix D: Artifact Catalogue from Site AiHd-160

Appendix C.1 Lithic Artifacts

Cat #	Context	Type	Stratum	Qty	Material	Notes
L100	370N-250E	Flake fragment	Ploughzone	2	Onondaga	
L101	370N-260E	Biface	Ploughzone	1	Onondaga	Refined/late stage, thin triangular biface missing tip w/expanding convex base; L 22.4 mm W 27 mm T 4.3 mm
L102	370N-260E	Primary thinning flake	Ploughzone	1	Onondaga	
L103	370N-260E	Secondary retouch flake	Ploughzone	1	Onondaga	
L104	370N-260E	Shatter	Ploughzone	7	Onondaga	
L105	370N-260E	Flake fragment	Ploughzone	3	Onondaga	
L106	380N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L107	380N-210E	Shatter	Ploughzone	1	Onondaga	
L108	380N-220E	Secondary knapping flake	Ploughzone	1	Onondaga	
L109	380N-220E	Shatter	Ploughzone	3	Onondaga	
L110	380N-220E	Flake fragment	Ploughzone	4	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L111	380N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L112	380N-220E	Flake fragment	Ploughzone	1	Onondaga	
L113	380N-230E	Primary thinning flake	Ploughzone	1	Onondaga	
L114	380N-230E	Secondary knapping flake	Ploughzone	1	Onondaga	
L115	380N-230E	Secondary retouch flake	Ploughzone	1	Onondaga	
L116	380N-230E	Shatter	Ploughzone	5	Onondaga	
L117	380N-230E	Flake fragment	Ploughzone	3	Onondaga	
L118	380N-240E	Flake fragment	Ploughzone	2	Onondaga	
L119	380N-250E	Secondary retouch flake	Ploughzone	2	Onondaga	
L120	380N-250E	Shatter	Ploughzone	8	Onondaga	
L121	380N-260E	Flake fragment	Ploughzone	2	Onondaga	
L122	380N-260E	Shatter	Ploughzone	1	Onondaga	
L123	390N-210E	Shatter	Ploughzone	1	Onondaga	
L124	390N-220E	Primary reduction flake	Ploughzone	1	Onondaga	Large flake, possibly intended to be a biface blank
L125	390N-220E	Primary thinning flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L126	390N-220E	Secondary retouch flake	Ploughzone	3	Onondaga	
L127	390N-220E	Shatter	Ploughzone	2	Onondaga	
L128	390N-220E	Flake fragment	Ploughzone	4	Onondaga	
L129	390N-230E	Secondary knapping flake	Ploughzone	1	Onondaga	
L130	390N-230E	Flake fragment	Ploughzone	2	Onondaga	
L131	390N-240E	Flake fragment	Ploughzone	2	Onondaga	
L132	390N-240E	Biface fragment	Ploughzone	1	Onondaga	Crude/early stage, blocky edge fragment; L 26 mm W 18 mm T 12.2 mm
L133	390N-240E	Biface fragment	Ploughzone	1	Onondaga	Refined/early stage, thin basal or tip fragment; L 21.9 mm W 17.9 mm T 5.5 mm
L134	390N-250E	Primary thinning flake	Ploughzone	2	Onondaga	
L135	390N-250E	Shatter	Ploughzone	2	Onondaga	
L136	390N-250E	Flake fragment	Ploughzone	2	Onondaga	
L137	390N-260E	Shatter	Ploughzone	2	Onondaga	
L138	390N-260E	Flake fragment	Ploughzone	1	Onondaga	
L139	400N-210E	Shatter	Ploughzone	1	Onondaga	
L140	400N-210E	Flake fragment	Ploughzone	1	Onondaga	
L141	400N-220E	Secondary retouch flake	Ploughzone	2	Onondaga	
L142	400N-220E	Shatter	Ploughzone	6	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L143	400N-220E	Flake fragment	Ploughzone	1	Onondaga	
L144	400N-230E	Shatter	Ploughzone	2	Onondaga	
L145	400N-230E	Flake fragment	Ploughzone	2	Onondaga	
L146	400N-240E	Projectile point	Ploughzone	1	Onondaga	Nanticoke Side-Notched; Small Late Woodland side-notched point; L 23.3 mm W 9 mm T 3.5 mm
L147	400N-240E	Secondary retouch flake	Ploughzone	1	Onondaga	
L148	400N-240E	Shatter	Ploughzone	4	Onondaga	
L149	400N-240E	Flake fragment	Ploughzone	6	Onondaga	
L150	400N-250E	Primary thinning flake	Ploughzone	1	Onondaga	
L151	400N-250E	Secondary knapping flake	Ploughzone	5	Onondaga	
L152	400N-250E	Secondary retouch flake	Ploughzone	1	Onondaga	
L153	400N-250E	Shatter	Ploughzone	7	Onondaga	
L154	400N-250E	Flake fragment	Ploughzone	1	Onondaga	
L155	410N-210E	Flake fragment	Ploughzone	1	Onondaga	
L156	410N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L157	410N-210E	Shatter	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L158	410N-220E	Secondary knapping flake	Ploughzone	1	Onondaga	
L159	410N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L160	410N-220E	Flake fragment	Ploughzone	3	Onondaga	
L161	410N-220E	Shatter	Ploughzone	10	Onondaga	
L162	410N-230E	Secondary knapping flake	Ploughzone	2	Onondaga	
L163	410N-230E	Secondary retouch flake	Ploughzone	1	Onondaga	
L164	410N-230E	Shatter	Ploughzone	5	Onondaga	
L165	410N-230E	Flake fragment	Ploughzone	2	Onondaga	
L166	410N-240E	Shatter	Ploughzone	4	Onondaga	
L167	410N-250E	Flake fragment	Ploughzone	4	Onondaga	
L168	410N-250E	Shatter	Ploughzone	5	Onondaga	
L169	410N-260E	Shatter	Ploughzone	2	Onondaga	
L171	470N-200E	Flake fragment	Ploughzone	7	Onondaga	
L172	470N-200E	Shatter	Ploughzone	3	Onondaga	
L173	420N-210E	Flake fragment	Ploughzone	1	Onondaga	
L174	420N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L175	420N-220E	Secondary knapping flake	Ploughzone	1	Onondaga	
L176	420N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L177	420N-220E	Shatter	Ploughzone	10	Onondaga	
L178	420N-220E	Flake fragment	Ploughzone	1	Onondaga	
L179	420N-230E	Secondary knapping flake	Ploughzone	2	Onondaga	
L180	420N-230E	Secondary retouch flake	Ploughzone	2	Onondaga	
L181	420N-230E	Shatter	Ploughzone	5	Onondaga	
L182	420N-230E	Flake fragment	Ploughzone	2	Onondaga	
L183	420N-240E	Secondary knapping flake	Ploughzone	2	Onondaga	
L184	420N-240E	Secondary retouch flake	Ploughzone	1	Onondaga	
L185	420N-240E	Flake fragment	Ploughzone	2	Onondaga	
L186	420N-240E	Shatter	Ploughzone	1	Onondaga	
L187	420N-250E	Flake fragment	Ploughzone	3	Onondaga	
L188	420N-250E	Shatter	Ploughzone	1	Onondaga	
L189	420N-260E	Secondary knapping flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L190	430N-210E	Flake fragment	Ploughzone	1	Onondaga	
L191	430N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L192	430N-210E	Shatter	Ploughzone	1	Onondaga	
L193	430N-220E	Secondary knapping flake	Ploughzone	1	Onondaga	
L194	430N-220E	Shatter	Ploughzone	5	Onondaga	
L195	430N-220E	Flake fragment	Ploughzone	1	Onondaga	
L196	430N-230E	Shatter	Ploughzone	1	Onondaga	
L197	430N-230E	Flake fragment	Ploughzone	1	Onondaga	
L198	430N-250E	Shatter	Ploughzone	1	Onondaga	
L199	440N-190E	Shatter	Ploughzone	1	Onondaga	
L200	440N-200E	Secondary knapping flake	Ploughzone	1	Onondaga	
L201	440N-200E	Shatter	Ploughzone	1	Onondaga	
L202	440N-200E	Flake fragment	Ploughzone	1	Onondaga	Modified along portions of one ventral lateral margin, two dorsal lateral margins and along the entire distal/dorsal end
L203	440N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L204	440N-210E	Shatter	Ploughzone	11	Onondaga	
L205	440N-210E	Flake fragment	Ploughzone	4	Onondaga	
L206	440N-220E	Flake fragment	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L207	440N-220E	Shatter	Ploughzone	1	Onondaga	
L208	440N-230E	Secondary knapping flake	Ploughzone	2	Onondaga	
L209	440N-230E	Shatter	Ploughzone	2	Onondaga	
L210	440N-230E	Flake fragment	Ploughzone	2	Onondaga	
L211	440N-240E	Secondary knapping flake	Ploughzone	1	Onondaga	
L212	440N-250E	Flake fragment	Ploughzone	1	Onondaga	
L213	440N-250E	Secondary retouch flake	Ploughzone	1	Onondaga	
L214	450N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	
L215	450N-190E	Shatter	Ploughzone	1	Onondaga	
L216	450N-190E	Flake fragment	Ploughzone	1	Onondaga	
L217	450N-200E	Secondary knapping flake	Ploughzone	1	Onondaga	
L218	450N-200E	Flake fragment	Ploughzone	1	Onondaga	
L219	450N-210E	Primary reduction flake	Ploughzone	1	Onondaga	
L220	450N-210E	Shatter	Ploughzone	16	Onondaga	
L221	450N-210E	Secondary retouch flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L222	450N-210E	Flake fragment	Ploughzone	4	Onondaga	
L223	450N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L224	450N-220E	Shatter	Ploughzone	2	Onondaga	
L225	450N-220E	Flake fragment	Ploughzone	1	Onondaga	
L226	450N-230E	Flake fragment	Ploughzone	1	Onondaga	
L227	450N-240E	Shatter	Ploughzone	2	Onondaga	
L228	450N-250E	Secondary retouch flake	Ploughzone	1	Onondaga	
L229	450N-250E	Shatter	Ploughzone	2	Onondaga	
L230	450N-250E	Flake fragment	Ploughzone	1	Onondaga	
L231	460N-190E	Secondary retouch flake	Ploughzone	1	Onondaga	
L232	460N-190E	Shatter	Ploughzone	4	Onondaga	
L233	460N-190E	Flake fragment	Ploughzone	2	Onondaga	
L234	460N-200E	Secondary knapping flake	Ploughzone	1	Onondaga	
L235	460N-200E	Shatter	Ploughzone	6	Onondaga	
L236	460N-200E	Flake fragment	Ploughzone	2	Onondaga	
L237	460N-210E	Projectile point	Ploughzone	1	Onondaga	Levanna; Middle/Late Woodland Levanna point; L 31.3 mm W 19.3 mm T 4.5 mm

