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PREHISTORIC QUARTZ QUARRYING IN THE MID-HUDSON HIGLANDS

PHASE II SUPPLEMENTAL CULTURAL RESOURCE INVESTIGATIONS OF THE PROPOSED HILLCREST COMMONS, TOWN OF CARMEL, PUTNAM COUNTY, NEW YORK

OPRHP File 08PR01680 (formerly 03PR05207)

Prepared for:

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Prepared by:

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December 31, 2007

With Addendum (Appendix I) in July, 2008

MANAGEMENT SUMMARY

SHPO Project Review Number: 08PR01680 (formerly 03PR05207)

Involved State and/or Federal Agencies: New York State Office of Parks, Recreation and Historic Preservation

Phase of Survey: Phase II

Location Information:
- Location: Hillcrest Commons
- Minor Civil Division: Town of Carmel
- County: Putnam

Survey Area (Metric & English):
- Length:
- Width:
- Depth: (when appropriate):
- Number of Acres Surveyed:
- Number of Square Ft and Meters Excavated: 21 square meters (excavations)
- Percentage of Site Excavated

USGS 7.5' Quadrangle Map: Lake Carmel

Archaeological Survey Overview:
- Number and Interval of Shovel Tests: none
- Number and Size of Units: 21 1-x-1 m units
- Width of Plowed Strips: none
- Surface Survey Transect Interval: none

Results of Archaeological Survey:
- Number and name of prehistoric sites identified: four clusters - Cluster1, Cluster 2, and Cluster 4
- Number and name of historic sites identified: none
- Number and name of sites recommended for Phase II/Avoidance: none recommended for Phase III or Avoidance

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Date of Report: December 31, 2007

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INTRODUCTION

This report presents the results of the Phase II cultural resource investigation by LaPorta & Associates, LLC of Warwick, New York (hereafter "LPA") for the planned Hillcrest Commons (OPRHP NO. 08PR01680, formerly 03PR05207) in the Town of Carmel, Putnam County, New York. The planned development encompasses approximately 108 acres (44 hectares) and rests in the Carmel Lake 7.5' Quadrangle (Figure 1).

The goal of a Phase II investigation, in accordance with the *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* (1994) by the New York Archaeological Council (NYAC), is to obtain detailed information on the integrity, limits, structure, function, and cultural/historical context of an archaeological site.

Columbia Heritage conducted the Phase IA cultural resource investigation in November, 2004 (Columbia Heritage 2004). Columbia Heritage (2007) also conducted Phase IB and Phase II testing. In addition to Columbia Heritage's work, LPA (2007) conducted a supplemental Phase IB field investigation of the prehistoric quarry sites within the study area. LPA investigators identified forty-two locations of quarry occurrence, quartz vein occurrence, geological interest, and/or archaeological interest. These were predominantly located in the western part of the project area (Appendix A). From these locations, Philip LaPorta identified four clusters, each characterized by quartz locations and quarries along a separate trend of quartz veins. Phase II fieldwork conducted by LPA included: (1) the geomorphological assessment for each cluster, including analysis of selected artifacts; and (2) the subsurface testing for quarry activities based on the geomorphological trenching and Phase IB surface finds.

BACKGROUND AND SUMMARY OF PREVIOUS RESEARCH

I. ENVIRONMETAL AND PHYSICAL SETTING

A. Physiography

The planned Hillcrest Commons Development lies within the Reading Prong physiographic province, a belt of hilly uplands that extend from northern New Jersey (where they are known as the New Jersey Highlands) into southern New York State (where they are known as the Hudson Highlands). The project area ranges in elevation from 231 m in the east/central part, to as low as 163 m in the valley that includes Michael Brook (Figure 1).

The underlying bedrock of the Hudson Highlands is dominated by Proterozoic crystalline rocks that have been folded and deformed by multiple episodes of geologic deformation between 1 billion and 300 million years ago. The topography of the region is largely a product of geologically recent uplift, glacial activity during the last ice age, and differential erosion of the various rock types present. This erosional pattern has resulted in the formation of valleys in areas dominated by easily weathered limestone and ridges in areas dominated by more resistant sandstones, conglomerates, and metamorphic rocks.

B. General Bedrock Geology and Structure

The Lower Hudson Sheet (Fischer et al. 1970) shows the underlying bedrock for the project as Middle Proterozoic biotite-quartz-plagioclase gneiss with subordinate biotite, granitic gneiss, amphibolite, calcsilicate rock. John Prucha's (1956) mapping of the Brewster Magnetite District resulted from the aerial mapping of the Lake Carmel, Brewster, Croton Falls, and Peach Lake 7.5' quadrangles. His delineated district (Prucha 1956:8-9) extends from Brewster southwest to Somers in Westchester County. This is to the southeast of the project area. Mather (1843:541) lists quartz veins as numerous in the Hudson Highlands, so much so as to generate the statement that "they may be found in every hill and mountain."

C. Soils

The soils within the project area fall under fifteen soil series, four of which (CrC, CsD, CtC, and CuD) are found in the four clusters. Underlying clusters 1 and 2 is CuD (Chatfield-Hollis-Rock outcrop complex). Underlying cluster 3 is CtC (Chatfield-Hollis-Rock outcrop complex). Underlying cluster 4 are CrC (Charlton-Chatfield complex) above the outcrop and CsD (Chatfield-Charlton Complex) below the outcrop. The descriptions are fully carried over from the supplemental Phase IB report (LaPorta and Associates 2007) for reference with the Phase II geomorphological study presented in this report.

The Charlton series is a very deep, well drained, loamy soil formed in till. This series is nearly level, to very steep soils on till plains and hills. Slope ranges from 0 to 50 percent. Saturated hydraulic conductivity is moderately high or high. Thickness of the solum ranges from 50-96 cm. Depth to bedrock is commonly more than 1.8 m. Rock fragments range from 5 to 35 percent by volume to a depth of 100 cm and up to 50 percent below 100 cm. Except where the surface layer is stony, the fragments are mostly sub rounded gravel and typically make up 60 percent or more of the total rock fragments. The O-horizon is 5 cm thick and contains decomposing organic matter. The A-horizon is a 2 to 15 cm thick, dark brown, fine, sandy loam, with many fine roots, 5 percent gravel, and an abrupt smooth boundary. The Bw is 50 cm thick, dark yellow-brown to brown, gravelly, fine, sandy loam, 10 to 15 percent gravel, and few very fine roots. The C-horizon is 96 cm thick, a gray-brown, gravelly, fine, sandy loam with thin lenses of loamy sand, contains few medium roots, and 25 percent gravel and cobbles.

Chatfield series consists of moderately deep, well drained, and somewhat excessively drained, soils formed in till. They are nearly level to very steep soils on glaciated plains, hills, and ridges. Slope ranges from 0 to 70 percent. Crystalline bedrock is at depths of 50-100 cm. Solum thickness ranges from

40-91 cm. Rock fragments range from 5 to 50 percent by volume in the A-horizon and from 5 to 35 percent in the B and C horizons. Rock fragments are typically gravel but include cobbles and flagstones, particularly just above bedrock. The O-horizon is 0-5 cm thick and contains decomposing organic matter. The A-horizon is 5 cm thick, very dark, gray-brown loam, with common very fine and fine roots; and few medium and coarse roots, 5 percent rock fragments, and an abrupt smooth boundary The AB-horizon is a common very fine to coarse roots, and few medium roots; 5 percent rock fragments; very strongly acidic; clear smooth boundary. The Bw is a 43 cm thick brown silt loam, with common fine and coarse roots, and few medium roots, 20 percent rock fragments, and an abrupt wavy boundary.

The Hollis series consists of shallow, well drained, and somewhat excessively drained, soils formed in a thin mantle of till derived from gneiss, schist, and granite. They are nearly level to very steep upland soils on bedrock controlled hills and ridges. Slope ranges from 0 to 60 percent. Permeability is moderate or moderately rapid. Rock fragments commonly range from 5 to 35 percent by volume but some pedons have less than 5 percent rock fragments. The fragments are mostly sub rounded gravel except where the surface is stony. The soil has 20 percent or more silt in the particle size control section. Depth to bedrock ranges from 25 to 50 cm. The O-horizon is 2 to 10 cm thick and contains slightly to decomposing plant matter. The A-horizon is 2 to 15 cm thick, very dark gray-brown, gravelly, fine, sandy loam, 10 percent gravel, and a clear smooth boundary. The Bw is 30 cm thick, dark yellow-brown to brown, gravelly, fine, sandy loam, 10 percent gravel, and few very fine roots.

D. Hydrology

The principal drainage within the project area is provided by Michael Brook, which runs north to south, with headwaters in Palmer Lake and debauching into the Croton Falls Reservoir (Figure 1). Other hydrological features near the project area include: Carmel Lake to the northeast; West Branch Reservoir to the west; Gleneida Lake to the southwest; Middle Branch Reservoir to the southeast; and several marshy areas to the east and east-southeast.

II. PREVIOUS INVESTIGATIONS

Columbia Heritage (2004, 2007) conducted the Phase IA, Phase IB, and Phase II investigations at the project area in 2005. LPA (2007) conducted supplemental Phase IB in 2005.

A. Columbia Heritage Phase IA Results, Conclusions, and Recommendations

Columbia Heritage (2004 – Appendix B) conducted the Phase IA investigation for the project area in 2004. No eligible historic structures, meeting minimum age requirements, were identified on the property or adjacent properties.

Researchers (Columbia Heritage 2004:3) identified three prehistoric sites in NYSOPRHP and New York State Museum (NYSM) site files. The first site (Carmel Corporate Site 1 – A079.01.0064) is a workshop 2.3 km south of the study area. The second site (Lake Carmel Corporate Site 2 – A079.01.0065) is a camp workshop associated with Late Archaic Sylvan Lake (ca. 2500-1500 B.C.) located 2.7 km to the south of the project area and was determined as eligible for National Register listing. The third site (Carmel Corporate Site 3 – A079.01.0066) is a camp workshop associated with Late Archaic Vosburg and Late Archaic Sylvan Lake (ca. 2500-1500 B.C.), located 2.7 km to the south of the project area and was determined as eligible for National Register listing.

Researchers at Columbia Heritage (2004:5) identified two historic sites in the vicinity of the project area. The Dykeman Farm (A079.01.0062) is a cellar hole associated with a former tenant house and is 1.4 km east of the project area. The West Branch Reservoir Dam #1 (A079.01.0038) is located 2.1 km to the southwest of the project area and was determined as eligible for National Register listing. No structures were identified in the project area on the 19th Century maps.

Recommendations. Columbia Heritage (2004:4-5) noted higher potential for prehistoric remains on higher, flatter, and better drained terrains, as small camps, with below average potential for historic remains on the proposed Hillcrest Commons. Recommendations were for Phase IB subsurface testing of flatter terrains, potential rock shelters, and outcrops of potential lithic resources.

B. Columbia Heritage Phase IB/II Results, Conclusions, and Recommendations

Columbia Heritage combined the Phase IB and Phase II investigations in their February 2007 report (Appendix B).

Phase IB subsurface testing yielded (Columbia Heritage 2007:5-6) Native American cultural materials in three subareas: (1) northwest part; (2) in the north-central part of the APE; and (3) in the west-central part of the project area. Artifacts include culturally modified quartz and one hammer. The greatest number of positive shovel tests and artifact counts came from the northwestern part of the project area. In addition, a large quartz cobble in the farm wall (southwest part of the property) indicated to Columbia Heritage the potential for quarrying. Subsurface testing at potential rockshelters unearthed a pattern of fractured bedrock beneath root mat, representing collapsed overhangs. Investigators also noted quartz veins near the potential rockshelters. Columbia Heritage (2007:7) recommended further investigation where cultural material was recovered to clarify the nature and extent of the deposit.

The Phase II investigation began with two goals: (1) investigate where cultural material was recovered to clarify the nature and extent; and (2) determine the spatial extent. The investigators demarcated three loci (locus 1, locus 2, and locus 3 – see paragraph above for locations) and excavated shovel test pits (STPs) in each locus. STPs were excavated at 15 ft (5 m) intervals. Nine STPs were positive in cluster 1, producing twenty-eight cultural items (item description or categorization not provided by authors). Four positive STPs in locus 2 yielded 10 pieces of chert. Only one STP was positive in locus 3, yielding 1 piece of quartz. Columbia Heritage also placed two 1-x-1 m units, one in locus 1 and one in

locus 2 (Columbia Heritage 2007:14). The two units produced "a quantity of what appeared at first to be naturally fractured quartz bedrock, but it was found in fact to constitute culturally produced material" (Columbia Heritage 2007:14).

Recommendations. Columbia Heritage (2007:15) inferred ephemeral use of locus 3, with quartz quarrying/workshops in locus 1 and locus 2. The test units represent the periphery of a more intensive, more focused, series of activities. Columbia Heritage's recommendation was for a geoarchaeology/prehistoric quarry specialist to conduct an investigation of quarry related resources that will better enable OPRHP to evaluate significance.

C. LPA Phase IB Results, Conclusions, and Recommendations

At the request of Columbia Heritage, LPA conducted a Phase IB supplemental surface survey to locate potential quarried quartz locations. LPA conducted fieldwork in the fall of 2005. The following is a table (Table 2) of the forty-two locations mapped by LPA for quarry occurrence, quartz vein occurrence, geological interest, and/or archaeological interest (see map in Appendix C). These finds were separated, when able, into clusters representing a connection between finds based on the trend of the outcrops and occurrence of quartz veins.

Cluster 1 is located in the western part of the boundary, from Q17 west to the end of a flat area overlooking the present-day location of ShopRite. The outcrop, Q17, contains a minimum of four quartz veins.

Cluster 2 is located on the western side of the slope, southeast of cluster 1. The north-south trending cluster includes Q12-16 and Q18-Q20. Q12-Q16 are the southernmost locations, mostly along the same outcrop. Q18-Q20 are in the northern outcrop that include an adit in a quartz vein, and two possible rockshelters with quartz veins. Below most of these locations is a stable slope, represented in the northern part by a dirt road that may have been placed according to a structurally supported flat slope.

Cluster 3 is located to the northeast of clusters 1 and 2, and includes a hill with a northwestern flat lying area. This east-west trending cluster includes locations Q21-Q24. Q21 to Q23 are quartz veins with a large potential rockshelter in front of Q21. Q24 consists of three different localities that follow a trend of quartz and its working.

Cluster 4 is located in a ravine in the southeast part of the property, before the slope to Michael Brook. The cluster includes and includes the four aspects of Q26 (Q26a-Q26d) and Q28. Q26 is an outcrop, with a series of quartz veins and potential rockshelters that stretches to beyond the property line. Of these, Q26a stands out with its 196 in (50 cm) thick vein of quartz that was partially mined. Q28 is a southeast facing outcrop across the ravine from Q26.

Recommendations. Cluster 1 is just outside the APE, but may be indirectly impacted during construction. The eastern slice of cluster 2 is within the APE. The adit in Q18 prompted initial inquiry as to the origin (prehistoric or historic) of its working. However, upon closer examination of the adit and surrounding scree during the Phase 1B investigation, the adit in Q18 was determined to be entirely of prehistoric origin. Cluster 3 is entirely within the APE. An emergency access road dissects cluster 4. As opposed to the quarry-point locations on the map, the quarry clusters represent the relationships between quarry points and associated topographic features, with respect to the potential for yielding buried data. Since the sole purpose of LPA's Phase 1B work was to identify these resources in the APE, the client should understand that the vertical and lateral extents must be determined through Phase II work (assessing the significance of the resource as per Secretary of the Interior and NYAC guidelines).

LPA PHASE II RATIONALE AND METHODOLOGY

The LPA Phase IB work (LaPorta and Associates 2007) produced prehistoric quarrying/processing instruments, suggesting a prehistoric use of quartz on the project area. The best known correlative that uses quartz is the Sylvan Lake Complex identified by Funk (1977). However, the investigators had reservations about the adit for two reasons: (1) there is no evidence in the northeast of an adit for prehistoric mining; and (2) the possibility of prospecting due to the proximity to the Tilley Foster mine. Before proceeding to the methodology used, LPA investigators found it prudent to address the background for these working hypotheses and similar sites in the vicinity of the study area (Figure 2).

I. Prehistoric and Historic Mining in the Vicinity of the Study Area

A. Prehistoric Activity – The Sylvan Lake Rockshelter Site and Sylvan Lake Complex

Robert Funk (1977:148-172) led the investigation and excavations at Sylvan Lake Rockshelter sporadically from May of 1964 to the spring of 1966. The rockshelter is located in the Town of Beekman, about 24 km to the northwest of Hillcrest Commons. Geologically, the rockshelter is in the limestone of the Cambrian-Ordovician age Wappinger Group, which overlies the basal Cambrian Poughquag Quartzite and Proterozoic gneisses and schists. Funk's team excavated 0.93 square meters, peeling levels away at 5 to 8 cm, and leaving balks between the units. Funk (1977:151-155) identified four different strata: (1) stratum I was loose, dark brown earth with considerable rubble and averaged 25 cm in thickness; (2) stratum II was a variable stratum of yellow to brown silt, 40 cm thick, with few rocks, charcoal lenses (19 features), and "considerable quartz rejectage"; (3) stratum III was gray earth and rubble achieving a thickness of 45 cm, overlying a compact 8 cm thick tan and silt rubble; (4) the fourth strata was a sterile, open, rubble, basal zone. Overlying stratum I before excavation was a large amount of fallen rock debris and rubble, mostly removed by James Shafer, an amateur archaeologist, in the 1950s.

Funk (1977:168) notes the use of quartz as greatest within the Sylvan Lake Component of the site (stratum II, subzones B to D) where quartz comprises 48% of the projectile points. All Susquehanna points were made from chert, as were most of the stratum I points. None of the stratum III projectile points were made from quartz. One Levanna point and two scrapers, all from stratum I, were made of quartz and date to the late Middle Woodland (c.a. A.D. 700). An incomplete crescent shaped, quartz bannerstone from stratum II, Subzone C represents an additional use for quartz (Funk 1977:163). Funk (1977:168) notes the "quartz and quartzite were readily available from local till and outcrops." Funk did not embellish as to the outcrop locations. Associated radiocarbon dates for the Sylvan Lake component (Funk 1977:163,169) are 2,210 B.C. ± 140 years (Y-1536) for the upper part of stratum 2. The base of stratum 2 was radiocarbon dated to 3,720 B.C. ± 75 years (Dic-208).

