PHASE II ARCHAEOLOGICAL EVALUATION

EAGLE CREEK SITE CLUSTER (33HK1008, 33HK1011, 33HK1012, 33HK1013, AND 33HK1014)
HANCOCK COUNTY FLOOD RISK REDUCTION PROGRAM
PHASE 2: EAGLE CREEK FLOOD BASIN
HANCOCK COUNTY, OHIO

APRIL 2022

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Phase II Archaeological Evaluation of the Eagle Creek Site Cluster (33HK1008, 33HK1011, 33HK1012, 33HK1013, and 33HK1014) for the Hancock County Flood Risk Reduction Program, Phase 2: Eagle Creek Flood Basin in Eagle Township (Township 1 South, Range 10 East), Hancock County, Ohio

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EXECUTIVE SUMMARY

During the fall of 2021, MSG conducted a Phase II evaluation of archaeological sites 33HK1008, 33HK1011, 3HK1012, 33HK1013, and 33HK1014 (collectively, the Eagle Creek site cluster) for the proposed Eagle Creek Flood Basin (the Project) in Hancock County, Ohio. The Project is a component of the Hancock County Flood Risk Reduction Program (HCFRRP). A Phase I archaeological survey for the Project previously completed by MSG (Julien et al. 2021) resulted in the recommendation that sites 33HK1008, 33HK1011, 33HK1012, 33HK1013 and 33HK1014 are a site cluster that may represent a single, larger site that is potentially eligible for the National Register of Historic Places (NRHP) under Criterion D for its ability to yield significant data regarding Early Archaic lifeways in northwest Ohio. The purpose of the Phase II investigation of this site cluster is to enable a formal determination of NRHP eligibility.

The research design for the Phase II investigations called for a two-staged approach. The first stage was a magnetic gradiometry survey of an area encompassing all five sites within the cluster, while the second stage was the manual excavation of selected magnetic anomalies. The magnetic gradient survey was conducted by the Applied Anthropology Laboratories at Ball State University (BSU), under the direction of Dr. Kevin Nolan. During the magnetic gradient survey, BSU observed a prominent linear anomaly traversing 33HK1008 that was interpreted as an old fence line. Additional evidence of disturbance was observed in the form of two apparent drain pipes and an apparent drainage trench excavated from the field into the woods toward Eagle Creek. However, further data processing revealed a total of 82 magnetic anomalies of potential archaeological interest. BSU then took soil cores from 33 of the anomalies; over half of the soil cores were ranked either Excellent or Good for evidence of cultural features. MSG then selected between four anomalies to test through manual excavation.

Test Unit 1 (33HK1008) revealed a pre-contact pit feature immediately below the plow zone. This feature yielded calibrated AMS date ranges of 646-585 cal BP (64.3% probability) and 567-530 cal BP (31.1% probability), both corresponding to the Late Prehistoric (Mississippian) time period (Appendix E). However, the function of this feature remains unclear as it yielded only two temporally non-diagnostic pieces of lithic debitage and 12 pieces of charcoal representing common deciduous tree species native to Ohio. Furthermore, this feature exhibited evidence of heavy disturbance from plowing and bioturbation (likely root growth). Test Unit 2 (33HK1008) was sterile. Test Unit 3 (33HK1014) yielded eight pieces of temporally non-diagnostic lithic debitage from the plow zone, while Test Unit 4 (33HK1013) yielded one temporally non-diagnostic utilized flake from the plow zone. Neither of these units contained pre-contact cultural features. Of the five site-specific research questions posed for the Eagle Creek site cluster in Section 2.3, the data collected during the Phase II investigation could only positively address one: the magnetic gradiometry survey did indicate potentially different prehistoric/historic land-use histories for 33HK1008 as opposed to sites 33HK1011-1014. However, insufficient evidence was collected to indicate that these five sites actually represent a single, larger site; no temporally diagnostic artifacts were recovered during the Phase II investigation; and no artifact types or ecofacts that could address research questions pertaining to site function(s), seasonality of occupation, or changing lithic technologies were collected.

In summary, archaeological sites 33HK1008 and 33HK1011-1014 do not appear to represent a single, larger site, and they do not appear to be eligible for the NRHP either as individual sites or as a site cluster. Therefore, no further investigation of these sites is recommended in association with the Project, and avoidance of the sites during construction should not be required.

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1.0 INTRODUCTION AND PROJECT BACKGROUND

During the fall of 2021, The Mannik & Smith Group, Inc. (MSG) conducted a Phase II evaluation of archaeological sites 33HK1008, 33HK1011, 3HK1012, 33HK1013, and 33HK1014 (collectively, the Eagle Creek site cluster) for the proposed Eagle Creek Flood Basin (the Project) in Hancock County, Ohio (Figures 1.1-1.2). The Project is a component of the Hancock County Flood Risk Reduction Program (HCFRRP). The HCFRRP is the most recent iteration of a long-term effort by a variety of local, regional and federal entities to reduce chronic flooding in the city of Findlay, Ohio due to frequent severe flood events along the Blanchard River and its tributaries in Hancock County. Currently, the HCFRRP is being led by Hancock County and the Maumee Watershed Conservancy District (MWCD), which contracted Stantec Consulting Services, Inc. (Stantec) to provide engineering and environmental permitting assistance for the program. For the purposes of this document, Hancock County, the MWCD, Stantec, and MSG will collectively be referred to as the Project Team.

A Phase I archaeological survey for the Project previously completed by MSG (Julien et al. 2021) resulted in the recommendation that sites 33HK1008, 33HK1011, 33HK1012, 33HK1013 and 33HK1014 are a site cluster that may represent a single, larger site that is potentially eligible for the National Register of Historic Places (NRHP) under Criterion D for its ability to yield significant data regarding Early Archaic lifeways in northwest Ohio. The Ohio State Historic Preservation Office (SHPO) concurred with this recommendation in a letter dated September 15, 2021. The purpose of the Phase II investigation of this site cluster is to enable a formal determination of NRHP eligibility.

This report presents the results of the Phase II investigation of the Eagle Creek site cluster. Section 2 includes the research design for the investigation, while Section 3 describes the field and laboratory methods used. Section 4 provides detailed results of the investigation, including summaries of magnetic gradiometry survey, text excavations and artifact analysis. Section 5 provides an evaluation of the site cluster against the criteria for NRHP eligibility (36 CFR 60.4), while Section 6 provides a summary of investigations and recommendations. Appendices include the magnetic gradiometry survey report; excavation unit plan and profile drawings; a photolog; an artifact catalog; the results of radiometric dating of selected cultural features; and Ohio Archaeological Inventory (OAI) forms for each site in the Eagle Creek site cluster.

Maura Johnson, M.A., is MSG's Project Manager for the HCFRRP efforts. Dr. Robert C. Chidester, RPA (who meets federal professional qualifications [36 CFR 61] as an archaeologist) served as the Principal Investigator for this Phase II testing. Ryan T. Botkin, B.S., was the Field Director; he was assisted by Project Archaeologist Elizabeth Hickle, B.S., and field technicians Jessica Devlin, Richard Francisco, P. Michael Randall, Julian Thibeau, and Conor Thomas. Artifact processing was completed by Mr. Thomas, while Botkin and Laboratory Director Julia Joblinski, B.A., cataloged and analyzed the recovered artifacts. Botkin and Chidester are the principal authors of this report. Project Archaeologist Kate Hayfield, B.S., coordinated the production of graphics and exhibits, which were created by GIS Specialist Bryan Agosti, M.A., and Project Archaeologist Athena Zissis, M.A. Dr. Chidester prepared the updated OAI forms. Karen Braxton was responsible for report formatting and production. The magnetic gradiometry survey was conducted by the Applied Anthropology Laboratories (AAL) at Ball State University (BSU); Dr. Kevin C. Nolan of the AAL prepared the report contained in Appendix A. Flotation of soil samples from selected features and identification of botanical specimens were completed by independent consultant Kathryn Parker, M.A. Carbon samples were submitted to Beta Analytic, Inc. for radiocarbon dating.

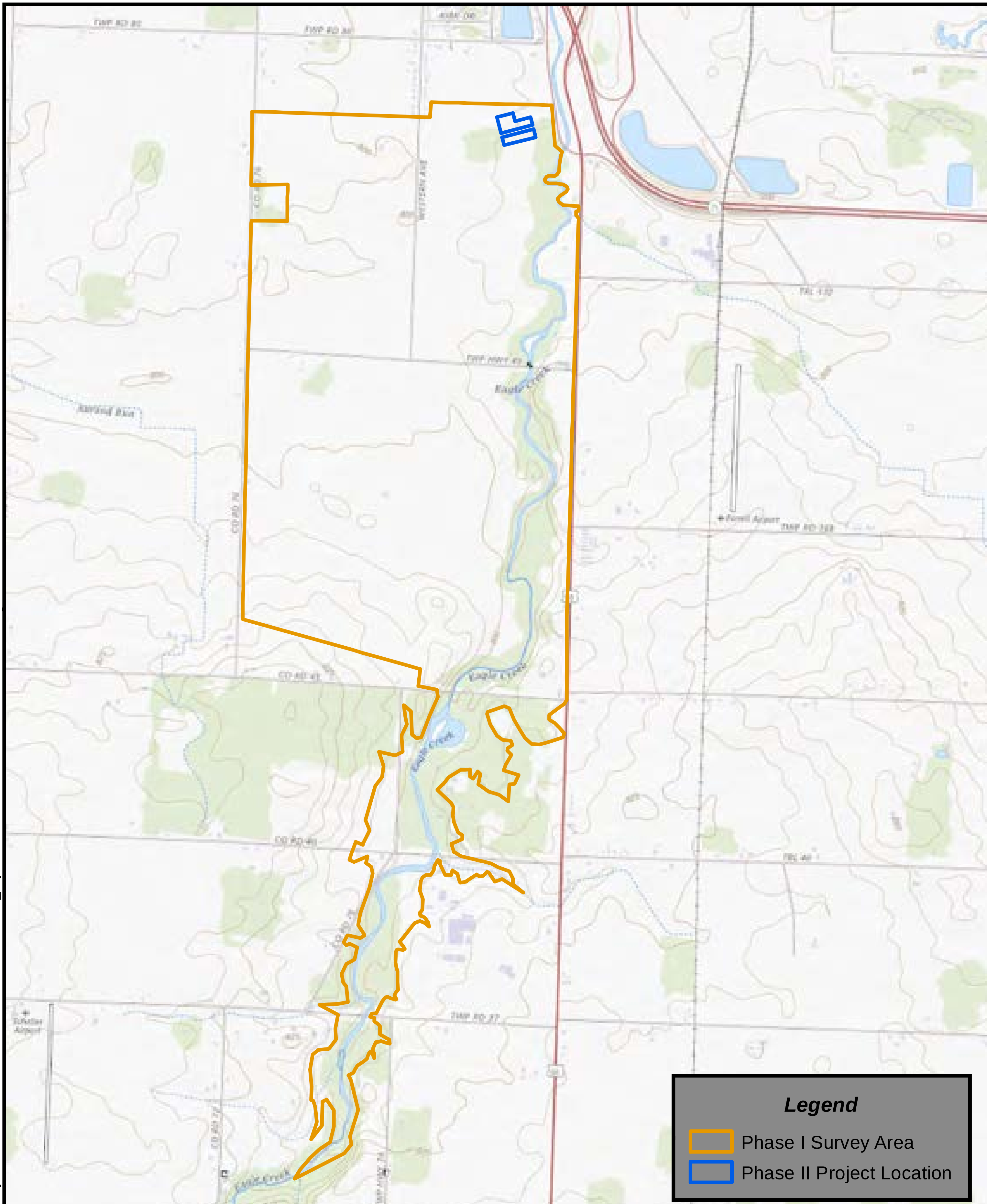

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Figure 1.1: Project Location
Eagle Creek Flood Basin
Hancock County, Ohio

Notes

USGS Quadrangle, The National Map
Arlington, OH 2019

Feet
0 **1,000** **2,000**

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2.0 RESEARCH DESIGN

2.1 Previous Investigations

As noted in Section 1.0, MSG completed a Phase I archaeological survey for the Project in April, 2021 (Julien et al. 2021). MSG surveyed a total of 920 acres (373 hectares) and identified 69 archaeological sites (designated as sites 33HK0799 and 33HK0965 through 33HK1032 in the OAI). MSG recommended that 62 of the sites were not eligible for the NRHP, but that seven of the sites (divided into two site clusters) were potentially eligible and should either be avoided or formally evaluated for NRHP eligibility. The Project Team has been able to adjust the project design so as to reduce impacts to the Byal site cluster (consisting of sites 33HK0991 and 33HK0992), and the SHPO has approved a program of archaeological monitoring during construction for these two sites. However, adjusting the project design to avoid impacts to the Eagle Creek site cluster was not possible. Section 2.1.1 provides a summary of the Phase I survey results for the Eagle Creek site cluster. Section 2.2 provides an overview of significant research domains in the archaeology of northwest Ohio, while Section 2.3 presents several site-specific research questions for the Eagle Creek site cluster.

2.1.1 Phase I Survey Results for the Eagle Creek Site Cluster

All five sites in the Eagle Creek site cluster are prehistoric sites. Site 33HK1008 is [location redacted]. A total of 22 artifacts were collected from this site during the Phase I survey, including 20 pieces of lithic debitage and two projectile points. One projectile point appears to be a MacCorkle Stemmed point, which dates to the Early Archaic period (ca. 8850 – 8750 B.P.). The second projectile point appears to be a Susquehanna Broad projectile point, which dates to the Late Archaic – Early Woodland transitional period (ca. 3650 – 2650 B.P.) (Justice 1987).

Site 33HK1011 is an isolated find [location redacted]. The artifact recovered from this site is a piece of lithic debitage made of Cedarville-Guelph chert. This artifact is not temporally diagnostic; it represents an ephemeral use of the locale at an unknown time during prehistory, likely for the purpose of stone tool maintenance.

Site 33HK1012 is [location redacted]. Three artifacts were recovered from this site, all lithic debitage made of Pipe Creek and Delaware cherts. None of these artifacts are temporally diagnostic. Like 33HK1011, 33HK1012 represents an ephemeral use of the locale at an unknown time during prehistory, likely for the purpose of stone tool maintenance.

Site 33HK1013 is [location redacted]. Four artifacts were recovered from this site: one piece of lithic debitage, a scraper, a broken projectile point reworked into a scraper, and a projectile point fragment. The broken point that was re-worked into a scraper may have been an Early Archaic Eden point type (ca. 9250-8850 B.P.). The other projectile point fragment is similar to a Middle Woodland Lowe Flared Base point type (ca. 1800-1400 B.P.) (Justice 1987).

Site 33HK1014 is [location redacted]. Fourteen artifacts were recovered from this site, including 10 pieces of lithic debitage, two expedient tools (a scraper and a utilized flake), a formal multi-tool (scraper / spokeshave), and a lithic core.

In the Phase I report, it was suggested that these five sites should be considered together as a site cluster due to their relative proximity to each other (all of the sites are located within 30-40 m [98-131 ft] of each other), their co-occurrence on the primary terrace above the Eagle Creek floodplain, and the presence of multiple projectile points dating to the Early Archaic time period. A total of 44 artifacts were collected from these five sites. When considered individually only 33HK1008 stands out (for having produced two intact projectile points), but when considered as a group the Eagle Creek site cluster represents the largest concentration of prehistoric material identified within the Phase I Survey Area – nearly twice as large as any other prehistoric site or site component reported. Only two other prehistoric sites or site components identified during the survey exceeded 20 artifacts (33HK0799 and 33HK1016), but neither of these sites are located in such close proximity to more than one other site or yielded temporally diagnostic artifacts. Furthermore, previous surveys in Hancock County have demonstrated that the Early Archaic period was one of particularly noticeable activity, likely because this was one of the few periods prior to the 19th century when Hancock County was not part of the Great Black Swamp. For much of prehistory the Great Black Swamp was a largely uninhabitable zone separating northwest Ohio from the rest of the state, but during the Early Archaic period lower water levels in the Great Lakes resulted in a somewhat drier, more habitable landscape (Chidester et al. 2011; Chidester et al. 2017). (The Great Black Swamp disappeared in the early 19th century when Euro-American settlers cleared and tiled the land for agricultural use [Bogart 2015]). As a cluster, sites 33HK1008, 33HK1011, 33HK1012, 33HK1013 and 33HK1014 may represent an Early Archaic-period camp or habitation site. The Phase I report recommended that if intact artifact deposits or features such as hearths or storage pits are present below the plow zone, then the Eagle Creek site cluster could potentially be eligible for the NRHP under Criterion D for its ability to yield significant data that could address important research themes in the prehistoric archaeology of northwestern Ohio (Julien et al. 2021:73-74).

2.2 Research Domains in the Archaeology of Pre-Contact Northwest Ohio

A general discussion of the prehistoric contexts of Hancock County was included in the Phase I survey report for the Project (Julien et al. 2021:10-16) and will not be repeated here. This section presents a more detailed discussion of important research domains relevant to the prehistory of northwest Ohio, focusing on those time periods represented by the Eagle Creek site cluster.

2.2.1 Research Domains in the Archaeology of the Paleoindian and Early Archaic Periods of Ohio

Over decades of research and analysis of early human history in the lower Great Lakes region, David Stothers and his colleagues and students associated with the Western Lake Erie Archaeological Research Program at the University of Toledo collected a large corpus of data concerning the Paleoindian and Archaic periods in northwestern and north-central Ohio prehistory. Before proceeding to an examination of their interpretations of this data for northwest Ohio, however, it will be useful to provide a statewide context for current understandings of Paleoindian and Early Archaic settlement systems and mobility ranges.

Much of what archaeologists know about Paleoindian and Early Archaic societies, and particularly the transition between the two, in the lower Great Lakes and surrounding regions is based on limited and sometimes quite equivocal data (i.e., Cleland and Ruggles 1996; Kuehn 1998; Lepper 1994; Payne 1982; Prufer 2001; Prufer and Long 1986; Purtill 2009; Raber et al. 1998; Shott 1999; Stothers, Schneider and Pape 2001; Valasik 2009; Wright 1978). Many of the sites dating to these early periods are known only from surface collections or, if they have been subjected to subsurface investigations, have failed to yield intact cultural features such as hearths or structures (Purtill 2009; Stothers 1996; but see Abel 1994; Cleland and Ruggles 1996; and Lepper 1994 for examples of Early Archaic sites with intact features). Lithic artifacts are by far the most numerous category of material culture represented at these sites, although other types of materials (e.g., bone implements, faunal remains, red ochre, and plaited basketry) are sometimes present in small, usually poorly preserved amounts (e.g., Adovasio et al. 2001).

Much research concerning the late Paleoindian-Early Archaic period in Ohio has been published over the past 30 years. Cultural resource management projects have been the most important generator of data statewide on mobility, settlement and subsistence patterns, and technology during this period (i.e., Kozarek et al. 1994; Lee and Hayfield 2010; Lepper 1994; Purtill 2004), although academic studies (i.e., Abel 1994; Bowen 1990, 1991, 1992, 1994; Mullett 2009; Stothers 1996; Stothers, Abel and Schneider 2001; Stothers, Schneider and Pape 2001) have also contributed significant data and interpretations. A recently published essay by Matthew Purtill (2009) provides the most comprehensive overview of the Ohio Archaic period to date.

Just prior to the beginning of the Early Archaic period (ca. 10,000 B.P.), the Ohio region had undergone a dramatic environmental shift that involved a transition from largely coniferous forest cover (which receded north) to mixed deciduous woodland, particularly oak and hickory (which expanded into Ohio from the south). From ca. 9500-5750 B.P., paleoclimatic data indicates that the climate was generally warmer and dryer than today (Shane 1987, 1994; Shane et al. 2001). According to Purtill (2009:580), Early Archaic-period sites in Ohio tend to be concentrated along the northern Lake Erie shore, and particularly in the Lake Plains region of northwestern and north-central Ohio, which was dominated by open forests. Whether this distribution pattern is a result of survey coverage bias, differential formation processes in various parts of the state, or is an actual reflection of Early Archaic population distribution in Ohio is unclear.

Early Archaic sites are distinguished from late Paleoindian sites by the replacement of older lanceolate projectile point forms with side- and corner-notched hafted bifaces (Purtill 2009:566, 569). While numerous cultural taxonomies outlining a bewildering array of phases, traditions, horizons, and complexes have been proposed by various scholars to describe Archaic-period tool assemblages in Ohio (i.e., Abel et al. 2001; Blank 1970; Bowen 1991; McKenzie 1967; Prufer and Sofsky 1965; Stothers and Abel 1993; Stothers, Abel and Schneider 2001; Vickery 1976), Purtill (2009:569) proposed an arrangement of 57 point types into 20 horizons. For the Early Archaic, which Purtill dates to 10,950-8450 cal B.P., the horizons include Early Side Notched (12,500-8600 cal B.P.), Charleston (11,000-9950 cal B.P.), Thebes (10,800-9500 cal B.P.), Kirk-Palmer (10,800-9500 cal B.P.), Kirk Stemmed (9950-8800 cal B.P.), Large Bifurcate (9950-6800 cal B.P.), and Small Bifurcate (9500-8500 cal B.P.). Two explanations have been advanced for the formal variability in tool types during the Early Archaic: Some researchers have argued that distinct ethnic groups manufactured different tool types while others believe that different tool types simply served different functions for whatever people or peoples were making and using them. Other lithic tool types frequently recovered from Early Archaic components include steep-edged end scrapers, large blades and blade cores, drills, burins, bifacially chipped tools that resemble adzes, unifacially beveled, crescent-shaped bifaces, and various ground-stone tools (Purtill 2009:569-570, 572).

While a variety of chert types were used for tool manufacture, Upper Mercer and Flint Ridge cherts (from east-central Ohio), Wyandot chert (from Harrison County, Indiana) and Paoli chert (from northern Kentucky) dominated tool assemblages from different parts of Ohio from the beginning of the Early Archaic until ca. 9500 B.P. At this time, hafted bifaces belonging to the Small Bifurcate horizon appeared all over the region and were made predominantly of local cherts (Purtill 2009:570-572). This chronological trend in lithic source utilization has provided much of the impetus for the debate over population mobility during the late Paleoindian-Early Archaic period, which is detailed below.