Cat #	Context	Type	Stratum	Qty	Material	Notes
L238	460N-210E	Secondary knapping flake	Ploughzone	2	Onondaga	
L239	460N-210E	Flake fragment	Ploughzone	1	Onondaga	
L240	460N-220E	Projectile point fragment	Ploughzone	1	Onondaga	Basal/tang fragment of notched point; L 8 mm W 12.1 mm T 3 mm
L241	460N-220E	Secondary knapping flake	Ploughzone	2	Onondaga	
L242	460N-220E	Shatter	Ploughzone	1	Onondaga	
L243	460N-220E	Flake fragment	Ploughzone	2	Onondaga	
L244	460N-230E	Secondary knapping flake	Ploughzone	2	Onondaga	
L245	460N-230E	Shatter	Ploughzone	2	Onondaga	
L246	460N-240E	Flake fragment	Ploughzone	2	Onondaga	
L247	470N-190E	Secondary retouch flake	Ploughzone	1	Onondaga	
L248	470N-190E	Flake fragment	Ploughzone	1	Onondaga	
L249	470N-210E	Secondary knapping flake	Ploughzone	5	Onondaga	
L25	Surface	Projectile point	Ploughzone	1	Onondaga	Nanticoke Side-Notched; Late Woodland Nanticoke Side Notch point ("Point #1"); L 38.2 mm W 15.6 mm T 3.9 mm
L250	470N-210E	Secondary retouch flake	Ploughzone	4	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L251	470N-210E	Shatter	Ploughzone	11	Onondaga	
L252	470N-210E	Flake fragment	Ploughzone	6	Onondaga	
L253	470N-220E	Biface	Ploughzone	1	Onondaga	Refined/late stage, crescent-shaped w/concave base; L 21.4 mm W 25.5 mm T 5.1 mm
L254	470N-220E	Secondary knapping flake	Ploughzone	5	Onondaga	
L255	470N-220E	Secondary retouch flake	Ploughzone	5	Onondaga	
L256	470N-220E	Shatter	Ploughzone	16	Onondaga	
L257	470N-220E	Flake fragment	Ploughzone	16	Onondaga	
L258	470N-230E	Secondary retouch flake	Ploughzone	1	Onondaga	
L259	480N-180E	Shatter	Ploughzone	1	Onondaga	
L26	Surface	Projectile point	Ploughzone	1	Onondaga	Adena; Early Woodland Adena point heavily resharpened into a "bunt", ("Tool #1"); L 28 mm W 20.8 mm T 5.7 mm
L260	480N-180E	Flake fragment	Ploughzone	1	Onondaga	
L261	480N-190E	Secondary retouch flake	Ploughzone	1	Onondaga	
L262	480N-190E	Shatter	Ploughzone	2	Onondaga	
L263	480N-190E	Flake fragment	Ploughzone	1	Onondaga	
L264	480N-200E	Secondary retouch flake	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L265	480N-200E	Flake fragment	Ploughzone		Onondaga	
L266	480N-210E	Secondary knapping flake	Ploughzone	4	Onondaga	
L267	480N-210E	Secondary retouch flake	Ploughzone	2	Onondaga	
L268	480N-210E	Shatter	Ploughzone	3	Onondaga	
L269	480N-210E	Flake fragment	Ploughzone	2	Onondaga	
L27	Surface	Biface fragment	Ploughzone	1	Haldimand	Refined tip, possible point fragment, ("Point #2"); L 28 mm W 20.8 mm T 5.7 mm
L270	480N-220E	Primary thinning flake	Ploughzone	1	Onondaga	
L271	480N-220E	Secondary knapping flake	Ploughzone	9	Onondaga	
L272	480N-220E	Secondary retouch flake	Ploughzone	3	Onondaga	
L273	480N-220E	Shatter	Ploughzone	1	Onondaga	
L274	480N-220E	Flake fragment	Ploughzone	19	Onondaga	
L275	490N-160E	Shatter	Ploughzone	1	Onondaga	
L276	490N-160E	Biface fragment	Ploughzone	1	Onondaga	Semi-refined/medium stage basal fragment; L 26.5 mm W 21.1 mm T 7 mm
L277	490N-170E	Shatter	Ploughzone	1	Onondaga	
L278	490N-170E	Flake fragment	Ploughzone	1	Onondaga	
L279	490N-180E	Biface fragment	Ploughzone	1	Onondaga	Refined tip, possible point fragment; L 21.8 mm W 16 mm T 4 mm

Cat #	Context	Type	Stratum	Qty	Material	Notes
L28	Surface	Biface fragment	Ploughzone	1	Onondaga	Refined, thin blade fragment, resharpened/modified with spokeshave-like margin; L 57.2 mm W 35 mm T 5.5 mm
L280	490N-180E	Flake fragment	Ploughzone	1	Onondaga	
L281	490N-200E	Shatter	Ploughzone	2	Onondaga	
L282	490N-200E	Shatter	Ploughzone	2	Onondaga	
L283	490N-210E	Secondary retouch flake	Ploughzone	1	Onondaga	
L284	490N-210E	Flake fragment	Ploughzone	4	Onondaga	
L285	490N-220E	Secondary knapping flake	Ploughzone	3	Onondaga	
L286	490N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L287	490N-220E	Shatter	Ploughzone	1	Onondaga	
L288	490N-220E	Flake fragment	Ploughzone	5	Onondaga	
L289	490N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	
L29	Surface	Biface	Ploughzone	1	Onondaga	Large, refined/late stage tear drop-shaped
L290	490N-190E	Flake fragment	Ploughzone	1	Onondaga	
L292	490N-230E	Flake fragment	Ploughzone	1	Onondaga	
L293	495N-160E	Primary thinning flake	Ploughzone	1	Onondaga	
L294	495N-160E	Shatter	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L295	500N-160E	Secondary knapping flake	Ploughzone	1	Onondaga	
L296	500N-160E	Flake fragment	Ploughzone	1	Onondaga	
L297	500N-170E	Secondary knapping flake	Ploughzone	2	Onondaga	
L298	500N-170E	Shatter	Ploughzone	7	Onondaga	
L299	500N-170E	Flake fragment	Ploughzone	2	Onondaga	
L30	Surface	Projectile point fragment	Ploughzone	1	Upper Mercer	Refined, narrow tip, possible point fragment; L 20.6 mm W 10.8 mm T 3.1 mm
L300	500N-180E	Shatter	Ploughzone	2	Onondaga	
L301	500N-190E	Primary thinning flake	Ploughzone	1	Onondaga	
L302	500N-190E	Secondary retouch flake	Ploughzone	1	Onondaga	
L303	500N-190E	Shatter	Ploughzone	1	Onondaga	
L304	500N-190E	Flake fragment	Ploughzone	1	Onondaga	
L305	500N-200E	Secondary knapping flake	Ploughzone	1	Onondaga	
L306	500N-200E	Secondary retouch flake	Ploughzone	1	Onondaga	
L307	500N-200E	Flake fragment	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L308	500N-210E	Biface fragment	Ploughzone	1	Onondaga	Crude/early stage edge fragment; L 33.3 mm W 14.4 mm T 10 mm
L309	500N-210E	Secondary knapping flake	Ploughzone	2	Onondaga	
L31	Surface	Core/Core fragment	Ploughzone	2	Onondaga	
L310	500N-210E	Shatter	Ploughzone	3	Onondaga	
L311	500N-210E	Flake fragment	Ploughzone	5	Onondaga	
L312	500N-220E	Shatter	Ploughzone	2	Onondaga	
L313	500N-220E	Flake fragment	Ploughzone	5	Onondaga	
L314	500N-230E	Shatter	Ploughzone	2	Onondaga	
L315	500N-230E	Flake fragment	Ploughzone	1	Onondaga	
L316	510N-150E	Biface fragment	Ploughzone	1	Onondaga	Semi-refined/medium stage basal fragment; L 29 mm W 30.1 mm T 7.2 mm
L317	510N-150E	Shatter	Ploughzone	2	Onondaga	
L318	510N-170E	Shatter	Ploughzone	6	Onondaga	
L319	510N-170E	Flake fragment	Ploughzone	1	Onondaga	
L32	Surface	Biface fragment	Ploughzone	1	Onondaga	Refined, thin, rectangular base/midsection; L 23.4 mm W 19.8 mm T 5 mm
L320	510N-180E	Secondary knapping flake	Ploughzone	1	Onondaga	
L321	510N-180E	Flake fragment	Ploughzone	1	Onondaga	
L322	510N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	
L323	510N-190E	Shatter	Ploughzone	3	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L324	510N-190E	Flake fragment	Ploughzone	2	Onondaga	
L325	510N-190E	Biface fragment	Ploughzone	1	Onondaga	Crude/early stage fragment; L 24.5 mm W 42.3 mm T 10.5 mm
L326	510N-200E	Projectile point fragment	Ploughzone	1	Onondaga	Notched point/thin blade fragment w/one intact barb; L 19.5 mm W 19.8 mm T 3.8 mm
L327	510N-200E	Flake fragment	Ploughzone	3	Onondaga	
L328	510N-200E	Shatter	Ploughzone	1	Onondaga	
L329	510N-210E	Secondary retouch flake	Ploughzone	1	Onondaga	
L33	Surface	End scraper	Ploughzone	1	Onondaga	L 28.5 mm W 22.5 mm T 8.5 mm
L330	510N-210E	Secondary retouch flake	Ploughzone	1	Onondaga	
L331	510N-210E	Shatter	Ploughzone	5	Onondaga	
L332	510N-210E	Flake fragment	Ploughzone	1	Onondaga	
L333	510N-220E	Shatter	Ploughzone	2	Onondaga	
L334	510N-220E	Flake fragment	Ploughzone	1	Onondaga	
L335	520N-170E	Shatter	Ploughzone	1	Onondaga	
L336	520N-180E	Secondary knapping flake	Ploughzone	2	Onondaga	
L337	520N-180E	Shatter	Ploughzone	1	Onondaga	
L338	520N-180E	Flake fragment	Ploughzone	1	Onondaga	
L339	520N-180E	Flake fragment	Ploughzone	1	Onondaga	Modified along a portion of one ventral lateral margin