Based on the Sylvan Lake site, Funk (1977:248) defined the Sylvan Lake Complex as a Late Archaic cultural horizon "distributed along the full length of the Hudson River Valley. Other sites include the Quarry Glen Rockshelter (near Monsey, Rockland County), Parham Ridge Site (near Croton, Westchester County), Samsonville Rockshelter (near Kingston, Ulster County), Lotus Point Site (near Catskill, Greene County), and the Hennessey Site (in Ballston Township, Saratoga County). Funk (1977:180-181) provides no raw material descriptions for the Quarry Glen Rockshelter, but most of the projectile points at Parham are fashioned from quartz or quartzite (Funk 1977:187-188). Ritchie (1958:31-33) mentions that at Lotus Point Site, Lamoka-like points exist in stratum 3 and 4, with a higher percentage being present in stratum 4, but few are made of quartz. Lamoka-like points were not observed the Hennessey Site (Ritchie 1958:59). Funk (1977:252) notes scant direct evidence of settlement patterns, but seasonal rounds are highly probable with the collection of shells on the Hudson River sites and probable warm weather hunting and gathering on lakes, tributaries, and other streams.

B. Historic Activity – The Brewster Magnetite Deposit, Tilly Foster Mine, and other Historic Mines in Putnam County

The Brewster Magnetite District, as defined by Prucha (1956), is a 9.6 km long trend of iron magnetite present in Proterozoic gneiss, granite, and marble that crops out from Brewster (southeastern Putnam County) to Somers (northeastern Westchester County). Magnetic iron ores east of the Hudson were noted by Mather (1843:559-564) and described as "abounding" in Putnam County.

Mather (1843:560) first mentions the Tilly Foster (in Brewster) as the hill of magnetic oxide of iron on Mr. Tilly Foster's farm. Hundreds to thousands of tons of ore were noted as easily procured without digging below the level of the hill. The ore deposit is bounded by gneiss to the east, along with serpentine, limestone, and "verd antique" to the west. The magnetite iron deposit was discovered in 1810, but large-scale underground mining did not occur until 1853 (New York State Museum 2006). By 1879, the mine reached a depth of 182.8 m, produced a total of about 700,000 tons of ore, and at its peak employed approximately 300 miners. The Tilly Foster mine closed shortly after a tragic rockslide in 1897 killed thirteen miners. The Simewog vein occurs in Simewog Hill, Townsend's Mine, trending south-southwest for nearly 1.6 km (Mather 1843:560). This was the first known and worked mine, c.a. 1810, in the area, with the largest amounts of extracted ore shipped to Danbury, Connecticut for smelting and further transport (Mather 1843:561; Prucha 1956:25). The vein was between 1 to 6 m in width. The Brewster Mine, as it was later referred to by Prucha (1956:41-42), revealed little in the Summer of 1954 save for one mine pit and a few visible honeycombed tunnels that were no longer accessible. About 4 km southwest of Brewster is the Croton Magnetic Iron Mine, not worked since before 1900, but prospected again in the 1940's (Prucha 1956:36). Continuing southwest is the Clover Mine, near Croton Falls, which was an open pit that flooded by at least the 1950's (Prucha 1956:42-43). The Phillips vein (Mather 1843:561-562) is 12.8 km long and was worked all along. Mather prominently mentions two mine locations. The first is right along the Coldspring and Patterson Turnpike (Route 301), in present day Clarence Fahnestock State Park. The second includes two mines and is referred to (Mather 1843:562) as Philip's mine. LaPorta and Minchak viewed and verified the two mines along Route 301.

Prucha's (1956:41) brief treatment on the Brady Farm shaft, off a bend in Nelson Boulevard southwest of Brewster, provides an interesting mention of quartz. The magnetite ore visible to Prucha on the surface in the 1950's was a 46 m wide band of finely disseminated magnetite in a quartz-poor phase of pyroxene-quartz-plagioclase gneiss striking N40º and dipping 90º. "Northwest of the ore zone is approximately 31 m of strongly banded, pyroxene-quartz-plagioclase gneiss interlayered with amphibolite, pegmatite, granite, and quartz (silex) crop out" (Prucha 1956:41).

According to Mather (1843:564), the Coldspring furnace was the only blast furnace operating in the counties of New York, Westchester, and Putnam in 1843. Its suppliers were the Phillips Mine (Putnam County), the Denny Mine (Putnam County), the Townsend Mine (Canterbury), and the O'Neill Mine (Orange County). The ores are mixed with a small amount of Singsing Limestone [presently known as the Ossining Marble] and produced, at the time, 1,400 tons of pig ore per year. Mather's (1843:564) only notation of a forge was one located in Phillipstown that was supplied with ore from the Stewart Mine (location not provided by Mather).

Mather (1843:530) also mentions local quarries developed in gneiss in Putnam County. The granitic gneiss (migmitite), "of light color," passes through Carmel (near Pine Pond) and trends south. The beds were quarried, "to a small extent," for local use.

II. Research Questions and Methodology

Phase II methodology for Hillcrest Commons followed the protocol outlined in the recommendations from LPA for the Smiths Basin quarry project in Washington County, New York (LaPorta and Associates 2001:20-26). Testing the LaPorta Prehistoric Quarry Model (First Tectonic Cycle)

was the research guiding this project. The model, as outlined below, has its origins in the Cambrian-Ordovician cherts of the Wallkill River Valley of New York and New Jersey. Thus, the initial presumption is that quartz quarrying is similar to that for the chert of the Wallkill river valley. In reality, quartz is a different material and the model served as a guide for initial investigations. A brief recap of the model stipulates four processing areas (LaPorta 2000:12-13).

1. Zone I – *Zone of Extraction* – the actual quarry face, or mine surface;
2. Zone II – *Zone of Milling* – the area where quartz is freed from the surrounding migmitite matrix;
3. Zone III – *Zone of Beneficiation* – where quartz of varying physical properties are appraised and winnowed;
4. Zone IV – *Zone of Refinement* – areas where quartz is flaked into bifaces and cores using large non-portable anvils. Other high-grade quartz may also be removed to lower lying workshops or habitation sites for further refinement and reduction.

The Phase II investigation is designed to reveal the quarry architecture, permitting geologists to make the necessary measurements in order to quantify and substantiate the initial evaluation of the Phase 1B. This includes a seven-step procedure.

Step 1. High resolution geological mapping – This was accomplished for Hillcrest Commons in the Phase IB study by LPA.
Step 2. Photodocumentation and identification of what needs further testing – This was accomplished for Hillcrest Commons in the Phase IB study by LPA.
Step 3. Surface sampling prior to removal – This was accomplished in the Phase IB investigation, as well as the onset of the Phase II investigation.
Step 4. Excavation of selected quarries and support sites – This was conducted in the Phase II in two sub steps: (a) mechanical excavation to determine the stratigraphy and extent of the quarry; and (b) hand dug 1-x-1 m units for a tighter spatial control.
Step 5. Analysis of recovered materials – This is accomplished after the excavations listed in Step 4.
Step 6. Report production – Completed after Steps 1-5 and submitted to Wilder-Balter and OPRHP.
Step 7. Curation – LPA will provide a repository for the material.

In general, the Phase II methodologies include detailed mapping, photo documentation and evidence collection. The Phase II methodology usually, but not always, suffices in evaluating the significance of the quarries. Phase II investigations fulfill OPRHP's requirement for measurement of vertical or horizontal parameters of archaeologically sensitive locations. Phase II investigations also permit the collection of samples for potential age dating.

The deep test and excavation programs were designed to consider site formation processes, quarry architectural elements underground, as well as the prehistoric mining technology present at each location. Site formation links the geomorphology of the site to the mining history.

A. Field Methods

Fieldwork began with backhoe trenching. LPA cleaned and analyzed profiles from backhoe trenches placed within the quarry clusters. Included in our methodology are preferentially oriented trenches, designed to capture the glacial ice-flow direction, as well as to elucidate quarry geometry. As such, most of the trenches were only meant for prospection. Four representative profiles were analyzed at each cluster. Each profile was cleaned with a shovel and trowel, with sediment and soil units outlined by trowel marks. The profiles were then measured, drafted (and/or described), and then color designated using Munsell soil color chips. Measurements were in centimeters and originate from the surface. Each sediment/soil unit was described and the profile was photographed. The sediment/soil units are numbered

with Roman numerals starting at the top of the profile, but in-field descriptions and analyses were begun at the base to better reflect the sedimentation history evident within each profile.

LPA investigators collected artifacts from the backfill piles of trenches after exposing rains. These were placed in bags and/or 18.93 L mason pails depending on amount and size of artifact(s). All recovered lithic material, from both the screen and as well as those that were mapped, were collected and bagged in plastic bags. Any recovered material that was too large for field bags were tagged with flagging tape. The bags or flagging tape were immediately labeled with the proper contextual information.

Grid systems with 1-x-1 m cells were established at each part of cluster 2. Each unit was excavated in 10 cm arbitrary levels within natural strata. All elevation measurements were taken from one of the three arbitrarily established datums. The units were excavated down to bedrock with plan-view maps drawn at the conclusion of each level in addition to the map of the bedrock floor. Profile maps of all available walls were also drawn at the termination of excavation of each unit. Plan-view maps were also drawn whenever the excavator encountered what was deemed to be a large collection of quarry related scatter. All 1-x-1 m excavated material was screened through a 0.64 cm metal mesh screen. All recovered lithic material, from both the screen, as well as those that were mapped, were collected and bagged in plastic bags and/or 18.93 L mason pails depending on amount and size of artifact(s). Any recovered material that was too large for field bags were tagged with flagging tape. The bags or flagging tape were immediately labeled with the proper unit and level information and at the conclusion of the day were given a field sequence (FS) number. The FS number was recorded in the logbook with the unit and level information, as well as a description of the contents of the bag. Photographic documentation at the conclusion of each unit was performed, as well as on any features or large assemblages of quarry related material encountered during excavation.

B. Laboratory Methods

The recovered materials were washed using water and a mild cleaning detergent, scrubbed with stiff brushes, rinsed in water, and left to dry. After drying, recovered materials were placed in new plastic bags, or cleaned buckets, with copied bag/bucket information, as well as the rolled up original bag/labeling to provide a check on the location of the cultural material. Artifact weights (in grams) were measured using two scales depending upon the weight of the artifact. Lighter artifacts, up to 600 g, were weighed on a *Ashiba MP-500* portable scale. Weights from this scale are given up to the tenth of a gram. Heavier artifacts were weighed on the *SILTEC Electronic Weighing Scale*.

C. Artifact Analysis Methods.

The methods of artifact organization follow those initiated by LaPorta (LaPorta and Associates 2001) in Smiths Basin, Washington County, New York. However, the organization was based on chert, not quartz, and thus cannot fully apply to the study at Hillcrest Commons. Hillcrest Commons property has a mixture of quartz, feldspar, plagioclase, and other minerals. As such, it is closer to the definitions of ore (Flawn 1966; Pryor 1965; Richards and Locke 1940).

Richards and Locke (1940:1) define *ore* as "a natural aggregation of minerals from which a metal or metallic compound can be recovered with profit on a large scale." Pryor (1965:815) more broadly defines ore as, "a naturally occurring complex of minerals from which any fraction of commercial value can be extracted and used." Flawn (1966:11-13) further broadens this to include liquids and gases, using the terms resources and reserves – dividing them into known (recoverable, marginal, and sub marginal) and unknown. Due to the limited geological scope, we refer to the quartz veins in Hillcrest Commons as ore.

Based on the selected artifacts from the trenches, LPA analysts created nineteen subdivisions that represent the refinement of the prehistoric ore in Hillcrest Commons. They are described below:

Table 1. LPA ore designations for analyzed Hillcrest Commons artifacts.

Ore Designation	Name/Description
1a	ORE BLOCK – joint bounded block of both ore (quartz) and country rock, or gangue (migmitite, biotite mica, feldspar, and tourmaline)
1b	TAILINGS – rotted ore, mixtures of gangue and ore, and extremely low-grade, or irregular, pieces or masses
1c	LEAN ORE – ore that is not economically viable either through physical flaw, chemical impurities, or grade
1d	ORE TAILINGS OR SCALING FLAKES – core rejuvenation flake, large and generally shell shaped flakes with one heavily faceted surface, one positive flake scar, and remnants of the joint surface
1e	GANGUE OR COUNTRY ROCK – non ore bearing rock (migmitite, biotite mica, feldspar, and tourmaline) surrounding the ore deposit (quartz)
1f	GANGUE/LEAN ORE – contact relations between country rock and ore body; an a mixture of country rock and ore
2a	MIDDLING CORE – largely flaked block of quartz bearing minor remnants of joint faces from original middling block, usually flaked to remove irregular surfaces, however containing a mixture of ores
2b	MIXED HETEROGENEOUS ORE – intergrown mixture of quartz, feldspar and accessory minerals (biotite mica and tourmaline)
2c	ORE SCALING FLAKES – small class of faceted flakes with battered platforms, index the refining process in creating the dressed ore - a refinement flake
2d	DRESSED ORE – ore that is physically beneficiated through the removal of lean ore and gangue
2e	HIGH GRADE ORE – ore with 80% or more homogenous quartz relatively free of impurity or flaw
3	LITHON PACKAGE – dressed ore packages, generally ≤2 microlithons in value, generally intermediate or high grade ore, ground and dressed along the edges, rhombic in outline
4	MICROLITHON – single most finely divisible volume of homogenous quartz
5	FLAKE – removal of ore within the microlithon for refinement, thin, containing negative scars on exterior (dorsal)
6	CHAT – crushed ore from ore block, small in size
7	CORE – ≥3 microlithon values, sealed, intermediate or high-grade ore, flaked parallel and/or perpendicular to domains
8	LIMONITE GOETHITE IRON ORE – iron oxide, a source for ochre
9	FELDSPAR – is a potassium, sodium, calcium bearing, three dimensional, silicate mineral
10	BIOTITE MICA – is an iron bearing, sheet-silicate mineral

As LPA analysts discovered in the trenches, clusters 1 through 4 have numerous artifacts that fall under the common archaeological classification of a hammerstone. A hammer is an instrument used for driving and breaking. To better reflect varying behavior, LPA analysts separated the hammers into fourteen basic categories: the "Hammer Designations" are used in the analysis (Appendix D).

Table 2. LPA instrument designations for analyzed Hillcrest Commons artifacts.

Hammer Designation	Description
IO	IMPACT OBJECT –large, oval, glacial erratic, usually contains many scallop shaped flake scars along edges; may be internally cracked, pounded, or pulverized along the edges
MI	MILLING INSTRUMENT – elongate, blocky, often rectangular in outline; usually fashioned from clay-rich sedimentary and metasedimentary rocks; upper surfaces may be conical or flaked, while lower surfaces are cuspate and pounded; lower surfaces may also be concave
PI	PROCESSING INSTRUMENT – oval in outline; entirely flaked around outer surface; sometimes pounded flat; often evolve into wheel shaped forms; flake scars may radiate from center; can be flat or disc shaped in cross section
BH	BEAKED HAMMER – ore splitters fashioned from a single glacially derived boulder; upper surface bears impact scars and may be pulverized; lower surface consists of coalescing radial flake scars forming a point, or beak
DH	DRESSING HAMMER – is used to dress the ore; to free the high grade ore
RW	ROUND (BLUNT) WEDGE – glacially derived cobbles; employed to focus compressive stress on joint surfaces of rock; upper surface is pitted and pulverized; lower surface is flat and slightly concave, containing radial flake scars
FW	FLAT WEDGE – cortex fragment derived from the rupture of an impact object, spalls containing outer cortex are jammed into the open joint spaces; the distal part of the flat wedge contains numerous elongate striations while the back end is pulverized from impact
H	HAMMERSTONE – fashioned from glacially derived cobbles; circular, oval, flat, or biconvex in cross section
MH	MAINTENANCE HAMMER – fashioned from glacially derived cobbles; usually round or elongate cylindrical in form; impact surfaces on opposing ends; occasionally containing deep flake scars
CH	COBBING HAMMER – small one handed hammers weighing 1.5 to 7 pounds (0.7-3.2 kg) used to cleave and hand pick high-grade ore (Richards and Locke 1940:7)
FH	FOCUS HAMMER – small wedge with blunt ends
C	CHISEL – an elongate flake modified on both proximal and distal ends for prying into joint surfaces, var. plug and feather, spall and focus chisels
FC	FOCUS CHISEL – very small class or hammerstones with irregular facets on all surfaces
SH	SCALING HAMMER – see maintenance hammer; also contains grooves from abrading edges

Due to the sheer number of artifacts recovered from the Phase II excavations, LPA analysts were required to develop an alternative mass analysis that both set the foundation for and complimented the more intensive analyses above. This was based on time and monetary constraints. Since excavation occurred at two quarry locations, LPA analysts realized that the crux of the in-depth analyses rested on the basic petrological separations. After cleaning and washing the excavated materials, analysts separated them according to these basic mineralogical groupings; amphibolite, biotite mica, chert, claystone, feldspar,

garnet; garnet schist, glacial quartz, groundstone, hematite mix, possible jasper, limonite, limonite goethite, mixture of rocks (a combination of quartz, migmitite, feldspar, tourmaline), quartz, quartzite, serpentinite, shale, and tourmaline. Analysts also kept a flexible watch for non-mineral and non-lithic materials. Investigators found one piece of bone and three of locations of what appeared to be charcoal, but were identified as degraded wood when analyzed in the laboratory.

After the initial separations, LPA analysts selected representative samples to run through the artifact (ore) and instrument analysis. The petrological categories that directly apply to these are quartz, feldspar, limonite goethite, and mixture (a combination of quartz, migmitite, feldspar, tourmaline). Feldspar and non-quartz bearing mixtures are classified under gangue. Mixed also falls under the artifact classifications of "mixed heterogeneous ore" and "lean ore." Limonite goethite remains the same – a potential for ochre. Quartz is the master category for the ore in the beneficiation and refinement processes. The catchall "glacial" category represents numerous petrological categories that exhibit glacial polish and rounding. This category was designed to be analyzed further to see if they are instruments, and if so then what kind of instrument.

PHASE II LPA FIELD INVESTIGATIONS

Phase II geomorphological investigations at Hillcrest Commons was conducted in two stages: (1) geomorphological trenching and (2) trench artifact analysis. Trenching was done prior to excavation to establish cluster boundaries and uncover spots of high potential for context.

I. Geomorphological Trenching

LPA investigators placed a total of fifty-two trenches in the four clusters identified in the Phase IB supplemental investigation by LaPorta and Associates.