Other aspects of Early Archaic life in Ohio are as of yet poorly understood. Evidence for subsistence strategies has largely been indirectly inferred from tool assemblages and site locations. In the Lake Plains region of northwestern Ohio, evidence for some tool assemblage continuity between the late Paleoindian period and the initial Early Archaic period led Stothers (1996) to hypothesize that caribou hunting continued to play a major role in subsistence activities. In the more rugged terrain of the Glaciated and Unglaciated Plateau regions of eastern Ohio, on the other hand, Blank (1970:342) long ago suggested that white-tailed deer, elk and moose were the primary focus of hunting activities, a shift that is believed not to have occurred in northwestern Ohio until ca. 8800 B.P. There is minimal but growing evidence for the exploitation of plant resources (particularly nuts) during the Early Archaic (Purtill 2009:586). Solid evidence for mortuary ceremonialism during the Early Archaic is known from just one site in Ohio, a rockshelter near Bolivar in Tuscarawas County, which yielded a feature of dark-stained earth containing cremated human bones and four broken St. Albans bifaces (Stothers, Abel and Schneider 2001:250).

2.2.1.1 Lithic Sources, Paleoindian-Early Archaic Mobility and Band Ranges

Stothers and his colleagues (Stothers 1996; Stothers, Abel and Schneider 2001) have used data concerning the distribution of stone tools fashioned from different lithic sources to construct a complex model for Paleoindian and Early Archaic mobility and band ranges in the lower Great Lakes region. During both periods in northwestern Ohio, Stothers argues that a large majority of lithic tools were fashioned from exotic (i.e., non-local) raw materials during early cultural-chronological horizons; over time, however, both the Paleoindian and Early Archaic periods witnessed a gradual shift to primary reliance on local raw materials for stone tool production (Stothers 1996:173; Stothers, Abel and Schneider 2001:239-241). Thus, for instance, 65 percent of fluted bifaces that have been recovered from the Middle and Lower Maumee Valley dating to the Paleoindian Gainey Phase (ca. 12,000-10,600 B.P.) were fashioned of either Upper Mercer or Flint Ridge cherts, while 80 percent of later Barnes/Parkhill fluted bifaces (ca. 10,600-10,400 B.P.) from the same region were made of local Ten Mile Creek chert (Stothers 1996:182). Similarly, during Stothers's Kirk Horizon and Large Bifurcate complex (ca. 10,000-7800 B.P. and ca. 8900-8500 B.P.) in the same region, 30 percent of projectile points that have been recorded were made of Upper Mercer or Flint Ridge cherts (as opposed to 28 percent made of local Pipe Creek or Ten Mile Creek cherts), while 70 percent of points recovered dating to the later Early Archaic Small Bifurcate complex (ca. 8500-7000 B.P.) were manufactured from local Pipe Creek or Ten Mile Creek cherts (as opposed to just 10 percent made of Upper Mercer or Flint Ridge cherts) (Stothers 1996:199-200).

Stothers interpreted these parallel trends separated in time as evidence that during both the Paleoindian and Early Archaic periods, southern-derived populations advanced into northern Ohio but continued to make periodic trips back to high-quality chert sources located in their original home territories, only adopting local northern Ohio chert sources over time as they "settled in" to their new habitats (Stothers 1996:173; Stothers, Abel and Schneider 2001:239-241). Stothers (1996:174, 204) considered but rejected two other possibilities: first, that the presence of tools in northern Ohio manufactured from exotic raw materials represented social and/or economic interaction in the form of trade or exchange relationships between central Ohio and northern Ohio bands; and second, that the presence of non-local raw materials in northern Ohio represents "personnel exchange" (exogamous marriage) between central Ohio and northern Ohio bands. Stothers rejected these scenarios as unlikely. In his words, they "would adequately account for situations in which tools fashioned of non-local source material were of low frequency . . . However, many Paleoindian and Early Archaic site assemblages from throughout the Midwest and American Northeast are characterized by virtually entire lithic assemblages fashioned of non-local resource materials" (Stothers 1996:174). He also mentioned a third possibility, a lithic procurement system that was "decoupled" or "disembedded" from band settlement and mobility patterns, in which small work parties only occasionally made trips to quarries when necessary to restock raw material supplies, rather than as part of annual migration patterns (Stothers 1996:174; after Spiess and Wilson 1989). While he did not explicitly reject this hypothesis, he did not give it further consideration either, apparently deeming it to be compatible with his preferred explanation of the colonization of northern Ohio by southern-derived populations during both the Paleoindian and Early Archaic periods.

The hypothesis of parallel southern colonizations does beg one further question: If populations from central and southern Ohio colonized northern Ohio at the beginning of the Early Archaic period, what happened to the older late Paleoindian populations in this area? Stothers, Abel and Schneider recognize two possibilities. The *in situ* late Paleoindian populations may have been culturally assimilated by the colonizing southern populations, or they may have moved into Michigan and southern Ontario themselves, following retreating ecological zones northward as temperatures in the lower Great Lakes region gradually warmed. There is evidence for both scenarios, and Stothers and his colleagues readily admit that it is entirely possible that both processes were in play at the same time (Stothers, Abel and Schneider 2001:241).

While Stothers and his colleagues made some valid criticisms of the interpretations of the Norman P and Henderson sites, their hypothesis of parallel Paleoindian and Early Archaic colonization events does not seem to adequately account for the data that Stothers himself presented. Based on accumulated data from a number of sites in northwestern Ohio (particularly in the Maumee River Valley), Stothers stated that 30 percent of Early Archaic Kirk Horizon and Large Bifurcate Complex (ca. 10,000-8500 B.P.) points were made of non-local cherts from central Ohio sources. This percentage is only slightly higher than the 20 percent of points manufactured from non-local cherts for the late Paleoindian Barnes/Parkhill Phase (ca. 10,600-10,400 B.P.), and nearly identical to the number of points made of local cherts during the Kirk Horizon and Large Bifurcate Complex (28 percent). Furthermore, if even only a small percentage of the unidentified cherts used to manufacture projectile points during this same period (42 percent of all recorded points) are assumed to be local pebble cherts collected from eroding streambeds, then the claim for the predominance of exotic cherts in northwestern Ohio during this earliest part of the Early Archaic is simply incorrect. These data certainly do not appear to support Stothers' assertion that "many Paleoindian and Early Archaic site assemblages from throughout the Midwest and American Northeast are characterized by *virtually entire lithic assemblages* fashioned of non-local resource materials" (Stothers 1996:174; emphasis added).

While a 30 percent ratio of non-local cherts may not support the interpretation of a large-scale population movement, it still seems reasonable to believe that this percentage is too high to represent trade/exchange relationships and/or a system of exogamous marriage (Stothers 1996:174). A more systematic evaluation of existing data must be combined with more controlled, systematic excavations of well-preserved Early Archaic sites in northwestern Ohio in order to adequately address this particular research domain.

2.2.2 Research Domains in the Archaeology of the Late Archaic Period of Northwest Ohio

While the Paleoindian and Early Archaic periods in Ohio generally lack evidence for regional cultural diversity, the Late Archaic period has produced evidence for regional diversity in cultural practices and styles across the state. Therefore, the discussion of the Late Archaic period will be restricted to developments in northwest Ohio. This discussion is largely based on the work of David Stothers and his students from the University of Toledo.

Stothers and his colleagues viewed the Late Archaic period in northwestern Ohio as the culmination of various cultural developments from the Paleoindian through Early Woodland periods, as social complexity gradually increased in response to increasing population and greater environmental pressures. While populations in Ohio were relatively sparse during the Early Archaic and especially the Middle Archaic time periods, a veritable explosion of sites can be seen during the Late Archaic; this is the case for northwestern Ohio as well as for the rest of the state (Stothers, Abel and Schneider 2001).

Although not well defined, Stothers and his students and colleagues recognized at least two, and possibly three, cultural “phases” in northwestern Ohio during the Late Archaic period. Two of these they named the Riverside and Firelands phases. Regardless of cultural phase attribution, Late Archaic populations in northwestern Ohio practiced what Stothers, Abel and Schneider (2001:242) describe as a seasonal coalescence-dispersal settlement-subsistence system, in which regional band populations came together in large focal settlements located in major river valleys from the late Spring through early Fall, then dispersed into much smaller groups (probably nuclear or minimally extended families) that occupied small campsites in interior regions from the late Fall through early Spring. The focal, riverine settlements were well placed to exploit seasonal fish spawning runs, other aquatic resources such as mussels, and plant resources typical of the river valleys during the warm season. The small winter campsites in interior regions allowed the population to exploit game animals (particularly deer) as well as mast resources.

Within this settlement-subsistence system, Stothers and his colleagues identified three primary site types. The focal, warm-season riverine sites were base camps occupied by band-level populations consisting of groups of related families. Base camps tend to appear in clusters that may represent either several camps that were used simultaneously, or small locational shifts over time. These clusters are regularly spaced throughout primary and secondary drainage systems, and seem to represent catchment zones of approximately 10.0 – 15.0 km (6.2 – 9.3 mi) in diameter. Often located in close proximity to base camp sites were “interaction centers” consisting of large cemeteries and associated short-term settlements. These are interpreted as representing periodic population aggregation for the purposes of conducting ritual/ceremonial activities and solidifying larger regional population ties. Finally, the third site type consists of small, special-purpose extractive campsites. As already mentioned, during the cold seasons these campsites were located in forested uplands in interior regions away from the major river valleys. During the warmer seasons these extractive campsites would have been spread out in close proximity to base camps. Specific activities pursued at extractive campsites included quarrying, foraging/hunting, animal processing, fishing, and raw material storage (Stothers, Abel and Schneider 2001:242-244).

As populations increased throughout the Late Archaic, mobility was decreased and trade networks took on increased importance. These trends can be seen as a precursor to the Hopewellian florescence of the Middle Woodland period. Stothers and his colleagues suggested that in general terms, large amounts of “exotic” lithic materials at a site (e.g., lithic materials that could only be obtained from sources more than 25 miles [40 km] away from the site) were indicative of relatively high band mobility, whereas small amounts of such materials were indicative of trade and exchange networks. In northwestern Ohio, Late Archaic sites tend to exhibit large amounts of local lithic materials (primarily Delaware and Ten Mile Creek cherts) and small percentages of non-local materials, indicating the importance of trade and exchange during this period. Materials appear to have been entering the region from several directions, including central Indiana, central Ohio, and the Niagara Peninsula in New York (Stothers, Abel and Schneider 2001:253-256).

2.2.2.1 Site Types, Material Culture, and Social Relations during the Late Archaic Period

Despite the seemingly complete model of cultural dynamics in northwestern Ohio during this period constructed by Stothers and his colleagues and students, several questions remain at least partially unanswered. For instance, they provide an inventory of sites within one identified catchment zone, centered on the Riverside site located at the second rapids of the Maumee River. This site inventory includes the Riverside site itself, a base camp; Asmus 2, a raw material and equipment cache site and possibly a secondary base camp; Missionary Island, an interaction center with cremation burials and a slate workshop; the Dodge site, a warm-season fishing station; at least five cold-season interior hunting/foraging stations; and possibly up to 10 additional extractive campsites within 1 mile (1.5 km) of the Riverside base camp (Stothers, Abel and Schneider 2001:244-246).

Within this site inventory, only one lithic workshop is specifically identified – the slate workshop at the Missionary Island site, which may have produced ritual or ceremonial slate objects. However, Stothers et al. have also suggested that during the Late Archaic period local populations experienced the growth of craft specialization as they shifted from a system of generalized reciprocity between groups to a system of institutionalized reciprocity, most likely due to increasing competition for resources (Stothers, Abel and Schneider 2001:256-257). Presumably, then, lithic workshops specializing in the production of more mundane, everyday tools can also be expected within catchment zone site inventories. How such sites fit within the settlement-subsistence system and settlement patterning in general appears to have been little investigated. Furthermore, even the model of increasing craft specialization seems to have simply been inferred from other developments, rather than actually demonstrated with reference to specific examples of identified craft specialization.

2.2.3 Research Domains in the Archaeology of the Middle Woodland Period of Northwest Ohio

As with the Late Archaic period, a great deal of regional diversity was present in Ohio during the Woodland period, and therefore the following discussion will be limited to northwest Ohio. Again, much of this information is based on the work of David Stothers and his students from the University of Toledo.

The Middle Woodland period (ca. 2000-1500 B.P.) in much of Ohio is associated with the florescence of the Hopewell culture; even outside of the core Hopewell culture area in southern Ohio, much of the rest of the state was integrated into the so-called Hopewell Interaction Sphere, which reached as far as the Upper Peninsula of Michigan, Illinois, the Gulf Coast, and the Carolinas (Pacheco 1996). In north-central Ohio, sites belonging to the so-called Esch phase have been identified as part of the Hopewell Interaction Sphere. Although this phase is not well understood due to the fact that few Esch phase sites have been studied, it appears that resident Middle Woodland populations were interacting (at least minimally) with Scioto Hopewell Complex populations to the south (Abel 1995:28; Pratt 1981). Evidence from sites that have been investigated indicates intensifying resource exploitation as well as use of cultigens such as maize, beans, and squash. Seasonal band dispersion and aggregation still occurred, but base camps appear to have been occupied more intensively for longer periods of time. Esch phase occupation was centered on the Huron River valley in modern Erie County (Stothers et al. 1979:55).

Esch phase populations appear to have overlapped a geographically more dispersed population that occupied much of southwestern Ontario, southeastern Michigan and northwestern Ohio, reaching as far east as the Huron River valley and identified by Stothers et al. (1979) as Western Basin Middle Woodland (WBMW) populations. In contrast to Esch phase sites, WBMW sites lack any evidence of being part of the Hopewell Interaction Sphere. The WBMW Tradition appears to have evolved out of "a uniform and homogenous Late Archaic cultural base" (Stothers et al. 1979:49). This tradition was limited to a zone stretching about 40 miles inland from the lake. WBMW sites have yielded distinctive ceramics that differ from other Middle Woodland populations in the Lower Great Lakes, being characterized by heavy cord-roughening, a lack of decoration below the neck, rounded or subconical bases, and flattened, splayed, wedge-shaped lips. Projectile points found on early WBMW sites are dominated by large corner-notched types that appear to represent a continuum from Early Woodland point types, while later WBMW sites have yielded smaller side- and corner-notched varieties similar to Jacks Reef Corner Notched and Otter Creek points. Late WBMW sites exhibit both these types as well as Levanna- and Madison-like point types, which became increasingly popular in the region during the Late Woodland period (Stothers et al. 1979:51).

Similar to the suite of material culture described above, WBMW sites appear to exhibit settlement-subsistence patterning that connects it to both earlier Late Archaic/Early Woodland populations and later Late Woodland populations in the region. This settlement-subsistence system has been described as a "Bipolar Settlement Pattern Model." At one end of the spectrum is a focal settlement pattern that is characterized by riverine-oriented, intensively (possibly permanently) occupied base camps supported by a network of "satellite stations" occupied seasonally according to the availability of specific resources. At the other end of the spectrum is a seasonal coalescence-dispersal settlement pattern. In this system, sites exhibit seasonal scheduling in the form of late spring through early fall base camps located in major river valleys and occupied by aggregated bands, which dispersed into smaller family or small extended groups that occupied seasonal campsites in the upland interior during the late fall through early spring months. Sites fitting both of these patterns have been identified in the Maumee Bay – Maumee River valley region of northwest Ohio (Stothers et al. 1979:54). Maize horticulture only appears late in the Middle Woodland sequence in northwest Ohio (Stothers et al. 1981:12), indicating that year-round sedentism may have been a relatively late development in this region.

In addition to site size and density patterns related to the settlement-subsistence system, information about the social structure of WBMW populations has been inferred largely from mortuary practices. Excavated burials have shown that males are typically found in primary, single interments, whereas women and children tend to be found in secondary, group interments. This pattern appears to hold across both cemetery burial patterns throughout much of the WBMW territory and mound burials on its eastern fringe (a rare possible sign of Hopewellian influence). This pattern has been suggested to represent a patrilineal-patrilocal society that practiced female exogamy and patrilocal burial patterns (Conway 1976). It has been observed that this pattern tends to be associated with pre-agricultural societies (Stothers et al. 1979:54).

2.2.3.1 Cultural Continuity and Cultural Boundaries in the Western Basin Middle Woodland

Apart from one published article (Stothers et al. 1979), brief treatment in an unpublished doctoral dissertation (Pratt 1981), and scattered technical reports (e.g., Conway 1976), the WBMW Tradition has received little attention. This is likely due in part to certain difficulties in identifying WBMW sites as such. One such difficulty is the likely small, ephemeral nature of late fall through early spring, inland hunting camps characteristic of the seasonal coalescence-dispersal settlement pattern; another is that certain types of satellite stations typical of the focal settlement pattern may well have been aceramic. In this latter situation, a Middle Woodland site is not likely to be recognized as such absent diagnostic projectile points or reliable radiometric dates from feature contexts. This difficulty in identifying WBMW sites is reflected in the results of the Mid-Maumee River Valley survey conducted by the University of Toledo in 1981: Of a total of 185 prehistoric components distributed among 158 archaeological sites recorded by the survey, just 5 components (2.7%) were identified as dating to the Middle Woodland (Stothers et al. 1981:22-24).

The relative lack of information regarding WBMW cultural dynamics means that several fundamental research questions regarding this time period in northwest Ohio have yet to be fully addressed. Regarding the proposed bipolar settlement pattern model, were the focal settlement and seasonal coalescence-dispersal patterns being practiced at the same time, or might they represent chronological developments within the Middle Woodland period? If they were being practiced contemporaneously, what are the implications for cultural variation and diversity within the WBMW Tradition? If they were instead temporally sequential developments (with Stothers et al. [1979:54] suggesting that the coalescence-dispersal model may have developed out of local Early Woodland patterns, eventually giving way to the focal settlement pattern), is this reflected in changing aspects of the "typical" material culture assemblage from sites associated with each pattern? Furthermore, how can we distinguish between satellite stations associated with focal settlements and seasonal campsites associated with the dispersal phase of the coalescence-dispersal pattern?

Another outstanding issue is the degree to which WBMW populations were isolated from neighboring cultural groups, particularly Hopewellian populations. No evidence for Hopewellian influence has been discerned at WBMW sites in the form of Hopewellian ceramic or lithic styles, exotic trade goods from various regions within the Hopewell Interaction Sphere, etc. Stothers et al. (1979) have interpreted the Hopewell Interaction Sphere as a function of the need to check a tendency towards negative reciprocity between neighboring populations that have approached the carrying capacity of their specific territories, and do not have access to new, empty territories in which a portion of the existing population can "bud off." However, due to the proximity of WBMW populations to Lake Erie, the carrying capacity of this region would have been greater than in central and southern Ohio due to the much greater availability of fish. Thus, Great Lakes-oriented populations would not have needed to participate in the Hopewell Interaction Sphere as a means of ensuring adequate access to subsistence resources. However, they may have chosen to participate (or not) based on several other factors, including "ethnic, linguistic, and theological differences." These differing choices may be reflected in the WBMW and their Esch phase neighbors, who also had access to abundant fish resources from Lake Erie but chose to participate in the Hopewell Interaction Sphere. Ultimately, the widespread adoption of maize agriculture may have led to the demise of the Hopewell Interaction Sphere by greatly increasing carrying capacity in all territories regardless of available natural resources, thus diminishing the imperative to avoid negative reciprocity between populations (Stothers et al. 1979:58).

Despite the apparent choice of WBMW populations to remain isolated from the Hopewell Interaction Sphere, some interaction with the outside world is evident. The use of burial mounds on the eastern fringe of the WBMW territory has already been mentioned. Continued, if minimal, interaction with other regional populations may also be evident in such trends of lithic raw material utilization. In general, the published literature on the Woodland period in northwest Ohio has little to say on the issue of lithic technology (apart from the identification of biface horizons), instead focusing heavily on ceramic styles as indicators of cultural organization and change. However, if statistically significant patterns of temporal change in the utilization of "local" versus "exotic" tool stone materials can be identified at WBMW sites, this may be another way in which to investigate the issue of cultural interaction during this time period.

2.3 Site-Specific Research Questions

In relation to the current project, it is worth noting that almost all professional archaeological investigations of pre-contact sites in northwest Ohio have been conducted within the Maumee River Valley and along the margin of Lake Erie. The cultural dynamics of areas further to the south (for instance, in modern-day Hancock County) are much more poorly understood. Many of the studies cited above treat these southern areas as essentially hinterlands to the Maumee River Valley, used perhaps primarily as cold-season hunting grounds for small, dispersed bands. The site-specific research questions discussed below were developed with this context in mind.

The goal of the Phase II investigation of the Eagle Creek site cluster was to collect sufficient data to provide answers to the following questions:

- Do magnetic anomalies across the site cluster appear to correspond in a meaningful way with the surface distribution of artifacts as recorded during the Phase I survey? Do these five sites in fact represent a single, larger archaeological site?
- Does the site cluster contain intact cultural features or living surfaces beneath the plow zone? If intact features are present, can they be dated, and how do such dates correspond (or not) to the surface-collected artifact assemblage as recorded by MSG?
- Are specific feature types, or other types of artifacts or ecofacts besides just lithic artifacts, present that can shed light on site function and/or season of occupation?
- If multiple temporal components are present, can the different temporal components be spatially defined, or do they overlap to such a degree that spatial definition is essentially impossible?
- If the temporal components can be spatially defined, then how do patterns of lithic raw material choice change over time?

3.0 METHODS

The Phase II investigation of the Eagle Creek site cluster was conducted in accordance with the guidelines developed by the Ohio Historic Preservation Office (OHPO 1994).

3.1 Field Methods

MSG utilized two primary methods during Phase II fieldwork: magnetic gradiometry survey (conducted by the AAL at BSU) and manual excavation of test units to ground-truth selected magnetic anomalies (conducted by MSG). These methods are described below.

3.1.1 Magnetic Gradiometry

The first stage of the field investigation consisted of a magnetic gradiometry survey of the areas where site boundaries (as established during the Phase I survey) overlap the limits of potential ground-disturbing activity for the Project. A full description of the methods utilized by BSU is contained in their report to MSG, which is attached to this report as Appendix A. After conducting the gradiometry survey and identifying magnetic anomalies that seemed to have the potential to be cultural features, the BSU crew used a ¾-inch steel Oakfield soil probe to core selected anomalies. The results of the coring (stratigraphy, inclusions such as charcoal, etc.) were combined with the gradiometry results to rank each anomaly on a scale from Excellent (i.e., very likely to be a cultural feature) to Poor (i.e., unlikely to be a cultural feature). MSG then compared the results of the magnetic gradiometry survey to the Phase I survey data and any other available information about each site to select specific magnetic anomalies for investigation through manual excavation.