Cat #	Context	Type	Stratum	Qty	Material	Notes
L34	Surface	Projectile point fragment	Ploughzone	1	Onondaga	Nanticoke Side-Notched; Late Woodland Nanticoke Side Notch point base; L 13.5 mm W 15.1 mm T 3.5 mm
L340	520N-190E	Secondary retouch flake	Ploughzone	1	Onondaga	
L341	520N-190E	Secondary retouch flake	Ploughzone	1	Kettle point	
L342	520N-190E	Shatter	Ploughzone	3	Onondaga	
L343	520N-190E	Flake fragment	Ploughzone	6	Onondaga	
L344	520N-200E	Secondary knapping flake	Ploughzone	3	Onondaga	
L345	520N-200E	Secondary retouch flake	Ploughzone	1	Onondaga	
L346	520N-200E	Shatter	Ploughzone	5	Onondaga	
L347	520N-200E	Flake fragment	Ploughzone	4	Onondaga	
L348	520N-210E	Secondary knapping flake	Ploughzone	3	Onondaga	
L349	520N-210E	Secondary retouch flake	Ploughzone	4	Onondaga	
L35	Surface	Projectile point fragment	Ploughzone	1	Onondaga	Medial fragment; L 12 mm W 14 mm T 2.5 mm
L350	520N-210E	Secondary retouch flake	Ploughzone	1	Flint Ridge chalcedony	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L351	520N-210E	Shatter	Ploughzone	3	Onondaga	
L352	520N-210E	Flake fragment	Ploughzone	11	Onondaga	
L353	520N-220E	Flake fragment	Ploughzone	2	Onondaga	
L354	520N-230E	Flake fragment	Ploughzone	2	Onondaga	
L355	530N-170E	Shatter	Ploughzone	2	Onondaga	
L356	530N-180E	Secondary retouch flake	Ploughzone	1	Onondaga	
L357	530N-180E	Flake fragment	Ploughzone	3	Onondaga	
L358	530N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	
L359	530N-190E	Shatter	Ploughzone	3	Onondaga	
L36	Surface	Projectile point fragment	Ploughzone	1	Onondaga	Notched point fragment w/both barbs; L 15.5 mm W 18.7 mm T 4.9 mm
L360	530N-190E	Flake fragment	Ploughzone	8	Onondaga	
L361	530N-200E	Biface fragment	Ploughzone	1	Onondaga	Refined/late stage, elongated tip, possible point fragment; L 29.6 mm W 15.5 mm T 3.9 mm
L362	530N-200E	Primary thinning flake	Ploughzone	1	Onondaga	Modified along a portion of the proximal dorsal end
L363	530N-200E	Secondary knapping flake	Ploughzone	11	Onondaga	
L364	530N-200E	Secondary retouch flake	Ploughzone	5	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L365	530N-200E	Shatter	Ploughzone	14	Onondaga	
L366	530N-200E	Flake fragment	Ploughzone	18	Onondaga	
L367	530N-210E	Core/Core fragment	Ploughzone	1	Onondaga	
L368	530N-210E	Primary thinning flake	Ploughzone	1	Onondaga	
L369	530N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L37	Surface	End scraper	Ploughzone	1	Onondaga	Bit end fragment; L 15 mm W 18.5 mm T 7.4 mm
L370	530N-210E	Secondary knapping flake	Ploughzone	1	Flint Ridge chalcedony	
L371	530N-210E	Shatter	Ploughzone	5	Onondaga	
L372	530N-210E	Flake fragment	Ploughzone	5	Onondaga	
L373	540N-170E	Shatter	Ploughzone	2	Onondaga	
L374	540N-180E	Core/Core fragment	Ploughzone	1	Onondaga	
L375	540N-180E	Secondary knapping flake	Ploughzone	1	Onondaga	
L376	540N-180E	Flake fragment	Ploughzone	2	Onondaga	
L377	540N-190E	Secondary knapping flake	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L378	540N-190E	Secondary retouch flake	Ploughzone	2	Onondaga	
L379	540N-190E	Shatter	Ploughzone	4	Onondaga	
L38	Surface	Biface	Ploughzone	1	Onondaga	Small, refined/late stage, rectangular, missing tip; L 22.8 mm W 17.9 mm T 4.5 mm
L380	540N-190E	Flake fragment	Ploughzone	3	Onondaga	
L381	540N-200E	Secondary knapping flake	Ploughzone	1	Onondaga	
L382	540N-200E	Shatter	Ploughzone	4	Onondaga	
L383	540N-200E	Flake fragment	Ploughzone	3	Onondaga	
L384	540N-210E	Shatter	Ploughzone	3	Onondaga	
L385	540N-210E	Flake fragment	Ploughzone	3	Onondaga	
L386	550N-180E	Shatter	Ploughzone	1	Onondaga	
L387	550N-180E	Flake fragment	Ploughzone	1	Onondaga	
L388	550N-190E	Biface fragment	Ploughzone	1	Onondaga	Crude/early stage fragment split longitudinally; L 43.8 mm W 24 mm T 9.5 mm
L389	550N-190E	End scraper	Ploughzone	1	Onondaga	Large, bifacially-worked; L 40 mm W 32.8 mm T 11.5 mm
L39	Surface	Biface fragment	Ploughzone	1	Onondaga	Refined/late stage, broad, rounded tip; L 14 mm W 21 mm T 4.9 mm
L390	550N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	
L391	550N-190E	Shatter	Ploughzone	3	Onondaga	
L392	550N-190E	Flake fragment	Ploughzone	4	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L393	550N-200E	Secondary knapping flake	Ploughzone	3	Onondaga	
L394	550N-200E	Shatter	Ploughzone	1	Onondaga	
L395	550N-200E	Flake fragment	Ploughzone	5	Onondaga	
L396	550N-210E	Secondary retouch flake	Ploughzone	2	Onondaga	
L397	550N-210E	Shatter	Ploughzone	3	Onondaga	
L398	550N-210E	Flake fragment	Ploughzone	2	Onondaga	
L399	560N-170E	Flake fragment	Ploughzone	2	Onondaga	
L40	Surface	Scraper	Ploughzone	1	Onondaga	Thumbnail scraper; L 19.9 mm W 20.5 mm T 2.8 mm
L400	560N-170E	Flake fragment	Ploughzone	1	Onondaga	Modified along a portion of one distal margin
L401	560N-200E	Shatter	Ploughzone	1	Onondaga	
L402	560N-200E	Flake fragment	Ploughzone	1	Bois blanc	
L403	560N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L404	560N-210E	Flake fragment	Ploughzone	1	Onondaga	
L405	560N-180E	Shatter	Ploughzone	1	Onondaga	
L406	560N-190E	Primary thinning flake	Ploughzone	1	Onondaga	
L407	560N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L408	560N-190E	Shatter	Ploughzone	5	Onondaga	
L409	560N-190E	Flake fragment	Ploughzone	1	Onondaga	
L41	Surface	Biface fragment	Ploughzone	1	Onondaga	Semi-refined/medium stage fragment; L 31.8 mm W 17 mm T 8 mm
L410	570N-170E	Primary thinning flake	Ploughzone	1	Onondaga	
L411	570N-170E	Secondary retouch flake	Ploughzone	3	Onondaga	
L412	570N-170E	Shatter	Ploughzone	1	Onondaga	
L413	570N-170E	Flake fragment	Ploughzone	1	Onondaga	
L414	570N-180E	Shatter	Ploughzone	4	Onondaga	
L415	570N-180E	Flake fragment	Ploughzone	2	Onondaga	
L416	570N-180E	Flake fragment	Ploughzone	1	Onondaga	Modified along one dorsal margin
L417	570N-180E	Flake fragment	Ploughzone	1	Bois blanc	
L418	570N-190E	Primary thinning flake	Ploughzone	1	Onondaga	
L419	570N-190E	Secondary knapping flake	Ploughzone	2	Onondaga	
L42	Surface	Biface fragment	Ploughzone	1	Onondaga	Rounded, semi-refined/medium stage tip fragment; L 19.9 mm W 19.5 mm T 5.5 mm
L420	570N-190E	Secondary retouch flake	Ploughzone	1	Onondaga	
L421	570N-190E	Shatter	Ploughzone	5	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L422	570N-190E	Flake fragment	Ploughzone	3	Onondaga	
L423	570N-200E	Primary thinning flake	Ploughzone	1	Onondaga	
L424	570N-210E	Primary reduction flake	Ploughzone	1	Onondaga	
L425	570N-210E	Secondary knapping flake	Ploughzone	1	Onondaga	
L426	570N-210E	Shatter	Ploughzone	6	Onondaga	
L427	570N-210E	Flake fragment	Ploughzone	2	Onondaga	
L428	570N-210E	Shatter	Ploughzone	1	Onondaga	
L429	570N-210E	Flake fragment	Ploughzone	1	Onondaga	
L43	Surface	Biface fragment	Ploughzone	1	Onondaga	Semi-refined/medium stage basal fragment w/straight base; L 7.5 mm W 19.9 mm T 9.8 mm
L430	580N-180E	Secondary knapping flake	Ploughzone	1	Onondaga	
L431	580N-180E	Shatter	Ploughzone	2	Onondaga	
L432	580N-180E	Flake fragment	Ploughzone	1	Onondaga	
L433	580N-190E	Secondary knapping flake	Ploughzone	2	Onondaga	
L434	580N-190E	Shatter	Ploughzone	6	Onondaga	
L435	580N-190E	Flake fragment	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L436	580N-200E	Secondary knapping flake	Ploughzone	1	Onondaga	
L437	580N-200E	Flake fragment	Ploughzone	2	Onondaga	
L438	590N-180E	Secondary knapping flake	Ploughzone	1	Onondaga	
L439	590N-200E	Shatter	Ploughzone	2	Onondaga	
L44	Surface	Biface fragment	Ploughzone	1	Onondaga	Rounded, refined basal fragment; L 15.5 mm W 22.5 mm T 4.7 mm
L440	590N-200E	Flake fragment	Ploughzone	2	Onondaga	
L441	590N-210E	Flake fragment	Ploughzone	2	Onondaga	
L442	590N-230E	Flake fragment	Ploughzone	1	Onondaga	
L443	600N-190E	Secondary knapping flake	Ploughzone	1	Onondaga	Modified along a portion of one upper distal lateral margin
L444	600N-190E	Flake fragment	Ploughzone	3	Onondaga	
L445	590N-190E	Shatter	Ploughzone	5	Onondaga	
L446	590N-190E	Flake fragment	Ploughzone	2	Onondaga	
L447	600N-200E	Secondary knapping flake	Ploughzone	3	Onondaga	
L448	600N-200E	Secondary retouch flake	Ploughzone	1	Onondaga	
L449	600N-200E	Shatter	Ploughzone	5	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L45	Surface	Biface fragment	Ploughzone	1	Onondaga	Crude fragment; L 27.7 mm W 25 mm T 7.5 mm
L450	600N-200E	Flake fragment	Ploughzone	3	Onondaga	
L451	600N-210E	Flake fragment	Ploughzone	1	Onondaga	
L452	600N-210E	Shatter	Ploughzone	4	Onondaga	
L453	610N-180E	Secondary knapping flake	Ploughzone	1	Onondaga	
L454	610N-190E	Flake fragment	Ploughzone	2	Onondaga	
L455	610N-200E	Secondary knapping flake	Ploughzone	5	Onondaga	
L456	610N-200E	Secondary retouch flake	Ploughzone	2	Onondaga	
L457	610N-200E	Shatter	Ploughzone	2	Onondaga	
L458	610N-200E	Flake fragment	Ploughzone	8	Onondaga	
L459	610N-210E	Primary thinning flake	Ploughzone	1	Onondaga	
L46	Surface	Biface fragment	Ploughzone	1	Onondaga	Semi-refined, rounded basal fragment; L 23.8 mm W 21.5 mm T 5.1 mm
L460	610N-210E	Secondary knapping flake	Ploughzone	1	Haldimand	
L461	610N-210E	Secondary knapping flake	Ploughzone	3	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L462	610N-210E	Secondary retouch flake	Ploughzone	1	Onondaga	
L463	610N-210E	Shatter	Ploughzone	2	Onondaga	
L464	610N-210E	Flake fragment	Ploughzone	5	Onondaga	
L465	620N-170E	Secondary knapping flake	Ploughzone	1	Onondaga	
L465	465N-195E	Shatter	Ploughzone	3	Onondaga	
L466	620N-170E	Shatter	Ploughzone	4	Onondaga	
L467	620N-180E	Shatter	Ploughzone	1	Onondaga	
L468	620N-190E	Flake fragment	Ploughzone	5	Onondaga	
L469	620N-200E	Flake fragment	Ploughzone	2	Onondaga	
L47	Surface	Biface fragment	Ploughzone	1	Onondaga	Semi-refined fragment; L 25.2 mm W 19.9 mm T 8.5 mm
L470	620N-210E	Shatter	Ploughzone	1	Onondaga	
L471	620N-210E	Flake fragment	Ploughzone	3	Onondaga	
L472	630N-170E	Secondary knapping flake	Ploughzone	1	Onondaga	
L473	630N-170E	Shatter	Ploughzone	1	Onondaga	Modified along one ventral margin
L474	630N-180E	Shatter	Ploughzone	9	Onondaga	
L475	630N-180E	Secondary knapping flake	Ploughzone	1	Onondaga	
L476	630N-180E	Primary thinning flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L477	630N-180E	Flake fragment	Ploughzone	3	Onondaga	
L478	630N-190E	Secondary knapping flake	Ploughzone	2	Onondaga	
L479	630N-190E	Shatter	Ploughzone	3	Onondaga	
L48	Surface	Biface fragment	Ploughzone	1	Onondaga	Semi-refined/medium stage fragment; L 22.5 mm W 31.5 mm T 7 mm
L480	640N-190E	Shatter	Ploughzone	1	Onondaga	
L481	640N-180E	Shatter	Ploughzone	1	Onondaga	
L482	640N-200E	Shatter	Ploughzone	2	Onondaga	
L483	650N-190E	Shatter	Ploughzone	2	Onondaga	
L484	650N-200E	Shatter	Ploughzone	1	Onondaga	
L485	Surface	Projectile point fragment	Ploughzone	1	Onondaga	Innes; Late Archaic Innes point, missing tip; L 26.2 mm W 21.9 mm T 5.7 mm
L486	330N-270E	Flake fragment	Ploughzone	1	Onondaga	
L487	330N-270E	Shatter	Ploughzone	1	Onondaga	
L488	340N-270E	Shatter	Ploughzone	1	Onondaga	
L489	350N-230E	Shatter	Ploughzone	3	Onondaga	
L49	Surface	Biface fragment	Ploughzone	1	Onondaga	Refined/late stage concave basal fragment; L 17.5 mm W 18.9 mm T 4.7 mm
L490	350N-230E	Flake fragment	Ploughzone	1	Onondaga	
L491	350N-270E	Secondary knapping flake	Ploughzone	6	Onondaga	
L492	350N-270E	Secondary retouch flake	Ploughzone	2	Onondaga	
L493	350N-270E	Shatter	Ploughzone	4	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L494	350N-270E	Flake fragment	Ploughzone	6	Onondaga	
L495	360N-270E	Secondary knapping flake	Ploughzone	2	Onondaga	
L496	360N-270E	Flake fragment	Ploughzone	1	Onondaga	
L497	375N-225E	Secondary knapping flake	Ploughzone	1	Onondaga	
L498	375N-225E	Flake fragment	Ploughzone	3	Onondaga	
L499	375N-235E	Secondary knapping flake	Ploughzone	3	Onondaga	
L50	Surface	Biface fragment	Ploughzone	1	Kettle point	Crude/early stage fragment; L 28.4 mm W 28.8 mm T 10.1 mm
L500	375N-235E	Shatter	Ploughzone	2	Onondaga	
L501	375N-235E	Flake fragment	Ploughzone	2	Onondaga	
L502	375N-235E	Core/Core fragment	Ploughzone	1	Onondaga	
L503	375N-255E	Secondary knapping flake	Ploughzone	8	Onondaga	
L504	375N-255E	Secondary retouch flake	Ploughzone	5	Onondaga	
L505	375N-255E	Shatter	Ploughzone	17	Onondaga	
L506	375N-255E	Flake fragment	Ploughzone	15	Onondaga	
L507	385N-255E	Flake fragment	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L508	395N-225E	Secondary knapping flake	Ploughzone	1	Onondaga	
L509	395N-225E	Secondary retouch flake	Ploughzone	3	Onondaga	
L51	Surface	End scraper	Ploughzone	1	Onondaga	End scraper w/modification along one ventral margin, damaged dorsal face; L 33 mm W 17 mm T 9 mm
L510	395N-225E	Shatter	Ploughzone	1	Onondaga	
L511	395N-225E	Flake fragment	Ploughzone	5	Onondaga	
L512	395N-235E	Secondary retouch flake	Ploughzone	1	Onondaga	
L513	395N-245E	Secondary knapping flake	Ploughzone	1	Onondaga	
L514	395N-245E	Secondary retouch flake	Ploughzone	1	Onondaga	
L515	395N-245E	Flake fragment	Ploughzone	4	Onondaga	
L516	395N-245E	Biface fragment	Ploughzone	1	Onondaga	Thin, refined fragment; L 19.6 mm W 19.9 mm T 3.3 mm
L517	395N-255E	Secondary knapping flake	Ploughzone	1	Onondaga	
L518	395N-255E	Shatter	Ploughzone	1	Onondaga	
L519	395N-255E	Flake fragment	Ploughzone	1	Onondaga	
L52	Surface	Biface fragment	Ploughzone	1	Onondaga	Semi-refined fragment; L 21.2 mm W 14.7 mm T 5.5 mm