A. Cluster 1

LPA placed a total of fourteen trenches in cluster 1 (Appendix A; Figure 3). One trench (CL1:TR8) was placed dissecting part of the outcrop of Q17. Eight trenches were placed circumscribing the outcrop of Q17. Five were placed on a flat area on the south. One was placed on a shallow slope to the northwest. LPA analysts cleaned and described four profiles in trenches: CL1:TR3, CL1:TR16: CL1:TR8, and CL1:TR10.

The eight trenches placed circumscribing the outcrop consist of CL1:TR1-CL1:T4, CL1:TR7, CL1:T9, and CL1:TR14-CL1:T16. Three profiles were cleaned and analyzed in CL1:TR3 and CL1:TR16, and CL1:TR8. Cluster 1, trench 3 (CL1:TR3) is a northeast-southwest trending mechanical excavation exposing some outcrop. LPA investigators chose a southwest profile (Figure 4), facing towards the flat, as the representative example. The profile extends to a depth of 120 cmbs. There are five different sedimentary units visible. Unit I (0-7 cmbs; 10YR 3/2) is a chestnut brown organic silt/clay duft with organics, representing the Ao-Horizon. Unit II (7-30 cmbs: 10YR3/4) is a very sandy and pebbly unit and overprinted by the A-Horizon. This unit contains broken quartz and small hammerstones, probably brought up by roots. Unit III (30-60 cmbs: 10YR 5/6) is pebbles, silt and fine sand overprinted by a B-Horizon and contains a gradational upper contact. This unit also contains quartz fragments and crushed feldspar from mining. Unit IV (60-101 cmbs: 10YR 5/6) is very clay-rich silt grading up to coarse silt and fine sand. The unit is artifact bearing at 67-80 cmbs with migmitite mine tailings and quartz debris. Unit V (101-120 cmbs; 5Y 6/1) is a clay-rich cemented glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation. The upper contact for Unit V (at 110 cmbs) is deflated and lined with ventifacts and frost breakage, but some artifacts could be present.

Cluster 1, trench 16 (CL1:TR16) is an approximately north-south trending mechanical excavation exposing some outcrop. LPA investigators chose a southeast profile (Figure 5), facing towards the outcrop at the south end of the trench, as the representative example. The profile extends to a depth of 110 cmbs. There are four different sedimentary units visible. Unit I (0-4 cmbs; 10YR 3/4) is a chestnut-brown, organic silt/clay duft with organics, representing the Ao-Horizon. This unit has some broken quartz and hammerstones probably brought up by roots. Unit II (4-44 cmbs: 10YR 5/6) contains pebbles, silt and fine sand overprinted by a B-Horizon and has a gradational upper contact. This unit also contains quartz fragments and crushed feldspar from mining. Unit III (44-80 cmbs: 10YR 5/6) is silt and rock debris (colluvium) overprinted by a B-Horizon and contains fine, small, broken, and mixed artifacts. This unit also contains quartz fragments and crushed feldspar from mining. Unit IV (80-110 cmbs; 5Y 5/3) is a clay-rich, cemented, glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation. Upper contact (at 80 cmbs) is deflated and lined with ventifacts and frost breakage, but some artifacts could be present.

Cluster 1, trench 8 (CL1:TR8) is a northeast-southwest trending mechanical excavation exposing some outcrop. LPA investigators chose a southwest profile (Figure 6), facing towards the flat, as the representative example. The profile extends to a depth of 80 cmbs. There are three different sedimentary units visible. Unit I (0-4 cmbs: 10YR3/4) is a very sandy and pebbly unit and overprinted by the A-

Horizon. This unit contains broken quartz and small hammerstones, probably brought up by roots. Unit II (4-44 cmbs: 10YR 5/6) has pebbles, silt and fine sand overprinted by a B-Horizon and contains a gradational upper contact. This unit also contains quartz fragments and crushed feldspar from mining. Unit III (44-80 cmbs; 5Y 5/3) is a clay-rich, cemented, glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation. Upper contact (at 44 cmbs) is deflated with ventifacts and frost breakage, but some artifacts could be present.

The five trenches placed on the flat area to the south consist of CL1:TR10-CL1:TR13, and CL1:TR5. One profile was cleaned and analyzed in CL1:TR10. Cluster 1, trench 10 (CL1:TR10) is a north-south trending mechanical excavation originating from an outcrop and terminating at the rock wall where LPA investigators chose a northwest profile (Figure 7), facing upslope, as the representative example. The profile extends to a depth of 83 cmbs. There are four different sedimentary units visible. Unit I (0-6 cmbs; 10YR 3/2) is a chestnut-brown, organic, silt/clay duft with organics, representing the Ao-Horizon. Unit II (6-23 cmbs: 10YR3/4) is a very sandy and pebbly unit and overprinted by the A-Horizon. This unit contains broken quartz and small hammerstones, probably brought up by roots. Unit III (23-57 cmbs: 10YR 5/6) has pebbles, silt and fine sand overprinted by a B-Horizon and contains a gradational upper contact. This unit also contains quartz fragments and crushed feldspar from mining. Unit IV (57-83 cmbs: 2.5Y 5/6) is a clay-rich, cemented, glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation. Upper contact (at 57 cmbs) is deflated with ventifacts and frost breakage, but some artifacts could be present.

B. Cluster 2

LPA placed twenty-two trenches in cluster 2 (Appendix A; Figure 8) to ascertain the horizontal and vertical extents of the quartz vein quarries (Q14-Q20) identified in the Phase IB by LPA. None were placed below Q13, due to the steepness of the slope. Five were placed topographically below the Q14 and Q15. Twelve trenches were placed below Q18-Q20 from the slope to the dirt road. Six were placed in a recess well below Q18. LPA analysts cleaned and described four profiles in trenches: CL2:TR4, CL2:TR16: CL2:TR6, and CL2:TR20.

The five trenches placed below Q14 to Q15 consist of CL2:TR1-CL2:TR3, CL2:TR16, and CL2:TR17. One profile was cleaned and analyzed in CL2:TR4. Cluster 2, trench 4 (CL2:TR4) is a northeast-southwest trending mechanical excavation originating from an outcrop and terminating on the flat to the west. LPA investigators chose a northwest profile (Figure 9), towards the outcrop and Q18, as the representative example. The profile extends to a depth of 105 cmbs. There are four different sedimentary units visible. Unit I (0-15 cmbs; 10YR 2/1) is a black, organic, silt/clay duft with organics, representing the Ao-Horizon. Unit II (15-27 cmbs: 10YR3/3) is a medium to fine sand and silt unit with numerous roots and overprinted by the A-Horizon. This unit contains broken quartz and feldspar, representing a possible surface. Unit III (27-80 cmbs: 10YR 4/6) is fine sand with silt and clay, overprinted by a B-Horizon, and conformably overlying Unit IV. This unit also contains quartz fragments, limonite, and charcoal speckling. Unit IV (80-105 cmbs: 10YR 5/6) is silt over clay (70/30), has a gradational upper contact, and has many broken pebbles and cobbles. The silt over clay is overprinted by a transitional B-C horizon and overlays bedrock.

The twelve trenches below the outcrops of Q14-Q20 consist of CL2:TR4, CL2:TR7-15, and CL2:TR22. One profile was cleaned and analyzed in CL2:TR17. Cluster 2, trench 17 (CL2:TR17) is a northeast-southwest trending mechanical excavation originating from an outcrop and terminating on the shallow slope to the west. LPA investigators chose a southeast profile (Figure 10), towards the outcrop, as the representative example. The profile extends to a depth of 210 cmbs. There are three different sedimentary units visible. Approximately 25 cm above Unit I was removed by the backhoe and represents correlatives of the Ao- and A-horizons seen in other profiles. Unit I (0-130 cmbs; 10YR 4/6) is a fine sand/silt/clay (70/20/10) unit filled with a tremendous quantity of broken migmitite, some reaching boulder size. The B-Horizon overprints the unit. Unit II (130-180 cmbs: 10YR 5/6) is a gradational reworked

sediment (loess or ablation till) with an abrupt upper contact that represents and unconformity and is overprinted by the B-Horizon. Unit III (180-210 cmbs: 2.5Y 5/6) is a cemented glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation.

The six trenches placed in the recess below Q18 were CL2:TR5, CL2:TR6, and CL2:TR18-CL2:TR22. Two profiles were cleaned and analyzed in CL2:TR6 and CL2:TR20. Cluster 2, trench 6 (CL2:TR6) is a northeast to southwest trending mechanical excavation on the slope to the recess. LPA investigators chose a northwest profile (Figure 11), towards the outcrop and Q18, as the representative example. The profile extends to a depth of 105 cmbs. There are six different sedimentary units visible. Unit I (0-6 cmbs; 10YR 2/1) is a black organic silt/clay duft with organics, representing the A-Horizon. Unit II (6-25 cmbs: 10YR4/4) is a humic silt and clay unit overprinted by the A-Horizon. This unit contains broken quartz and migmitite. Unit III (25-39 cmbs: 10YR 4/6) is a fine sand/silt/clay (70/20/10) unit filled with a tremendous quantity of broken migmitite, some reaching boulder size. This unit also contains quartz fragments, limonite, and charcoal speckling. Unit IV (39-60 cmbs: 10YR 5/6) is a colluvium filled with large migmitite pieces and quartz fragments. Unit V (60-90 cmbs; 10YR5/6) is a transitional medium to silt/fine sand/ (50/30/20) with a hummocky upper contact. The unit contains rotting migmitite, pebbles, and quartz fragments. Unit VI (90-105 cmbs; 2.5Y 5/6) is a cemented glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation.

Cluster 2, trench 20 (CL2:TR20) is a northwest-southeast trending mechanical excavation in the flat of the recess. LPA investigators chose a northwest profile (Figure 12), towards the outcrop and Q18, as the representative example. The profile extends to a depth of 115 cmbs. There are five different sedimentary units visible. Unit I (0-15 cmbs; 10YR 3/3) is a black organic silt/clay duft with organics, representing the A/Ao-Horizon. Unit II (15-43 cmbs: 10YR4/6) is a medium to fine sand and silt unit with numerous roots and overprinted by the A-Horizon. Unit III (43-69 cmbs: 10YR 5/8) is a fine sand/silt/clay (70/20/10) unit filled with finely dispersed pebbles and a gradational upper contact. This unit also contains small fragments of quartz and large and small flakes of migmitite mining debris. Unit IV (69-96 cmbs: 2.5Y 6/4) is a transitional medium to silt/fine sand/ (50/30/20) with a gradational upper contact containing quarts and migmitite fragments. Unit V (96-115 cmbs; 2.5Y 6/4) is a cemented glacial lodgment till of pebbles (chert and quartz) and cobbles (Proterozoic) with broken bedrock and no special orientation.

Observations and Comments. Not surprisingly, the intermediate and high elevations of the study area contain numerous bedrock outcrops. Many of these were sculpted by the transgression and regression of the Woodfordian Stage of the Pleistocene Glaciation as ice passed through the area. Glacial striae, as well as ice plucked rock, represent an abundant physical characteristic, or evidence, of the grip glacial ice held on the region prior to 18,000 B.P. In addition, the lowest sections of each and every profile are represented by a thick veneer of lodgment till overlain by ablation till, erratics, and coarse, light colored, quartz sand that contains abundant heavy minerals derived from the Adirondack massif to the north. Granulometric laboratory studies, to date, have revealed the presence of opaque minerals such as magnetite, hematite, and ilmenite. In association with this is a full suite of non-opaque minerals that include garnet, black tourmaline, zircon, and a variety of rare earths all derived from the Adirondack Mountains. Directly overlying the vestiges of the Wisconsin glacial effect is a well developed unconformity known in archaeology as a buried A-Horizon. Near outcrops, the A-Horizon protects a paleosol on the far southern edge of cluster 2. The paleosol consists of fine silt and clay, is bright orange, and represents genetically reworked loess that was originally deposited in a periglacial environment as the ice sheet ablated. At other locations distal to the outcrops, the unconformity is covered by a pavement that is a mixture of quarry instruments, glacial erratics, and ice plucked rock debris. Proximal to the outcrops are large masses of fallen granite migmitite and compositionally simple pegmatite that have fallen into their present position due to the effects of annual freeze/thaw during the establishment of the periglacial. Many of the glacially derived cobbles occurring on this pavement reveal glacially striated surfaces and ventifacted (polished) surfaces. Upon close inspection under a hand lens, the en-echelon scalloped shaped divits cut into the cobbles and boulders are referred to as chatter marks and index the kinematic viscosity (the slinky effect) with which the ice moved across this landscape.

The succession of sedimentary horizons, which overlies the glacial/periglacial pediment surface is largely one of soilized and partially soilized colluvial episodes. This is attested to by the fact that the sediment horizons each thicken in the proximal direction towards outcrops and thin, subsequently, in the direction away from exposed rock surfaces. Most of the colluvial episodes begin with periods of forestation or vegetation growth and their cessation is generally marked by deforestation/climate change or human anthropogenic changes. The difficulty at Hillcrest has been determining which effect initiated colluvium and which effect caused its termination.

C. Cluster 3

LPA placed eleven trenches in cluster 3 (Appendix A; Figure 13). Eight were placed to the north-northeast of Q21. Three were placed to the southwest of Q24. LPA analysts cleaned and described four profiles in trenches: CL3:TR1, CL3:TR3: CL3:TR6, and CL3:TR7.

Cluster 3, trench 1 (CL3:TR1) is a northwest-southeast trending mechanical excavation originating from an outcrop and terminating on the flat to the west. LPA investigators chose a southwest profile (Figure 14), near the intersection with CL3:TR9, as the representative example. The profile extends to a depth of 58 cmbs. There are six different sedimentary units visible. Unit I (0-4 cmbs; 10YR 2/1) is a black organic silt/clay duft with organics, representing the Ao-Horizon. Unit II (4-6 cmbs; 10YR 3/4) is a silt and clay unit, overprinted by the A-Horizon. Unit III (6-28 cmbs: 10YR 4/6) is fine sand with silt and clay, overprinted by a A-Horizon, and conformably overlying Unit IV. This unit also contains numerous quartz fragments and hammerstones. Unit IV (28-40 cmbs: 10YR 5/6) is a coarse to fine sand with silt and clay unit with pebbles and cobbles (unmodified) lining the upper surface. Unit V (40-43 cmbs: 10YR 5/6) is a transitional medium to fine sand with little clay and silt. Unit VI (43-58 cmbs: 2.5Y 5/6) is a glacial lodgment till of cobbles with a silt/clay and fine sand matrix. The till has no orientation and overlays bedrock.

Cluster 3, trench 3 (CL3:TR3) is an approximately south to north trending mechanical excavation originating from an outcrop and terminating on the flat to the north. LPA investigators chose a southwest profile (Figure 15), by the widening of the trench in the northern part, as the representative example. The profile extends to a depth of 75 cmbs. There are six different sedimentary units visible. Unit I (0-3 cmbs; 10YR 2/1) is a black organic silt/clay duft with organics, representing the Ao-Horizon. Unit II (3-15 cmbs; 10YR 3/4) is a silt and clay unit, overprinted by the A-Horizon. Unit III (15-28 cmbs: 10YR 4/6) is fine sand with silt and clay, overprinted by a B-Horizon, with charcoal flecking. Unit IV (28-41 cmbs: 10YR 4/6) is a coarse to fine sand with silt and clay unit with charcoal flecking and overprinted by a B-Horizon. Unit V (41-56 cmbs: 2.5Y 5/6) is a transitional medium to fine sand with little clay and silt. Unit VI (56-75 cmbs: 2.5Y 5/6) is a glacial ablation till of cobbles with a high clay content and hummocky upper surface. The till has no orientation and overlays bedrock.

Cluster 3, trench 6 (CL3:TR6) is a northeast-southwest trending mechanical excavation originating from an outcrop and terminating on the flat to the west. LPA investigators chose a southwest profile (Figure 16), by the outcrop, as the representative example. The profile extends to a depth of 103 cmbs. There are six different sedimentary units visible. Unit I (0-3 cmbs; 10YR 2/1) is a black organic silt/clay duft with organics, representing the Ao-Horizon. Unit II (3-13 cmbs; 10YR 3/4) is a silt and clay unit, overprinted by the A-Horizon. Unit III (13-18 cmbs; 10YR 3/4) is fine sand with silt and clay, overprinted by an A-Horizon, with quartz and charcoal flecking. Unit IV (18-68 cmbs: 10YR 4/6) is a coarse to fine sand with silt and clay unit with charcoal flecking and overprinted by a B-Horizon. This unit also contains angular fragments of quartz and migmitite. Unit V (68-87 cmbs: 10YR 5/6) is a transitional medium to fine sand with little clay and silt. Unit VI (87-103 cmbs: 2.5Y 5/6) is a glacial lodgment till of cobbles with a silt/clay and fine sand matrix. The till has no orientation and overlays bedrock.

Cluster 3, trench 7 (CL3:TR7) is an approximately northeast-southwest trending mechanical excavation originating from CL3:TR6 northwest termination and ending with the encounter of a large boulder adjacent to CL3:TR8. LPA investigators chose a southwest profile (Figure 17), by the widening of the trench in the northern part, as the representative example. The profile extends to a depth of 84 cmbs. There are six different sedimentary units visible. Unit I (0-1 cmbs; 10YR 2/1) is a black organic silt/clay duft with organics, representing the Ao-Horizon. Unit II (1-7 cmbs; 10YR 3/4) is a silt and clay unit, overprinted by the A-Horizon. Unit III (7-21 cmbs; 10YR 4/6) is fine sand with silt and clay, overprinted by an A-Horizon, with a large amount of quartz and hammerstones. Unit IV (21-46 cmbs; 10YR 5/6) is a sandy colluvium with an abrupt upper contact and overprinted by a B-Horizon. The unit contains quartz and hammerstones with a high concentration of these two on the abrupt upper contact (at 28 cmbs). Unit V (46-65 cmbs; 10YR5/6) is a transitional sandy unit with pebbles. Unit VI (65-84 cmbs; 2.5Y 5/6) is a glacial lodgment till of cobbles with a silt/clay and fine sand matrix. The till has no orientation and overlays bedrock.

D. Cluster 4

LPA placed eleven trenches in cluster 4 (Appendix A; Figure 18), five to the northwest of Q26a, and one in front of Q28. LPA analysts cleaned and described four profiles in trenches: CL4:TR1, CL4:TR7: CL4:TR9, and CL4:TR10.