3.1.2 Manual Excavation

MSG excavated 1.0-m (3.3-ft) square units to expose each selected anomaly. The plow zone of each unit was removed by shovel as a single level. Following the removal of the plow zone, excavation of each unit continued by arbitrary 10.0-cm (3.9-in) levels within the subsoil. As soil anomalies were identified within the units, they were mapped and assigned feature numbers. Trowel excavation of selected features then proceeded by arbitrary 10.0-cm (3.9-in) levels, with stratigraphic changes noted by dividing the 10.0-cm levels into sub-levels as necessary. Features were not excavated if it was determined that they were the result of dead roots, rodent burrowing, etc., as opposed to cultural activity.

All soil was screened through ¼-inch wire mesh, and all artifacts recovered were bagged and labeled by provenience. Organic materials were collected and wrapped in foil, and soil samples were collected from all excavated feature contexts. Digital photographs were taken of all features and other relevant contexts, and plan/profile views of excavation units and features were recorded as well. Detailed notes regarding soil types, colors, textures, and inclusions were also kept.

3.2 Laboratory Processing and Artifact Identification

All cultural materials collected in the field were washed, sorted and catalogued in MSG's laboratory facility in Maumee. Artifacts were then re-bagged in 4-mil plastic, zip top bags, and the bags were labeled according to provenience. The following section describes the methods used by MSG to analyze the cultural materials collected during the Phase II investigation of the Eagle Creek site cluster. The only pre-contact artifacts recovered during the Phase II investigations were lithic artifacts, and therefore ceramic artifacts and faunal remains will not be discussed.

3.2.1 Lithic Artifacts

In many ways, lithic assemblages are ideal for the study of prehistoric cultures. Chert was almost universally utilized by prehistoric cultures in North America. Because the tool manufacturing process creates large amounts of lithic detritus, chert has a nearly ubiquitous presence on prehistoric sites (Meyers 1970:5). In the general vicinity of the sites, chert would have likely been gathered from either of two possible source types: primary bedded outcrops or glacial till and other secondary deposits. Several non-geological factors may also affect the availability of chert resources. These factors include seasonal differences in the accessibility of source locations and the depletion of available chert resources through continued exploitation.

Determination of chert types is based upon a macroscopic investigation of the overall properties of the chert and descriptions taken from relevant literature (e.g., DeRegnaucourt and Georgiady 1998; Justice 1987; Ritchie 1961). As much as possible, all lithic artifacts were identified by chert type. In cases where it was not possible to identify the type of chert, artifacts are generally assumed to have been manufactured from local pebble cherts from glacial deposits.

The classification scheme presented here seeks to order all prehistoric artifacts into groups based upon shared attributes (e.g., bifaces). These classes are broken down further into morphological classifications that seek to place artifacts in descriptive categories with a focus on the similarity of objects, if not their specific usage (e.g., projectile points). When possible, these descriptive categories are assigned to tertiary groups, which are types that have been shown to have chronological or cultural significance (e.g., Kirk Corner-Notched projectile points, which are diagnostic of the Early Archaic period). The primary artifact classes utilized here are lithic debitage (which includes flakes and shatter), formal tools (including cores, projectile points, bifaces, gravers, scrapers, drills, grinding stones, etc.), fire-cracked rock (FCR), and unmodified tool stone packages. It is important to note that for the purposes of this study, unmodified tool stone packages have been identified as lithic objects that display evidence of heat treatment or heat damage (such as crazing, discoloration, etc.) but that otherwise do not exhibit evidence of cultural modification, or unmodified lithic objects made of raw materials that are not naturally available in the Maumee River Valley (e.g., central Ohio chert types). Unmodified lithic objects of locally available stone types that do not exhibit any evidence of heat treatment or heat damage were cataloged as non-cultural items.

Cores may be used to identify tool production (reduction) strategies employed at a site. Reduction strategies may then help to identify the mobility strategies or the distances involved (local or long-distance) in raw material procurement for lithic toolmakers (Bamforth 1986; Beck et al. 2002; Binford 1979, 1980; Nelson 1991). Cores can be identified as blade cores or flake cores based on fracture scar directionality and shape across the core surface. Blade cores are here defined as cores with a prepared platform from which long, thin, prismatic blades have been removed in a uniform direction across the core. A prismatic blade is a relatively flat flake that is at least twice as long as it is wide, with parallel sides, generally one or two dorsal ridges (creating a prismatic cross-section), and a prepared flat platform. Flake cores are defined here as cores that may or may not have prepared platforms and exhibit flake removal from multiple directions across the core. The objective pieces removed from blade cores are considered to have a high utility and are preferable in situations of gearing up in anticipation of future needs (Rasic and Andrefsky 2001), as opposed to the objective pieces removed from flake cores which are more commonly associated with production as a result of more immediate needs. Thus, analysis of core types can tell us what type(s) of objective pieces were leaving the site and, by extension, which mobility strategies were likely employed by the site's occupants: Blade cores are more likely to be associated with a long-distance mobility strategy while flake cores are more likely to be associated with a more localized, short-distance mobility strategy.

Based on specific attributes, lithic debitage can be identified as being associated with a biface reduction event or another reductive strategy. Debitage was sorted into four primary categories based upon the individual attributes of the detritus. These categories included simple flakes (including decortication flakes), complex flakes (flakes having two or more dorsal scars and/or two or more platform facets), shatter, and remnant core fragments. Additionally, statistical characterization and evaluation of the data was expressed using frequencies of characteristics (e.g., platform facet counts and preparation evidence, flake dimensions, weight, and presence of cortex). Modified flakes demonstrate specific evidence of deliberate modification or use-wear and include both retouched and utilized flakes. All flakes were macroscopically analyzed for evidence of lithic retouch or use-wear along the edges. Lithic debitage was then used to characterize likely manufacturing (reduction) processes at the site in terms of expedience versus preparation for anticipated future needs (e.g., expediently removed and utilized flakes or flakes produced as a byproduct of the creation of an objective piece) and, when possible, tool form(s) produced or worked on at the site as evidenced by flake debitage characteristics (e.g., biface manufacture identified through a predominance of thinning flakes) (following Odell [2003] and Andrefsky [2005]). When a tool form is inferred as the objective piece at such a site, a statement can be made regarding the intended use of the objective piece and the relationship between that function and mobility. For example, one is more likely to associate bifacial tools with a gearing up process which is commonly associated with long distance travel, whereas simple flakes, possibly utilized, are associated with an expedient strategy wherein use of that particular material is in response to an immediate need of the manufacturer (Binford 1979; Bamforth 1986).

Analysis of lithic tools included the identification of the type of tool (e.g., projectile point, graver, scraper, drill, ground stone, etc.) and the lithic material from which the tool was fashioned. Projectile points were analyzed utilizing a synthesis of point type descriptions developed for the midwestern and northeastern United States by Ritchie (1961) and Justice (1987). By considering the intentions of the tool manufacturer, a statement can be made regarding the relationship between the manufacturer, the material type, the material source, and mobility strategy. In this way a better understanding can be gained of the manufacturer's relationship to the landscape and the surrounding environment.

Bifacial tools are defined here as lithic material with reduction scars occurring on both faces, exhibiting a thinning of parallel sides and profile shape. Note that this definition allows for the inclusion of bifacial cores as unfinished bifacial tools. Unifacial tools are defined here as lithic material with reduction scars occurring on only one face and thinning of either one or both parallel sides evidenced by relatively uniform flaking of the uniface edge or a portion of the edge. Reworking or re-sharpening of edges is identified by the presence of regularly spaced flakes superimposed on the original flake scars for either or both faces of an edge. A predominance of broken rather than whole bifacial tools may indicate that the material was part of a long-distance mobility strategy, based on the assumption that under circumstances that warrant higher curation rates (in this example, greater distance from the quarry) whole tools would be unlikely to have been discarded (Bamforth 1986). Thus, if we know approximately where the material was acquired, we can elucidate the relationship between the site location, the lithic material, and the intentions of the manufacturer. The presence of re-sharpened biface edges may be another method of determining whether a tool was part of a predominantly local or long distance strategy (Kelly 1988). Analysis of the sharpened edges of bifacial tools can be beneficial considering that a greater proportion of reworked edges has been associated with long distance, long use-life, curated strategies (Bamforth and Becker 2000).

3.3 Analysis

In addition to the identification and analysis of lithic artifacts following the procedures described above, MSG pursued two other methods of analysis of the assemblage resulting from the Phase II investigation. First, MSG subcontracted Ms. Kathryn Parker, M.A. to conduct archaeobotanical analysis of soil samples collected from feature contexts. Secondly, organic remains were sent to Beta Analytic, Inc. in Miami, Florida for accelerator mass spectrometry (AMS) dating. Documentation of the radiocarbon dating is contained in Appendix E.

3.4 Curation

In order to comply with Section 106 of the National Historic Preservation Act (NHPA), the federal agency whose involvement has triggered the Section 106 process is responsible for making a good-faith effort to ensure that artifacts are curated at a federally recognized curation facility. However, all cultural materials collected during professional archaeological investigations are the property of the landowner. MSG will notify the property owners whose land contains the sites where artifacts were recovered. Following the completion of all Phase II investigations, the relevant property owners will be given a choice whether to have their artifacts returned to them, or to have the artifacts curated at a professional curation facility. If a property owner requests that the artifacts from their property be returned to them, MSG will package the artifacts along with a complete catalog and ship them back to the property owner. If a property owner wishes to donate his or her artifacts to a professional curation or research facility, MSG will arrange for the donation of the assemblage to such a facility. No decision as to a specific facility has been made at this time.

4.0 RESULTS

The magnetic gradiometry survey was conducted by Ball State University from November 29 – December 1, 2021. Manual excavation was conducted by MSG from December 6 – December 14, 2021. The results of these efforts are described below.

4.1 Magnetic Gradiometry Survey

Prior to beginning the magnetic gradiometry survey, BSU established a single mapping grid encompassing all five sites in the Eagle Creek site cluster, with a grid datum located southwest of 33HK1014 and designated with the coordinates N460 E500 (meters). As described in Appendix A, BSU's magnetic gradiometry survey revealed a significant contrast between the primary area occupied by 33HK1008 and that site's northwestern corner as well as the area south of the tree line occupied by sites 33HK1011-1014 (see Appendix A, Figure 8). An old fence line paralleling the tree line was evident in the former area. To the south of the tree line, the magnetic data revealed additional disturbance in the form of two apparent drain pipes and an apparent drainage trench excavated from the field into the woods toward Eagle Creek. Following additional data processing, a higher incidence of magnetic anomalies of potential archaeological interest was still visible in the area covered by 33HK1008.

A total of 82 magnetic anomalies were analyzed by BSU, and 33 of these were cored. The coring results were more promising than expected given the magnetic data: Eight anomalies were ranked Excellent (24%), 11 were ranked Good (33%), 10 were ranked Fair (30%), and four were ranked as Non-Cultural (12%) (Appendix A, Table 2. Notable clusters of Good and Excellent anomalies were present in the western half of 33HK1008 – even extending outside of the site area as defined during the Phase I survey – and 33HK1012-1014 each had at least one Excellent anomaly within or adjacent to their site boundaries (Appendix A, Figure 7).

4.2 Manual Excavation

Based on these results, MSG selected four locations for test excavation: Anomaly B9-3, located at approximately N561.15 E513.76 on the grid established by BSU (Test Unit 1); Anomaly B7-1, located at N540.30 E598.26 (Test Unit 2); Anomaly B1-3, located at N463.79 E527.00 (Test Unit 3); and Anomaly B4-1, located at N481.60 E624.00 (Test Unit 4). The results for each unit are summarized below. The locations of the manual excavation units are depicted on Figure 4.1.

In addition, to the test units, MSG collected one additional artifact from the ground surface within the boundary of 33HK1014. This artifact is a unifacial scraper fragment made of Upper Mercer chert (Appendix D, Table D5). The location of this surface find is indicated on Figure 4.1.

4.2.1 Test Unit 1 / Anomaly B9-3 (33HK1008)

Anomaly B9-3 was investigated through a 1.0 m x 1.0 m (3.3 ft x 3.3 ft) excavation unit with its southwestern corner located at N561.00 E513.00 on the site grid (see Figure 4.1). BSU ranked this anomaly as Excellent; it was bracketed to the east and west by anomalies ranked as Good. Although located 7 m (23 ft) to the west of the site boundary of 33HK1008 as indicated by the Phase I surface artifact distribution, this anomaly was selected for testing to determine if cultural material was present below the plow zone outside of the site boundary as mapped during the Phase I survey. At the time of the investigation the field had not recently been plowed, and no plow furrows were evident on the ground surface to indicate whether or not cultural material in the plow zone may have been dragged away from any sub-plow zone feature.

The plow zone (Ap Horizon) in this unit consisted of 10YR 4/3 brown silty clay loam that extended to an average depth of 24.1 cm (9.5 in) below ground surface (bgs). The plow zone was located directly above the Btg Horizon. A multi-component feature, designated as Feature 1-1, was visible at the interface between the plow zone and the subsoil, along with several deep plow scars (Appendix B, Figure B1; Appendix C, Photos 1-2). The entirety of the plow zone was screened and yielded three lithic artifacts: one complex flake made of Upper Mercer Gray Variety chert, and two pieces of lithic shatter made of Local Devonian Limestone chert (Appendix D, Table D1).

Feature 1-1 was excavated after the plow zone was removed. This feature consisted of an irregularly-shaped area of dark soil (Feature 1-1A) surrounded by a larger, irregularly-shaped area of lighter soil (Feature 1-1B) that occupied the southwestern quadrant of the test unit. Feature 1-1A was composed of 10YR 3/2 very dark grayish brown silty clay loam mottled with 10YR 6/3 pale brown silty clay loam. Feature 1-1B was composed of 10YR 6/3 pale brown silt loam mottled with 7.5YR 5/8 strong brown silt loam. Feature 1-1A measured 67.0 cm (26.4 in) north-south x 33 cm (13.0 in) east-west, while Feature 1-1B extended the entire 100.0-cm (39.4-in) length of the western unit wall and measured 84.0 cm (33.1 in) east-west at its widest point (Appendix B, Figures B2-B4; Appendix C, Photos 3-6).

Both of the feature components were excavated in 10.0-cm (3.9-in) levels; a total of three levels were excavated. Level 1 began immediately below the plow zone at 24.1 cm (9.5 in) and extended to an average depth of 33.5 cm (13.2 in) bgs. In this level Feature 1-1B contracted slightly to the west (Appendix B, Figure B2; Appendix C, Photos 3-4). Level 2 extended to an average depth of 44.0 cm (17.3 in) bgs. In this level Feature 1-1A began to contract on its eastern, northern and western sides (Appendix B, Figure B3; Appendix C, Photo 5). Level 3 extended to a maximum depth of 54.0 cm (21.3 in), at which point the base of the feature was reached (Appendix B, Figure B4; Appendix C, Photo 6). Features 1-1 yielded two lithic artifacts: a piece of lithic shatter made of Pipe Creek chert (Feature 1-1A, Level 1) and a piece of lithic shatter made of Delaware chert (Feature 1-1B, Level 2). Feature 1-1A also yielded 11 small iron oxide concretions that were determined to be non-cultural in origin (Appendix D, Table D1). The natural profiles provided by the western and southern unit walls indicated that Feature 1-1 was a small pit feature whose top had been smeared by plowing, and which had also experienced some form of bioturbation, likely root activity (Appendix B, Figures B6-B7; Appendix C, Photo 10).

A two-liter soil sample and six large fragments of carbonized wood (charcoal) were collected from Feature 1-1A. The soil sample was subjected to soil flotation for the recovery of macrobotanical remains. The flotation yielded six carbonized wood fragments weighing 0.08 g (0.003 oz) in aggregate. Although none of the fragments were identifiable by taxon, three of the fragments were identified as a diffuse porous deciduous wood type. This category includes several trees native to the Ohio region, such as beech, maple, birch and sycamore. The six larger charcoal fragments that were collected directly from the feature weighed 1.71 g (0.060 oz) in aggregate. These six fragments were also identified as a diffuse porous deciduous wood type, likely beech (*Fagus grandifolia*) (Parker, personal communication to Dr. Chidester, March 8, 2022).

A charcoal sample was also submitted to Beta Analytic, Inc. for accelerator mass spectrometry (AMS) dating. This sample returned two calibrated date ranges within the standard 95.4% probability calculation: 646-585 cal BP (64.3%) and 567-530 cal BP (31.1%) (see Appendix E). Both of these ranges fall within the Late Prehistoric (Mississippian) time period in northwestern Ohio.

Following the removal of Feature 1-1, excavation proceeded in arbitrary 10.0-cm (3.9-in) levels. Level 2 consisted of 7.5YR 5/8 strong brown silty clay loam mottled with 10YR 5/4 yellowish brown silty clay loam (Appendix B, Figure B3; Appendix C, Photo 7). Level 2 began immediately beneath the plow zone at an average depth of 24.1 cm (9.5 in) and continued to an average depth of approximately 33.6 cm (13.2 in) bgs. No artifacts were recovered from Level 2.

Level 3 consisted of the same soil matrix as Level 2 (Appendix B, Figure B4; Appendix C, Photo 8). Level 3 extended to an average depth of 43.6 cm (17.2 in) bgs. No artifacts were recovered from Level 3.

Level 4 consisted of the same soil matrix as Levels 2 and 3. Two small patches of 10YR 5/2 grayish brown soil were visible below the level of Feature 1-1A, and were interpreted as bioturbation. A large cobble was also encountered just below the base of Feature 1-1B along the southern unit wall within Level 4. Level 4 was excavated to an average depth of 54.2 cm (21.3 in) bgs (Appendix B, Figure B5; Appendix C, Photo 9).

In summary, four levels were excavated within Test Unit 1 – the plow zone and three arbitrary subsoil levels (Appendix B, Figures B6-B7; Appendix C, Photo 10). Feature 1-1 was located immediately beneath the plow zone in the southwestern corner of the unit, and appears to represent a small prehistoric pit feature that was heavily impacted by both plowing activity and bioturbation in the form of plant roots growing through the feature. Just two pieces of temporally non-diagnostic lithic debitage were recovered from Feature 1-1; three additional pieces of temporally non-diagnostic lithic debitage were recovered from the plow zone in the unit. A total of 12 carbonized wood fragments representing a diffuse porous deciduous wood type (common among tree species native to Ohio) were also recovered. Calibrated radiocarbon date ranges of 646-585 cal BP (64.3% probability) and 567-530 cal BP (31.1% probability), both corresponding to the Late Prehistoric (Mississippian) time period, were received from a carbon sample submitted for AMS dating.

4.2.2 Test Unit 2 / Anomaly B7-1 (33HK1008)

Anomaly B7-1 was investigated through a 1.0 m x 1.0 m (3.3 ft x 3.3 ft) excavation unit with its southwestern corner located at N538.50 E599.50 on the site grid (see Figure 4.1). BSU ranked this anomaly as Good. This anomaly is located in the eastern half of 33HK1008.

The plow zone (Ap Horizon) in this unit consisted of 10YR 3/4 dark yellowish brown silt loam that extended to an average depth of 24.4 cm (9.6 in) bgs. The plow zone was located directly above the Btg Horizon. Deep plow scars were visible at the interface between the plow zone and the subsoil; no pre-contact features were observed (Appendix B, Figures B8-B9; Appendix C, Photos 11-12). The entirety of the plow zone was screened and yielded no artifacts.

Following the removal of the plow zone, excavation proceeded in arbitrary 10.0-cm (3.9-in) levels. Level 2 began immediately beneath the plow zone at 24.4 cm (9.6 in) bgs and extended to an average depth of 35.6 cm (14.0 in) bgs. The soil matrix in Level 2 consisted of 10YR 6/6 brownish yellow clay loam mottled with 10YR 6/2 light brownish gray clay loam (Appendix B, Figure B10; Appendix C, Photo 13). No artifacts were recovered from this level and no features were observed.

In summary, two levels were excavated within Test Unit 2 – the plow zone and one arbitrary subsoil level (Appendix B, Figure B11; Appendix C, Photo 14). No artifacts were recovered from Test Unit 2, and no pre-contact cultural features were observed. It is unclear what caused the magnetic anomaly detected in this location.

4.2.3 Test Unit 3 / Anomaly B1-3 (33HK1014)

Anomaly B1-3 was investigated through a 1.0 m x 1.0 m (3.3 ft x 3.3 ft) excavation unit with its southwestern corner located at N463.50 E526.50 on the site grid (see Figure 4.1). BSU ranked this anomaly as Excellent. This anomaly is located in the southeastern quadrant of 33HK1014.

The plow zone (Ap Horizon) in this unit consisted of 10YR 3/4 dark yellowish brown silt loam with a heavy concentration of gravel; the plow zone extended to an average depth of 31.2 cm (12.3 in) bgs. The plow zone was located directly above the Btg Horizon. Although a rodent burrow was found at the plow zone/subsoil interface, no cultural features were observed (Appendix B, Figures B12-B13; Appendix C, Photos 15-16). The entirety of the plow zone was screened and yielded eight lithic artifacts. The assemblage consisted of complex flakes (n=6; 75%) and shatter (n=2; 25%). Raw materials include Upper Mercer (n=6; 75%), Local Devonian Limestone (n=1; 12.5%), and Flint Ridge (n=1; 12.5%) cherts (Appendix D, Table D5).

Following the removal of the plow zone, excavation proceeded in arbitrary 10.0-cm (3.9-in) levels. Level 2 began immediately beneath the plow zone at 31.2 cm (12.3 in) bgs and extended to an average depth of 42.0 cm (16.5 in). The soil matrix in Level 2 consisted of mottled 10YR 6/6 brownish yellow clay loam. The rodent burrow continued downward along the southern wall of the unit (Appendix B, Figure B14; Appendix C, Photo 17). The entirety of Level 2 was screened; no artifacts were recovered.

Level 3 extended to an average depth of 52.0 cm (20.5 in) bgs. The soil matrix in Level 3 was the same as in Level 2; by the base of Level 3, the rodent burrow was no longer visible (Appendix B, Figure B15; Appendix C, Photo 18). No artifacts were recovered from Level 3.

In summary, three levels were excavated within Test Unit 3 – the plow zone and two arbitrary subsoil levels (Appendix B, Figure B16). Eight pieces of temporally non-diagnostic lithic debitage were recovered from the plow zone. No cultural features were observed below the plow zone.