Cat #	Context	Type	Stratum	Qty	Material	Notes
L520	405N-225E	Secondary knapping flake	Ploughzone	1	Onondaga	
L521	405N-225E	Flake fragment	Ploughzone	5	Onondaga	
L523	405N-235E	Secondary knapping flake	Ploughzone	1	Onondaga	
L524	405N-235E	Shatter	Ploughzone	5	Onondaga	
L525	405N-235E	Flake fragment	Ploughzone	2	Onondaga	
L526	405N-245E	Secondary knapping flake	Ploughzone	3	Onondaga	
L527	405N-245E	Secondary retouch flake	Ploughzone	1	Onondaga	
L528	405N-245E	Shatter	Ploughzone	2	Onondaga	
L529	405N-245E	Flake fragment	Ploughzone	2	Onondaga	
L53	Surface	Primary reduction flake	Ploughzone	1	Onondaga	Modified along entire ventral circumference
L530	405N-245E	Biface fragment	Ploughzone	1	Onondaga	Edge fragment; L 19 mm W 16.8 mm T 4.2 mm
L531	415N-215E	Secondary retouch flake	Ploughzone	1	Onondaga	
L532	415N-215E	Shatter	Ploughzone	3	Onondaga	
L533	415N-225E	Core/Core fragment	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L534	415N-225E	Secondary knapping flake	Ploughzone	1	Onondaga	
L535	415N-225E	Secondary retouch flake	Ploughzone	2	Onondaga	
L536	415N-225E	Shatter	Ploughzone	11	Onondaga	
L537	415N-235E	Secondary knapping flake	Ploughzone	4	Onondaga	
L538	415N-235E	Shatter	Ploughzone	3	Onondaga	
L539	415N-235E	Flake fragment	Ploughzone	4	Onondaga	
L54	Surface	Secondary knapping flake	Ploughzone	1	Onondaga	Modified along one ventral margin
L540	415N-255E	Secondary knapping flake	Ploughzone	1	Onondaga	
L541	415N-255E	Secondary retouch flake	Ploughzone	2	Onondaga	
L542	415N-255E	Shatter	Ploughzone	1	Onondaga	
L543	415N-255E	Flake fragment	Ploughzone	4	Onondaga	
L544	425N-215E	Secondary knapping flake	Ploughzone	1	Onondaga	
L545	425N-215E	Secondary retouch flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L546	425N-225E	Secondary knapping flake	Ploughzone	1	Onondaga	
L547	425N-225E	Secondary retouch flake	Ploughzone	1	Onondaga	
L548	425N-225E	Shatter	Ploughzone	3	Onondaga	
L549	425N-225E	Flake fragment	Ploughzone	3	Onondaga	
L55	Surface	Secondary knapping flake	Ploughzone	1	Onondaga	Modified along one ventral margin
L550	425N-235E	Secondary retouch flake	Ploughzone	2	Onondaga	
L551	425N-235E	Shatter	Ploughzone	1	Kettle point	
L552	425N-235E	Shatter	Ploughzone	3	Onondaga	
L553	425N-235E	Flake fragment	Ploughzone	3	Onondaga	
L554	435N-215E	Shatter	Ploughzone	5	Onondaga	
L555	435N-215E	Flake fragment	Ploughzone	1	Onondaga	
L556	440N-180E	Shatter	Ploughzone	1	Onondaga	
L557	440N-270E	Flake fragment	Ploughzone	1	Onondaga	
L558	445N-205E	Flake fragment	Ploughzone	1	Onondaga	
L559	445N-205E	Shatter	Ploughzone	1	Onondaga	
L56	Surface	Primary thinning flake	Ploughzone	54	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L560	445N-215E	Secondary knapping flake	Ploughzone	1	Onondaga	
L561	445N-215E	Secondary retouch flake	Ploughzone	1	Onondaga	
L562	445N-215E	Shatter	Ploughzone	2	Onondaga	
L563	450N-260E	Flake fragment	Ploughzone	1	Onondaga	
L564	455N-195E	Secondary knapping flake	Ploughzone	1	Onondaga	
L565	455N-195E	Secondary retouch flake	Ploughzone	4	Onondaga	
L566	455N-195E	Shatter	Ploughzone	5	Onondaga	
L567	455N-195E	Flake fragment	Ploughzone	7	Onondaga	
L568	455N-205E	Biface fragment	Ploughzone	1	Onondaga	Small, refined, concave basal fragment, possible point fragment; L 8.1 mm W 16.5 mm T 3.9 mm
L569	455N-205E	Secondary retouch flake	Ploughzone	1	Onondaga	
L57	Surface	Secondary knapping flake	Ploughzone	151	Onondaga	
L570	455N-215E	Flake fragment	Ploughzone	2	Onondaga	
L571	460N-270E	Shatter	Ploughzone	1	Onondaga	
L573	465N-195E	Flake fragment	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L574	465N-205E	Biface fragment	Ploughzone	1	Onondaga	Semi-refined basal fragment, straight base; L 23 mm W 28.8 mm T 5.7 mm
L575	465N-205E	Secondary knapping flake	Ploughzone	2	Onondaga	
L576	465N-205E	Shatter	Ploughzone	2	Onondaga	
L577	465N-205E	Shatter	Ploughzone	1	Bois blanc	
L578	465N-205E	Flake fragment	Ploughzone	4	Onondaga	
L579	465N-215E	Secondary knapping flake	Ploughzone	7	Onondaga	
L58	Surface	Secondary retouch flake	Ploughzone	38	Onondaga	
L580	465N-215E	Secondary retouch flake	Ploughzone	1	Onondaga	
L581	465N-215E	Shatter	Ploughzone	3	Onondaga	
L582	465N-215E	Flake fragment	Ploughzone	4	Onondaga	
L583	470N-170E	Shatter	Ploughzone	1	Onondaga	
L584	470N-170E	Secondary knapping flake	Ploughzone	1	Onondaga	
L585	470N-170E	Secondary retouch flake	Ploughzone	1	Onondaga	
L586	470N-170E	Shatter	Ploughzone	3	Onondaga	
L587	470N-170E	Flake fragment	Ploughzone	3	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L588	470N-250E	Secondary retouch flake	Ploughzone	2	Onondaga	
L589	470N-250E	Flake fragment	Ploughzone	1	Onondaga	
L59	Surface	Flake fragment	Ploughzone	339	Onondaga	
L590	470N-260E	Secondary retouch flake	Ploughzone	1	Onondaga	
L591	475N-205E	Secondary knapping flake	Ploughzone	2	Onondaga	
L592	475N-205E	Flake fragment	Ploughzone	2	Onondaga	
L593	475N-215E	Secondary knapping flake	Ploughzone	7	Onondaga	
L594	475N-215E	Secondary retouch flake	Ploughzone	7	Onondaga	
L595	475N-215E	Shatter	Ploughzone	7	Onondaga	
L596	475N-215E	Flake fragment	Ploughzone	22	Onondaga	
L597	480N-170E	Secondary knapping flake	Ploughzone	1	Onondaga	
L598	480N-170E	Shatter	Ploughzone	1	Onondaga	
L599	480N-170E	Flake fragment	Ploughzone	2	Onondaga	
L60	Surface	Shatter	Ploughzone	382	Onondaga	
L600	480N-160E	Flake fragment	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L601	480N-250E	Secondary retouch flake	Ploughzone	1	Onondaga	
L602	485N-215E	Biface fragment	Ploughzone	1	Onondaga	Refined edge fragment; L 21.3 mm W 5.1 mm T 3 mm
L603	485N-215E	Shatter	Ploughzone	3	Onondaga	
L604	485N-215E	Flake fragment	Ploughzone	1	Onondaga	
L605	500N-150E	Projectile point fragment	Ploughzone	1	Bois blanc	Elongated, narrow, thin tip; L 20 mm W 10.5 mm T 3.9 mm
L606	505N-155E	Flake fragment	Ploughzone	1	Onondaga	
L607	505N-225E	Secondary knapping flake	Ploughzone	1	Onondaga	
L608	505N-225E	Flake fragment	Ploughzone	1	Onondaga	
L609	510N-160E	Flake fragment	Ploughzone	2	Onondaga	
L61	Surface	Secondary knapping flake	Ploughzone	1	Unknown	Light grey w/white mottling, waxy, translucent
L610	510N-160E	Shatter	Ploughzone	6	Onondaga	
L611	515N-195E	Secondary knapping flake	Ploughzone	3	Onondaga	
L612	515N-195E	Secondary retouch flake	Ploughzone	1	Onondaga	
L613	515N-195E	Secondary retouch flake	Ploughzone	1	Bois blanc	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L614	515N-195E	Shatter	Ploughzone	2	Onondaga	
L615	515N-195E	Flake fragment	Ploughzone	3	Onondaga	
L616	515N-195E	Flake fragment	Ploughzone	1	Bois blanc	
L617	515N-205E	Secondary knapping flake	Ploughzone	1	Onondaga	
L618	515N-205E	Secondary retouch flake	Ploughzone	3	Onondaga	
L619	515N-205E	Shatter	Ploughzone	3	Onondaga	
L62	Surface	Secondary knapping flake	Ploughzone	1	Kettle point	Shaping flake
L620	515N-205E	Flake fragment	Ploughzone	10	Onondaga	
L621	525N-185E	Primary thinning flake	Ploughzone	1	Onondaga	
L622	525N-185E	Secondary knapping flake	Ploughzone	2	Onondaga	
L623	525N-185E	Secondary retouch flake	Ploughzone	3	Onondaga	
L624	525N-185E	Shatter	Ploughzone	3	Onondaga	
L625	525N-185E	Flake fragment	Ploughzone	5	Onondaga	
L626	525N-195E	Biface fragment	Ploughzone	1	Onondaga	Semi-refined medial fragment; L 21.2 mm W 25 mm T 7.2 mm