Cluster 4, trench 1 (CL4:TR1) is a to northwest-southeast trending mechanical excavation originating from an outcrop at Q26a and terminating on the flat to the west. LPA investigators chose a southwest profile (Figure 19), by the outcrop, as the representative example. The profile extends to a depth of 103 cmbs. There are three different sedimentary units visible. Unit I (0-4 cmbs; 10YR 3/3) is a black, organic, silt/clay duft with organics, representing the Ao-Horizon. Unit II (4-13 cmbs; 10YR 2/2) is a fine, sand/silt/clay (70/20/10) with broken quartz and feldspar. Unit III (41-105 cmbs; 10YR 5/6) is coarse to medium, fine, sand with silt with an abrupt upper contact (possible surface) that overlays regolith.

Cluster 4, trench 7 (CL4:TR7) is a northwest-southeast to trending mechanical excavation originating from an outcrop at Q26b and terminating on the flat to the east. LPA investigators chose a northeast profile (Figure 20), midway along the trench, as the representative example. The profile extends to a depth of 94 cmbs. There are six different sedimentary units visible. Unit I (0-10 cmbs; 10YR 2/1) is a black, organic, silt/clay duft with organics, representing the Ao-Horizon. Unit II (10-34 cmbs; 10YR 4/4) is coarse to fine, sand with silt unit, overprinted by the B-Horizon. Unit III (34-58 cmbs; 10YR 5/6) is a colluvium with coarse sand/medium sand/fine sand/silt/clay (20/20/10/35/5), overprinted by a B-Horizon. The unit also has mine tailings. Unit IV (58-98 cmbs: 10YR 5/6) is dark organic-rich unit of irregular thickness. Unit V (98-100 cmbs: 10YR 5/6) is a transitional unit with coarse sand and broken mined quartz. Unit VI (100-110 cmbs: 2.5Y 5/6) is a glacial lodgment till of cobbles with a silt/clay and fine sand matrix. The till has no orientation and overlays bedrock.

Cluster 4, trench 9 (CL4:TR9) is a northeast-southwest to trending mechanical excavation running parallel to the outcrop at Q26c. LPA investigators chose a southwest profile (Figure 21), at the southwest end of the trench, as the representative example. The profile extends to a depth of 91 cmbs. There are six different sedimentary units visible. Unit I (0-1 cmbs; 10YR 2/1) is a black, organic, silt/clay duft with organics, representing the Ao-Horizon. Unit II (1-21 cmbs; 10YR 4/4) is silt and clay unit, overprinted by the A-Horizon. Unit III (21-39 cmbs; 10YR 4/6) is a fine sand/silt/clay (40/50/10), overprinted by a B-Horizon. The unit also has broken quartz and feldspar. Unit IV (39-67 cmbs: 10YR 5/6) is soft, chestnut-brown colluvium with medium sand/silt/clay (35/30/35). The unit contains quartz fragments, charcoal flecking, and migmitite. Unit V (67-71 cmbs: 10YR 4/4) is a transitional unit with coarse sand and broken, mined quartz. Unit VI (100-110 cmbs: 2.5Y 5/6) is a hard, indurated, sand pavement of coarse sand and fine mud, is clay rich, and contains quartz.

Cluster 4, trench 10 (CL4:TR10) is a northeast-southwest trending mechanical excavation originating from an outcrop at Q28 and terminating on the flat to the east. LPA investigators chose a southeast profile (Figure 22), by the outcrop, as the representative example. The profile extends to a depth of 94 cmbs. There are six different sedimentary units visible. Unit I (0-4 cmbs; 10YR 2/2) is a black, organic, silt/clay duft with organics, representing the Ao-Horizon. Unit II (4-13 cmbs; 10YR 2/2) is a silt and clay unit, overprinted by the A-Horizon. Unit III (13-30 cmbs; 7.5YR 3/2) is chestnut brown and sandy, overprinted by a B-Horizon, with charcoal flecking. Unit IV (30-39 cmbs: 7.5YR 4/6) is dark organic-rich unit of irregular thickness. Unit V (39-82 cmbs: 7.5YR 5/4) is coarse sand with pebbles and spalls of migmitite. Unit VI (82-94 cmbs: 2.5Y 5/6) is a clay-rich, transitional unit with pebbles and cobbles that overlays bedrock.

II. PHASE II EXCAVATIONS

Prior to excavations, investigators posed the following research questions that are based on background research and backhoe trench analyses at the four clusters. Unlike other research groups, LPA staff have worked steadily on quarries for almost fifteen years as a company and our commitment to the resource is long term. Many of the research questions posed below have accumulated since the 1990s when Philip LaPorta first began looking at quartz quarries in the lower Hudson Valley. Therefore, the following questions are those addressed in other LPA documents that involve quartz, and non-quartz, quarries.

1. How are quartz veins mined or extracted?
2. What is the chain-of-operation for the comminution of quartz vs. chert or other raw material types (ore)?
3. How does the deciphered chain-of-operation differ from other quartz quarries and non-quartz quarries?
4. What types of mining instruments are constructed for the extraction of quartz veins?
5. Can we elucidate, from excavations, task subdivision in the vicinity of the adit (Q18) in cluster 2? How does it compare to the typical quarry model of the Cambrian-Ordovician Wallkill River Valley cherts?
6. What are the other minerals, or mineral commodities, that may have been mined along with the associated quartz? Also, what other mineral ores were produced at these locations?

The methodology executed is focused towards answering the posed research questions. During the Phase 1B investigations, mapping at clusters 1 through 4 provided what seemed to be ample geological evidence for the presence of quartz veins, formalized prehistoric mines and quarries, and even suitable geomorphological context for the promotion of habitation development, quarry support sites and even overhang or shelter occupations. However, exhaustive geomorphological testing conducted during the Phase II investigation revealed architectural elements of native quarries and mines in clusters 1 and 2 that were not present in cluster 3, and poorly developed in cluster 4. Additionally, clusters 1 and 2 were sealed by a thick colluvium in front, and to the sides, of each quarry complex that preserved the evidence needed to elucidate much of the mining operation. Such a stratigraphic context was missing form clusters 3 and 4. Clusters 3 and 4 were not lacking in total merit as evidence for mining activity and the associated production of mining instruments was present. The few recovered artifacts were largely ore blocks, middling blocks, and various types of tailings. However, cluster 3 and 4 artifacts were not in a stratified context and a chain of operation could not be elucidated. It is for this reason that LPA investigators decided to focus Phase II excavations on clusters 1 and 2.

In Cluster 2, six test units were placed directly below and to either side of the adit (Q18) to test for Zone I, Zone II, and Zone III on steep slopes. Six test units were placed above to test for Zone IV workshops. In addition, two units were placed to test for Zone IV in the southern part of cluster 2. In cluster 1, seven 1-x-1 m units were placed to look for evidence of backfilling, milling (Zone II), beneficiation (Zone III), workshops (Zone IV), and to uncover the zones of extraction (Zone I).

A. Excavations in Cluster 1

After trenching and collecting, LPA investigators identified four spots in cluster 1 for potential of deeper buried evidence of quarry processing as well as information to supplement the information seen in the deep tests. LPA investigators placed and excavated seven 1-x-1 m units (TU1-TU7) in cluster 1 (Figure 3).

i. TU1-TU3. The first three units (TU1, TU2, and TU3) are contiguous and rest to the north of the quartz bearing outcrop CL1:Q17 (identified in Phase IB fieldwork) and trend east-west. The units were excavated to southwest and southeast dipping bedrock (Figure 23). The first is seen in the southwest part

of TU1 and the second in TU3 showing steeply dipping bedrock to the southwest. Investigators identified two strata the three contiguous units. Stratum I is a very dark, gray-brown (10YR 3/2) loam that also includes the root mat that covered the units. Stratum II is identified as a dark, yellow-brown (10YR 3/4) loam. The artifacts collected were mainly feldspars and quartz quarry debris and stratum 1 contained the majority of the artifacts.

ii. TU4. One unit (TU4) was placed to the southeast of CL1:Q17, between Phase II backhoe trenches CL1:TR8 and CL1:TR9. TU4 was excavated in natural strata to total depth of 61 cm below datum in the south half of the unit and 51 cm below datum in the north half of the unit (Figure 24). The unit bottomed out on what is designated as stratum III identified as a dark, yellow-brown (10YR 4/6) loam – equated to the glacial till from CL1:TR3 (Unit III, glacial lodgement till). Stratum I is identified as a yellow-brown (10YR 5/2) silt loam that yielded only five quartz fragments. Stratum II, a yellow-brown (10YR 5/6) loam, produced a larger number of artifacts including one possible hammerstone. This stratum bottomed out on stratum III.

iii TU5-TU6. Two contiguous units (TU5 and TU6) were excavated off the western face of outcrop CL1:Q17 and trend east west. TU5 rests partially (eastern half of the unit) on the quartz bearing outcrop. TU6, while contiguous to the west of TU5, was bounded to the west by CL1:TR14. TU5 was excavated to as deep as fifty-six cm below surface in the southwest corner. Both units (Figure 25) contained two natural strata (stratum I and stratum II) and terminated on bedrock (feldspar, quartz, and migmitite). Stratum I was a black (10YR 2/1), and dark brown, (10YR 2/2) silty loam. Stratum II was a light, yellow-brown loam (10YR 6/4). Both strata generally increased westward in thickness and slope. The surface, bedrock, and strata all dipped to the west-northwest. A quartz vein in the central part of TU5 dictated bedrock depth, while the bedrock a separate thicker quartz vein dominated comparatively gently sloping floor of TU6. Numerous quartz and feldspar fragments, possible hammerstone fragments, and one heated hammerstone were recovered while excavating and screening.

iv TU7. One 1-x-1 m unit (TU7) was excavated between backhoe trenches CL1:TR3 and CL1:TR4, to the north of CL1:Q17. The unit (Figure 26) was excavated in three natural strata (strata I-III). Stratum I was a very dark grayish brown (10YR 3/2) clayey loam. Stratum II was a yellowish brown (10YR 4/6) silt, with 10% clay. Stratum III was a light yellowish brown (10YR 5/6) silty loam, with 10% clay. The unit terminated on the olive-colored cobble-bearing glacial till described in the profile of the adjacent CL1:TR3. Artifacts (quartz, feldspar fragments, and hammerstone fragments) were encountered from the surface to the first 20 cm of the third strata (ca. 40 to 50 cm below the surface), with a significant drop-off in the remaining stratum III.

B. Excavations in Cluster 2

After trenching and collecting, LPA investigators identified two spots for the potential of deeper buried evidence of quarry processing as well as information to supplement the information seen in the deep tests. Trenches from all clusters include artifacts that, to varying degrees, represent the processing of quartz. None exhibited the extraction, with the exception of instruments that When CL2:TR22 was excavated by the backhoe, LPA investigators recognized a large (ca. 300 lb, or 136 kg) quartz impactor/anvil that came from in front of the adit at Q18. Based on the find, and testing the LaPorta quarry model, excavation units were placed in front of the adit and above the adit on a stable flat-lying area. Six 1-x-1 m units (TU1-TU6) were excavated above the adit, while six were excavated in front of the adit (Figure 4, Figure 27). In addition, LPA placed two 1-x-1 m units (TU13-TU14) north of CL2:TR17, in the southern part of the cluster (Figure 6), to test for a potential living floor or feature identified in the profile.

i. Above the Adit at Q18 (TU1-TU6). The six 1-x-1 m units excavated above the adit were in a 2-x-2 m block, with a 1-x-1 m unit (TU5) off to the east of TU4 and a 1-x-1 m unit (TU6) to the north of TU5. Due to the contiguous nature of the units, the strata were correlated between each unit (TU1 to TU6) in the field.

a. TU1 and TU3. TU1 and TU3 (Figures 28 and 29) were the first 1-x-1 m units excavated at the top of the adit. They are separated from the other units in the grid due to the shallowness of the bedrock before the dipping to the west. A very dark brown (10YR 2/2) stratum I (3-7 cm) is a shallow O-Horizon/A-Horizon, with a thickened part in the southwest due to a partial remains of a stump and a thick tuft of moss. A dark, yellow-brown (10YR 4/6) stratum II was shallow in the center, due to a "hump" of bedrock gneiss that steeply dropped, 10-12 cm at 80-90º, to the west and 40º to the east in TU1 to a depth between 16 and 18 cm and encompassed two levels. Stratum I rested unconformably over the bedrock only in the south central part of TU1. Stratum II rested on bedrock in all other places, with a root mat between stratum II and the bedrock.

b. TU2, TU4, and TU5. TU3 and TU4 (Figures 29 and 30) were excavated contiguous to the east of TU1 and TU3, while TU5 was excavated to the east of TU4. Stratum I (3-12 cm) is a shallow O-Horizon/A-Horizon, thicker in TU5 due to the remains of a small tree stump. Stratum II exhibited a more uniformly dipped to the east, with stratum II to a thickness of 16 cm to the west and 70 cm to the east in TU2 and TU5, with 74 cm to the southeast in TU4. TU5 dipped more towards the southeast, terminating at 51-75 cm thick in the west and 80 cm thick in the east. Light, olive-brown (2.5Y 5/6) stratum III in TU5 was excavated 10 cm, but was terminated due to a drop off in artifacts and a 25% increase in pebbles and gravels from stratum II/level 7.

c. TU6. TU6 (Figure 29) was excavated to the north of TU5. This unit was placed outside of the 2-x-3 m grid to determine the extent of a shallow occurrence of quartz in upper stratum II. Stratum I was a shallow at 3-6 cm thick. Stratum II is 40 cm thick in the west and 30 to 50 cm in the east through six separate levels. Although the ending elevations were similar, the 20 cm discrepancy in the northeast and southeast measurements is attributed to the presence of the lone feature (Feature 1) in the site. Feature 1 contains a large rock, a higher density of cobbles, a change to silty loam and gravel, and a change of color to strong brown (7.5YR 4/6). A third stratum, termed stratum II transitional, was noted at the base of TU6 as a loam gravel that is yellow-brown (10YR 5/6) mottled with light olive brown (2.5Y 5/6).

ii. In front of the Adit at Q18 (TU7-TU12). The six 1-x-1 m units in front of the adit were split between three sub-locations. The first location is a lower lying ledge to the northwest of the adit and contains a 1-x-2 m unit (TU7 and TU8) trending east-to-west. Three 1-x-1 m units (TU9-TU11) were excavated directly in front of the adit, to the west. A sole 1-x-1 m unit (TU12) rests on another low-lying ledge to the southwest of the adit.

a. TU7 & TU8. TU7 and TU8 were two contiguous 1-x-1 m units excavated to depths of 30 cm and 71 cm respectively (Figure 31). The sediments there rested on bedrock dipping to the east-southeast at a 10º slope. The sediment cover itself sloped to the west at 28º. Stratum I (O-horizon and thin A-horizon) is shallow in Unit 7, but thickens on the eastern half of TU8, owing to the close proximity to the outcrop. The thin O-Horizon of stratum I was black (10YR 2/1), while the underlying A-Horizon was very dark brown (10YR 2/2). Stratum II (B-Horizon) is a brown-yellow (10YR 6/6). Excavators designated stratum III based on the increase of sand while excavating, but color and other characteristics correspond to stratum II.

b. TU9, TU10, & TU11. TU9, TU10, and TU11 were placed directly in front of the adit to assess the potential of mining debris in close proximity to the point of extraction itself. The units are a contiguous "L-shape." TU9 is 36-84 cm deep, deepest in the SE quadrant, terminated due to bedrock and root impediment (Figure 32). TU10 is 19-49 cm deep, deepest in the NW quadrant, and thickest in the NE quadrant (Figure 32). TU11 is 19-68 cm deep, deepest in the NW quadrant and thickest in the SE quadrant (Figure 33). Stratum I (O-horizon and A-horizon) is a shallow, black (10YR 2/1), silt unit with gravel. Stratum II contains five levels in TU9, two levels in TU10, and four levels in TU11. TU9 and TU11 terminate on bedrock, while tree roots and an immovable block of migmitite impeded TU10.

c. TU12. TU12 was placed to the south of the adit units (TU9-TU11) and rests on a bedrock dip similar to that seen for the contiguous units TU7/TU8. The unit was excavated to depths of 14 to 67 cm respectively (Figure 33). The unit terminated on migmitite bedrock, first exposed in the east (14-41 cmbs) and then to the west (at 63-67 cmbs). Stratum I consists of one level and is a black (10YR 2/1) loam with 10-20% gravel. Stratum II, consisting of five levels (S-II/Lvl-1 to S-II/Lvl-5), is a dark, yellow-brown (10YR 4/6) loamy sand with an increase to ca. 50% gravel. The termination of S-II/Lvl-I produced bedrock in the center and yielded approximately five gal (18.9 L) worth of quartz were recovered from S-II/Lvl-1. S-II/Lvl-2 ended on bedrock in the NW quadrant and SW corner and yielded approximately five gal (18.9 L) worth of quartz. Gravel content decreased to ca. 10% in S-II/Lvl-3 and S-II/Lvl-4, with the sediment confined to a narrow (10-40 cm wide) trough in the western half of the unit and artifacts noticeably dropping in level 4. S-II/Lvl-5 terminated on bedrock and contained ca. 5% gravel.

iii. North of CL1:TR17 (TU13 and TU14). Two contiguous north-south trending units (TU13 and TU14) were excavated to the north of CL2:TR17. TU13 was excavated to depths of 66-74 cmbs and was thickest in the east and deepest in the west (Figure 34). TU14 was excavated to depths of 53-77 cmbs, deepest in the west and thickest in the NE (Figure 34). In placing these units, investigators intended to test for the possibility of a fire feature in the form of an ash layer that had been seen in the profile of the trench. TU 13 is to the north and TU14 is to the south, just north of CL2:TR17. Three strata were encountered during excavations. Stratum I proved to be a dark, yellow-brown (10YR 3/4) loam. The stratum proved to be thicker in the north and thinner in the south. Artifact counts for this stratum was considerably low. Stratum II is identified as a strong brown (7.5YR 4/6) loam that thickens to the north. Stratum II artifact counts remained as low as those seen in stratum I. Investigators expected the ash lens in stratum II, but found no evidence in the excavation. This stratum bottomed out on stratum III. Stratum III is identified as a dark yellow-brown (10YR 4/6) hummocky loam with gravel. This stratum is identified as the sub-soil of the area and contains a gravel/pebble content of about 15 to 20%. This stratum was excavated 10 to 20cm in depth and yielded no artifacts.