4.2.4 Test Unit 4 / Anomaly B4-1

Anomaly B4-1 was investigated through a 1.0 m x 1.0 m (3.3 ft x 3.3 ft) excavation unit with its southwestern corner located at N481.00 E623.50 on the site grid (see Figure 4.1). BSU ranked this anomaly as Excellent. This anomaly is located on the southeastern edge of 33HK1013.

The plow zone (Ap Horizon) in this unit consisted of 10YR 4/4 dark yellowish brown silty clay that extended to an average depth of 55.6 cm (21.7 in) bgs. The plow zone was located directly above the Btg Horizon. A deposit of 10YR 3/1 very dark gray clay was located in the southwestern corner of the unit at the base of the plow zone (Appendix B, Figure B17; Appendix C, Photos 19-20). The entirety of the plow zone was screened and yielded a single utilized flake made of Pipe Creek chert (Appendix D, Table D4).

Following the removal of the plow zone, excavation proceeded in arbitrary 10.0-cm (3.9-in) levels. The soil matrix in Level 2 consisted of 10YR 3/3 dark brown clay mottled with 10YR 5/1 gray clay. Mid-way through the level a patch of 10YR 3/2 very dark grayish brown silty clay mottled with 5YR 5/8 yellowish red clay was encountered along the northern unit wall; this was designated as Feature 2 (Appendix B, Figure B18). Level 2 reached an average depth of 68.8 cm (27.1 in) bgs. No artifacts were recovered from Level 2.

Feature 2 was excavated in two 10.0-cm (3.9-in) levels. The top of the feature was found at 60.0 cm (23.6 in) bgs, and it extended to a maximum depth of 80.0 cm (31.5 in) bgs. The feature was found to have a highly irregular shape, measuring 28.0 cm (11.0 in) north-south x 73.0 cm (28.7 in) east-west at its maximum extents, although part of the feature extended outside of the unit to the north (Appendix B, Figure B19; Appendix C, Photo 21). No artifacts were recovered from Feature 2. Based on its highly irregular shape, it was interpreted as a burnt tree stump.

Unit Level 3 began at a depth of 68.8 cm (27.1 in) bgs and reached an average depth of 80.0 cm (31.5 in) bgs. The soil matrix in Level 3 was largely the same as in Level 2, though additional mottling of 10YR 5/6 yellowish brown and 10YR 4/1 dark gray clay was present along the northern edge of the unit. A new patch of 10YR 4/1 dark gray clay was present in the southwestern corner of the unit (Appendix B, Figure B20; Appendix C, Photo 23). No artifacts were recovered from Level 3.

In summary, three levels were excavated within Test Unit 4 – the plow zone and two arbitrary subsoil levels (Appendix B, Figure B21; Appendix C, Photo 24). Just one temporally non-diagnostic utilized flake was recovered from the plow zone, and no cultural features were observed below the plow zone. One apparent feature was interpreted as a burnt tree stump. Deposits of dark clay in the southwestern corner of the unit may be from past flood episodes.

4.3 Interpretation / Analysis

Several site-specific research questions for the Eagle Creek site cluster were listed in Section 2.3. These questions will be re-stated here, with results below.

Question: Do magnetic anomalies across the site cluster appear to correspond in a meaningful way with the surface distribution of artifacts as recorded during the Phase I survey? Do these five sites in fact represent a single, larger archaeological site?

Results: While magnetic anomalies of potential archaeological interest were identified across the Phase II study area, there was a notable difference in the magnetic data between the area south of the tree line (sites 33HK1011-1014) and the area north of the tree line (33HK1008). This difference may reflect a difference in past land use. The data collected during the Phase II investigation does not support a conclusion that the five sites in the Eagle Creek site cluster should be considered as a single, larger site.

Question: Does the site cluster contain intact cultural features or living surfaces beneath the plow zone (Ap Horizon)? If intact features are present, can they be dated, and how do such dates correspond (or not) to the surface-collected artifact assemblage as recorded by MSG?

Results: Just one pre-contact cultural feature was encountered during the test excavations, in Test Unit 1. This test unit was located outside of the boundary of 33HK1008 as defined during the Phase I survey; the boundary of this this site has thus been extended to the west by an additional 10 m (33 ft) (Figure 4.2). However, this feature was heavily disturbed by both plowing activity as well as bioturbation (likely root growth). Furthermore, a carbon sample yielded calibrated AMS date ranges of 646-585 cal BP (64.3% probability) and 567-530 cal BP (31.1% probability), both corresponding to the Late Prehistoric (Mississippian) time period. This time period does not correspond to any of the temporally diagnostic artifacts that were recovered from any of the five sites during the Phase I survey. This feature may represent a separate, incidental use of the landform during the Late Mississippian period, or the radiocarbon dates may have been influenced by the observed bioturbation.

Question: Are specific feature types, or other types of artifacts or ecofacts besides just lithic artifacts, present that can shed light on site function and/or season of occupation?

Results: Feature 1-1 is interpreted as a pit feature. However, it is unclear what the exact function of this feature was, as it contained only two pieces of temporally non-diagnostic lithic debitage. No artifact types besides lithic artifacts were recovered during the Phase II investigation of the Eagle Creek site cluster. While 12 fragments of carbonized wood were recovered from Test Unit 1, these could not be identified by specific taxon and generally appear to be from native deciduous tree species common in Ohio.

Question: If multiple temporal components are present, can the different temporal components be spatially defined, or do they overlap to such a degree that spatial definition is essentially impossible?

Results: The data collected during the Phase II investigation is insufficient to address this research question.

Question: If the temporal components can be spatially defined, then how do patterns of lithic raw material choice change over time?

Results: The data collected during the Phase II investigation is insufficient to address this research question.

5.0 NRHP ELIGIBILITY EVALUATION

This section of the report presents an analysis of the results of Phase II evaluative testing of The Eagle Creek site cluster. This evaluation includes a discussion of site integrity, site formation processes, and their implications for the usefulness of the methods used during both the Phase I and Phase II investigations of the site; and a discussion of the ability of the Eagle Creek site cluster to address the research questions presented in Section 2 of this report. Finally, this section of the report will conclude with an evaluation of the Eagle Creek site cluster against the NRHP eligibility criteria.

5.1 NRHP Eligibility Evaluation

The objective of the current study is to determine whether the archaeological resources within the Eagle Creek site cluster (33HK1008, 33HK1011, 3HK1012, 33HK1013, and 33HK1014) constitute one or more historically significant properties. Significance evaluations of archaeological resources are made in terms of their eligibility for listing in the NRHP. According to 36 CFR 60.4 of the NHPA, properties may be eligible for listing in the NRHP if they meet one or more of the following criteria:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in the districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- *A. Association with events that have made a significant contribution to the broad patterns of American history;*
- *B. Association with the lives of historically significant persons;*
- *C. Embodiment of distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possession of high artistic values; or representation of a significant and distinguishable entity whose components may lack individual distinction (for archaeological sites associated with standing architecture, or yielding related architectural evidence); or*
- *D. Ability to yield information important to the study of North American prehistory or history.*

Archaeological properties are most often determined to be eligible for the NRHP under Criterion D. Therefore, it is important to note that in order for archaeological remains to satisfy the criteria considerations and to yield information important to the study of North American prehistory or history, they must satisfy two conditions: They should remain within the depositional environment in which they were originally interred or accumulated (i.e., undisturbed contexts), and they should have the ability to yield data that can be used to address specific research questions within general research designs related to specific regions and time periods.

5.2 Evaluation of the Eagle Creek Site Cluster

During the magnetic gradient survey, BSU observed a prominent linear anomaly traversing through 33HK1008 that was interpreted as an old fence line. Additional evidence of disturbance was observed in the form of two apparent drain pipes and an apparent drainage trench excavated from the field into the woods toward Eagle Creek. In addition, while the average depth of the plow zone to the north of the tree line (33HK1008) was found to be 24.3 cm (9.6 in) bgs, the average depth of the plow zone south of the tree line (sites 33HK1013 and 33HK1014) was found to be a much deeper 43.4 cm (17.1 in), possibly as a result of erosion from the terrace to the north. Furthermore, dark clay deposits below the plow zone within 33HK1013 may be evidence of past flood episodes. Overall, physical conditions within the Eagle Creek site cluster do not appear to be conducive to the preservation of intact archaeological deposits.

The Phase II investigation did encounter one pre-contact cultural feature beneath the plow zone, in Test Unit 1. However, this feature was found to have been heavily disturbed, and it yielded a radiocarbon date indicating the Late Prehistoric (Mississippian) time period, which does not match any of the temporally diagnostic artifacts recovered from any of the five sites within the cluster during the Phase I survey. Of the five site-specific research questions posed for the Eagle Creek site cluster in Section 2.3, the data collected during the Phase II investigation could only positively address one: the magnetic gradiometry survey did indicate potentially different prehistoric/historic land-use histories for 33HK1008 as opposed to sites 33HK1011-1014. However, insufficient evidence was collected to indicate that these five sites actually represent a single, larger site; no temporally diagnostic artifacts were recovered during the Phase II investigation; and no artifact types apart from lithic artifacts were recovered during either the Phase I survey or the Phase II investigation. While 12 fragments of carbonized wood were recovered from Test Unit 1, these could not be identified by specific taxon and generally appear to be from native deciduous tree species common in Ohio. Therefore, research questions pertaining to site function(s), time period(s), or lithic technologies cannot be addressed in any more detail now than they could be after the Phase I survey.

Based on the results of the Phase II investigation of the Eagle Creek site cluster as summarized above, it does not appear that any of the five sites (33HK1008 and 33HK1011-1014) meet any of the criteria for NRHP eligibility. Therefore, these sites do not appear to qualify as historically significant properties, either as individual sites or as a site cluster. No further investigation of them is recommended in association with the Project.

6.0 SUMMARY AND RECOMMENDATIONS

During the fall of 2021, MSG conducted a Phase II evaluation of archaeological sites 33HK1008, 33HK1011, 3HK1012, 33HK1013, and 33HK1014 (collectively, the Eagle Creek site cluster) for the proposed Eagle Creek Flood Basin (the Project) in Hancock County, Ohio. The Project is Phase 2 of the Hancock County Flood Risk Reduction Program (HCFRRP). A Phase I archaeological survey for the Project previously completed by MSG (Julien et al. 2021) resulted in the recommendation that sites 33HK1008, 33HK1011, 33HK1012, 33HK1013 and 33HK1014 are a site cluster that may represent a single, larger site that is potentially eligible for the NRHP under Criterion D for its ability to yield significant data regarding Early Archaic lifeways in northwest Ohio. The purpose of the Phase II investigation of this site cluster is to enable a formal determination of NRHP eligibility.

The research design for the Phase II investigations called for a two-staged approach. The first stage was a magnetic gradiometry survey of an area encompassing all five sites within the cluster, while the second stage was the manual excavation of selected magnetic anomalies. The magnetic gradient survey was conducted by the Applied Anthropology Laboratories at Ball State University (BSU), under the direction of Dr. Kevin Nolan. During the magnetic gradient survey, BSU observed a prominent linear anomaly traversing 33HK1008 that was interpreted as an old fence line. Additional evidence of disturbance was observed in the form of two apparent drain pipes and an apparent drainage trench excavated from the field into the woods toward Eagle Creek. However, further data processing revealed a total of 82 magnetic anomalies of potential archaeological interest. BSU took soil cores from 33 of the anomalies; over half of the soil cores were ranked either Excellent or Good for evidence of cultural features. MSG then selected between four anomalies to test through manual excavation.

Test Unit 1 (33HK1008) revealed a pre-contact pit feature immediately below the plow zone. This feature yielded calibrated AMS date ranges of 646-585 cal BP (64.3% probability) and 567-530 cal BP (31.1% probability), both corresponding to the Late Prehistoric (Mississippian) time period (Appendix E). However, the function of this feature remains unclear as it yielded only two temporally non-diagnostic pieces of lithic debitage and 12 pieces of charcoal representing common deciduous tree species native to Ohio. Furthermore, this feature exhibited evidence of heavy disturbance from plowing and bioturbation (likely root growth). Test Unit 2 (33HK1008) was sterile. Test Unit 3 (33HK1014) yielded eight pieces of temporally non-diagnostic lithic debitage from the plow zone, while Test Unit 4 (33HK1013) yielded one temporally non-diagnostic utilized flake from the plow zone. Neither of these units contained pre-contact cultural features. Of the five site-specific research questions posed for the Eagle Creek site cluster in Section 2.3, the data collected during the Phase II investigation could only positively address one: the magnetic gradiometry survey did indicate potentially different prehistoric/historic land-use histories for 33HK1008 as opposed to sites 33HK1011-1014. However, insufficient evidence was collected to indicate that these five sites actually represent a single, larger site; no temporally diagnostic artifacts were recovered during the Phase II investigation; and no artifact types or ecofacts that could address research questions pertaining to site function(s), seasonality of occupation, or changing lithic technologies were collected.

In summary, archaeological sites 33HK1008 and 33HK1011-1014 do not appear to represent a single, larger site, and they do not appear to be eligible for the NRHP either as individual sites or as a site cluster. Therefore, no further investigation of these sites is recommended in association with the Project, and avoidance of the sites during construction should not be required.

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APPENDIX A
GEOPHYSICAL SURVEY REPORT

BALL STATE UNIVERSITY
College of Sciences and Humanities
Applied Anthropology Laboratories

Learning in Action: Student Centered Research

Learn. Work. Discover.

Geophysical Archaeological Survey for Phase II assessment of Sites 33Hk1008, 33Hk1011, 33Hk1012, 33Hk1013, and 33Hk1014 in Hancock County, Ohio

Prepared for:
Robert C. Chidester, Ph.D., RPA
Archaeology Team Leader
The Mannik & Smith Group, Inc.

Prepared by:
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January 25, 2022

AAL Projects #21GP010

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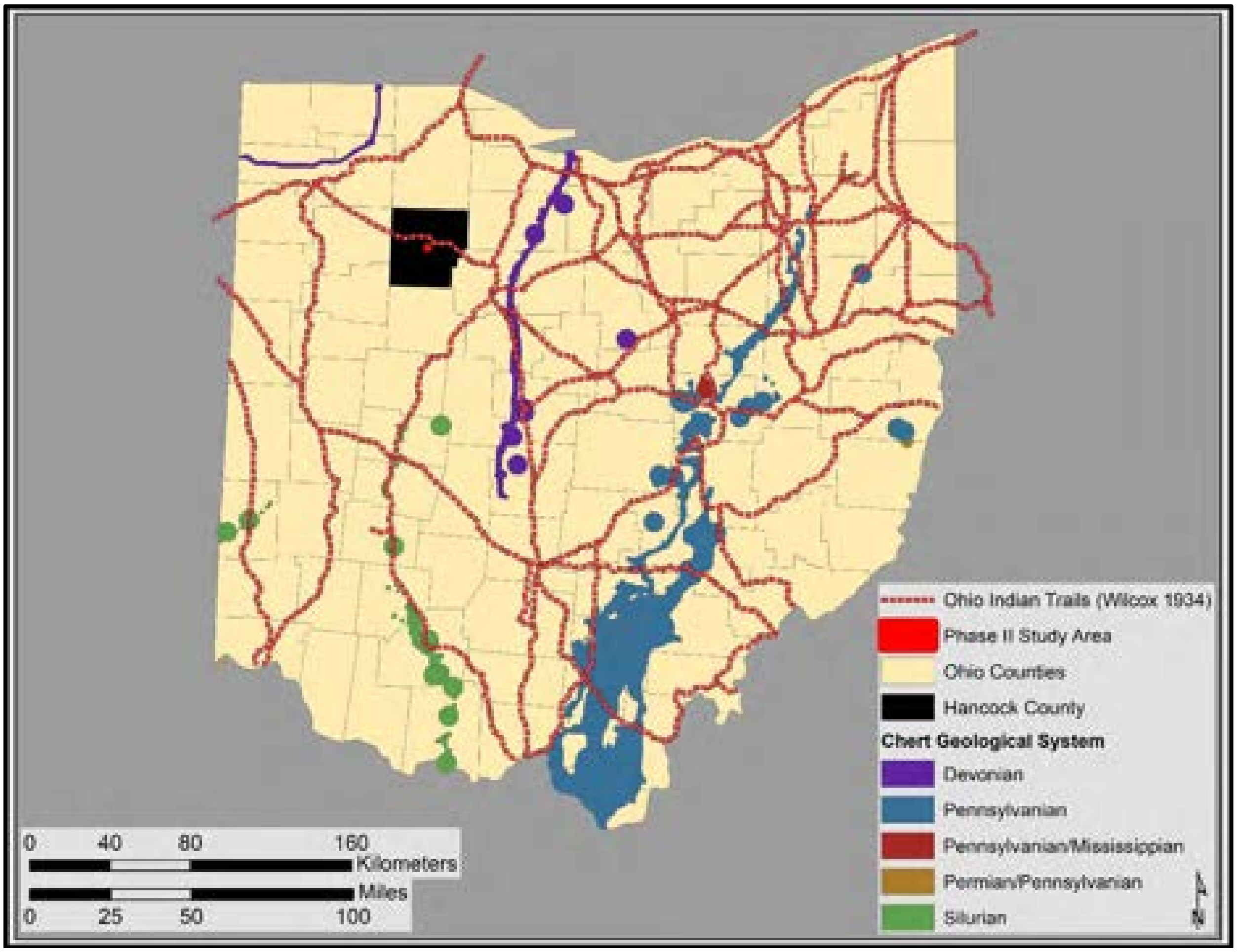
Introduction

At the request of Dr. Robert Chidester, Archaeology Team Leader for The Mannik & Smith Group, Inc., the Applied Anthropology Laboratories (AAL) conducted a magnetic gradiometry survey of sites 33Hk1008, 33Hk1011, 33Hk1012, 33Hk1013, and 33Hk1014 in Hancock County, Ohio (Figure 1). The survey is intended to aid Mannik & Smith in planning for Phase II investigations of the above listed sites. The survey was directed by Dr. Kevin C. Nolan, and conducted with the aid of Dr. Rebecca Barzilai (Project Archaeologist), and Samantha Beckman, on November 29 through December 1, 2021. Preliminary interpretation of results was communicated to Dr. Chidester to aid in planning Phase II excavations. A sample of magnetic features possibly caused by cultural activity were plotted and cored to assess likelihood of intact buried features that generated the magnetic signature.



Setting

All project sites are located near Eagle Creek, (Figure 2 and Figure 3) on relatively flat agricultural land with a small elevation break separating 33Hk1008 from the sites in the southern portion of the Project area. The sites are in the Clayey High Lime Till Plains of the Eastern Corn Belt Plains (55a) ecoregion (Azevedo et al. 1998; Omernik 1987). Gordon's (1966) reconstruction of the natural, precolonial vegetation places all project sites within Beech Forest on the edge of Elm-Ash Swamp Forest (Figure 4).

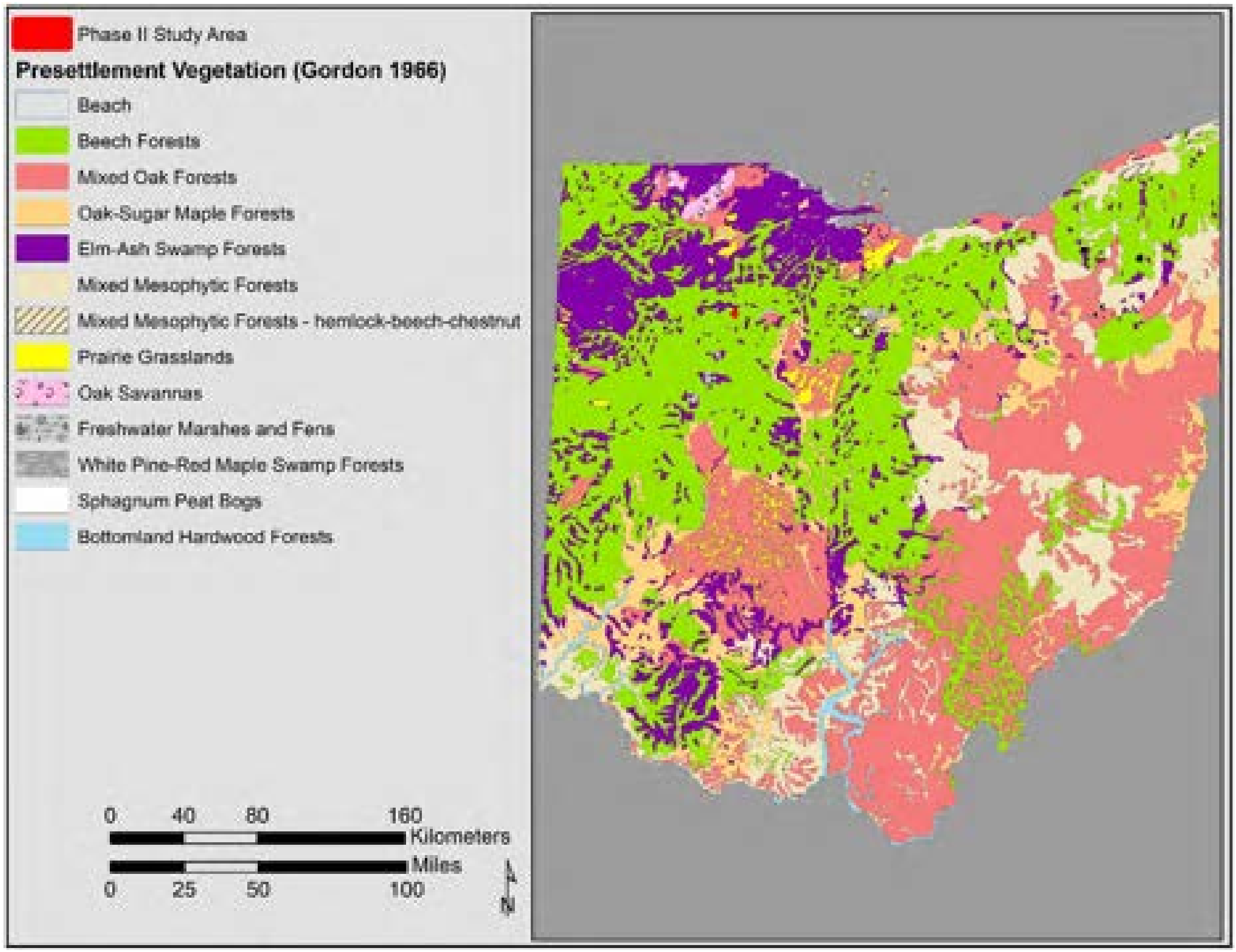


Figure 4: Project area over the Natural Vegetation of Ohio (Gordon 1966, Ohio DNR 2003).