Cat #	Context	Type	Stratum	Qty	Material	Notes
L627	525N-195E	Secondary knapping flake	Ploughzone	7	Onondaga	
L628	525N-195E	Secondary retouch flake	Ploughzone	11	Onondaga	
L629	525N-195E	Shatter	Ploughzone	9	Onondaga	
L63	Surface	Primary thinning flake	Ploughzone	1	Kettle point	
L630	525N-195E	Flake fragment	Ploughzone	19	Onondaga	
L631	525N-205E	Secondary knapping flake	Ploughzone	3	Onondaga	
L632	525N-205E	Secondary retouch flake	Ploughzone	2	Onondaga	
L633	525N-205E	Shatter	Ploughzone	6	Onondaga	
L634	525N-205E	Flake fragment	Ploughzone	6	Onondaga	
L635	530N-130E	Secondary knapping flake	Ploughzone	1	Onondaga	
L636	530N-230E	Flake fragment	Ploughzone	1	Onondaga	
L637	535N-195E	Primary thinning flake	Ploughzone	1	Onondaga	
L638	535N-195E	Secondary knapping flake	Ploughzone	2	Onondaga	
L639	535N-195E	Shatter	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L64	Surface	Flake fragment	Ploughzone	1	Bois blanc	
L640	535N-195E	Flake fragment	Ploughzone	3	Onondaga	
L641	535N-195E	Flake fragment	Ploughzone	1	Onondaga	Modified along one ventral margin
L642	535N-205E	Secondary knapping flake	Ploughzone	1	Onondaga	
L643	535N-205E	Shatter	Ploughzone	1	Onondaga	
L644	535N-205E	Flake fragment	Ploughzone	3	Onondaga	
L645	540N-220E	Flake fragment	Ploughzone	3	Onondaga	
L646	540N-160E	Bipolar flake	Ploughzone	1	Onondaga	
L647	545N-185E	Flake fragment	Ploughzone	2	Onondaga	
L648	550N-170E	Flake fragment	Ploughzone	1	Onondaga	
L649	550N-220E	Secondary knapping flake	Ploughzone	1	Onondaga	
L65	350N-240E	Flake fragment	Ploughzone	1	Onondaga	
L650	560N-150E	Flake fragment	Ploughzone	2	Onondaga	
L651	560N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L652	565N-185E	Shatter	Ploughzone	2	Onondaga	
L653	570N-160E	Secondary knapping flake	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L654	570N-160E	Shatter	Ploughzone	1	Onondaga	
L655	570N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L656	570N-220E	Flake fragment	Ploughzone	1	Onondaga	
L657	570N-230E	Biface fragment	Ploughzone	1	Onondaga	Refined, straight base, possible point fragment; L 9.8 mm W 21.7 mm T 3.6 mm
L658	575N-185E	Shatter	Ploughzone	5	Onondaga	
L659	575N-185E	Flake fragment	Ploughzone	1	Onondaga	
L66	350N-240E	Shatter	Ploughzone	1	Onondaga	
L660	575N-195E	Secondary knapping flake	Ploughzone	1	Onondaga	
L661	575N-195E	Shatter	Ploughzone	5	Onondaga	
L662	575N-195E	Flake fragment	Ploughzone	3	Onondaga	
L663	575N-195E	Scraper	Ploughzone	1	Onondaga	Thumbnail scraper; L 19.8 mm W 17.5 mm T 7 mm
L664	575N-195E	Biface fragment	Ploughzone	1	Selkirk	Large, refined tip, possible point fragment; L 25.1 mm W 26 mm T 7 mm
L665	575N-205E	Flake fragment	Ploughzone	1	Onondaga	
L666	575N-205E	Secondary retouch flake	Ploughzone	1	Onondaga	
L667	575N-205E	Shatter	Ploughzone	3	Onondaga	
L668	580N-170E	Shatter	Ploughzone	1	Onondaga	
L669	580N-210E	Flake fragment	Ploughzone	2	Onondaga	
L67	350N-250E	Flake fragment	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L670	585N-195E	Flake fragment	Ploughzone	4	Onondaga	
L671	585N-195E	Secondary knapping flake	Ploughzone	3	Onondaga	
L672	585N-195E	Secondary retouch flake	Ploughzone	2	Onondaga	
L673	585N-195E	Shatter	Ploughzone	5	Onondaga	
L674	590N-160E	Secondary knapping flake	Ploughzone	1	Onondaga	Modified along a portion of one lower ventral margin and a portion of one upper dorsal margin
L675	590N-160E	Secondary retouch flake	Ploughzone	1	Onondaga	
L676	590N-160E	Shatter	Ploughzone	2	Onondaga	
L677	595N-205E	Secondary knapping flake	Ploughzone	1	Onondaga	
L678	595N-205E	Shatter	Ploughzone	3	Onondaga	
L679	600N-180E	Shatter	Ploughzone	1	Onondaga	
L68	350N-260E	Secondary retouch flake	Ploughzone	3	Onondaga	
L680	605N-195E	Shatter	Ploughzone	5	Onondaga	
L681	605N-195E	Flake fragment	Ploughzone	1	Onondaga	
L682	605N-205E	Biface fragment	Ploughzone	1	Onondaga	Crude fragment; L 24.6 mm W 23 mm T 8 mm
L683	605N-205E	Flake fragment	Ploughzone	3	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L684	605N-205E	Secondary retouch flake	Ploughzone	2	Onondaga	
L685	605N-205E	Shatter	Ploughzone	7	Onondaga	
L686	610N-160E	Flake fragment	Ploughzone	1	Onondaga	
L687	610N-220E	Shatter	Ploughzone	1	Onondaga	
L688	615N-195E	Secondary retouch flake	Ploughzone	1	Onondaga	
L689	615N-205E	Secondary knapping flake	Ploughzone	1	Onondaga	
L69	350N-260E	Shatter	Ploughzone	4	Onondaga	
L690	615N-205E	Secondary retouch flake	Ploughzone	3	Onondaga	
L691	615N-205E	Flake fragment	Ploughzone	3	Onondaga	
L692	625N-175E	Flake fragment	Ploughzone	2	Onondaga	
L693	625N-175E	Shatter	Ploughzone	5	Onondaga	
L694	625N-185E	Biface fragment	Ploughzone	1	Onondaga	Refined edge fragment; L 16.5 mm W 12.5 mm T 4.8 mm
L695	625N-185E	Shatter	Ploughzone	3	Onondaga	
L696	625N-185E	Flake fragment	Ploughzone	1	Onondaga	
L697	630N-150E	Secondary retouch flake	Ploughzone	1	Onondaga	
L698	635N-175E	Flake fragment	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L699	635N-175E	Secondary knapping flake	Ploughzone	2	Onondaga	
L70	350N-260E	Flake fragment	Ploughzone	3	Onondaga	
L700	635N-185E	Flake fragment	Ploughzone	2	Onondaga	
L701	635N-185E	Shatter	Ploughzone	1	Onondaga	
L702	650N-150E	Flake fragment	Ploughzone	2	Onondaga	
L703	650N-160E	Secondary retouch flake	Ploughzone	1	Onondaga	
L704	695N-180E	Flake fragment	Ploughzone	1	Onondaga	
L71	360N-220E	Secondary knapping flake	Ploughzone	1	Onondaga	
L710	Surface	Core trimming flake	Ploughzone	1	Onondaga	
L711	Surface	Primary thinning flake	Ploughzone	1	Onondaga	
L712	Surface	Secondary knapping flake	Ploughzone	50	Onondaga	
L713	Surface	Secondary retouch flake	Ploughzone	22	Onondaga	
L714	Surface	Flake fragment	Ploughzone	147	Onondaga	
L715	Surface	Shatter	Ploughzone	2	Trent Valley	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L716	Surface	Secondary knapping flake	Ploughzone	1	Bois blanc	
L717	Surface	Primary thinning flake	Ploughzone	1	Lockport	
L718	Surface	Secondary knapping flake	Ploughzone	2	Lockport	
L719	Surface	Flake fragment	Ploughzone	13	Lockport	
L72	360N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L720	Surface	Flake fragment	Ploughzone	2	Bois blanc	
L721	Surface	Shatter	Ploughzone	2	Onondaga	
L722	Surface	Core/Core fragment	Ploughzone	1	Onondaga	prob. exhausted core frag.
L723	Surface	Secondary knapping flake	Ploughzone	1	Onondaga	dorsal, lateral retouch
L724	Surface	Flake fragment	Ploughzone	1	Onondaga	pronounced dorsal, lateral retouch creating scraper edge
L725	Surface	Flake fragment	Ploughzone	1	Onondaga	ventral, lateral retouch
L726	Surface	Secondary knapping flake	Ploughzone	1	Onondaga	ventral, lateral retouch
L727	Surface	Flake fragment	Ploughzone	1	Onondaga	pronounced retouch along 1 margin
L728	Surface	Flake fragment	Ploughzone	1	Onondaga	ret./ utiliz. on distal margin