C. LPA Continuation of Columbia Heritage Phase II Excavations Units

Columbia Heritage requested that LPA continue to excavate two 1-x-1 m units, to the north of clusters 1 and 2, that were excavated by Columbia Heritage in their Phase II work (Oberon 2007). As stated by Clumbia Heritage (2007:14), the two units produced "a quantity of what appeared at first to be naturally fractured quartz bedrock, but it was found in fact to constitute culturally-produced material." These were titled by LPA excavators as "Oberon TU1(A)" and "Oberon TU2(B)" (see Appendix A). Presented here is a summary of the LPA excavated strata, along with artifact analysis of recovered materials using the artifact analysis presented in the ARTIFACT ANALYSIS section following this.

1. LPA Excavation Results

Oberon TU1(A) (Appendix A; Figure 35) is a 1-x-1 m unit located north of cluster 2. LPA field technicians placed a datum 10 cm above ground surface and excavated from 45-95 cmbs, designating under four strata: B/1, B/2, C/3, and D/4. Stratum B/1 is a 10YR5/6 (yellow brown) sandy loam with less than 2% gravel. The unit is 10-12 cm thick and is deepest in the northwest corner. Stratum B/2 is a 10YR 5/6 (yellow brown) sandy loam natural level 6-10 cm thick and deepest in the northwest corner. Stratum C/3 is a 10YR 5/8 (yellow brown) loamy sand with ~5% gravel. The stratum is 11-14 cm thick and deepest in the northwest corner. Stratum D/4 is a 5Y 5/4 (olive) coarse loamy sand, excavated between 9-13 cm, deepest in the northwest, and ~20% gravel/cobble content. The floor of the unit was an 8:2 mix of 5Y 5/4 olive loamy sand and 10YR 5/8 (yellow brown) sandy loam. Excavators ended excavation when the sediment turned to an almost pavement and the geomorphologist confirmed that they were in the glacial till.

Oberon TU2(B) (Appendix A; Figures 36 and 37) is a 1-x-1 m unit located north of cluster 1, off the intersection of two dirt roads on the property. LPA field technicians placed a datum 10 cm above ground surface and excavated from 30-54 cmbs, designating under two levels in one strata: B/L1 and B/L2.

Level B/L1 is a 14 cm thick level with a large number of cobbles. An estimated 35% of the unit remained unexcavatable due to the presence of large boulders. Level B/L2 is a 10YR 4/6 (dark yellow brown), grading into 2.5 Y 5/6 (light olive brown), 10 cm thick sandy loam level with ~20% cobbles and pebbles. The unit remained 35% excavatable. The floor of the level is a 2.5Y 5/6 (light olive brown) loamy, sand, glacial till.

2. Artifact Analysis

Investigators excavated sicty-one pieces in the continuation of the two Columbia Heritage units (see Appendix D). Fifty-two were recovered from TU1(A) and nine were recovered from TU2(B). Thirty-six of the sixty-one artifacts (59%) are glacial quartz, showing no signs of cultural modification. Included are seven pieces of feldspar (11.4%). Of the 18 artifacts collected (29.5% of the total), ten are hammerstones/hammerstone fragments (55.6%), five are quartz scaling flakes (27.8%), one quartz hammer/core, one core fragment (5.6%), one piece of dressed ore (5.6%), and one quartz flake (5.6%). Glacial quartz was present in all strata and all levels. Eight hammer/hammer fragments and the hammer/core were recovered from TU1(A). Two small wedges and one split greywacke hammer came from stratum B/level 1 while the quartz hammer/core came from stratum B/level 2. One hammer, two small quartz focal chisels, and one greywacke spall came from stratum C/level 3. Two hammer/hammer fragments and the hammer/core were recovered from TU2(B), stratum B, levels 1 and 2. The hammer from level 1 is a 0.3 kg porphyritic andesite hammer, while the level 2 piece is a split greywacke with possible heat treatment. The core fragment came from TU2(B) stratum B/level 1. The lone flake was recovered from TU1(A) stratum B/level 1. The five scaling flakes came from TU1(A) stratum B/level 1 (n=1), TU1(A) stratum C/level 3 (n=1), TU1(A) stratum B/level 2 (n=1), and TU2(B) stratum B/level 1 (n=2).

3. Inferences

It should be noted that this is a complimentary analysis to the findings of Columbia Heritage and do not reflect additional artifacts and context of Columbia Heritage's own excavation and their nearby work. The LPA continuation of Columbia Heritage units produced 18 artifacts that include instruments, scaling flakes, dressed ore, a quartz flake, and a quartz core. The hammers were concentrated mostly in TU1(A) and represent a beneficiation zone (Zone III) and possible beginnings of refinement (Zone III) with a possible between stage activity unrecognized by investigators.

ARTIFACTS ANALYSIS FROM THE PHASE II GEOMORPHOLOGICAL TRENCHES AND EXCAVATIONS

I. Artifacts from the Trenches

Artifacts from the trenches of the four clusters helped to define the classifications of the ore and instruments. LPA analysts collected artifacts from trenches and selected samples from the different clusters and analyzed a selected 331 artifacts (Appendices D and E) to provide (see METHODS section for further description): (1) represent the variety in the heterogenous quartz ore and instruments used to extract and process the quartz; and (2) a foundation for the analyses of artifacts excavated in the future. The following are descriptions for the recovered artifacts from the trenches at: cluster 1, cluster 2, cluster 3, and cluster 4.

A. Cluster 1

Remains uncovered from trench 4 (CL1:TR4), located directly to the west of the outcrop, were selected to represent the ore from cluster 1. Representative instruments were analyzed from trench 6 (CL1:TR6), down slope and to the northeast of the outcrop, and trench 4 (CL1:TR4).

The western wall of CL1:TR4 uncovered the subsurface continuation of Q17. LPA investigators recovered 123 artifacts (103 pieces of quartz ore – Table 3, 19 hammerstones, and one piece of limonite goethite ore) (Figure 38). Forty-two pieces (40.8% of the total CL1:TR4 collected ore) of the material was gangue/country rock (n=27) and gangue/lean ore (n=15), representing the non quartz-bearing rocks and mixture of quartz with the migmitite, feldspar, and mica. Three pieces (2.9% of the total CL1:TR4 collected ore) of dressed ore and eight (7.8% of the total CL1:TR4 collected ore) of high-grade ore are characterized by high-grade quartz and slight abrasion (see Appendix E descriptions). Accompanying these are twenty-two (21.3% of the total CL1:TR4 collected ore) scaling flakes that result from dressing quartz. Eight (7.8% of the total CL1:TR4 collected ore) lithon packages are 2-3 microlithons in thickness. Sixteen (15.5% of the total CL1:TR4 collected ore) microlithons, the single most divisible unit of quartz. Three (2.9% of the total CL1:TR4 collected ore) small pieces of chat, crushed ore, were recovered. One (0.1%) limonite goethite iron ore was found, representing a possible source of ochre.

Table 3. Ore classification frequencies from Cluster 1, Trench 4.

Classification	Count	Weight (g)
3	8	2389.2
4	16	284.2
6	3	9.3
8	1	12.8
1e	27	7239.8
1f	15	3814
2c	22	270.1
2d	3	1103
2e	8	459.7
TOTALS	**103**	**15582.1**

LPA investigators recovered nineteen instruments from the back dirt piles of CL1:TR4 (Table 4). The impact object (IO) is a 3.4 kg round-shaped glacially derived quartzite with numerous negative spall scars. Two shaping hammers were recovered. The first is fashioned from a glacially derived quartzite cobble with pitting. Backhoe marks are evident on the artifact, but they are independent of the older pitting. The second shaping hammer is fashioned from a glacially derived, oval shaped,

antigorite/biotite/magnetite/schist that is spalled and abraded on one end. Two chisels are fashioned from glacially derived quartzites that are tapered to one end and battered on the other end. The third chisel is a mylonite plug-and-feather chisel, an elongate artifact that is heavily battered on one end and used to accentuate joints. Thirteen (68.4% of the total CL1:TR4 collected instruments) are focal chisels (FC), fashioned from migmitite and quartz.

Table 4. Instrument classification frequencies from Cluster 1, Trench 4.

Classification	Count
IO	1
SH	2
C	3
FC	13
TOTALS	**19**

B. Cluster 2

Since the cluster 2 1-x-1 m excavations produced a plethora of ore, the authors decided to concentrate on the instruments when reviewing trench artifacts. LPA investigators analyzed instruments from CL2:TR10 (to the north along the same outcrop as the lower excavations at Q18) and CL2:TR18 (to the west and down slope of the excavations at Q18).

LPA investigators recovered twelve instruments (Table 5) from CL2:TR10 (Figures 39 and 40), which is located to the north of Q18, along the outcrop. These represent a wide array of different instruments from extraction to beneficiation and maintenance. The impact object and milling instrument represent the largest instruments collected and are both fashioned from glacially derived quartzites. One milling hammer is fashioned from glacially derived quartzite. Both scaling are fashioned from glacially derived quartzites. The recovered dressing hammer is fashioned from a glacially derived elongate cobble of phyllite that exhibits negative spalling on one end with a break on the side. The cobbing hammer is a glacially derived quartzite cobble with only one negative spall. One instrument is characterized by step scars and pitting and a flattened cobble exhibits pitting and grooves on both faces. LPA investigators collected two wedges. The flat wedge is a faceted wedge with abraded edges and fashioned from high-grade quartz ore. The round (blunt) wedge is a triangular shaped instrument fashioned from glacially derived quartzite that exhibits abrasion and step scars on the tapered end. The two focal hammers are fashioned from glacially derived quartzites. One focal hammer is faceted and the second is tapered to one end. A small anvil, fashioned from porous glacially derived sandstone, was cracked in half and represents a failure most likely due to a lack of strength in the sandstone.

Table 5. Instrument classification frequencies from Cluster 2, Trench 10.

Classification	Count
IO	1
MI	1
FW	1
SH	2
DH	1
CH	1
MH	1

RW	1
FH	2
A	1
TOTALS	**12**

Only one instrument was analyzed from CL2:TR18, a large and heavy glacially derived impact object (IO). This glacially derived quartzite instrument is a 14.4 kg impactor with battering and pitting focused on one end. The instrument is also battered and pitted on sides and ventral face, with heavy step scars one side.

C. Cluster 3

The ore collected from the northeast trench 3 (CL3:TR3) provided the basic for the classification of ore in the methods section. CL3:TR6 is located to the northwest of the steep bedrock exposure and was excavated near Q24. Surprisingly, cluster 3 showed the greatest amount and variation in instruments. This was especially true of the trench parallel to the cliff, trench 6 (CL3:TR6). CL3:TR6 was placed perpendicular to the outcrop northwest of Q22.

LPA investigators collected 126 artifacts (116 pieces of ore and 10 hammerstones) from CL3:TR3 (Table 6). Twenty-eight (1a-1e – 24.1% of the total CL3:TR3 collected ore) are the remains from milling quartz. A large 3 kg ore block is composed of 1/2 migmitite and 1/2 quartz. The seven (6% of the total CL3:TR3 collected ore) pieces of tailings are migmitite with minimal to no quartz. The six pieces of lean ore are quartz mixed with migmitite, feldspar, mica, and/or black tourmaline. The seven pieces of lean ore are feldspar mixed with quartz. The seven pieces of gangue/country rock are migmitite, feldspar, and/or mica without quartz. Twenty-three (2a-2c – 19.8% of the total CL3:TR3 collected ore) artifacts are the remains from ore beneficiation. One 2 kg middling core was collected and contains high-grade ore and mica. Nine pieces of mixed heterogeneous ore consist of quartz with intermixed mica. Thirteen ore scaling flakes represent the residual from dressing ore and are composed of heterogeneous ore. Seventeen (14.6% of the total CL3:TR3 collected ore) are on average two microlithons of varying thickness. While the lithon packages from CL1:TR4 were clean of non-ore, the ones from CL3:TR3 have the occasional negligible small amount of mica, black tourmaline, or migmitite on the ends. Thirteen (11.2% of the total CL3:TR3 collected ore) microlithons were recovered from CL3:TR3. Six of these are whole, while eight are broken (referred to as "rejected"). Two of the "rejected" microlithons are reddened on one of their ends. Fifteen (12.9% of the total CL3:TR3 collected ore) flakes are well defined. Fourteen (12.1% of the total CL3:TR3 collected ore) pieces of chat, crushed ore, were recovered. Four (3.4% of the total CL3:TR3 collected ore) cores were recovered from CL3:TR3. Two of these are glacially polished masses with flake scar negatives and some black tourmaline. The two non-artifacts (referred to as "N/A") are glacially derived gravel-size quartz with no modification.

Table 6. Ore classification frequencies from Cluster 3, Trench 3.

Classification	Count	Weight (g)
3	17	1548.1
4	13	280.3
5	15	223
6	14	194
7	4	729.5
1a	1	3000
1b	7	69.9

1c	6	1160
1d	7	197.5
1e	7	259.9
2a	1	2000
2b	9	4056.2
2c	13	584.9
N/A	2	68.7
TOTALS	**116**	**14372**

LPA investigators also recovered ten instruments from the back dirt piles of CL3:TR3 (Table 7; Figure 41). The milling instrument is fashioned from glacially derived sandstone with a break and grooved on one end. The other end of the artifact exhibits backhoe marks, independent of the previously mentioned older grooves and break. A round (blunt) wedge fashioned from glacially derived quartzite and used for plug and feathering. Two small focal hammers are fashioned from glacially derived quartzite and quartz respectively. Six (60% of the total CL3:TR3 collected instruments) are focal chisels, fashioned from quartz and quartzite.

Table 7. Instrument classification frequencies from Cluster 3, Trench 3.

Classification	Count
MI	1
RW	1
FH	2
FC	6
TOTALS	**10**

In addition, LPA investigators recovered eight instruments from the back dirt piles of CL3:TR6 (Table 8). Two large, multi-use, instruments are fashioned from glacially derived quartzite. One impact object has a beak on the side created by two large spalls. The impact object and ore splitting wedge exhibits heavy step scarring from battering. A large glacially derived quartzite cobbing hammer/milling hammer that exhibits a premature split lengthwise and the remains of to impact points on two ends. Elongate glacially derived quartzite round (blunt) wedge that is pointed on one end and used to split ore from joints. Two milling instruments are fashioned from glacially derived quartzite cobbles and contain negatives of spalls and step scars. One focal hammer is a glacially derived sandstone and most heavily spalled on one end. Another focal hammer is a rectangular shaped glacially derived quartzite split in the front and contains small shallow grooves emanating from the break.

Table 8. Instrument classification frequencies from Cluster 3, Trench 6.

Classification	Count
H	1
MH	2
FH	1
RW	1
CH/MH	1
IO/RW	1
IO/RW/BH	1

TOTALS	8

D. Cluster 4

LPA investigators selected representative samples of ore and instruments from back dirt piles CL4:TR1 and CL4:TR5 in cluster 4. CL4:TR1 was excavated perpendicular to the outcrop containing the 50 cm thick quartz vein of Q26a. CL4:TR5 was excavated along strike with trench 1 but at the opposite side of the small gulley.

LPA investigators collected forty-five pieces of ore from the back dirt piles of CL4:TR1 (Table 9; Figure 42). Ten (1a-1e – 22.2% of the total CL4:TR1 collected ore) are the remains from milling quartz. The ore block is bounded on one end by migmitite and by feldspar and mica on the other end. Seven pieces of lean ore are quartz mixed with migmitite, feldspar, mica, and/or black tourmaline. The two pieces of gangue/country rock are migmitite, feldspar, and/or mica without quartz. Four (2a-2c – 8.9% of the total CL4:TR1 collected ore) artifacts are the remains from ore beneficiation. The small ore block is two thick microlithons bounded on one end by migmitite and by feldspar and mica on the other end. One piece of mixed heterogeneous ore, consisting of quartz with intermixed mica, was recovered. Two dressed ore pieces were recovered, one of which is a high-grade quartz freed from the migmitite while the second has faint remains of migmitite and black tourmaline on both ends. Fourteen (31.1% of the total CL4:TR1 collected ore) lithon packages were removed from the back dirt piles, each representing high-grade ore 2-3 microlithons in thickness. Eleven (24.4% of the total CL4:TR1 collected ore) of the collected pieces are microlithons, the lowest divisible unit of quartz ore. Two flakes and three pieces of chat, the latter of which is crushed quartz, are further evidence of quartz reduction. Finally, one piece of limonite goethite iron ore was recovered.

Table 9. Ore classification frequencies from Cluster 4, Trench 1.

Classification	Count	Weight (g)
3	14	1154.7
4	11	264.7
5	2	6.7
6	3	13.3
8	1	71.4
1a	1	2500
1c	7	785.9
1e	2	34.3
2a	1	2500
2b	1	39.2
2d	2	974.5
TOTALS	**45**	**8344.7**

LPA investigators also recovered three instruments from CL4:TR1 (Table 10; Figure 43). The lone milling instrument is fashioned from an elongate glacially derived cobble that has spall negatives on one end and pitting on the other end. A round (blunt) wedge is fashioned from a glacially derived quartzite cobble and was split before the spall negatives were removed. The combination focal hammer and round wedge is fashioned from glacially derived quartzite and exhibits spall scars on opposing tips.

Table 10. Instrument classification frequencies from Cluster 4, Trench 1.

Classification	Count
MI	1
RW	1
FH/RW	1
TOTALS	**3**

LPA investigators recovered three pieces of ore from CL4:TR5 (Table 11). The) lean ore consisted of a thin vein of quartz with feldspar, migmitite, mica, and black tourmaline. One high grade quartz lithon package that is bounded on lengthwise ends by traces of mica and feldspar. A second high-grade quartz is three microlithon-thick lithon package.

Table 11. Ore classification frequencies from Cluster 4, Trench 5.

Classification	Count	Weight (g)
3	2	1500
1c	1	1300
TOTALS	**3**	**2800**

LPA investigators also recovered eight instruments from CL4:TR5 (Table 12). The impact object/round (blunt) wedge is fashioned from glacially derived quartzite that exhibits large negatives of removes spalls and step scars on multiple locations. A beaked hammer is fashioned from glacially derived quart and shows abrasion on the beak. The milling instrument is fashioned from faceted glacially derived quartz with spalls taken off the end. A milling hammer is fashioned from a glacially derived sandstone cobble what exhibits some preferential weathering along with some pitting. The lone hammerstone is fashioned from an elongate glacially derived quartzite cobble that is spalled on one end and contains heavy abrasion on the other end. Two round (blunt) wedges are fashioned from glacially derived quartzite and red sandstone respectively. One is a tapered to on end and shows some battering and macro-striations. A combination hammerstone/beaked hammer/round (blunt) wedge fashioned from an elongate glacially derived quartzite cobble that exhibits battering and step scars.