Table 1: Soil Map Units (SMU) Project Sites (Soil Survey Staff 2020)

Site	SMU	Name	Slope	Flood	Pond	Drainage	Geomorphology	Subgroup
All	Blg1B1	Blount silt loam, ground moraine, 2 to 4 percent slopes	3	None	Occasional	Somewhat poor	till plains, ground moraines on till plains	Aeric Epiaqualfs
HK1008	Blg1A1	Blount silt loam, ground moraine, 0 to 2 percent slopes	1	None	Occasional	Somewhat poor	till plains, ground moraines on till plains	Aquic Hapludalfs
HK1008	PmA	Pewamo silty clay loam, 0 to 1 percent slopes	0.5	None	Frequent	Very poor	depressions on till plains, till plains	Typic Endoaquolls

At a finer scale the project sites are a located in relatively wet soils (Figure 5). Soils for each site are given in Table 1 (Soil Survey Staff 2020). The soils are located on till plains and floodplains (Figure 6). The project sites were situated to have access to wet prairie, wet forest, and riverine resources.

The remainder of this report will provide a brief overview of the methods used for data collection, processing, and interpretation; followed by results and recommendations. Note that recommendations were communicated to the Mannik & Smith archaeology team prior to initiation of Phase II excavations.

Magnetic Gradiometry Survey Methods

A Sensys MXPDA fluxgate gradiometer system was used to survey a series of blocks (40 m x 40 m) with 5 sensors in the cart spaced 0.5 m apart. All gradiometry probes used are Sensys FGM650 probes with a 65 cm spacing between top and bottom sensors. Collectively gradiometer survey covered 1.6 ha, or 3.95 acres, of land. The survey grids are shown in Figure 3.

Within blocks, survey was conducted in a zig-zag pattern starting in the southwest corner of the block with the first sensor on the western edge of the block. Readings were recorded every 0.1 m along a traverse. The MXPDA system is GPS-enabled, but was operated in "Field Mode" using only the included odometer and local grid markers. Transects were marked using non-magnetic tape measures on the north and south ends with center traverses marked with a plastic flag to guide straight traverses. Each block was registered as a "Field" in Sensys' Monex data collection software specifying local grid coordinates directly into the system. Upon completion of the survey and export to Magneto all the blocks can be assembled into a composite using the grid coordinates from the Field Mode settings (or with absolute positions if used with a GPS).

Within Magneto one step of data processing was applied to remove system noise and correct for method of collection: Auto Field Compensation. Magneto does not have full processing capability, so data had to be exported to an ASCII file for import into TerraSurveyor. Preliminary interpretations of the data are conducted in Magneto using the Object Search function. Potential anomalies are selected on the color-coded map (Magneto terminology referring to magnetogram) by clicking in the center of the area of interest and using the object search window to set the size of the search box. Once size is set to encompass the extent of the suspected anomaly, the function can record the maximum and minimum values recorded within the search box. For monopolar anomalies, only a positive (maximum) value is recorded. For dipolar anomalies both positive and negative maxima are recorded. Magneto creates a table of "objects" from this process that includes the local grid coordinates of the anomaly, the coordinates of each maxima (when applicable), and calculates other properties for dipolar features. These extra calculated properties are not directly relevant to archaeological application, but are reported here where present.

A sample of these anomalies (objects) were flagged and cored using an oakfield soil probe to assess the likelihood of an intact cultural source for the magnetic measurements. Note that the magnetic measurements (barring instrument error) have a real source, irrespective of whether it is a cultural feature or a physical property of the matrix that can be seen or felt by an excavator in the soil (e.g. Kvamme et al 2006:250, 314, 353, 355). Older sites, or sites subjected to intensive cultivation disturbance may retain only magnetic, and not tactile or visual, remains of past features.

After completing the fieldwork, all blocks were exported to ACII text files and imported into TerraSurveyor for additional processing. In TerraSurveyor the blocks are reassembled into a composite (if all the same size and orientation). The following processing steps were applied to the data: destripe (zero median traverse), clip (remove all data +/- 3SD). Due to operator errors and field conditions, more intensive processing was applied as needed to "clean" the data. Where traverse starting points were not exactly over the baseline destaggering was applied. Due to deep furrows, extensive crop debris and other obstacles, some blocks had periodic magnetic waves introduced into the recorded data. These were removed via a low-pass filter.

Pre-contact cultural features tend to be less than 30 nT, with many pits and posts of archaeological interest below 10 nT or 5 nT. This depends on a few variables in the survey setup and the nature of the feature formation. The spacing between the two sensors within the gradiometer can determine the intensity of features recorded; the further the sensors are apart, the greater the intensity of the recorded difference (i.e., the same feature detected with a 50 cm separation and a 65 cm separation will be more intense in the latter). Further, the height of the sensor above the ground can impact the recorded magnetic response (i.e., higher above the ground, weaker signal). Outside of the surveyor's control is variation in the composition of the soil. With larger area surveys, it is likely that different soil backgrounds will be encompassed within the same magnetogram. This means that a single threshold for defining anomalies cannot always be applied. Parsing background, noise, and signal in magnetograms is an iterative and exploratory process.

The processed magnetograms were exported from TerraSurveyor as ESRI Grid files and georeferenced to the survey blocks in ArcMap 10.8. The Grid file type preserves the measured values in the pixels and can be analytically used in a GIS for various operations. To explore the variability in the horizontal differences in magnetism, the Grid was used to generate a series of isoline maps. The Contour tool in ArcToolbox, Spatial Analyst extension, surface analysis group was used to derive the isolines in 1 nT and 2.5 nT increments.

Results

In this section I present the results and discuss implications and recommendations by site in the order they were surveyed. Survey was conducted in a southern (B1-4) and northern (B5-10) set of blocks, and the northern blocks were slightly offset from the southern blocks.

Table *2* and Figure 7 present the Magneto objects for Eagle Creek project area and the composite magnetogram is given in Figure 8. The most notable pattern in the magnetogram the drastic difference in intensity of the background in B5-8 (southern blocks of the northern group); even at a +4/-4 contrast, very few potential features are visible in the southern section (B1-4) and the two northern most blocks (B9 and B10). Some of this could be historic land use differences as there is a remnant fence line (alternating black/white line) across B5-B8. This magnetic line is close to, but no parallel to the property boundary line marked out by Mr. Tom Inbody, farmer of the northern field (personal communication December 1, 2020). The flags placed by Mr. Inbody, two drain(?) pipes in Blocks 3 and 4, and a moderate sized backdirt pile from an apparent drainage trench excavated from the eastern woods into the eastern edge of the field had visible impacts on the magnetograms (Figure 9 and Figure 10).

Table 2: Magneto Objects and Coring Results for 21GP010

Block	No.	North	East	Depth	Dia	Volume	Min	Max	Results
1	1	473.7	514.5					6.63	Fair
1	2	488.5	516					6.05	Fair
1	3	463.79	527					4.19	Excellent
1	4	461.1	512.5					12.45	
1	5	481.57	505	0.4	0.06	0.09	-3.99	10.7	Non-Cultural
1	6	495.7	508					7.13	
1	7	474.2	518					2.31	
1	8	473	522					6.53	
2	1	497.63	574.89	1.2	0.18	3.1	-5.1	20.25	Fair
2	2	468.39	553.5					10.26	Good
2	3	484.89	564					8.14	Excellent
2	4	470.89	551					6.02	
2	5	488.89	547.5					11.07	
2	6	478.89	575					10.45	
2	7	468.66	547.28	0.41	0.05	0.08	-5.12	6.62	
2	8	498.89	574					4.41	
2	9	479.29	547.5					6.25	
3	1	481.2	592.5					7.9	Fair
3	2	494.79	619					6.31	Fair
3	3	491.7	611.5					5.42	Good
3	4	492.6	580.5					7.86	
4	1	481.6	624					10.21	Excellent
4	2	496.79	646					4.5	Good
4	3	478	657					8.52	Good
4	4	496	635.5					4.09	
4	5	489.29	658.5					14.34	
4	6	469.29	642					7.49	
4	7	480.29	639.5					6.24	
4	8	476.5	647.5					8.87	

Block	No.	North	East	Depth	Dia	Volume	Min	Max	Results
5	1	551.45	531.26					6.58	Fair
5	2	559.15	505.76					14.85	Non-Cultural
5	3	559.15	520.26					6.91	Good
5	4	530.25	506.76					11.77	Non-Cultural
6	1	547.25	547.76					9.42	Excellent
6	2	540.04	557.76					4.8	Good
6	3	525.54	557.76					12.41	Non-Cultural
6	4	544.39	552.76	0.3	0.06	0.13	-4.14	33.85	Good
6	5	533.54	541.76					14.25	
6	6	546.75	546.26					8.53	
6	7	544.95	548.76					7.23	
6	8	550.74	555.24	1.06	0.13	1.14	-6.17	6.75	
6	9	524.63	551.98	0.37	0.06	0.09	-6.42	9.31	
6	10	554.25	563.76					7.21	
7	1	540.3	598.26					11.8	Good
7	2	526.68	601.93	0.55	0.09	0.4	-9.62	20.33	Good
7	3	554.61	581.26					12.13	Good
7	4	552.8	612.76					9.63	
7	5	536.41	593.26					14.07	
7	6	528.61	582.26					7.99	
7	7	553.3	584.26					8.71	
7	8	532.3	587.26					4.87	
7	9	532.89	588.54	0.37	0.06	0.11	-8.45	10.87	
7	10	544.01	599.76					8.25	
7	11	550.41	609.26					5.12	
7	12	536.41	589.76					7.52	
7	13	559.01	616.26					8.16	
7	14	553.61	597.26					8.06	
8	1	543.11	648.26					11.54	Fair
8	2	533.91	646.76					12.47	Fair
8	3	557.3	622.26					6.29	Fair
8	4	530.3	630.26					7.54	
8	5	532.21	657.26					10.05	
8	6	547.3	622.76					6.81	
8	7	548.48	643.85	0.37	0.07	0.19	-5.29	31.04	
8	8	557.3	633.76					6.27	
8	9	533.51	658.76					5.57	
8	10	536.71	642.26					12.01	
8	11	528.3	650.61	0.29	0.06	0.1	-8.91	22.08	
8	12	529.11	647.26					10.36	
8	13	538.91	622.76					7.87	
8	14	534.71	625.26					5.7	
8	15	542.71	634.89	0.78	0.14	1.5	-10.61	32.94	
9	1	512.26	573.95					7.54	Fair
9	2	511.26	564.15					5.97	Good
9	3	513.76	561.15					7.24	Excellent
10	1	600.93	570.47	1.61	0.28	11.17	-4.98	32.48	Excellent

Block	No.	North	East	Depth	Dia	Volume	Min	Max	Results
10	2	581.35	548.26					8.19	Excellent
10	3	585.95	563.26					13.07	Excellent
10	4	599.45	552.76					10.26	
10	5	580.95	563.26					5.62	
10	6	570.05	545.26					9.02	
10	7	578.45	574.26					5.52	

Figure 7: Magneto Objects and Coring Results over World Imagery (Esri 2020.

The variable intensity in magnetic background across the surveyed area requires identification of local thresholds for identification of anomalies. A series of exploratory isoline analyses were performed to find the thresholds that best capture variability in each set of blocks. Initial 2.5 nT interval isolines were too coarse, though a 7.5 nT threshold captured the majority of relevant magnetic variability in Blocks 5-8. A second set of isolines was created with a 1 nT interval. Representations of the threshold values that best characterize each set of blocks are shown in Figure 9, Figure 10, and Figure 11. Figure 11 is provided to maximize visibility of the subtle isolines, where the other two contextualize this variability. Even with the higher threshold for Blocks 5-8, there are more anomalous areas than for Blocks 1-4 and Blocks 9-10. This may accurately reflect the archaeological difference between site 33HK1008 and the other study sites.

Figure 12 and Figure 13 presents composite magnetic isoline thresholds as polygons (using the COUNTOUR_SHELL_UP option with each local threshold) with anomalies unlikely to be pre-contact features manually removed (e.g., the entire fence line, those around surface obstructions). The pattern of likely isoline features generally matches the overall distribution of Magneto interpreted anomalies (Figure 14).

The coring results were generally very good, with a relatively high proportion of “Good” (N=11, 33.3%) and “Excellent” (N=8, 24.2%) rated anomalies. This is somewhat surprising given the relatively low contrast between the anomalies and their backgrounds (even B5-8 where the background is higher, exhibit subtle distinctions defining potential cultural features). Burned earth was relatively abundant in the core samples (e.g., B4-2, B4-3, B2-1, B8-3, B9-2, B6-4, B6-2, B10-1, B10-2).

<u>Summary and Recommendations</u>

A total of 3.95 acres (1.6 ha) were subjected to magnetic gradient survey between November 29, 2021 and December 1, 2021. Several dozen magnetic anomalies were identified, 33 of which were cored to assess likelihood of intact features. A plurality of anomalies cored were rated Good, followed by Fair, and Excellent. Only 12 percent of sampled anomalies were classified Non-Cultural. In general, the gradiometry results indicate activity areas overlapping with, or immediately adjacent to surface concentrations of artifacts recovered during the Phase 1 survey by Mannik & Smith. However, the distribution of likely features (e.g., B1-3, B2-3, B10-1, B10-2) extends outside the boundaries of artifact distributions codified by defined site boundaries. Surface artifact distributions are not perfect indicators of the distribution of preserved cultural deposits (see Dunlop 2018), and geophysical prospection can serve as a method of primary identification of extent of archaeological material.

Excavations were recommended to explore highly rated sampled potential features. Excellent and Good rated potential features provided abundant targets for Phase II assessment.

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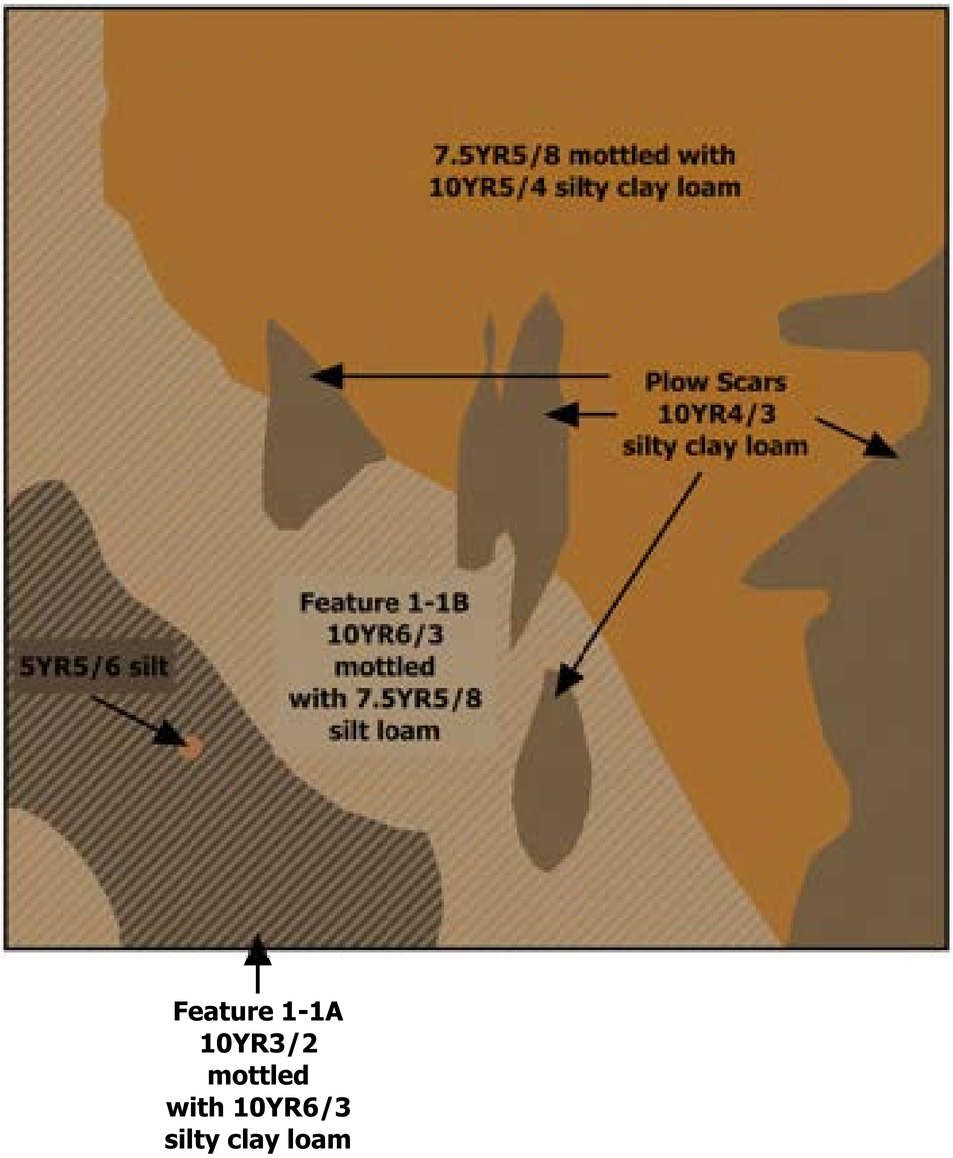
APPENDIX B
TEST UNIT PLAN AND PROFILE DRAWINGS



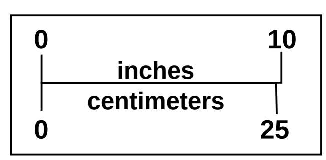


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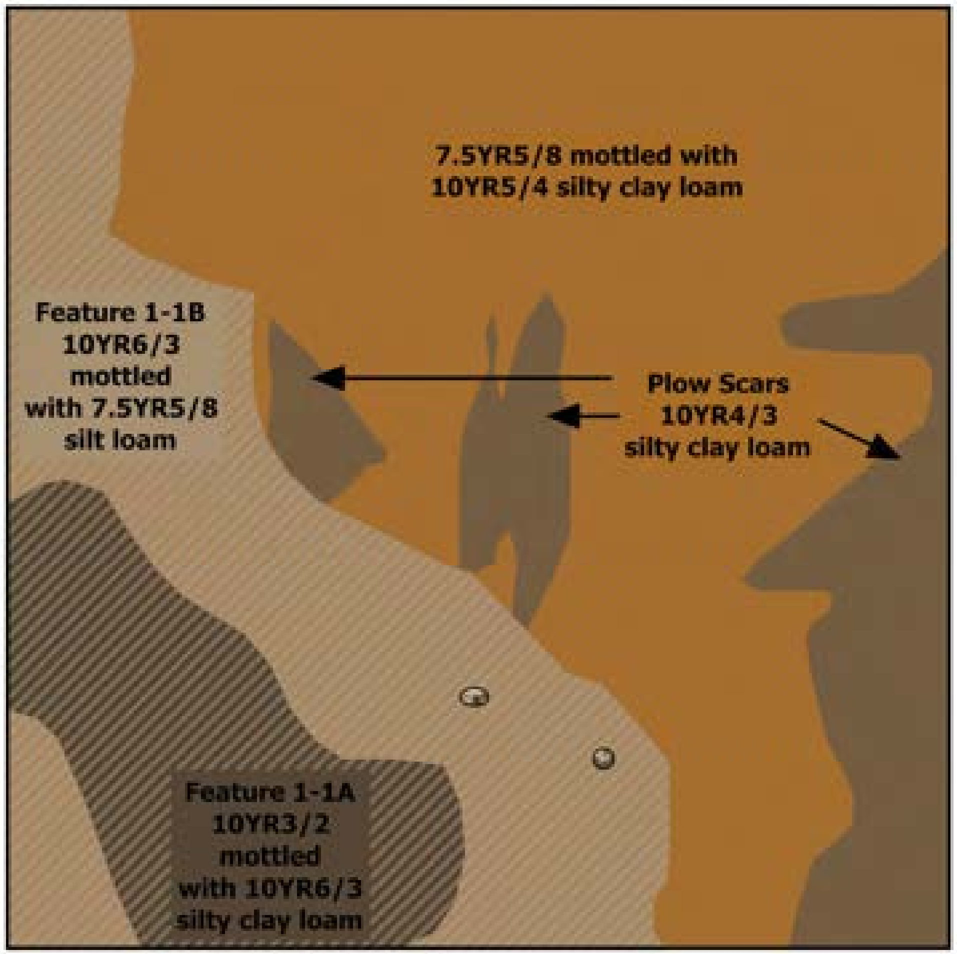
Figure B1
Eagle Creek Site Cluster
Test Unit 1, Plan View, Level 1

N



Rock

0 inches 10
0 centimeters 25

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Figure B2
Eagle Creek Site Cluster
Test Unit 1, Plan View
Feature 1-1, Level 1