Cat #	Context	Type	Stratum	Qty	Material	Notes
L729	Surface	Flake fragment	Ploughzone	1	Onondaga	utiliz./ret. on ventral, lateral margin
L73	360N-220E	Shatter	Ploughzone	2	Onondaga	
L730	Surface	Flake fragment	Ploughzone	1	Onondaga	bilateral retouch on ventral and dorsal surfaces
L731	Surface	Secondary knapping flake	Ploughzone	1	Onondaga	ventral lateral retouch and possible distal margin retouch
L732	Surface	Flake fragment	Ploughzone	1	Onondaga	dorsal lateral and proximal margin retouch; possible graver tip
L733	Surface	Wedge	Ploughzone	1	Onondaga	square-shaped flake fragment with flaking from opposing ends; L 23 mm W 22 mm T 7 mm
L734	Surface	Biface	Ploughzone	1	Onondaga	semi-refined triangular biface; L 50 mm W 40 mm T 12 mm
L735	Surface	Biface fragment	Ploughzone	1	Onondaga	unrefined; L 31 mm W 19 mm T 13 mm
L736	Surface	Biface	Ploughzone	1	Onondaga	thin; semi-refined; L 24 mm W 18 mm T 6 mm
L737	Surface	Biface fragment	Ploughzone	1	Onondaga	refined; L 18 mm W 13 mm T 4 mm
L738	Surface	Biface fragment	Ploughzone	1	Onondaga	L 15 mm W 13 mm T 4 mm
L739	Surface	Biface fragment	Ploughzone	1	Lockport	semi-refined; L 31 mm W 19 mm T 10 mm
L74	360N-220E	Flake fragment	Ploughzone	3	Onondaga	
L740	Surface	Projectile point fragment	Ploughzone	1	Onondaga	stemmed or notched base; L 9 mm W 22 mm T 5 mm
L741	Surface	Wedge	Ploughzone	1	Bois blanc	damage at opposing ends and evidence of flake removals ; L 38 mm W 30 mm T 11 mm
L742	Surface	Chunk/Cobble	Ploughzone	1	Lockport	weathered rounded margins ; L 79 mm W 42 mm T 30 mm