Table 12. Instrument classification frequencies from Cluster 4, Trench 5.

Classification	Count
IO/RW	1
BH	1
MI	1
MH	1
RW	2
H	1
H/BH/RW	1
TOTALS	**8**

II. Artifacts from the Excavation Units

LPA analysts excavated and collected 30,593+40,700=71,293 specimens from twenty-one $1m^2$ units in cluster 1 and cluster 2. Analysis of cluster 2 (TU1-TU14) preceded the analysis for cluster 1 and provided the baseline for the ore processing analysis (see Appendix G). Analysts separated the recovered specimens into multiple types. These types include amphibolite, biotite mica, chert, claystone, feldspar, garnet, garnet schist, glacial quartz, glacial hematite mix, instruments/fragments, possible jasper, limonite, limonite goethite, mixture of rocks from local bedrock, quartz, quartzite, serpentinite, shale, and tourmaline. In addition, investigators found one bone (TU8) and three spots of decaying, non-carbonized, wood in the sediment (TU9). Due to the high number of artifacts recovered, LPA analysts selected a representative sample of artifacts for analysis from stratum II of clusters 1 and 2. LPA selected 54,455 artifacts (Appendix G) (see METHODS section for further description) to represent the variety in the heterogeneous quartz ore and instruments used to extract and process the quartz. Glacial specimens were removed. The following are descriptions for the recovered artifacts from the excavation units in cluster 1 and cluster 2.

A. Cluster 1

After trenching and collecting, LPA investigators identified four spots in cluster 1 for potential of deeper buried evidence of quarry processing as well as information to supplement the information seen in the deep tests. LPA investigators placed and excavated seven 1-x-1 m units (TU1-TU7) in cluster 1. The seven cluster 1 units yielded 30,593 artifacts (23,748 non-glacial).

Ore Processing Analysis: Frequency tables (TABLE 15) reveal that almost half the excavated material (45% - 13,768) was identified as feldspar pieces, of which 12,946 (94% of the total recovered cluster 1 feldspar) pieces were in TU5 and TU6. Countwise, glacial and quartz follow the feldspar frequencies. Quartz accounted for 5,089 (16.6%) of the recovered pieces. Separated from the quartz are the 193 pieces (0.6%) of ore blocks and dressed ore recovered. Instruments account for ninety-three pieces (0.3%). Glacial pieces account for 6,842 (22.4%) of the total and only 3,406 pieces of mixed ore (11.1%) were recovered in cluster 1 excavations. Large pieces of mixed ore (n=5) accounted for <0.1% of the recovered pieces. Other recovered non-glacial and non-modified rocks (biotite mica, garnet, limonite goethite, and tourmaline) account for 3.9% (1,195) of the recovered pieces.

TU1 contains 1,025 pieces, of which 1,017 were non-glacial. A majority of these (734, or 71.6%) are quartz, while twenty-one pieces (2%) of dressed ore and one instrument (<0.1%) comprised the residual ore and removal instrument. TU2 contains 3,110 pieces, of which 3,108 are non-glacial. Approximately 45.7% (n=1,420) of the recovered material is quartz, while 40% (n=1,265) is an ore mixture and 10.8% (n=336) is feldspar. Sixty-six pieces of dressed ore (2.1%) were recovered. No instruments were recovered in TU2. TU3 contains 3,108 pieces, of which 2,922 are non-glacial. Approximately 51.9% (n=1,613) of the recovered material is quartz, while 32.7% (n=1,017) is mixed ore and 5.2% (n=162) is feldspar. Five (0.1%) instruments and ninety-six (3%) pieces of dressed ore were recovered. The lone six large pieces of ore blocks, from cluster 1, were removed from stratum I (n=4) and stratum II (n=2) of TU3. TU4 contains forty-one pieces, of which thirty are non-glacial. Approximately 36.5% (n=15) of the recovered pieces are quartz, while 12% (n=5) is composed of instruments.

TU5 contains 10,291 pieces, of which 9,047 are non-glacial. Approximately 79.3% (n=8,159) of the recovered pieces are feldspar, while only 3.7% (n=382) is quartz and <0.1% (3) are instruments. TU6 contains 12,270 pieces, of which 6,908 are non-glacial. Approximately 43.7% (5,362) are glacial pebbles, gravels, and cobbles and 39% (n=4,787) is composed of feldspar. Approximately 8.3% (n=1,019) falls under the "other" category. Quartz accounts for 5.1% (n=626) of the TU6 pieces. TU6 contains 42 instruments and instrument fragments, the most of any cluster 1 unit. Thirty-four instruments/instrument fragments (80.9%) are in stratum II. TU7 contains 748 pieces, of which 716 are non-glacial. Investigators located processed bedrock quartz that accounts for 38.7% of the TU7 total. Four pieces of dressed ore were

recovered from the upper strata of TU7. Twenty-nine (78.3%) of the thirty-seven instruments/instrument fragments were recovered from stratum III. The remaining 48.8% (n=365) of the recovered artifacts are mixed ore and feldspar mostly recovered from stratum III (79.2% of the 365 total).

Ore Processing Conclusions and Inferences: When the analysts first began the ore processing analysis, what some would refer to as mass analysis, the goal was to assess the anatomy of the quarry and the possible subdivision of activities to test the LaPorta model. Since the underlying of quartz as a prehistoric ore is synonymous with a prehistoric lithic ore of modern value, LPA analysts decided to use the general comminution to trace the steps of ore processing from extraction (Zone I), to milling (Zone II), to beneficiation (Zone III), to possible refinement (Zone IV). The feldspar and mixed ore, present in the outcrops with quartz, aided analysts to trace the movement of the processed ore using the excavation units in cluster 1.

TU1-TU3, three contiguous units in front of and resting on a quartz outcrop (CL1:Q17), contain a majority of quartz per unit (TU1=743 at 71.6%; TU2=1420 at 45.7%; and TU3=1,613 at 51.9%). The next highest percentage is mixed ore. Feldspar, although visible in the outcrop, account for only 5.2% to 10.8%. All of these were almost exclusively recovered from stratum I. In addition, the presence of six large ore blocks in TU3, lend to the LPA inference of this as a Zone of Extraction (Zone I) with the beginning of milling (Zone II). Since the artifacts are confined mostly to stratum I, we infer little sedimentation after quarrying.

TU4, located to the south and above TU1-TU3, was the sparsest of the units in terms of total pieces (n=41). Fifteen of the recovered pieces are processed quartz, while five are instruments/instrument fragments and eleven are glacial. The upper part, also dissected by CL2:TR8 and CL2:TR9, represents a Zone of Beneficiation (Zone III).

The contiguous TU5-TU6 rests on outcrop (CL1:Q17) of feldspar and quartz and account for 73.7% of the recovered cluster 1 excavation pieces (22,561 of 30.593). The presence of quartz in the outcrop, as well as the low percentage of processed quartz (TU5=3.7%; TU6=5.1%), makes this an ideal Zone of Extraction (Zone I). The highest number of instruments/instrument fragments (n=42) and high percentage of feldspar (TU5=8,159 at 79.3%; and TU6=4,798 at 39.1%. The high percentage of glacial pebbles and cobbles (43.7%) in TU6 (stratum I=1,062; stratum II=4,300) indicates a glacial sediment trap where only the exposed vertical quartz was quarried. No evidence of extraction was visible on the quartz uncovered in the bedrock floor of TU6.

The lone TU7, north of and down slope from TU1-TU3, is located in-between CL2:TR3 and CL2:TR4. The unit yielded 748 pieces, or 2.4%, of the pieces excavated from TU7. Processed quartz accounts for 38.7% (n=290) of the TU7 total, followed by 48% mixed ore/feldspar (n=365), and 4.9% (n=37) instruments/instrument fragments. The processed quartz, mixed ore, and feldspar were almost wholly confined to stratum I. The instruments came from stratum III at the interface between stratum II and the glacial till. Based on the these conclusions, we infer that this is a location of instrument removal that was covered over and later received scree from the Zone of Extraction at TU1-TU3. If not a scree, then the artifacts indicate a Zone of Beneficiation (Zone III).

Table 13. Spatial Frequency Analysis for Cluster 1 by unit and strata: (a) mixture; (b) feldspar; (c) processed quartz; (d) instruments/instrument fragments; (e) glacial pieces; (f) glacial quartz; (g) other; (h) unit totals; (i) non-glacial unit totals; (j) ore blocks; and (k) dressed ore.

(a)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	100	61	0	161

(b)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	53	38	0	**91**

TU2	1240	25	0	1265
TU3	944	73	0	1017
TU4	5	3	0	8
TU5	64	330	0	394
TU6	49	385	0	434
TU7	23	10	99	132
TOTAL	2425	887	99	3411

TU2	331	5	0	**336**
TU3	138	24	0	**162**
TU4	0	0	0	**0**
TU5	2217	5942	0	**8159**
TU6	1403	3384	0	**4787**
TU7	39	2	192	**233**
TOTAL	**4181**	**9395**	**192**	**13768**

(c)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	329	414	0	**743**
TU2	1267	153	0	**1420**
TU3	1307	306	0	**1613**
TU4	0	15	0	**15**
TU5	150	232	0	**382**
TU6	79	547	0	**626**
TU7	161	9	120	**290**
TOTAL	**3293**	**1676**	**120**	**5089**

(d)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	1	0	0	**1**
TU2	0	0	0	**0**
TU3	4	1	0	**5**
TU4	0	5	0	**5**
TU5	0	3	0	**3**
TU6	8	34	0	**42**
TU7	5	3	29	**37**
TOTAL	**18**	**46**	**29**	**93**

(e)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	6	2	0	**8**
TU2	0	0	0	**0**
TU3	183	3	0	**186**
TU4	0	11	0	**11**
TU5	48	1196	0	**1244**
TU6	1062	4300	0	**5362**
TU7	7	0	24	**31**
TOTAL	**1306**	**5512**	**24**	**6842**

(f)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	0	0	**0**
TU2	0	2	0	**2**
TU3	0	0	0	**0**
TU4	0	0	0	**0**
TU5	0	0	0	**0**
TU6	0	0	0	**0**
TU7	0	0	1	**1**
TOTAL	**0**	**2**	**1**	**3**

(g)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	0	0	**0**
TU2	21	0	0	**21**
TU3	23	0	0	**23**
TU4	0	2	0	**2**
TU5	11	98	0	**109**
TU6	162	857	0	**1019**
TU7	4	0	16	**20**
TOTAL	**221**	**957**	**16**	**1194**

(h)

	TOTALS
TU1	1025
TU2	3110
TU3	3108
TU4	41
TU5	10291
TU6	12270
TU7	748
TOTAL	**30593**

(i)

	TOTALS
TU1	1017
TU2	3108
TU3	2922
TU4	30
TU5	9047
TU6	6908
TU7	716
TOTAL	**23748**

(j)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	0	0	**0**
TU2	0	0	0	**0**
TU3	4	2	0	**6**
TU4	0	0	0	**0**
TU5	0	0	0	**0**
TU6	0	0	0	**0**
TU7	0	0	0	**0**
TOTAL	**4**	**2**	**0**	**6**

(k)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	21	0	**21**
TU2	30	36	0	**66**
TU3	29	67	0	**96**
TU4	0	0	0	**0**
TU5	0	0	0	**0**
TU6	0	0	0	**0**
TU7	3	1	0	**4**
TOTAL	**62**	**125**	**0**	**187**

Refined Analysis of Stratum II artifacts from Cluster 1: Based on the ore processing analysis and consultation with OPRHP, LPA lithic analysts ran 18,922 pieces (from stratum II of all units, and 61.8% of the 30,593 pieces excavated) through a more refined artifact analysis (see Appendix G). The model for the analysis is that used for the selected artifacts analyzed from the backhoe trench piles (see METHODS section). Of the analyzed pieces, 5,646 (29.8% of the total analyzed) were identified as glacial pebbles with no modification. Since they are not artifacts, the artifact count was adjusted to 13,276.

A total of fifty-four (0.4%) instruments and instrument fragments were identified. One impact object (IO) and one impact wedge (IW) were identified from level 1, stratum II of TU6. Nine milling instruments (MI) were identified from TU6 (n=8) and TU7 (n=1). One milling hammer was identified in level 1, stratum II of TU6. One beaked hammer (BH) was found in TU3. Two focal hammers (FH) were identified from TU7 artifacts. Six plug-and-feather chisels (PF) were identified from level 1, stratum II of TU6. Twenty are focal chisels (FC) located in TU4 (n=5), TU5 (n=3), and TU6 (n=12). Thirteen are unidentified fragments (FRAG) from levels 1 and 2 of TU6 stratum II.

LPA analysts identified two microlithons, one from TU6 and one from TU7. Lean ore accounts for 202 pieces (1c and 1f, and 1.5% of the stratum II artifacts from cluster 1). A majority of these are in TU2 (n=157), followed by TU1 (n=37). Smaller amounts were identified in TU3 (n=11), TU5 (n=4), TU6 (n=3), and TU7 (n=13). A total of thirty pieces (0.2% of stratum II artifacts from cluster 1) of mixed heterogeneous ore were identified in TU2 (n=14) and TU3 (n=16). Fifty-four (0.4% of stratum II artifacts from cluster 1) ore scaling flakes were identified in TU1 (n=37), TU2 (n=17), and TU3 (n=1). Twelve pieces of dressed ore (0.09% of stratum II artifacts from cluster 1) were identified in TU2 (n=4) and TU3 (n=8). Twenty-two pieces of high-grade ore (0.16% of stratum II artifacts from cluster 1) were identified in TU2 (n=19) and TU3 (n=3). Chat accounted for 1,060 (8% of stratum II artifacts from cluster 1) of the identified pieces from TU1 (n=323), TU3 (n=15), TU5 (n=244), and TU6 (n=478).

Tailings (categories 1b and 1d) account for only 839 (6.3%) of the stratum II artifacts from cluster 1. Larger amounts of tailings (1b) were identified in TU5 (n=262) and TU6 (n=49). Smaller amounts of tailings (1b) were identified in TU3 (n=17) and TU4 (n=18). Ore tailings/scaling flakes (1d) were identified in TU1 (n=93), TU3 (n=252), TU5 (n=52), and TU7 (n=95).

Analysts identified 9,516 pieces of feldspar (71.7% of the cluster 1 stratum II artifacts). The feldspar is concentrated most heavily in TU5 (n=5,942) and TU6 (n=3,384). Smaller amounts of feldspar were identified in artifacts from TU2 (n= 8), TU3 (n=24), and TU7 (n=158). A total of 1,372 (10.3%) pieces of gangue/country rock were identified from stratum II artifacts. A majority (1,195) of the gangue was identified from TU6 artifacts. Smaller amounts of gangue were identified in artifacts from TU2 (n= 25), TU3 (n=63), TU5 (n=16), and TU7 (n=73). Other minerals (limonite goethite, mica, garnet, and tourmaline) account for nine pieces limonite goethite (from TU6) and one piece of mica (from TU3).

***Interpretations of the Refined Stratum II (Cluster 1) Artifact Analysis*:** The stratum II artifacts from cluster 1 are interpreted using the LaPorta prehistoric quarry model (described in the METHODS section) for the four quarry zones: Zone I (Zone of Extraction), Zone II (Zone of Milling), Zone III (Zone of Beneficiation), and Zone IV (Zone of Refinement).

Beneficiation (Zone III), and to a lesser extent milling (Zone II), activities are represented in stratum II of TU1, TU2, and TU3. An ore splitting beaked hammer (BH) is the only instrument located in stratum II for these three test units and was identified in TU3. High-grade ore is present exclusively in TU2 (n=19) and TU3 (n=3), along with heterogeneous ore (TU2=14 and TU3=16). Lean ore is present in each of the three units, with the highest amount in TU2 (n=157), then TU1 (n=37), and finally TU3 (n=11). Dressed ore is present in TU2 (n=4) and TU3 (n=8). A high number of chat (n=323) was identified in TU1, fifteen in TU3, and none in TU2. Tailings and tailings/scaling flakes are present in TU1 (n=93) and TU3 (n=269). Scaling flakes are present in all three units (TU1=37, TU2=17, and TU3=1). Gangue is only present in TU3 (n=63) and TU2 (n=25). More likely than not, this is an overlap of activities with most of the milling (Zone II) activities taking place in TU3 and most beneficiation (Zone III) activities taking place in TU1.

Stratum II of TU5 was a zone of extraction (Zone I) and beginning of zone of milling (Zone II), while stratum II of TU6 served as a continuation of milling (Zone II) and beginning of beneficiation (Zone III). TU5 is dominated by feldspar (n=5,942), tailings (n=262), and chat (n=244). The only remaining instruments are three small focal chisels. These focal chisels are the remains of the instruments used to pry the quartz ore away using natural joints. The amount of feldspar is not surprising, considering that feldspar dominates the bedrock occupying 3/4 of the TU5 opening. TU6 contains the most instruments (n=41) and the only fragments (n=13) excavated from stratum II. The instruments themselves (impact object, milling instrument, milling hammer, plug and feather chisel, focus chisels, and fragments) lend credence to the heavy working of separating the quartz from surrounding feldspar and country rock (migmitite). This is also supported by the high amounts of feldspar (n=3,384), gangue (n=1,195), and chat (n-478) produced in the milling and edge crushing of the initial ore blocks. Since refinement and beneficiation took place elsewhere, the result was few numbers of lean ore (n=3) and microlithons (n=1).

Stratum II of TU7 represents the activity of beneficiation (Zone III). The test unit yielded 330 artifacts, the majority of which were feldspar (n=158), tailings/scaling flakes (n=95), and gangue (n=73). One microlithon, one milling instrument, and two focal instruments hint at a possible transition between Zone III and Zone IV.

TU4, located above the outcrop (Q17) and on a flat area, yielded the least number of artifacts in stratum II (n=23). These were composed of five focal chisels and eighteen pieces of tailings. A small number of quartz fragments and crushed feldspar were visible 4-44 cm below the surface in CL1:TR8 (between TU4 and Q17 outcrop), correlative to stratum II of TU4. The little amount of quartz and feldspar observed in CL1:TR9, along with the presented inferences from artifact analysis, suggest that TU4 represents a termination of debris from quarrying and processing in cluster 1.