N

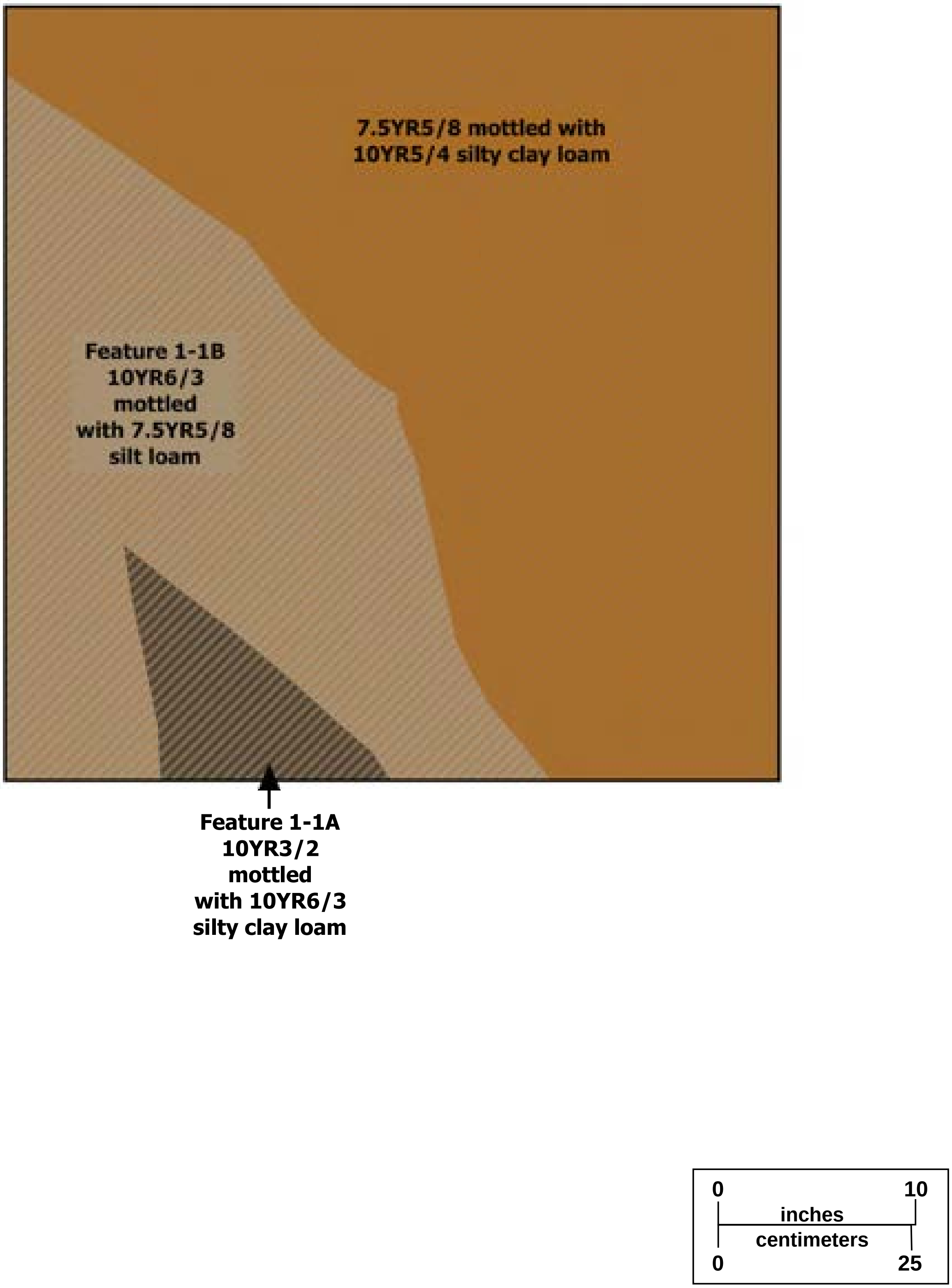

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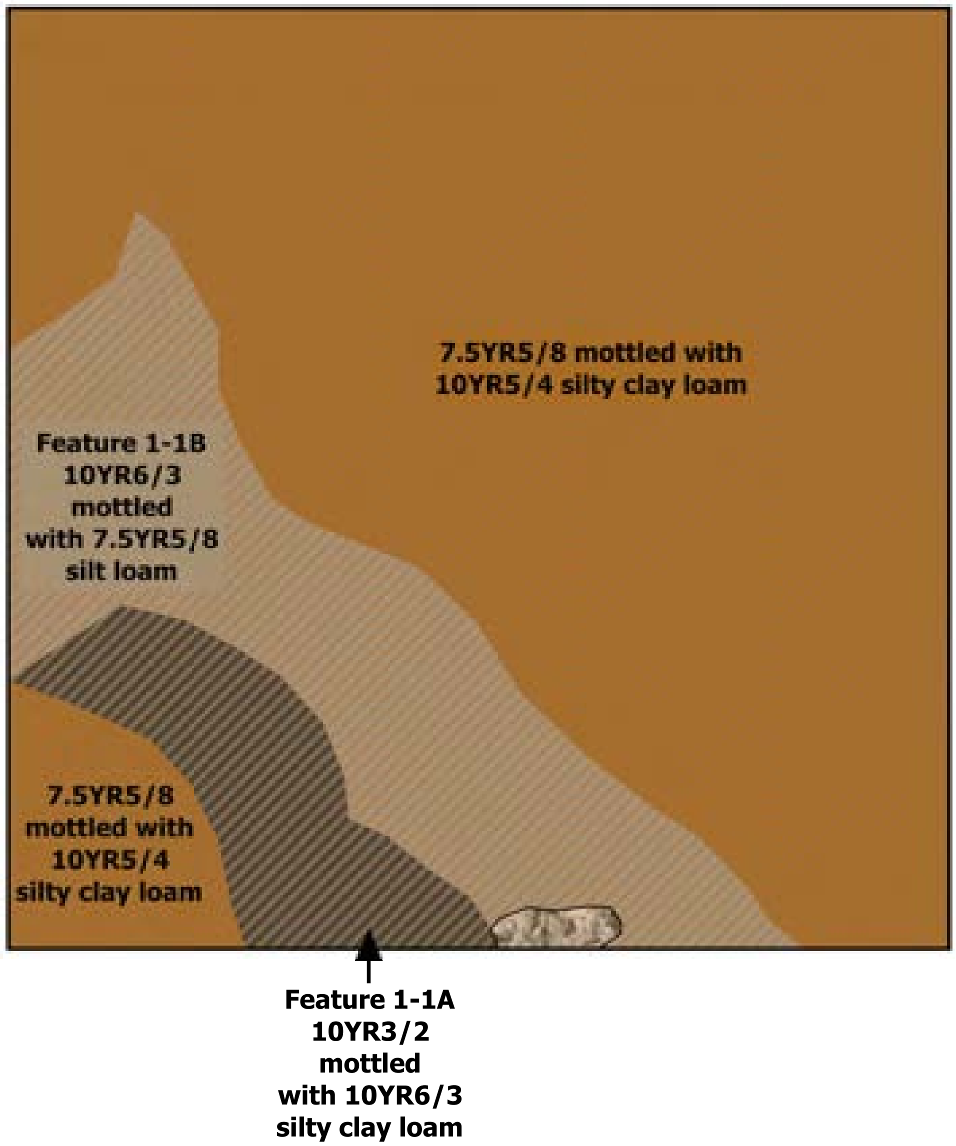
Figure B3
Eagle Creek Site Cluster
Test Unit 1, Plan View, Level 2
and Feature 1-1, Level 2

N



Rock

0 10 inches

0 25 centimeters

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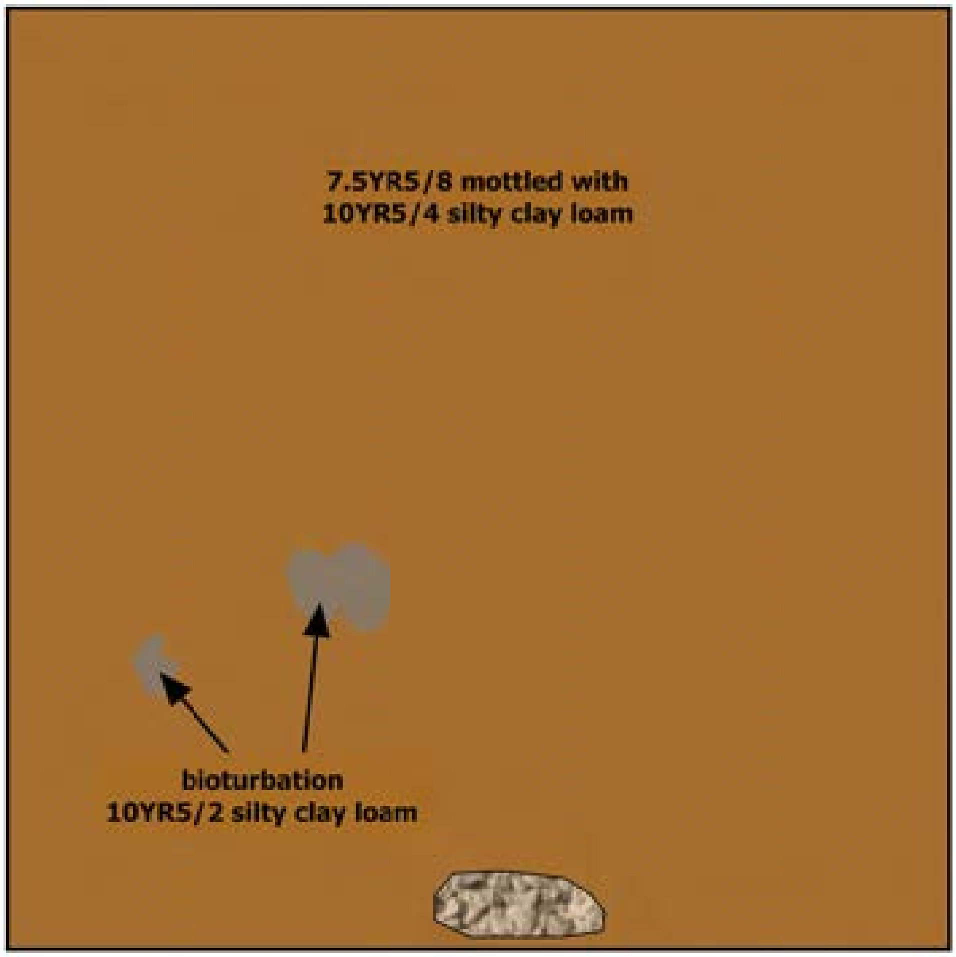
Figure B4
Eagle Creek Site Cluster
Test Unit 1, Plan View, Level 3
and Feature 1-1, Level 3

N



Rock

0 10
inches
centimeters
0 25

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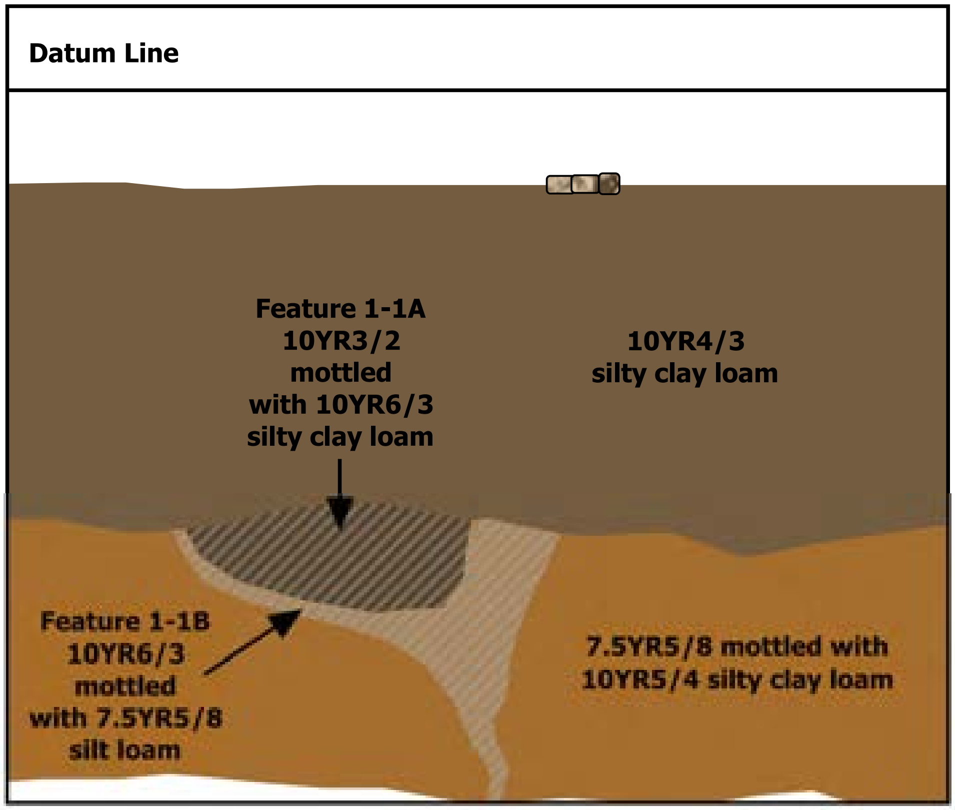
Figure B5
Eagle Creek Site Cluster
Test Unit 1, Plan View, Level 4

N



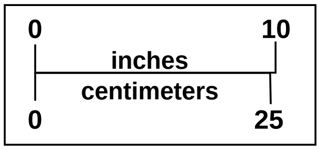


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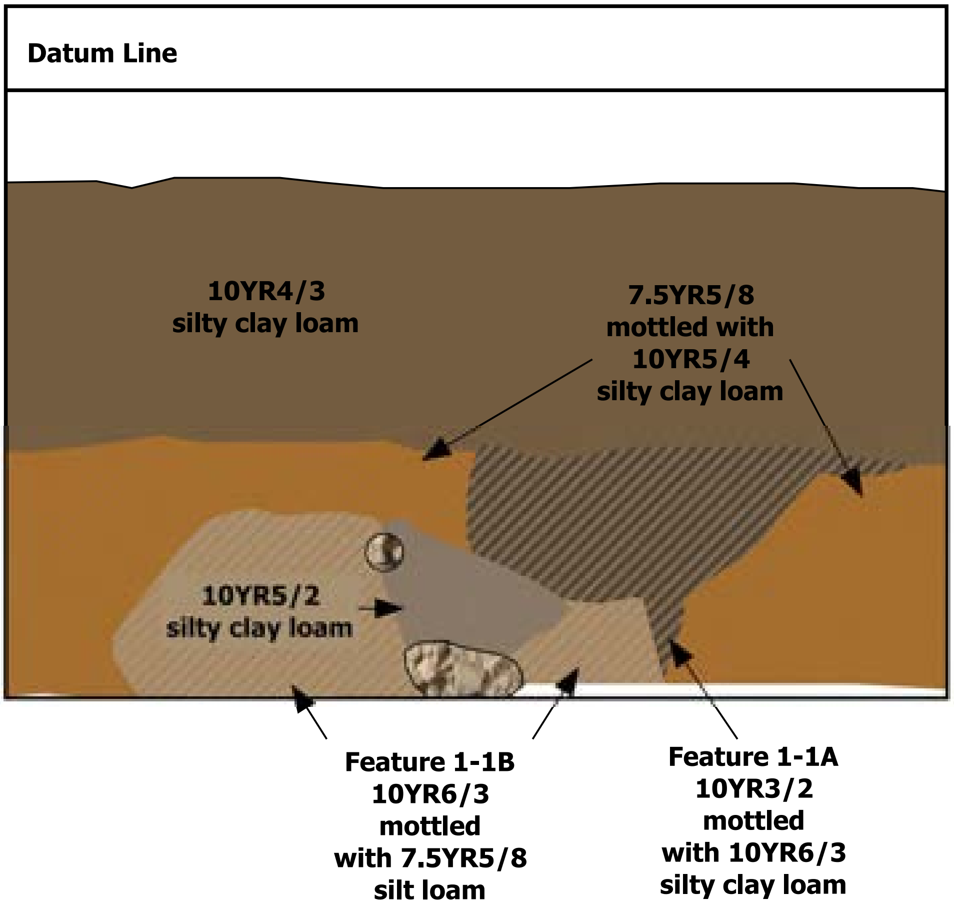
Figure B6
Eagle Creek Site Cluster
Test Unit 1, West Wall Profile



Rock

0 inches 10

0 centimeters 25

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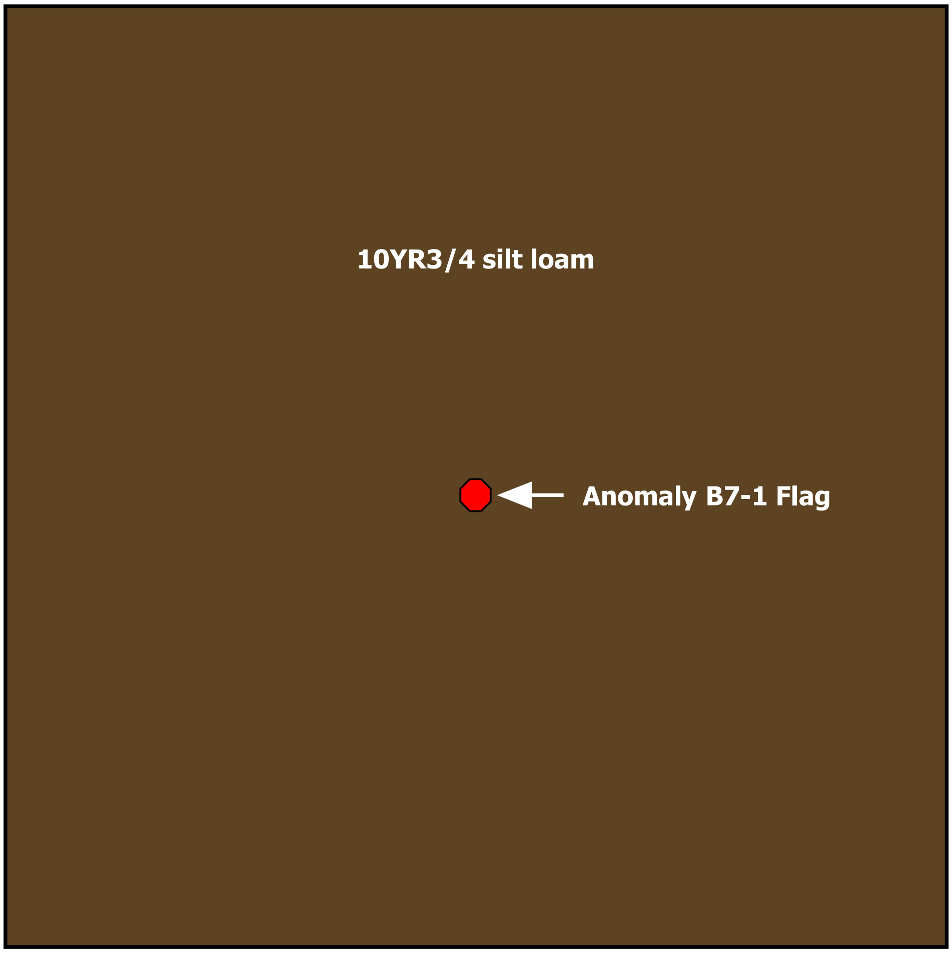
Figure B7
Eagle Creek Site Cluster
Test Unit 1, South Wall Profile



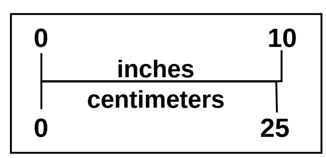


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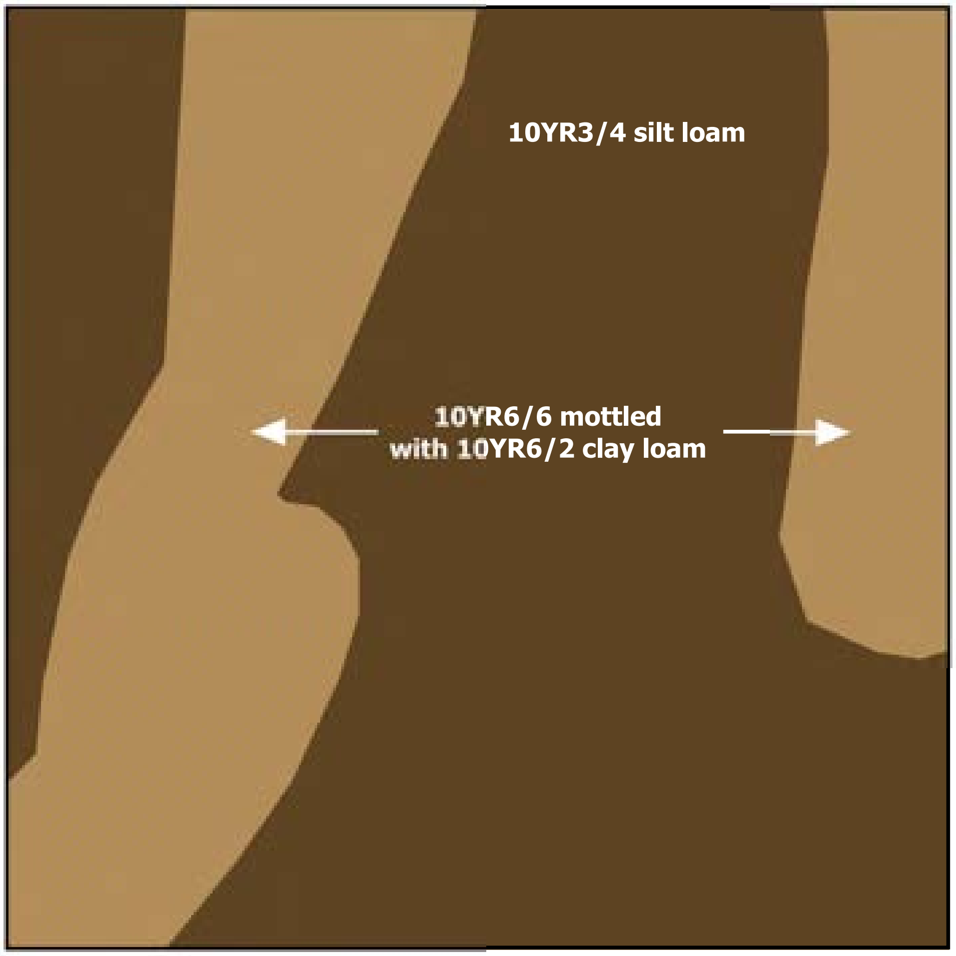
Figure B8
Eagle Creek Site Cluster
Test Unit 2, Plan View, Surface

N



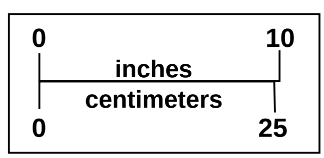


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Figure B9
Eagle Creek Site Cluster
Test Unit 2, Plan View, Level 1