Cat #	Context	Type	Stratum	Qty	Material	Notes
L743	Surface	End scraper	Ploughzone	1	Onondaga	bifacial; steep distal retouch on dorsal surface and deep ventral retouch from both lateral margins ; L 32 mm W 22 mm T 7 mm
L744	Surface	Biface	Ploughzone	1	Lockport	refined; tapered to proximal end; full bifacial flaking; beveled on one margin; L 35 mm W 21 mm T 9 mm
L745	Surface	Biface fragment	Ploughzone	1	Onondaga	tip; dorsal retouch; L 20 mm W 21 mm T 6 mm
L746	Surface	Projectile point fragment	Ploughzone	1	Kettle point	Crawford Knoll; partial base and midsection of small corner-notched pt.- prob. Late Archaic Crawford Knoll; retouched lateral margins; prob. ; L 21 mm W 20 mm T 4 mm
L747	Surface	Projectile point	Ploughzone	1	Lockport	side-notched; straight base; base width = 20 mm, notch width = 8 mm depth = 3 mm; L 37 mm W 20 mm T 7 mm
L75	360N-230E	Biface fragment	Ploughzone	1	Onondaga	Refined/late stage, thin basal fragment; L 16 mm W 15.5 mm T 4 mm
L76	360N-230E	Secondary knapping flake	Ploughzone	3	Onondaga	
L77	360N-230E	Flake fragment	Ploughzone	1	Onondaga	
L78	360N-240E	Secondary knapping flake	Ploughzone	1	Onondaga	
L79	360N-240E	Secondary retouch flake	Ploughzone	1	Onondaga	
L80	360N-250E	Secondary retouch flake	Ploughzone	1	Onondaga	
L81	360N-250E	Shatter	Ploughzone	2	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L818	340N-250E	Secondary retouch flake	Ploughzone	1	Onondaga	
L819	340N-250E	Secondary knapping flake	Ploughzone	1	Onondaga	
L82	360N-250E	Flake fragment	Ploughzone	1	Onondaga	
L820	340N-250E	Flake fragment	Ploughzone	2	Onondaga	
L821	340N-260E	Secondary knapping flake	Ploughzone	1	Onondaga	dorsal retouch at distal end
L822	340N-260E	Secondary retouch flake	Ploughzone	4	Onondaga	
L823	340N-260E	Flake fragment	Ploughzone	9	Onondaga	
L824	340N-260E	Flake fragment	Ploughzone	2	Bois blanc	
L825	340N-265E	Secondary knapping flake	Ploughzone	2	Onondaga	
L826	340N-265E	Flake fragment	Ploughzone	8	Onondaga	
L827	340N-265E	Flake fragment	Ploughzone	1	Lockport	
L828	340N-265E	Secondary retouch flake	Ploughzone	2	Onondaga	
L829	340N-265E	Flake fragment	Ploughzone	1	Kettle point	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L83	360N-260E	Secondary knapping flake	Ploughzone	2	Onondaga	
L830	340N-265E	Flake fragment	Ploughzone	1	Trent Valley	
L831	340N-270E	Flake fragment	Ploughzone	1	Onondaga	
L832	340N-275E	Flake fragment	Ploughzone	1	Bois blanc	
L833	345N-260E	Secondary knapping flake	Ploughzone	3	Onondaga	
L834	345N-260E	Secondary retouch flake	Ploughzone	1	Onondaga	
L835	345N-260E	Secondary retouch flake	Ploughzone	1	Lockport	
L836	345N-260E	Flake fragment	Ploughzone	8	Onondaga	
L837	345N-265E	Secondary knapping flake	Ploughzone	5	Onondaga	
L838	345N-265E	Secondary knapping flake	Ploughzone	1	Onondaga	utiliz./ ret. on distal margin
L839	345N-265E	Secondary retouch flake	Ploughzone	3	Onondaga	
L84	360N-260E	Shatter	Ploughzone	3	Onondaga	
L840	345N-265E	Secondary retouch flake	Ploughzone	1	Kettle point	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L841	345N-265E	Secondary retouch flake	Ploughzone	2	Lockport	
L842	345N-265E	Flake fragment	Ploughzone	1	Lockport	
L843	345N-265E	Shatter	Ploughzone	1	Trent Valley	
L844	345N-265E	Flake fragment	Ploughzone	16	Onondaga	
L845	345N-265E	Biface fragment	Ploughzone	1	Onondaga	frag. with bifacial flaking; L 26 mm W 17 mm T 8 mm
L846	345N-270E	Secondary knapping flake	Ploughzone	4	Onondaga	
L847	345N-270E	Secondary knapping flake	Ploughzone	1	Onondaga	pronounced retouch on ventral, lateral margin
L848	345N-270E	Secondary retouch flake	Ploughzone	6	Onondaga	
L849	345N-270E	Flake fragment	Ploughzone	13	Onondaga	
L85	360N-260E	Flake fragment	Ploughzone	3	Onondaga	
L850	345N-275E	Secondary knapping flake	Ploughzone	2	Onondaga	
L851	345N-275E	Secondary retouch flake	Ploughzone	1	Onondaga	
L852	345N-275E	Flake fragment	Ploughzone	2	Onondaga	
L853	345N-275E	Flake fragment	Ploughzone	1	Bois blanc	
L854	345N-275E	Flake fragment	Ploughzone	1	Onondaga	retouched along 1 margin- poss. Wedge

Cat #	Context	Type	Stratum	Qty	Material	Notes
L855	350N-265E	Flake fragment	Ploughzone	1	Kettle point	
L856	350N-275E	Secondary retouch flake	Ploughzone	3	Onondaga	
L857	350N-275E	Flake fragment	Ploughzone	1	Trent Valley	
L858	355N-265E	Secondary knapping flake	Ploughzone	1	Onondaga	
L859	355N-265E	Flake fragment	Ploughzone	2	Onondaga	
L86	370N-220E	Secondary knapping flake	Ploughzone	3	Onondaga	
L860	355N-270E	Secondary knapping flake	Ploughzone	1	Onondaga	
L861	355N-270E	Secondary retouch flake	Ploughzone	2	Onondaga	
L862	355N-275E	Flake fragment	Ploughzone	1	Lockport	
L863	355N-275E	Secondary retouch flake	Ploughzone	1	Onondaga	
L864	360N-260E	Secondary knapping flake	Ploughzone	1	Trent Valley	
L865	360N-260E	Flake fragment	Ploughzone	1	Trent Valley	
L866	360N-260E	Flake fragment	Ploughzone	1	Onondaga	

Cat #	Context	Type	Stratum	Qty	Material	Notes
L866	360N-260E	Secondary retouch flake	Ploughzone	3	Onondaga	
L87	370N-220E	Secondary retouch flake	Ploughzone	1	Onondaga	
L88	370N-220E	Flake fragment	Ploughzone	3	Onondaga	
L89	370N-220E	Flake fragment	Ploughzone	1	Bois blanc	
L90	370N-230E	Flake fragment	Ploughzone	1	Onondaga	
L91	370N-230E	Secondary knapping flake	Ploughzone	1	Onondaga	
L92	370N-230E	Secondary retouch flake	Ploughzone	2	Onondaga	
L93	370N-230E	Shatter	Ploughzone	10	Onondaga	
L94	370N-240E	Secondary knapping flake	Ploughzone	1	Onondaga	Modified along one dorsal margin
L95	370N-240E	Secondary retouch flake	Ploughzone	1	Onondaga	
L96	370N-240E	Shatter	Ploughzone	2	Onondaga	
L97	370N-240E	Flake fragment	Ploughzone	1	Onondaga	
L98	370N-250E	Secondary knapping flake	Ploughzone	2	Onondaga	
L99	370N-250E	Shatter	Ploughzone	2	Onondaga	

Appendix C.2 Ceramic Artifacts

Cat #	Context	Stratum	Type	Portion	Qty	Comments
P1	380N-220E	Ploughzone	Analyzable Vessel	Lip-Neck	1	TYPE: Huron Incised; MORPHOLOGY: Rim - Outflaring and Collared (Poorly-Developed and Angular); Lip - Flat; Collar Height: 19.58 mm; Max Collar Thickness: 10.62 mm; Lip Thickness: 7.05 mm; SURFACE TREATMENT: Smoothed lip; Smoothed exterior; Smoothed interior; DECORATION: Plain [Lip] over Incised Verticals [Rim] over Plain [Upper Neck]; Interior - Plain [Rim] over Plain [Neck]
P2	380N-220E	Ploughzone	Analyzable Vessel	Lip-Neck	1	TYPE: Pound Necked; MORPHOLOGY: Rim - Outflaring and Collared (Poorly-Developed and Rounded); Lip - Flat; Collar Height: 20.64 mm; Max Collar Thickness: 5.11 mm; Lip Thickness: 8.6 mm; SURFACE TREATMENT: Smoothed lip; Smoothed exterior; Smoothed interior; DECORATION: Plain [Lip] over Incised Right Hatches superimposed with Incised Right Obliques [Rim] over Incised Horizontals (x1) [Upper Neck]; Interior - Plain [Rim] over Plain [Neck]
P3	380N-220E	Ploughzone	Analyzable Sherd	Body	2	SURFACE TREATMENT: Rib Paddled exterior; Smoothed interior; DECORATION: Plain [Body]
P4	390N-230E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	7	
P5	400N-220E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P6	400N-220E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P7	400N-230E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P8	410N-220E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P9	420N-220E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P10	490N-180E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P11	370N-230E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	