B. Cluster 2

After trenching and collecting, LPA investigators identified two spots for the potential of deeper buried evidence of quarry processing as well as information to supplement the information seen in the deep tests. Trenches from all clusters include artifacts that, to varying degrees, represent the processing of quartz. None exhibited the extraction, with the exception of instruments that When CL2:TR22 was excavated by the backhoe, LPA investigators recognized a large (estimated at ca. 136 kg) quartz impactor/anvil that came from in front of the adit at Q18 – NOT collected due to weight. Based on the find, and testing the LaPorta quarry model, excavation units were placed in front of the adit and above the adit on a stable flat lying area. Six 1-x-1 m units (TU1-TU6) were excavated above the adit, while six were excavated in front of the adit. In addition, LPA placed two 1-x-1 m units (TU13-TU14) north of CL2:TR17, in the southern part of the cluster, to test for a potential living floor or feature identified in the profile. Excavators recovered 40,700 items (TABLE 16; Figures 45-48).

Ore processing analysis: Two trends are immediately apparent from the mineral based ore processing frequency analysis: (1) feldspar and mixtures represent a majority (33,788, or 83%) of the collection; and (2) Hillcrest outcrop quartz, not to be confused with glacial quartz, represents a smaller amount (4,067, or 10%) of the collection. The remainder of the collection is composed of glacial rocks (1,973, or 4.8%), instruments and instrument fragments (111, or 2.7%), and other outcrop or surrounding rocks (biotite mica, garnet, limonite goethite, and tourmaline – 666, or 1.6%).

Based on the spatial frequency analysis (TABLE 16), most of the quartz that was discovered in TU1-TU6 was glacial quartz (1,352 of 1,378). A majority of this glacial quartz (810, or 60%) came from stratum I of TU6. The only processed quartz was only recovered above the adit was twenty-six pieces from stratum II of TU2 and ninety-sic pieces from stratum II of TU6. Conversely, TU1-TU6 yielded the highest percentage of instruments (89.2% of the total recovered cluster 2 instruments). Aside from TU14 (n=12), the instruments and instrument fragments are exclusively from TU1-TU6, and almost exclusively in stratum II.

Of the quartz, free of country rock/gangue, 96.2% (3,915 of 4,067) comes from TU7-TU12 below the adit and 52.3% (2,129 of 4,067) comes from stratum II of TU12. TU7 contains 334 pieces, of which 333 are non-glacial. A majority (52.7%, or 176) of the recovered pieces are mixed ore/migmitite, while only 16.6% (n=54) is feldspar and 28.4% (n=95) is processed bedrock quartz. These are all exclusively from stratum II of TU7. TU8 contains 1,310 pieces, of which 1,287 are non-glacial. A majority (48.3%, or 633) of the recovered pieces are mixed ore/migmitite, while only 20.3% (n=266) is feldspar and 28.3% (n=372) is processed quartz. The processed quartz percentages from the contiguous TU7 and TU8 are almost identical (28.4% to 28.3%). No instruments were recovered from either unit.

TU9-TU11 are contiguous and directly in front of the adit (to the west) and contain a combined total of 6,473 pieces (15.9% of the total recovered pieces). The TU10 and TU11 had the highest frequency of quartz, at 499 pieces each, but TU10 had 318 of 499 in stratum I while TU11 had 306 of 499 in stratum II. The 284 pieces of processed quartz from TU9 were almost evenly distributed between stratum I and stratum II. The mixed ore percentages per unit drop heavily from TU9 (54.4%) to TU10 (43%) to TU11 (37.2%), but the frequencies are similar (948, 999, and 895 respectively). Stratum II accounts for approximately 1/3 of the mixture frequencies in each of the three units. Both frequencies and percentages per unit of feldspar pieces recovered increases from TU9-TU11 (TU9=391 at 22.4%; TU10=686 at 29.5%; and TU11=966 at 40.1%). With the exception of TU10, the higher percentages of feldspar per level within each unit belongs to stratum II. No instruments were recovered from TU9-TU11.

Spatial frequency analysis (TABLE 16) reveals that an overwhelming 72.8% (29,634) of recovered cluster 2 excavated materials come from stratum II of TU 12. TU12 is on a ledge to the south of TU9-TU11 and is separate from the other eleven 1-x-1 m units. Conversely, it also has the highest frequency of artifacts (30,125, or 74% of the recovered pieces). Archaeologically, two noteworthy aspects

of TU12 are, for the sheer number of artifacts, the LACK of: (1) instruments/instrument fragments; and (2) a large frequency of processed quartz. Of the total count from TU12, the 2,166 pieces of processed quartz account for only 7.27%. About 98% of the processed quartz comes from stratum II. Over half (53.2%, or 16,119) of the recovered TU12 materials consist of mixed ore, while 38.2% (11,512) consists of feldspar.

The contiguous TU13 and TU14 units contained seventy-eight recovered pieces, of which twenty-two (28.2%) were identified as glacial quartz. Of the recovered fifty-six artifacts, thirty (53.5%) are quartz from outcrops. Few of these were heat treated. Twelve instruments (Figure 48) were recovered from TU14, nine from stratum II and three from stratum III.

Ore Processing Conclusions and Inferences: When the analysts first began the ore processing analysis, what some would refer to as mass analysis, the goal was to assess the anatomy of the quarry and the possible subdivision of activities to test the LaPorta model. Since the underlying of quartz as a prehistoric ore is synonymous with a prehistoric lithic ore of modern value, LPA analysts decided to use the general communition to trace the steps of ore processing from extraction (Zone I), to milling (Zone II), to beneficiation (Zone III), to possible refinement (Zone IV). The feldspar and mixed ore, present in the outcrops with quartz, aided analysts to trace the movement of the processed ore using the excavation units in cluster 2.

Of 40,700 pieces, 1,973 (or 4.8%) are glacial pieces. These are almost exclusively in the upper units (TU1-TU6) to the east of the adit (CL2:Q18). These units were placed as a potential workshop due to a stable platform above the quarry that is away from falling debris (following the LaPorta prehistoric quarry model using Cambrian-Ordovician cherts of the Wallkill River Valley). However, little processed quartz remains and majorities of the identified hammerstones (99 of 112) were recovered from these units and these are mostly from stratum II. The paucity of processed quartz and mixed ore (TABLE 16) reflect an ephemeral ore processing of the top and potentially a place to store instruments.

Based on the spatial frequency analysis of the rough ore processing analysis, a few different activities occurred to the west of the adit (CL2:Q18) on platforms going down slope. Directly in front of the adit, in TU9-TU11, are the debris from the Zone of Extraction (Zone I at Cl2:Q18). The sediment and bedrock in front of the adit heavily dip down slope to the west. The increase in quartz to TU11 and an increase in percentages of feldspar and mixed ore closer to the adit that are the direct or indirect placement from mining and milling.

The two platforms to the west of the adit were investigated with TU7-TU8 and with TU12. TU7-TU8 platform contains a higher percentage of quartz and mixed ore to feldspar, suggesting that the location served as a Zone of Milling (Zone II) and Zone of Beneficiation (Zone III). TU12, on the platform to the south, served as a Zone of Milling (Zone II) as evidenced by the high percentage of mixed ore (53.2%) and feldspar (38.7%) as opposed to the small percentage of processed ore (7.27%).

Table 14. Spatial Frequency Analysis for Cluster 2 by unit and strata: (a) mixture; (b) fedspar; (c) processed quartz; (d) instruments/instrument fragments; (e) glacial pieces; (f) glacial quartz; (g) other; (h) unit totals; and (i) non-glacial unit totals.

(a)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	4	0	**4**
TU2	27	10	0	**37**
TU3	3	0	0	**3**
TU4	0	17	0	**17**
TU5	2	33	2	**37**
TU6	0	32	0	**32**
TU7	0	176	0	**176**
TU8	6	567	60	**633**
TU9	222	726	0	**948**
TU10	377	622	0	**999**
TU11	245	650	0	**895**
TU12	123	15996	0	**16119**
TU13	4	2	0	**6**
TU14	1	1	0	**2**
TOTAL	**1010**	**18836**	**62**	**19908**

(b)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	2	0	0	**2**
TU2	1	0	0	**1**
TU3	0	0	0	**0**
TU4	0	0	0	**0**
TU5	0	0	0	**0**
TU6	0	0	0	**0**
TU7	0	54	0	**54**
TU8	4	254	8	**266**
TU9	104	287	0	**391**
TU10	380	306	0	**686**
TU11	152	814	0	**966**
TU12	331	11181	0	**11512**
TU13	0	0	0	**0**
TU14	0	2	0	**2**
TOTAL	**974**	**12898**	**8**	**13880**

(c)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	0	0	**0**
TU2	0	26	0	**26**
TU3	0	0	0	**0**
TU4	0	0	0	**0**
TU5	0	0	0	**0**
TU6	0	96	0	**96**
TU7	0	95	0	**95**
TU8	12	333	27	**372**
TU9	115	169	0	**284**
TU10	318	181	0	**499**
TU11	193	306	0	**499**
TU12	37	2129	0	**2166**
TU13	4	6	0	**10**
TU14	0	17	3	**20**
TOTAL	**679**	**3358**	**30**	**4067**

(d)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	0	6	0	**6**
TU2	3	12	0	**15**
TU3	3	1	0	**4**
TU4	0	17	0	**17**
TU5	1	25	3	**29**
TU6	1	27	0	**28**
TU7	0	0	0	**0**
TU8	0	0	0	**0**
TU9	0	0	0	**0**
TU10	0	0	0	**0**
TU11	0	0	0	**0**
TU12	0	0	0	**0**
TU13	0	0	0	**0**
TU14	0	9	3	**12**
TOTAL	**8**	**97**	**6**	**111**

(e)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	18	32	0	**50**
TU2	14	85	0	**99**
TU3	16	31	0	**47**
TU4	7	40	0	**47**
TU5	0	89	3	**92**
TU6	0	240	0	**240**
TU7	0	1	0	**1**
TU8	0	23	0	**23**
TU9	0	0	0	**0**
TU10	0	0	0	**0**
TU11	0	0	0	**0**

(f)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	21	87	0	**108**
TU2	55	68	0	**123**
TU3	24	39	0	**63**
TU4	7	50	0	**57**
TU5	7	158	4	**169**
TU6	22	810	0	**832**
TU7	0	0	0	**0**
TU8	0	0	0	**0**
TU9	0	0	0	**0**
TU10	0	0	0	**0**
TU11	0	0	0	**0**

TU12	0	0	0	**0**
TU13	0	0	0	**0**
TU14	0	0	0	**0**
TOTAL	**55**	**541**	**3**	**599**

TU12	0	0	0	**0**
TU13	4	16	0	**20**
TU14	2	0	0	**2**
TOTAL	**142**	**1228**	**4**	**1374**

(g)

	STRAT I	STRAT II	STRAT III	TOTAL
TU1	2	5	0	**7**
TU2	4	22	0	**26**
TU3	3	2	0	**5**
TU4	0	17	0	**17**
TU5	0	23	2	**25**
TU6	0	19	0	**19**
TU7	0	8	0	**8**
TU8	1	14	1	**16**
TU9	34	84	0	**118**
TU10	83	57	0	**140**
TU11	5	43	0	**48**
TU12	0	328	0	**328**
TU13	0	1	0	**1**
TU14	0	3	0	**3**
TOTAL	**132**	**626**	**3**	**761**

(h)

	TOTALS
TU1	177
TU2	327
TU3	122
TU4	155
TU5	352
TU6	1247
TU7	334
TU8	1310
TU9	1741
TU10	2324
TU11	2408
TU12	30125
TU13	37
TU14	41
TOTAL	**40700**

(i)

	TOTALS
TU1	19
TU2	105
TU3	12
TU4	51
TU5	91
TU6	175
TU7	333
TU8	1287
TU9	1741
TU10	2324
TU11	2408
TU12	30125
TU13	17
TU14	39
TOTAL	**38727**

Refined Analysis of Stratum II artifacts from Cluster 2: Based on the ore processing analysis and consultation with OPRHP, LPA lithic analysts ran 37,375 pieces (from stratum II of all units, and 91.8% of the 40,700 pieces excavated) through a more refined artifact analysis (see Appendix G). The model for the analysis is that used for the selected artifacts analyzed from the backhoe trench piles (see METHODS section). Of the analyzed pieces, 1,842 (4.9% of the total analyzed) were identified as glacial pebbles with no modification. Since they are not artifacts, the artifact count was adjusted to 35,533.

A total of ninety-six (0.3%) instruments and instrument fragments were identified. With the exception of nine instruments from TU14, all were found in the TU1-TU6 units excavated above the adit (Q18). Four beaked hammers (BH) were identified in TU2. Three impact objects (IO) were identified from TU2 (n=1) and TU5 (n=2). The impact objects are also likely used as anvils due to some observed battering and placement above the quartz veins. One impact wedge (IW) was identified from TU5. Fourteen milling instruments (MI) were identified in TU4 (n=11), TU5 (n=2), and TU14 (n=1). Six milling hammers (MH) were identified in TU5 (n=2) and TU6 (n=4). Ten cobbing hammers (CH) were identified in TU4 (n=4) and TU5 (n=6). Six dressing hammers (DH) were identified in TU4 (n=2) and TU6 (n=4). One hammer (H) was identified in TU5. Nine round wedges (RW) were identified in TU2 (n=7), TU5 (n=1), and TU6 (n=1). Three flat wedges (FW) were identified in TU2 (n=1) and TU5 (n=2). Three processing instruments (PI) were identified in TU5. A total of twenty-nine focal chisels (FC) were recovered from TU1 (n=6), TU3 (n=1), TU5 (n=4), TU6 (n=10), and TU14 (n=8).

Lean ore (1c and 1f) accounted for 160 artifacts identified in TU2 (n=3), TU5 (n=5), TU8 (n=96), TU9 (n=5), TU10 (n=1), TU11 (n=46), and TU12 (n=4). One 2.4 kg middling core (FS#66) was identified in level 1, stratum II of TU9. One mixed heterogeneous ore (2b) piece was identified in TU12. Analysts identified 128 scaling flakes (2c) in TU8 (n=5) and TU12 (n=123). Analysts also identified 1,384 (3.9%) pieces of chat in TU5 (n=4), TU9 (n=5), TU11 (n=45), TU12 (n=1324), and TU13 (n=6).

Tailings (1b and 1d) account for 18,634 (52.4%) of the stratum II artifacts from cluster 2 excavations. An overwhelming majority (16,572, or 88.9% of the tailings) comes from TU12. Decreasing in numbers are TU11 (n=565), TU10 (n=558), TU9 (n=462), and TU8 (n=336). The least amount was excavated from TU13 (n=2) and TU14 (n=17). No tailings were identified in stratum II artifacts from TU1-TU7.

Feldspar accounts for 12,899 (36.3%) of the stratum II artifact count from cluster 2. A majority of the feldspar was identified in TU11 (n=814) and TU12 (n=11,181). Lower numbers of feldspar were identified in TU8 (n=260), TU9 (n=287), and TU10 (n=306). The lowest numbers of feldspar are in TU7 (n=49) and TU14 (n=2). No feldspar was recovered from stratum II of TU1-TU6 and TU13. A total of 1,414 (4%) pieces of gangue/country rock (1e) were identified from stratum II artifacts. A majority (1,195) of the gangue was identified from TU7 (n=230), TU8 (n=369), TU9 (n=370), and TU10 (n=244) artifacts. Smaller amounts were identified in artifacts from TU11 (n= 159), TU12 (n=35), TU5 (n=2), TU6 (n=3), and TU14 (n=1). For mineral (limonite goethite, mica, garnet, and tourmaline) see "ore processing" analysis. One piece of bone (BONE) was located in level 5, stratum II of TU8. Two patches of rotting wood were identified from levels 1 and 3, stratum II of TU9.

***Interpretations of the Refined Stratum II (Cluster 2) Artifact Analysis*:** The stratum II artifacts from cluster 1 are interpreted using the LaPorta prehistoric quarry model (described in the METHODS section) for the four quarry zones: Zone I (Zone of Extraction), Zone II (Zone of Milling), Zone III (Zone of Beneficiation), and Zone IV (Zone of Refinement).

Test units 1-6, resting on the flat above the adit, represent a comparative enigma to the rest of the excavations (in both clusters 1 and 2). LPA analysts identified eighty-four of the ninety-three instruments (90.3% - with the remaining nine coming from TU14) from these units, with TU5 (n=24) and TU6 (n=22) containing the highest amount. Combined, the north-south contiguous TU1 and TU3 yielded only seven artifacts in stratum II. TU5 and TU6 have the most instruments. Instruments from TU5 (n=24) include: impact objects (n=2), an impact wedge, middling hammers (n=2), middling instruments (n=2), cobbing hammers (n=6), a hammer, processing instruments (n=3), a round wedge, flat wedges (n=2), and focal chisels (n=4). This was followed by TU6 (n=24), which yielded: middling hammers (n=4), dressing hammers (n=5), focal hammers (n=4), a round wedge, and focal chisels (n=10). TU4 contained seventeen instruments that include: cobbing hammers (n=4), dressing hammers (n=2), and milling instruments (n=11). TU2 contains fourteen instruments: an impact object, beaked hammers (n=4), round wedges (n=7), one flat wedge, and one focal hammer. In addition to instruments, analysts identified five pieces of lean ore and two pieces of gangue in stratum II of TU5. TU1 yielded only six focal chisels and TU3, to the north of TU1, yielded only one focal chisel. LPA analysts infer a possible hammerstone quarry/pit in the ablation till due to the high percentage of instruments and relative lack of ore.

Test units 7 and 8 (TU7 and TU8) represent remains from the maintenance of the adit quarry. Stratum II of TU7 contains 279 artifacts of feldspar (n=49) and gangue (n=230). This, combined with its location directly under the outcrop, account for the fewer finds when compared to TU8. Stratum II of TU8 contains 1,086 artifacts that include: lean ore (n=96), scaling flakes (n=5), tailings (n=336), feldspar (n=280), and gangue (n=369). These are the remains of beneficiation (Zone III), where the non-economically viable ore (lean ore) is fully identified after removing scaling flakes and tailings (especially true due to the mixture of the quartz ore with the feldspar and migmitite).