N

0 inches 10
0 centimeters 25

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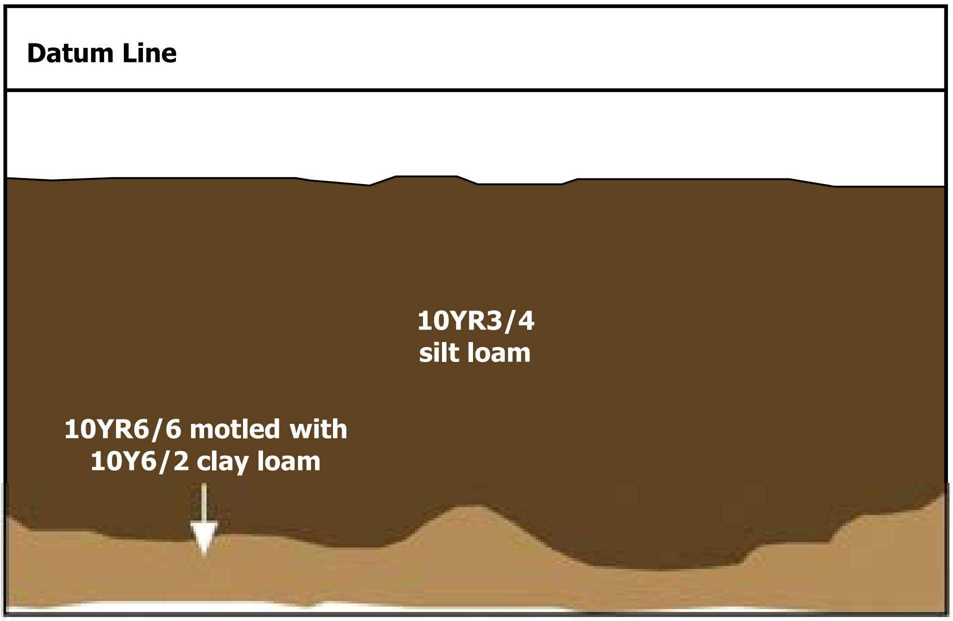
Figure B10
Eagle Creek Site Cluster
Test Unit 2, Plan View, Level 2

N



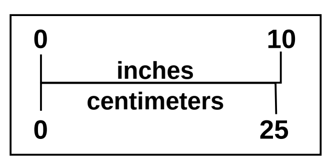


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Figure B11
Eagle Creek Site Cluster
Test Unit 1, North Wall Profile

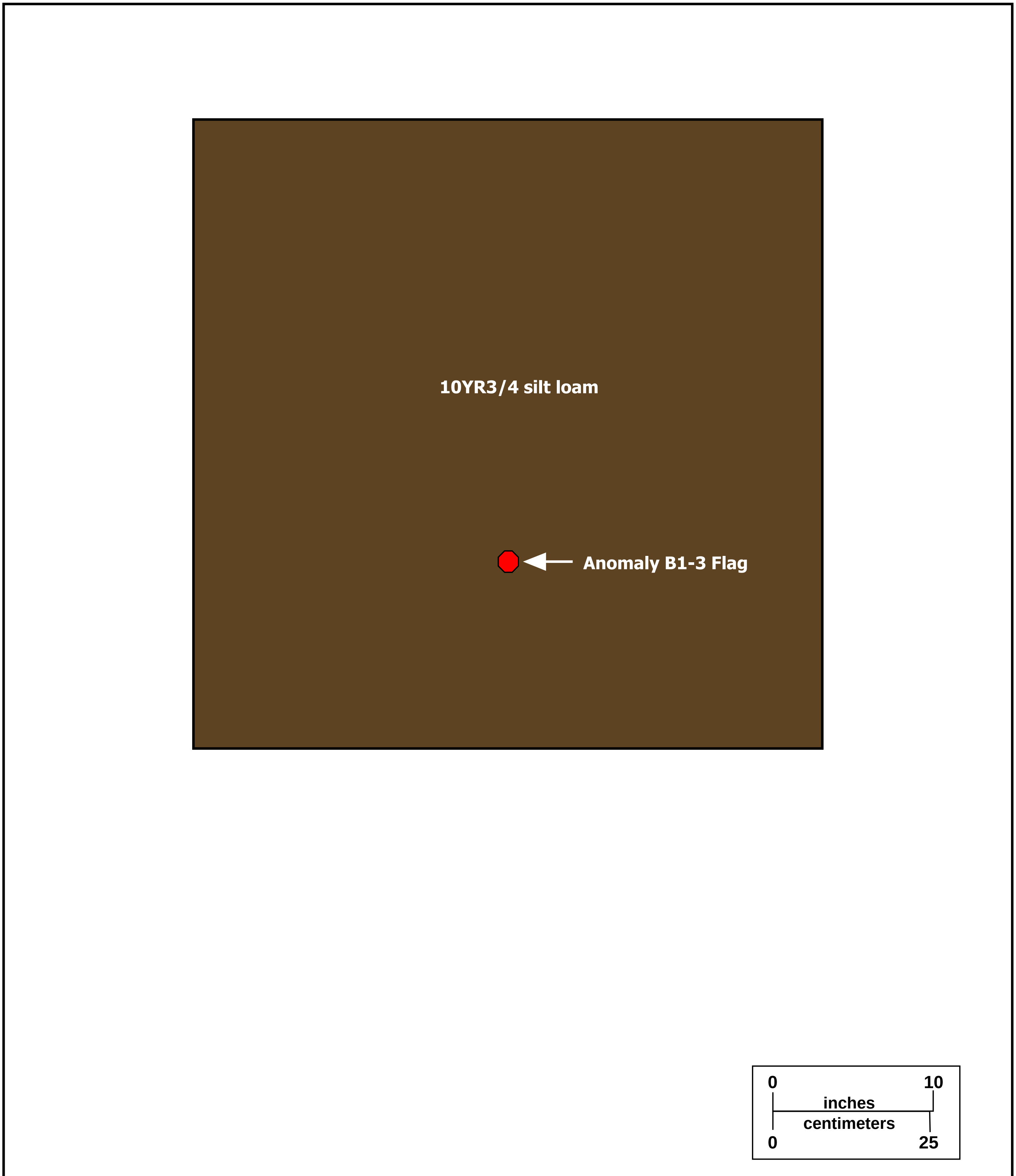

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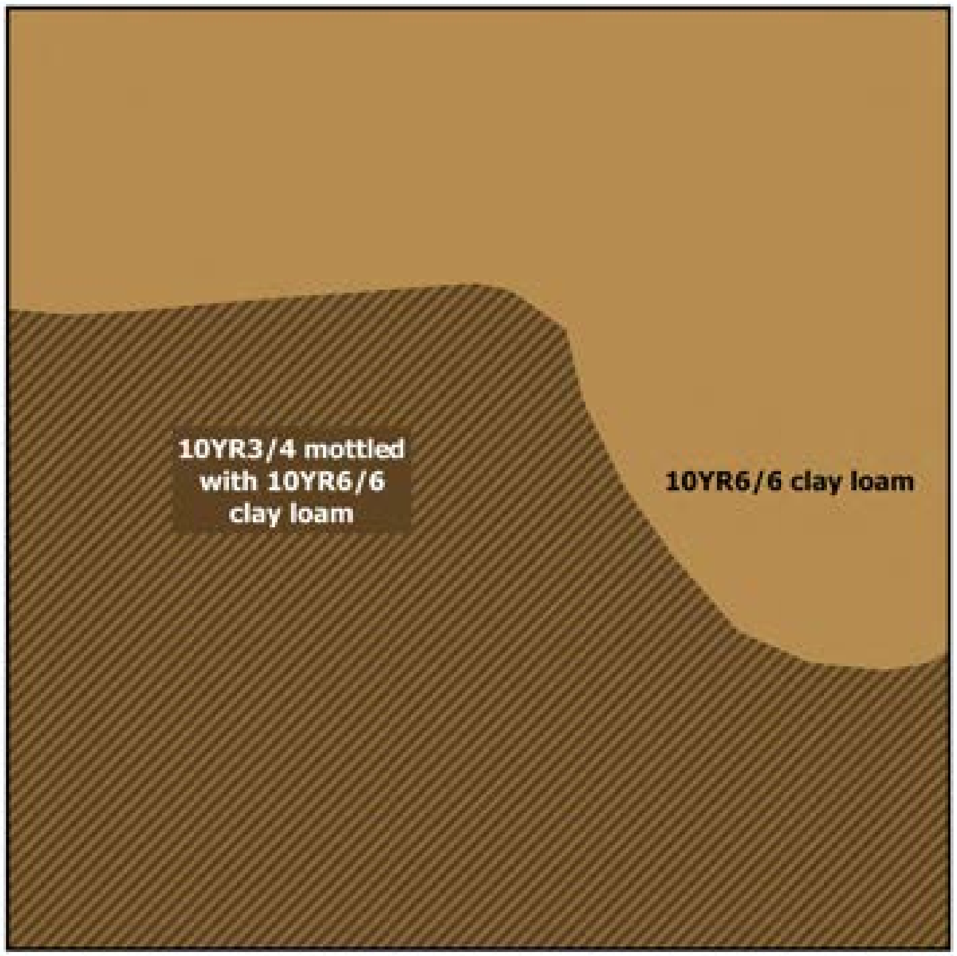
Figure B12
Eagle Creek Site Cluster
Test Unit 3, Plan View, Surface



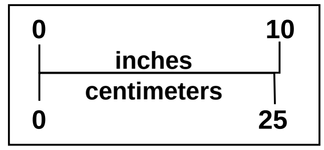


Figure B13
Eagle Creek Site Cluster
Test Unit 3, Plan View, Level 1

N

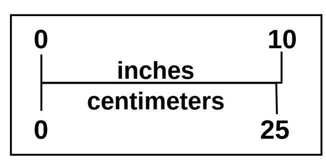


Figure B14
Eagle Creek Site Cluster
Test Unit 3, Plan View, Level 2

N

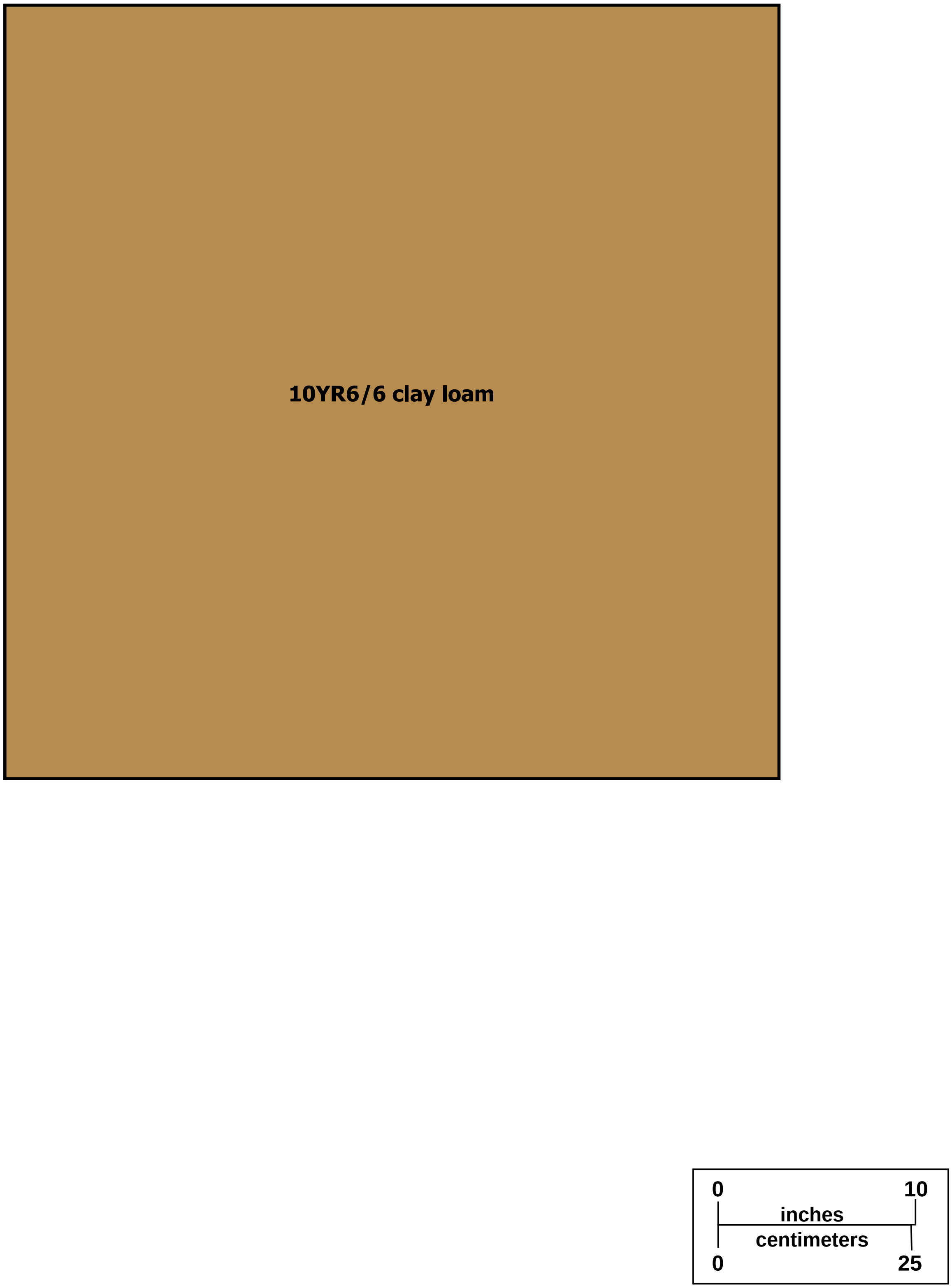


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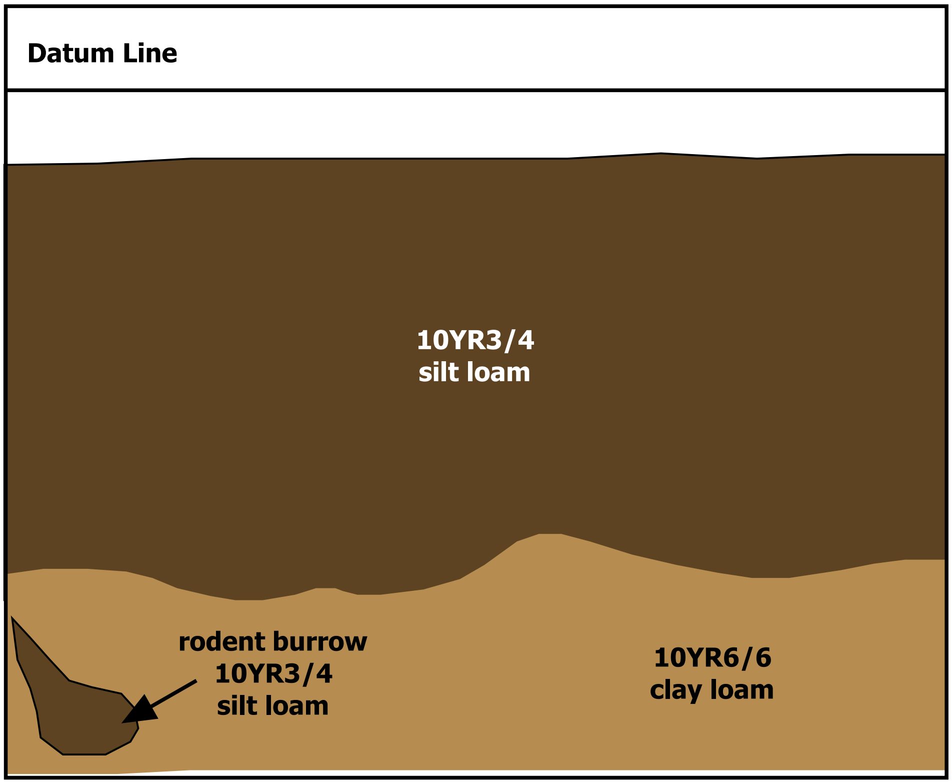
Figure B15
Eagle Creek Site Cluster
Test Unit 3, Plan View, Level 3

N



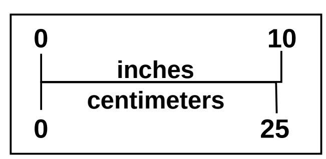


Figure B16
Eagle Creek Site Cluster
Test Unit 3, South Wall Profile

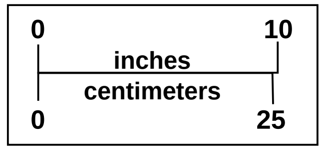


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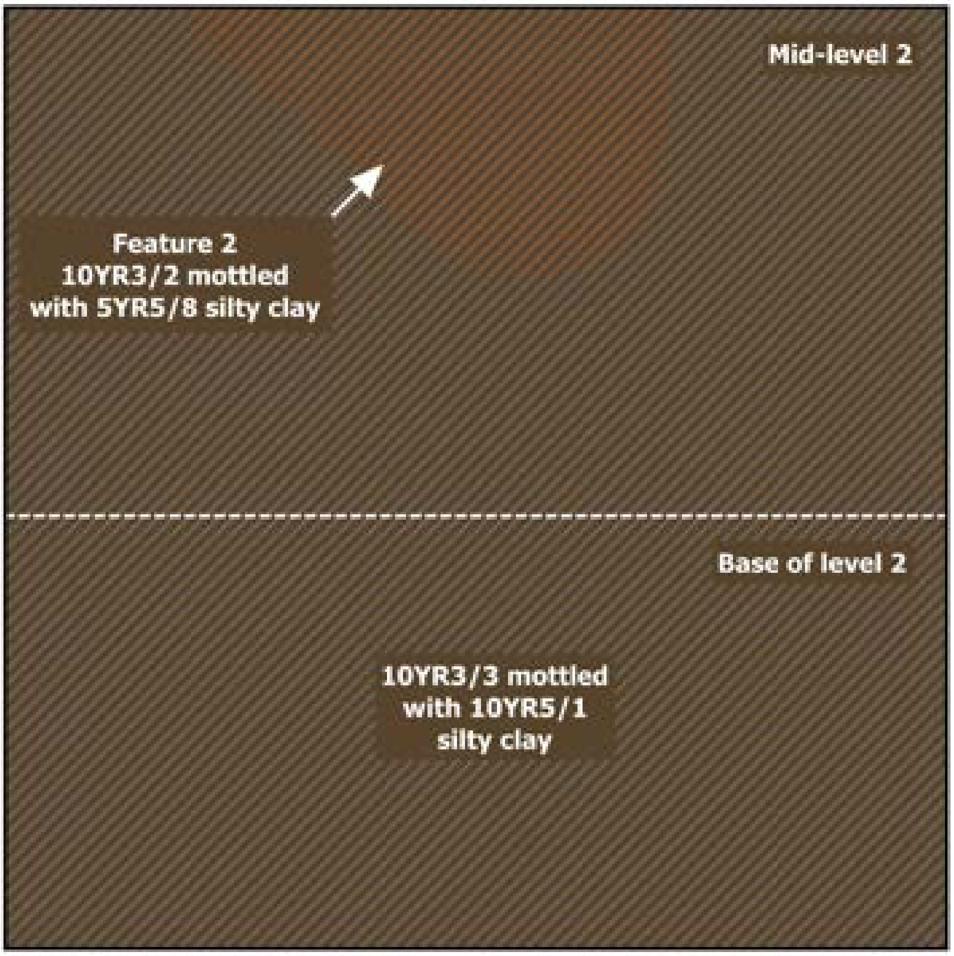
Figure B17
Eagle Creek Site Cluster
Test Unit 4, Plan View, Level 1

N



0 inches 10
0 centimeters 25

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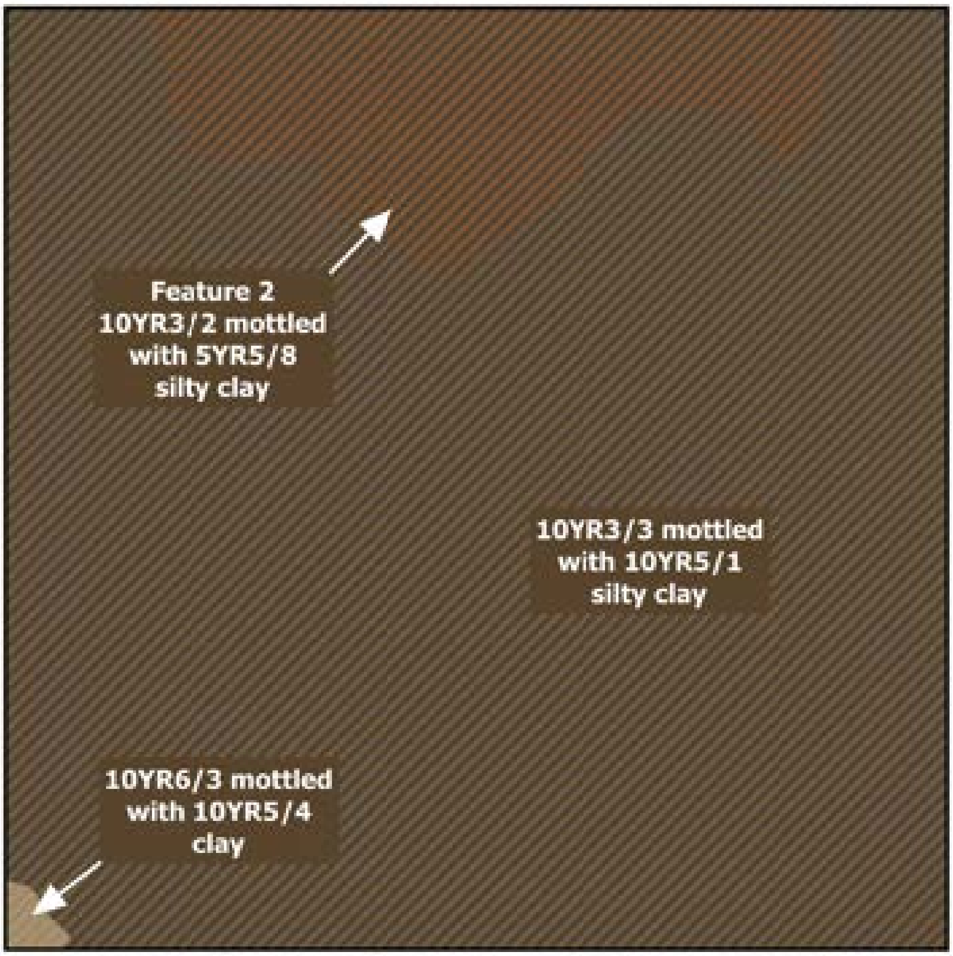
Figure B18
Eagle Creek Site Cluster
Test Unit 4, Plan View, Mid-Level 2
(Feature 2, Surface)

N



0 10
inches
centimeters
0 25

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Figure B19
Eagle Creek Site Cluster
Test Unit 4, Plan View, Level 2
and Feature 2, Level 1