Cat #	Context	Stratum	Type	Portion	Qty	Comments
P12	500N-180E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P13	500N-180E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P14	510N-170E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P15	510N-210E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P16	520N-190E	Ploughzone	Analyzable Sherd	Lip-Rim	1	MORPHOLOGY: Rim - Indeterminate (Lip - Flat; Lip Thickness: 7.88 mm; SURFACE TREATMENT: Smoothed lip; Smoothed exterior; Smoothed interior; DECORATION: Plain [Lip] over Incised Right Obliques superimposed with Incised Interrupted Horizontals [Rim]; Interior - Incised Cross-Hatched Motif [Rim]
P17	520N-190E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P18	530N-190E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	3	
P19	530N-200E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P20	570N-190E	Ploughzone	Analyzable Sherd	Neck-Shoulder	1	SURFACE TREATMENT: Smoothed exterior; Indeterminate interior; DECORATION: Stamped Crescent Verticals over Incised Horizontals (x1) [Neck] over Incised Right Obliques (Isolated) [Lower Neck] over Plain [Shoulder]
P21	570N-210E	Ploughzone	Analyzable Sherd	Body	1	SURFACE TREATMENT: Wiped exterior; Smoothed interior; DECORATION: Plain [Body]
P22	570N-210E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P23	600N-190E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P24	620N-170E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	3	

Cat #	Context	Stratum	Type	Portion	Qty	Comments
P25	630N-180E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	3	
P26	350N-270E	Ploughzone	Analyzable Sherd	Body	1	SURFACE TREATMENT: Smoothed exterior; Smoothed interior; DECORATION: Plain [Body]
P27	350N-270E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	7	
P28	375N-255E	Ploughzone	Analyzable Sherd	Body	2	SURFACE TREATMENT: Smoothed exterior; Smoothed interior; DECORATION: Plain [Body]
P29	375N-255E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	35	
P30	385N-255E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P31	395N-225E	Ploughzone	Analyzable Sherd	Rim	1	MORPHOLOGY: Rim - Indeterminate (Lip - Indeterminate; SURFACE TREATMENT: Smoothed exterior; Indeterminate interior; DECORATION: Incised Horizontals (x4) [Rim]; Interior - Indeterminate [Rim]
P32	395N-225E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	8	
P33	415N-225E	Ploughzone	Analyzable Sherd	Body	1	SURFACE TREATMENT: Wiped exterior; Smoothed interior; DECORATION: Plain [Body]
P34	415N-235E	Ploughzone	Analyzable Pipe	Mouthpiece	1	MORPHOLOGY: Stem - Indeterminate cross-section with a hole made from Reed; Mouthpiece - Reworked (Ground) shape; SURFACE TREATMENT: Smoothed; DECORATION: Plain (Undecorated) [Mouthpiece]
P35	415N-225E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	4	
P36	415N-225E	Ploughzone	Analyzable Sherd	Neck-Shoulder	1	SURFACE TREATMENT: Smoothed exterior; Smoothed interior; DECORATION: Plain [Neck] over Stamped Linear Left Obliques over Plain [Shoulder]; NOTES: Shoulder: Rounded:
P37	415N-235E	Ploughzone	Analyzable Pipe	Stem	1	MORPHOLOGY: Stem - Indeterminate cross-section with a hole made from Reed; SURFACE TREATMENT: Smoothed; DECORATION: Plain (Undecorated) [Stem]
P38	415N-235E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P39	515N-205E	Ploughzone	Analyzable Sherd	Body	1	SURFACE TREATMENT: Smoothed exterior; Smoothed interior; DECORATION: Plain [Body]

Cat #	Context	Stratum	Type	Portion	Qty	Comments
P40	515N-205E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P41	525N-205E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P42	525N-205E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P43	520N-150E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P44	525N-195E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P45	535N-195E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P46	625N-175E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P101	Ploughzone	Ploughzone	Analyzable Sherd	Lip-Rim	1	TYPE: Indeterminate; MORPHOLOGY: Rim - Indeterminate and Collared (Lip - Flat; Collar Height: 16 mm; Max Collar Thickness: 9 mm; Lip Thickness: 6 mm; SURFACE TREATMENT: Smoothed lip; Smoothed exterior; Smoothed interior; DECORATION: Plain [Lip] over Incised Opposed (Horizontal/Simple) [Rim]; Interior - Plain [Rim]
P102	Ploughzone	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P103	Ploughzone	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P104	Ploughzone	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P105	Ploughzone	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P106	345N-275E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P107	350N-265E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	

Cat #	Context	Stratum	Type	Portion	Qty	Comments
P108	350N-265E	Ploughzone	Analyzable Pipe	Stem	1	MORPHOLOGY: Stem - Indeterminate cross-section with a hole made from Reed; DECORATION: Plain (Undecorated) [Stem]; NOTES: Red ochre wash on piece
P109	345N-260E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P110	240N-265E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P111	230N-265E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	2	
P112	350N-275E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P113	355N-270E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	1	
P114	345N-265E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	45	
P115	345N-270E	Ploughzone	Unanalyzable Sherd	Fragmentary Sherd	32	
P116	345N-270E	Ploughzone	Analyzable Sherd	n/a	6	SURFACE TREATMENT: Smoothed exterior; Smoothed interior
P117	345N-270E	Ploughzone	Analyzable Vessel	Lip-Neck	1	TYPE: Lawson Opposed; MORPHOLOGY: Rim - Outflaring and Collared (Well-Developed and Angular); Lip - Flat; Collar Height: 28 mm; Max Collar Thickness: 12 mm; Lip Thickness: 6 mm; SURFACE TREATMENT: Smoothed lip; Smoothed and Wiped exterior; Smoothed interior; DECORATION: Plain [Lip] over Incised Opposed (Simple/Simple) [Rim] over Plain [Neck]; Interior - Plain [Rim]

Appendix C.3 Groundstone Artifacts

Cat	Context	Stratum	Type	Qty	Material	Complete	Notes
G1	495N-160E	Ploughzone	Indeterminate	1	Chlorite Schist	No	Miscellaneous ground stone piece appears to be bevelled along one lateral margin and ground and polished.
G2	Surface	Ploughzone	Axe	1	Chlorite Schist	No	Bit/midsection of a chlorite schist axe. Symetrical bit is chipped. Piece derived from a lateral section of the axe. Appears to be thermally altered as attested to by firecracking and oxidization.
G3	Surface	Ploughzone	Celt	1	Chlorite Schist	No	Bit/midsection of a chlorite schist celt. Appears to be a bit spall that may have detached due to impact. Surface polish.
G4	400N-230E	Ploughzone	Chisel	1	Chlorite Schist	Yes	Near complete chlorite schist chisel with chipped symetrical bit. Tapers towards the poll. Polish is restricted to the bit area suggesting that it was hafted.
G5	Surface	Ploughzone	Axe	1	Chlorite Schist	No	Bit/midsection of a chlorite schist axe. Symetrical bit is honed and polished. Piece derived from a lateral section of a large axe.
G6	Surface	Ploughzone	Axe	1	Chlorite Schist	Yes	Small chlorite schist axe. Complete except missing a portion of the poll. Symetrical bit is polished and chipped. Most of the exterior surface is polished. Thickness suggests a small axe rather than a chisel.
G7	550N-190E	Ploughzone	Hammer	1	Dolomite	Yes	Large hammer made on dolomite cobble with centrally placed grip pitting on one side and grip roughening on the obverse side. Side with the grip roughening has been ground flat. Multiple hammer facets on lateral margins.
G8	Surface	Ploughzone	Adze	1	Chlorite Schist	No	Bit/midsection of a chlorite schist adze. Asymetrical bit is chipped. Missing a portion of the lateral section of the adze and the poll.
G9	440N-200E	Ploughzone	Bead	1	Steatite	Yes	Complete tubular black steatite bead with surface polish. Perforation is bidirectional.

Appendix C.1 Faunal Artifacts

Cat #	Qty	Context	Stratum	Class	Type	Element	Thermal
F1	2	Surface	Ploughzone	Mammalia	Medium (sheep, pig, dog size)	limb	No
F2	34	Surface	Ploughzone	Mammalia	Indeterminate	indeterminate	Yes
F3	1	610N-190E	Ploughzone	Mammalia	deer, moose, or wapiti; antler only	tooth,molar,man	No
F4	1	580N-190E	Ploughzone	Mammalia	coyote, wolf, or dog	tooth,incisor	No
F5	1	410N-220E	Ploughzone	Indeterminate	Indeterminate	limb	No
F6	1	370N-230E	Ploughzone	Mammalia	Indeterminate	cranial	Yes
F7	1	380N-250E	Ploughzone	Mammalia	Indeterminate	limb	Yes
F8	1	500N-170E	Ploughzone	Mammalia	Indeterminate	indeterminate	Yes
F9	1	540N-190E	Ploughzone	Mammalia	Small (<squirrel size)	humerus	No
F10	1	600N-190E	Ploughzone	Mammalia	deer, moose, or wapiti; antler only	tooth,molar,max	No
F11	1	375N-255E	Ploughzone	Reptilia	family turtles	carapace	No
F12	1	375N-255E	Ploughzone	Aves	Indeterminate	limb	No
F13	1	375N-255E	Ploughzone	Mammalia	Indeterminate	limb	No
F14	1	395N-225E	Ploughzone	Mammalia	Medium (sheep, pig, dog size)	limb	No

Cat #	Qty	Context	Stratum	Class	Type	Element	Thermal
F15	1	490N-240E	Ploughzone	Mammalia	Indeterminate	limb	No
F16	1	530N-150E	Ploughzone	Mammalia	horse	tooth,molar	No
F17	1	535N-195E	Ploughzone	Mammalia	Indeterminate	indeterminate	No
F18	1	480N-160E	Ploughzone	Mammalia	Indeterminate	limb	No
F19	1	240N-260E	Ploughzone	Mammalia	Indeterminate	indeterminate	Yes
F20	2	240N-260E	Ploughzone	Mammalia	Indeterminate	indeterminate	No

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