N

0 10
inches
centimeters
0 25

Figure B20
Eagle Creek Site Cluster
Test Unit 4, Plan View, Level 3

N

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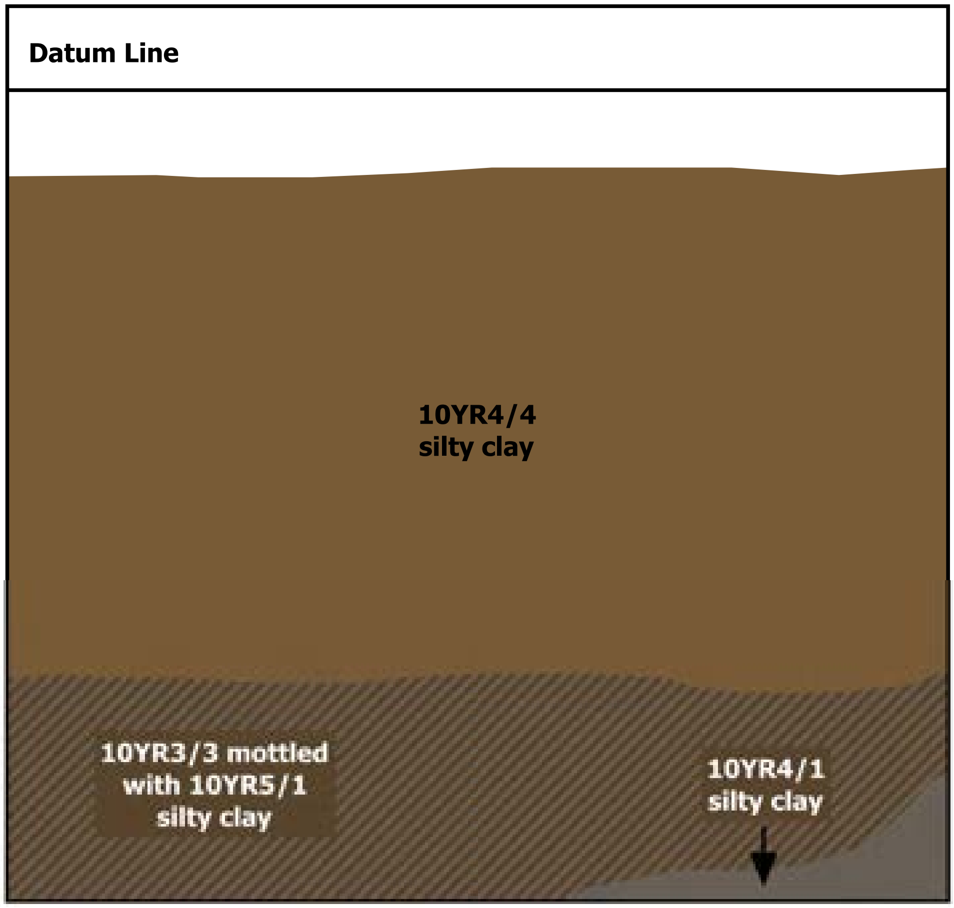

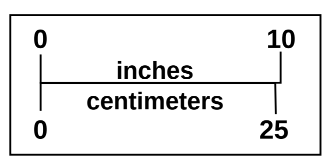

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Figure B21
Eagle Creek Site Cluster
Test Unit 4, South Wall Profile

APPENDIX C

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APPENDIX D
ARTIFACT CATALOG

Table D1
Artifact Catalog, 33HK1008

PROVENIENCE							DESCRIPTION					TOOLS & DEBITAGE				FCR		GENERAL				
Phase of Investigation	Bag #	Object #	State Site #	Horizontal Provenience	Vertical Provenience	Associated Feature	Material Type	Material Sub-Type	Functional Category	Functional Sub-Category	Description	Heat Treated	Heat Damaged	Utilized	Retouched	Shape	Size	Weight (g)	Count	Temporal Period	Reference	Notes
I	43	43.01	33HK1008	Field Site AD015, FS #1	Surface		Lithic	Pipe Creek	Debitage	Complex Flake		No	No	No	No			2.4	1			
I	44	44.01	33HK1008	Field Site AD016, FS #1	Surface		Lithic	Upper Mercer	Debitage	Complex Flake		No	No	No	No			0.5	1			
I	45	45.01	33HK1008	Field Site AD017, FS #1	Surface		Lithic	Flint Ridge Chalcedony	Debitage	Complex Flake		No	No	No	No			0.7	1			
I	46	46.01	33HK1008	Field Site AD018, FS #1	Surface		Lithic	Cedarville-Guelph	Debitage	Complex Flake		No	No	No	No			1.2	1			
I	55	55.01	33HK1008	Field Site AD018, FS #10	Surface		Lithic	Flint Ridge	Debitage	Shatter		No	No	No	No			1.0	1			
I	56	56.01	33HK1008	Field Site AD018, FS #11	Surface		Lithic	Flint Ridge Chalcedony	Debitage	Simple Flake		No	No	No	No			0.9	1			
I	57	57.01	33HK1008	Field Site AD018, FS #12	Surface		Lithic	Flint Ridge Chalcedony	Debitage	Complex Flake		No	No	No	No			1.6	1			
I	58	58.01	33HK1008	Field Site AD018, FS #13	Surface		Lithic	Pipe Creek	Debitage	Simple Flake		No	No	No	No			1.4	1			
I	59	59.01	33HK1008	Field Site AD018, FS #14	Surface		Lithic	Flint Ridge Chalcedony	Tool	Formal Tool	Susquehanna Broad Projectile Point fragment	Yes	No	Yes	No			12.9	1	Early Archaic (ca. 9250 - 8850 BP)	Justice 1987	19.37 mm base, (broken) height, 8.23 thickness.
I	60	60.01	33HK1008	Field Site AD018, FS #15	Surface		Lithic	Bloomville	Debitage	Shatter		No	No	No	No			3.9	1			
I	61	61.01	33HK1008	Field Site AD018, FS #16	Surface		Lithic	Pipe Creek	Debitage	Complex Flake		Yes	No	No	No			1.6	1			
I	62	62.01	33HK1008	Field Site AD018, FS #17	Surface		Lithic	Bloomville	Debitage	Complex Flake		No	No	No	No			9.1	1			
I	196	196.01	33HK1008	Field Site AD018, FS #18	Surface		Lithic	Upper Mercer	Tool	Formal Tool	MacCorkle Stemmed Projectile Point fragment	Yes	No	No	Yes			4.0	1	Early Archaic (ca. 8850 - 8750 BP)	Justice 1987	19.70 mm base, (broken) height, 5.11 thickness.
I	47	47.01	33HK1008	Field Site AD018, FS #2	Surface		Lithic	Pipe Creek	Debitage	Complex Flake		Yes	No	No	No			0.8	1			
I	48	48.01	33HK1008	Field Site AD018, FS #3	Surface		Lithic	Flint Ridge	Debitage	Complex Flake		No	No	No	No			1.0	1			
I	49	49.01	33HK1008	Field Site AD018, FS #4	Surface		Lithic	Delaware	Debitage	Complex Flake		Yes	No	No	No			0.4	1			
I	50	50.01	33HK1008	Field Site AD018, FS #5	Surface		Lithic	Pipe Creek	Debitage	Shatter		No	No	No	No			2.7	1			
I	51	51.01	33HK1008	Field Site AD018, FS #6	Surface		Lithic	Upper Mercer	Debitage	Complex Flake		No	No	No	No			0.7	1			
I	52	52.01	33HK1008	Field Site AD018, FS #7	Surface		Lithic	Flint Ridge	Debitage	Complex Flake		No	No	No	No			0.1	1			
I	53	53.01	33HK1008	Field Site AD018, FS #8	Surface		Lithic	Flint Ridge	Debitage	Complex Flake		No	No	No	No			2.7	2			
I	54	54.01	33HK1008	Field Site AD018, FS #9	Surface		Lithic	Delaware	Debitage	Shatter		No	No	No	No			1.0	1			
II	327	327.01	33HK1008	Test Unit 1	Feature 1-1A, Level 1	Feature 1-1	Lithic	Pipe Creek	Debitage	Shatter		Yes	No	No	No			0.6	1			
II	327	327.02	33HK1008	Test Unit 1	Feature 1-1A, Level 1	Feature 1-1	Mineral	Iron Oxide	Non-Cultural			No	No	No	No			7.9	11			Three of the mineral fragments consist of hematite in a sedimentary rock matrix; eight of the fragments are iron oxide concretions.
II	B1	B1.01	33HK1008	Test Unit 1	Feature 1-1A, Level 1	Feature 1-1	Floral	Charcoal	Miscellaneous	Fuel								1.7	6			All are from a diffuse porous deciduous taxon, likely American beech; less likely possibility is sycamore.
II	S1	S1.01	33HK1008	Test Unit 1	Feature 1-1A, Level 1	Feature 1-1	Floral	Charcoal	Miscellaneous	Fuel								0.1	6			All are from a diffuse porous deciduous taxon, but cannot be identified more specifically.
II	328	328.01	33HK1008	Test Unit 1	Feature 1-1B, Level 2	Feature 1-1	Lithic	Delaware	Debitage	Shatter		No	No	No	No			1.1	1			
II	326	326.01	33HK1008	Test Unit 1	Level 1 (Plow Zone)	Feature 1-1	Lithic	Local Devonian Limestone Chert	Debitage	Shatter		No	No	No	No			4.7	2			
II	326	326.02	33HK1008	Test Unit 1	Level 1 (Plow Zone)	Feature 1-1	Lithic	Upper Mercer: Grey Variety	Debitage	Complex Flake		Yes	No	No	No			0.5	1			
																		Total	*50*			

Table D2
Artifact Catalog, 33HK1011

PROVENIENCE							DESCRIPTION					TOOLS & DEBITAGE				FCR		GENERAL				
Phase of Investigation	Bag #	Object #	State Site #	Horizontal Provenience	Vertical Provenience	Associated Feature	Material Type	Material Sub-Type	Functional Category	Functional Sub-Category	Description	Heat Treated	Heat Damaged	Utilized	Retouched	Shape	Size	Weight (g)	Count	Temporal Period	Reference	Notes
I	68	68.01	33HK1011	Field Site AD021, FS #1	Surface		Lithic	Cedarville-Guelph	Debitage	Complex Flake		Yes	No	No	No			1.5	1			
																		Total	*1*			

Table D3
Artifact Catalog, 33HK1012

PROVENIENCE							DESCRIPTION					TOOLS & DEBITAGE				FCR		GENERAL				
Phase of Investigation	Bag #	Object #	State Site #	Horizontal Provenience	Vertical Provenience	Associated Feature	Material Type	Material Sub-Type	Functional Category	Functional Sub-Category	Description	Heat Treated	Heat Damaged	Utilized	Retouched	Shape	Size	Weight (g)	Count	Temporal Period	Reference	Notes
I	69	69.01	33HK1012	Field Site AD022, FS #1	Surface		Lithic	Pipe Creek	Debitage	Simple Flake		No	No	No	No			0.3	1			
I	72	72.01	33HK1012	Field Site AD022, FS #4	Surface		Lithic	Delaware	Debitage	Simple Flake		Yes	No	No	No			0.2	1			
I	75	75.01	33HK1012	Field Site AD022, FS #7	Surface		Lithic	Delaware	Debitage	Shatter		No	No	No	No			5.1	1			
																		Total	*3*			

Table D4
Artifact Catalog, 33HK1013

PROVENIENCE							DESCRIPTION					TOOLS & DEBITAGE				FCR		GENERAL				
Phase of Investigation	Bag #	Object #	State Site #	Horizontal Provenience	Vertical Provenience	Associated Feature	Material Type	Material Sub-Type	Functional Category	Functional Sub-Category	Description	Heat Treated	Heat Damaged	Utilized	Retouched	Shape	Size	Weight (g)	Count	Temporal Period	Reference	Notes
I	76	76.01	33HK1013	Field Site AD023, FS #1	Surface		Lithic	Cedarville-Guelph	Tool	Expedient Tool	Scraper	Yes	No	Yes	Yes			11.7	1			
I	77	77.01	33HK1013	Field Site AD023, FS #2	Surface		Lithic	Cedarville-Guelph	Debitage	Shatter		Yes	No	No	No			1.3	1			
I	78	78.01	33HK1013	Field Site AD023, FS #3	Surface		Lithic	Cedarville-Guelph	Tool	Formal Tool	Eden Projectile Point fragment / Scraper	No	No	Yes	Yes			3.2	1	Early Archaic (ca. 9250 - 8850 BP)?	Justice 1987	Broken projectile point reworked into a scraper. Projectile point identification is tentative.
I	79	79.01	33HK1013	Field Site AD023, FS #4	Surface		Lithic	Bloomville	Tool	Formal Tool	Lowe Flared Base (?) Projectile Point fragment	Yes	No	Yes	No			2.2	1	Middle Woodland (ca. 1800 - 1400 BP)?	Justice 1987	Identification is tentative.
II	330	330.01	33HK1013	Test Unit 4	Level 1 (Plow Zone)	N/A	Lithic	Pipe Creek	Tool	Expedient Tool	Utilized Flake - Scraper / Spokeshave Multitool	Yes	No	Yes	Yes			3.5	1			
																		Total	*5*			

Table D5
Artifact Catalog, 33HK1014

PROVENIENCE							DESCRIPTION					TOOLS & DEBITAGE				FCR		General				
Phase of Investigation	Bag #	Object #	State Site #	Horizontal Provenience	Vertical Provenience	Associated Feature	Material Type	Material Sub-Type	Functional Category	Functional Sub-Category	Description	Heat Treated	Heat Damaged	Utilized	Retouched	Shape	Size	Weight (g)	Count	Temporal Period	Reference	Notes
I	80	80.01	33HK1014	Field Site AD024, FS #1	Surface		Lithic	Pipe Creek	Tool	Expedient Tool	Utilized Flake	Yes	No	Yes	Yes			1.8	1			
I	89	89.01	33HK1014	Field Site AD024, FS #10	Surface		Lithic	Bloomville	Core		Core fragment	Yes	No	No	No			3.6	1			
I	90	90.01	33HK1014	Field Site AD024, FS #11	Surface		Lithic	Bloomville	Debitage	Complex Flake		No	No	No	No			1.6	1			
I	91	91.01	33HK1014	Field Site AD024, FS #12	Surface		Lithic	Flint Ridge Chalcedony	Debitage	Shatter		No	No	No	No			3.0	1			
I	92	92.01	33HK1014	Field Site AD024, FS #13	Surface		Lithic	Flint Ridge	Debitage	Shatter		No	No	No	No			0.9	1			
I	81	81.01	33HK1014	Field Site AD024, FS #2	Surface		Lithic	Delaware	Debitage	Complex Flake		No	No	No	No			2.3	1			
I	82	82.01	33HK1014	Field Site AD024, FS #3	Surface		Lithic	Pipe Creek	Debitage	Complex Flake		Yes	No	No	No			2.0	1			
I	83	83.01	33HK1014	Field Site AD024, FS #4	Surface		Lithic	Pipe Creek	Tool	Expedient Tool	Scraper fragment	Yes	No	Yes	Yes			2.6	1			
I	84	84.01	33HK1014	Field Site AD024, FS #5	Surface		Lithic	Pipe Creek	Debitage	Simple Flake		No	No	No	No			0.4	1			
I	84	84.02	33HK1014	Field Site AD024, FS #5	Surface		Lithic	Delaware	Debitage	Complex Flake		Yes	No	No	No			1.7	1			
I	85	85.01	33HK1014	Field Site AD024, FS #6	Surface		Lithic	Flint Ridge Chalcedony	Tool	Formal Tool	Multi-tool (Spokeshave / Scraper)	No	No	Yes	Yes			2.8	1			
I	86	86.01	33HK1014	Field Site AD024, FS #7	Surface		Lithic	Flint Ridge	Debitage	Complex Flake		No	No	No	No			0.5	1			
I	87	87.01	33HK1014	Field Site AD024, FS #8	Surface		Lithic	Pipe Creek	Debitage	Shatter		No	No	No	No			1.7	1			
I	88	88.01	33HK1014	Field Site AD024, FS #9	Surface		Lithic	Upper Mercer	Debitage	Complex Flake		No	No	No	No			1.3	1			
II	329	329.01	33HK1014	FS #14	Surface	N/A	Lithic	Upper Mercer	Tool	Expedient Tool	Unifacial Scraper fragment	No	No	Yes	No			16.4	1			
II	332	332.01	33HK1014	Test Unit 3	Level 1 (Plow Zone)	N/A	Lithic	Local Devonian Limestone Chert	Debitage	Shatter		Yes	No	No	No			2.1	1			
II	332	332.02	33HK1014	Test Unit 3	Level 1 (Plow Zone)	N/A	Lithic	Flint Ridge	Debitage	Complex Flake		Yes	No	No	No			< 0.1	1			
II	332	332.03	33HK1014	Test Unit 3	Level 1 (Plow Zone)	N/A	Lithic	Upper Mercer	Debitage	Shatter		No	No	No	No			1.3	1			
II	332	332.04	33HK1014	Test Unit 3	Level 1 (Plow Zone)	N/A	Lithic	Upper Mercer	Debitage	Complex Flake		No	No	No	No			0.6	3			
II	332	332.05	33HK1014	Test Unit 3	Level 1 (Plow Zone)	N/A	Lithic	Upper Mercer	Debitage	Complex Flake		Yes	No	No	No			0.6	1			
II	331	331.01	33HK1014	Test Unit 3	Surface	N/A	Lithic	Upper Mercer: Grey Variety	Debitage	Complex Flake		Yes	No	No	No			0.4	1			
																		Total	*23*			

APPENDIX E

RADIOMETRIC DATING REPORT

Beta Analytic, Inc.
4985 SW 74th Court
Miami, FL 33155 USA
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

Beta Analytic
TESTING LABORATORY

ISO/IEC 17025:2017-Accredited Testing Laboratory

February 23, 2022

Ms. Julia Joblinski
The Mannik & Smith Group, Inc.
1800 Indian Wood Cir.
Maumee, Ohio 43537
United States

RE: Radiocarbon Dating Results

Dear Ms. Joblinski,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

Thank you for prepaying the analysis. As always, if you have any questions or would like to discuss the results, don t hesitate to contact us.

Sincerely,

Chris Patrick
Digital signature on file

Chris Patrick
Vice President of Laboratory Operations

Beta Analytic, Inc.
4985 SW 74th Court
Miami, FL 33155 USA
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2017-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Julia Joblinski

The Mannik & Smith Group, Inc.

Report Date: February 23, 2022

Material Received: February 07, 2022

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
Beta - 618647	**C1**	**580 +/- 30 BP**	IRMS 13C: -27.1 o/oo

(64.3%)	**1304 - 1365 cal AD**	**(646 - 585 cal BP)**
(31.1%)	**1383 - 1420 cal AD**	**(567 - 530 cal BP)**

Submitter Material: Charcoal
Pretreatment: (charred material) acid/alkali/acid
Analyzed Material: Charred material
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 93.03 +/- 0.35 pMC
Fraction Modern Carbon: 0.9303 +/- 0.0035
D14C: -69.66 +/- 3.47 o/oo
! 14C: -77.73 +/- 3.47 o/oo (1950:2022)
Measured Radiocarbon Age: (without d13C correction): 610 +/- 30 BP
Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), “present” = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -27.1 o/oo)

Laboratory number **Beta-618647**

Conventional radiocarbon age **580 ± 30 BP**

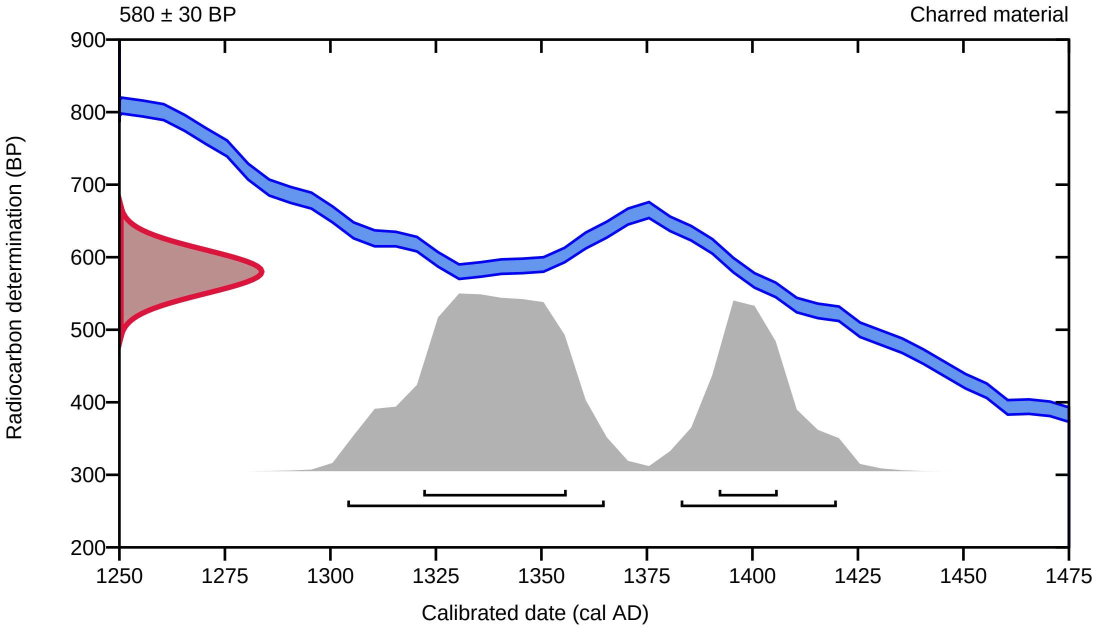
95.4% probability

(64.3%)	1304 - 1365 cal AD	(646 - 585 cal BP)
(31.1%)	1383 - 1420 cal AD	(567 - 530 cal BP)

68.2% probability

(49.3%)	1322 - 1356 cal AD	(628 - 594 cal BP)
(18.9%)	1392 - 1406 cal AD	(558 - 544 cal BP)

C1



Database used

INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, Radiocarbon 62(4):725-757.

Beta Analytic Radiocarbon Dating Laboratory

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Beta Analytic
TESTING LABORATORY

ISO/IEC 17025:2017-Accredited Testing Laboratory

Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NISTSRM-1990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: March 09, 2022
Submitter: Ms. Julia Joblinski

QA MEASUREMENTS

Reference 1

Expected Value: 129.41 +/- 0.06 pMC

Measured Value: 129.37 +/- 0.34 pMC

Agreement: Accepted

Reference 2

Expected Value: 96.69 +/- 0.50 pMC

Measured Value: 97.12 +/- 0.28 pMC

Agreement: Accepted

Reference 3

Expected Value: 0.42 +/- 0.04 pMC

Measured Value: 0.42 +/- 0.04 pMC

Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: Chris Patrick
Digital signature on file

Date: March 09, 2022

APPENDIX F

OHIO ARCHAEOLOGICAL INVENTORY FORMS

REDACTED