Test units 9, 10, and 11 (TU9, TU10, and TU11) are contiguous and located directly in front of the adit (Q18). Stratum II of TU9 contains an interesting middling core (FS#66), wedge-shaped with mixed ores and large flake scars. Lean ore is present in each unit, but the economically unviable ore is seen mostly in TU11 (n=46). TU10 contains only one piece of lean ore, while TU9 contains five pieces of lean ore. Tailings increased from TU9 (n=462), to TU10 (n=558), to TU11 (n=565). Feldspar increases from TU9 (n=287), to TU10 (n=306), to more than double in TU11 (n=814). Gangue decreases from TU9 (n=370), to TU10 (n=244), to TU11 (n=159). Few pieces of chat were recovered from the units (TU9=5 and TU11-45). This is the area that contains remains from the last episode(s) of extraction (with the adit as the Zone of Extraction – Zone I). The remains, however, are predominantly from original extraction and milling (Zone II) that are moving down hill. This is especially true due to the steeper slope and lower elevation than the adit.

Test unit 12 (TU12) is a lone test unit to the south of the adit (Q18) on a structurally (bedrock) supported flat. This was originally placed as a potential quarry zone due to the stable platform. Stratum II from TU12 yielded 29,240 artifacts. Approximately 57% (n=16,572) are tailings, while 38% (n=11,181) are feldspar – accounting for approximately 95% of the stratum II artifacts of TU12. Chat, at 1,324 (4.5%) is the next numerous. Remaining artifact types are: lean ore (n=4), mixed heterogeneous ore (n=1), scaling flakes (n=123), and gangue (n=35). These, combined with the large number of tailings and feldspar, suggest an intensive milling (Zone II) and, to a lesser extent, beneficiation (Zone III), activities south of the adit.

Test units 13 and 14 (TU13 and TU14) are located perpendicular (north-to-south) to CL2:TR17, with TU14 ~20 north of the trench. Combined, stratum II in the two units yielded a combined thirty-seven artifacts (TU13=8, TU14=29). A majority of these artifacts are tailings, which were identified in both TU13 (n=2) and TU14 (n=17), but there were reddened quartz pieces (possible heat treated) in the tailings from TU14. Six pieces of chat were identified in TU13 and two pieces of feldspar in TU14. In addition, TU14 yielded nine instruments/instrument fragments (one milling instrument fragment and eight focal chisels). Analysts interpret this location in the southern part of the site as a possible small camp/beneficiation spot in cluster 2.

RESULTS AND RECOMMENDATIONS

I. LPA Phase II Results

A. Cluster 1

Cluster 1 is a site surrounding a small outcrop (heavily metamorphosed migmitite with quartz veins) and associated quarries/potential locations in accompanying structurally supported flat areas. The outcrop is west of cluster 2 and east of the present-day ShopRite.

To test vertical and horizontal constraints, LPA placed twenty-two backhoe (mechanically excavated) trenches west of the outcrop. Of the total number of trenches that were excavated, a selection was chosen for detailed examination because they most clearly revealed both the vertical and lateral extent of the prehistoric workings. The remaining trenches were employed to provide supportive evidence for the absence of associated quarry support sites. Of the sixteen trenches, LPA investigators analyzed profiles in four backhoe trenches (CL1:TR3, CL1:TR8, CL1:TR10, and CL1:TR16). Each profile showed artifacts within the first 30 cm below the surface. Profiles around the outcrop of Q17 show deeply buried sediments down to 80 cm below surface (Figures 7 and 8). Profiles to the south of the outcrop have artifact bearing horizons down to 50-55 cm below the surface, where the contact with the ablation till was encountered. In all profiles, artifacts rested unconformably over the glacial till. This suggests post-glacial stability and early use of the quartz. LPA investigators collected nineteen instruments CL1:TR4, one impact object and thirteen focal instruments. LPA investigators conclude that prehistoric extraction and initial milling occurred in cluster 1 due to the high number of focal instruments, as well as proximity to the quartz-bearing outcrop.

LPA investigators excavated seven 1-x-1 m units down slope, upslope, and adjacent to Q17 (Figure 49) identified in the Supplemental Phase IB. Five of the units (TU1, TU2, TU3, TU5, and TU6) terminated on bedrock, each of which contained quartz. TU4 and TU7 terminated 10 cm in ablation till. Excavations unearthed 23,748 non-glacial pieces. Based on stratum II artifact analyses, the site served as an extraction location (Zone I - TU5), multiple milling zones (Zone II – TU1, TU2, TU3, TU5, and TU6), and beneficiation locations (Zone III – TU1, TU2, TU3, and TU7). The low artifact count of TU4 indicates a termination in beneficiation activity. The extraction zone (Zone I) is inferred by the presence of: quartz vein in an outcrop; large amounts of feldspar, tailings, and chat; and the limited presence of instruments remaining (three focal chisels). Milling stations (Zone II) are inferred by the presence of: instruments (milling instruments, milling hammers, and chisels); and large amounts of feldspar, gangue, and chat. Beneficiation stations (Zone III) are inferred by the presence of: smaller amounts of feldspar and gangue; presence of scaling flakes; and instruments.

Although no diagnostic points were recovered from excavations, diagnostic instruments were recovered. These diagnostic instruments, along with debris, provide a partial history of activity at cluster 1. The quarries are prehistoric and any historic/modern overprint is negligible. Quartz was quarried along the outcrop on multiple veins from TU1 to TU5. Milling and beneficiation were conducted on stable platforms by the zones of extraction. Beneficiation, or grading of the quartz ore, was conducted on the stable platforms below and above the 1-x-3 m (TU1-TU3) excavation and Q17 outcrop. The overlap of activities are the result of either: (1) extended temporal use of quarry; or (2) separate activities between the previously recognized zones that are not readily apparent. More instruments were identified in the backhoe trenches below the outcrop, indicating the movement of the larger artifacts through gravity.

B. Cluster 2

Cluster 2 is a site resting in the spine of an approximately north-south trending outcrop (heavily metamorphosed migmitite with quartz veins) and associated quarries/potential locations in accompanying structurally supported terraces. The outcrop is east of cluster 1.

To test vertical and horizontal constraints, LPA placed twenty-two backhoe (mechanically excavated) trenches west of the outcrop. Most trenches served as a marker for possible extent, while few were selected for detailed analysis to determine constraints. Of the twenty-two trenches excavated, LPA investigators analyzed profiles in four backhoe trenches (CL2:TR4, CL2:TR6, CL2:TR20, and CL2:TR17). Trench 4 showed the most potential with quartz fragments and diffuse charcoal found until 80 cm below the surface. The profiles for trenches 6 and 17 show thick (60-130 cm below the surface) accumulations of angular migmitite, which LaPorta believes to be potential historic tailings. Trench 20, located in the flat below the outcrop, contained quartz fragments 43-97 cm below the surface. This most likely resulted from quarrying and processing, then buried sediments from upslope. Since the small benches in front of Q18 were always targeted for 1-x-1 m excavation, we decided to analyze the hammerstones from two trenches. The instruments from trench 10, located to the north along the outcrop, are associated with milling and beneficiation activities. The impactor from trench 18 is associated with the zone of extraction. LPA investigators hypothesize that these artifacts were used in the adit and moved down slope, either naturally or culturally, after use.

LPA investigators excavated twelve $1m^2$ units down slope, upslope, and adjacent to Q18 (Figure 50) and two $1m^2$ units down slope from Q13 (Figure 51). Six units were located above Q18 and terminated on bedrock and 10 cm into glacial till. Six units below Q18 terminated in bedrock. The two units below Q13 terminated 10 cm into glacial till. Excavations unearthed 38,727 non-glacial pieces. Ore processing analysis for the cluster 2 units suggested milling and beneficiation activities below Q18, a place of storage for hammerstones above Q18, and little for the units below Q13. Based on stratum II artifact analyses, the area below the Q18 adit served as an extraction location (Zone I – Q18), middling/extraction remains area (TU7-TU11), a middling/small beneficiation activity area (Zone II – TU12). The area above the Q18 adit (TU1-TU6) served as a possible hammerstone quarry/pit in the glacial till. The two southern units (TU13-TU14), down slope of Q13, is a small ephemeral camp/beneficiation spot related to quarrying.

As with cluster 1, there are no diagnostic points in cluster 2. These diagnostic instruments, along with debris, provide a partial history of activity at cluster 2. The quarries are prehistoric and any historic/modern overprint is negligible in the northern part, but great in the southern terminus of the southern part. Quartz was quarried in the adit (Q18), based on the lack of historic finds and large range of prehistoric instrument finds in the backhoe trenches below. Quarry debris was maintenanced away from the adit, as evident in TU7-TU8, and gravitationally moved down slope (TU9-TU11). Ore was milled in front of the quarry and off to the side on the flat containing TU12. Instruments, used to quarry quartz, were quarried from the bedrock till located above the adit (TU1-TU6) and below (CL1:TR5-6 and CL1:TR18-20) to use in quartz extraction and processing. Historic prospecting is evident in the large amount of migmitite fragments in CL1:TR6 and CL1:TR17. Due to the proximity to the magnetite deposit, this is a likely assumption.

C. Cluster 3

Cluster 3 is a site resting on the opposing sides of a spine of an approximately north-to-south trending outcrop (heavily metamorphosed migmitite with quartz veins) and associated quarries/potential locations. The outcrop is east of clusters 1 and 2. To test vertical and horizontal constraints, LPA placed eleven backhoe (mechanically excavated) trenches west, north, and northeast of the outcrops. Most trenches served as a marker for possible extent, while few were selected for detailed analysis to determine constraints. Of the eleven trenches excavated, LPA investigators analyzed profiles in four backhoe trenches (CL3:TR1, CL3:TR7, CL3:TR6, and CL3:TR3). Compared to clusters 1 and 2, these were relatively shallow trenches (50-100 cm below the surface). Trench 1 contained artifacts to 40 cm below the surface, resting on the transitional unit. Trench 6 contained a similar profile, where the units thickened in size and the artifacts depth increased to 65 cm below the surface. Trench 7 profile shows a surface at 20 cm below the surface, with artifacts continuing to 65 cm below the surface coming into contact with the ablation till. Trench 3, located to the northwest of the other trenches discussed, contained artifacts 28-56

cm below the surface. Diffuse charcoal was located 15-41 cm below the surface, but looked to be burnt roots and rootlets. Ore analysis indicates that the trench 3 area was an activity area of refinement, along with little milling and beneficiation. Instrument analyses from trenches 3 and 6, along with the quartz outcrop (Q24) indicates extraction, milling, and beneficiation played larger roles.

D. Cluster 4

Cluster 4 is a site resting in a gully of approximately north-south trending outcrop (heavily metamorphosed migmitite with quartz veins) and associated quarries/potential locations next to the eastern and western outcrops. The outcrop is east of all clusters. To test vertical and horizontal constraints, LPA placed eleven backhoe (mechanically excavated) trenches west of the outcrop. Most trenches served as a marker for possible extent, while few were selected for detailed analysis to determine constraints. Of the eleven trenches excavated, LPA investigators analyzed profiles in four backhoe trenches (CL4:TR1, CL4:TR7, CL4:TR9, and CL4:TR10). In trench 1, located directly in front of Q26a, sediments containing broken quartz and migmitite went down to a depth of 100 cm below the surface where it overlays regolith. Diffuse quartz was present to 41 cm below the surface, where the surface of artifacts was present. Further south along the same outcrop as Q26, the profile for trench 7 was slightly different. Quartz and mine tailings were located 10-98 cm below the surface, with a concentration from 34-58 cm below the surface. LPA investigators are inconclusive as to the relative time (prehistoric or historic) of this concentration. A hammerstone was located in the profile at 60 cm below the surface, but is not associated with the concentration listed above. Further south and away of trenches 1 and 7 is trench 9. which exhibits the same concentration from 39-67 cm below the surface. The top 20 cm of trench 9 contains diffuse charcoal and LaPorta interprets this as a land-clearing event. Trench 10 is located across the gulley and in front of Q28. Possible occupation level is inferred between 30-39 cm below the surface, where there is a dark organic horizon. Unit III (13-30 cm below the surface) of trench 10 corresponds to the possible land-clearing event from trench 10. We believe this is a land-clearing episode due to the irregularity of the unit and it's placement on the slope by the outcrops. No artifacts were found and it seems to be more of a hiatus before the overlying sand of Unit III which was a more dynamic environment that includes small flecks of charcoal widely dispersed through the unit. Due to that and its location in the funnel shaped area that is Cluster 4, we infer land clearing. We also infer historic, due to the lack of artifacts, stratigraphic height, and presence of the rock walls indicating a greater potential of livestock use in the historic period. The ore samples analyzed from trenches 1 and 5 indicate a higher degree of beneficiation occurring in cluster 4. Milling instruments and wedges are the indicators of the extraction and milling occurring in the quartz vein of Q26a.

II. Discussion and Recommendations

The clusters in Hillcrest Commons are prehistoric quartz quarries with historic magnetite prospets in clusters 2 and 4. These quarry site clusters do not have associated ages due to the lack of diagnostic points and other datable material. In addition, Columbia Heritage did not identify quarry related habitation sites in their Phase IB or Phase II investigations that could account for possible diagnostic and datable materials associated with quarry use. Due to the increased use of quartz in the Late Archaic Sylvan Lake Phase (Funk 1976), LPA attributes the majority of prehistoric quartz quarrying activity to this time period. However, we also remain open to the attribution of earlier or later exploitation based on new investigations in the mid-Hudson Highlands. Aside from quartz, limonite goethite (present in trenches and cluster 2 test units 1-6), biotite mica (most present in test units below the Q18 adit in cluster 2), and black tourmaline represent alternative ores for prehistoric quarrying/mining on the property. Limonite goethite is the source of red ochre, used in Woodland Age Meadowood burials in New York State (Ritchie 1965:199). Biotite mica was used in temper (LaPorta and Associates 1998) and in Woodland burials in New York State (Ritchie 1965:225-226).

The sites represent extractions and processing of quartz ore from surrounding country rock (primarily migmitite and feldspar). With the exception of the adit in Cluster 2 (a legitimate mine), all clusters contain quarried quartz. Zone III (Beneficiation) proximal to the outcrop in Cluster 1, provides the zones of beneficiation to compliment the more intensive excavation and milling seen in Cluster 2. The chain of operation is slightly longer in terms of milling and winnowing, due to the mixture of quartz, migmitite, and other minerals. Instruments for quartz extraction were removed from the abundantly available glacial till in the APE. More curation and forethought, however, were placed on the milling instruments to separate the quartz from the migmitite and quartz/migmitite mixtures. We elucidated task subdivisions at Q17 and Q18 in Cluster 2, but it differs from the Wallkill River Valley in that there is no refinement above the quarry. In fact, we could find no zones of refinement in the APE. LPA concludes that cleaned ore was removed from the project area and refined/reduced in nearby camps.

The research questions posed at the onset of excavations were well-answered with the LPA 1-x-1 m excavations, geomorphic backhoe trenches, and artifacts collected from the backhoe trenches. Based on LPA's Phase 1B geological mapping exercise, Phase II trench analyses from all clusters, as well as Phase II excavations in clusters 1-2, additional investigations of the subject property will most likely not produce significant results beyond the Phase II investigation. The abundance, repetition of activities, and lack of refinement centers leads LPA to the conclusion that additional fieldwork is not warranted for the project. This client has permitted the scientific investigation of prehistoric quarries and other archaeological resources to a degree that exceeds the standards set forth by NYAC (New York Archaeological Council). Archaeological excavations were conducted not only in the APE, but also in areas outside the APE, to allow LPA researchers the opportunity to understand the dataset without constraints imposed by developmental boundaries that have little or no parallel to the spatial boundaries of prehistoric quarries and/or other archaeological sites. However, LPA does not advocate this recommendation beyond the project area for other investigators due to: (1) the potential difference in quartz ore properties beyond Hillcrest Commons; and (2) the locations of refinement centers, camps, and workshops outside the APE and project area.

LPA concludes Cluster 1 and Cluster 2 as eligible for placement on the National Register. Alternately, LPA concludes that Cluster 3 and Cluster 4 are not eligible for placement on the National Register. Data sets (quarries, adit, artifacts, and patterned relationships) in Cluster 1 and Cluster 2 have the potential to answer additional research questions and have answered the middle-range types of research questions posed in page 23. However, as stated above, due to the amount and quality of work conducted on this project, LPA does not recommend additional fieldwork.

******NOTE: The following is from Appendix I (LPA's assessment of map, artifacts, and additional STP work by Columbia Heritage after LPA Phase IB investigations)******

Based on LPA's Phase IB/II (LPA, 2007, 2008) work and Columbia Heritage's Phase IB (Columbia heritage, 2004) work, LPA recognizes more activity on positive STPs (TP-54, 55, 59, and 64) are located to the north of LPA Cluster 1. The tailings recovered west of, and donwnslope of, LPA Cluster 1 are inferred by LPA investigators as sheet midden of beneficiation remains from quartz quarrying (see LPA Phase II investigation) at Cluster 1 or near the small quartz veins in the outcrop trend to the north (LPA Phase IB locations "QTZ VEIN," RS-4, RS-5, and RS-6). LPA recognizes an additional cluster (Cluster 5) based on Columbia Heritage's positive STP locations, artifact findings, and proximity to quartz in outcrops.

LPA recommends no additional work in Cluster 5. However, due to the proximity of Cluster 5 to clusters 1 and 2, as well as the recognized rockshelter down the slope and behind ShopRite, LPA infers a site complex (Cluster 1, Cluster 2, Cluster 5, rockshelter, and stream) that likely utilized the stream and flats directly under the present-day ShopRite and the associated plaza. LPA does recommend additional work if, in the future, the APE were to be shifter further west. Geological investigations of the LPA Phase IB (LPA, 2007) of the quartz quarries (now in Cluster 5) indicated that these outcrops represented

expressions or prospects, and were very weakly developed. The recent discoveries of Columbia Heritage's STPs suggest that the quarry cluster (Cluster 5) is discreet and separate from Cluster 1. However, the findings of Columbia Heritage do not provide the need to elevate Cluster 5 beyond a series expressions or failed prospects. More importantly, two small quarry support sites (see Appendix A), discovered by LPA through artifacts eroding downslope onto the dirt road, occur at small breaks in topography below Cluster 5. Surface findings for the two small sites include quartz tailings that the authors hypothesize as originating from Cluster 5, as well as flaked chert artifacts fashioned from glacially derived cobbles. These two small sites are positioned outside the old and new APE.

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GLOSSARY

******For Artifact Type Definitions/Descriptions, see Tables 3-4. ******

Adit – is a " nearly horizontal passage from the surface by which a mine is entered and unwatered. In the United States, an adit is usually called a tunnel, though the latter, strictly speaking, passes entirely through a hill and is open at both ends. Frequently also called Drift, or Adit level" (Fay 1947:16).

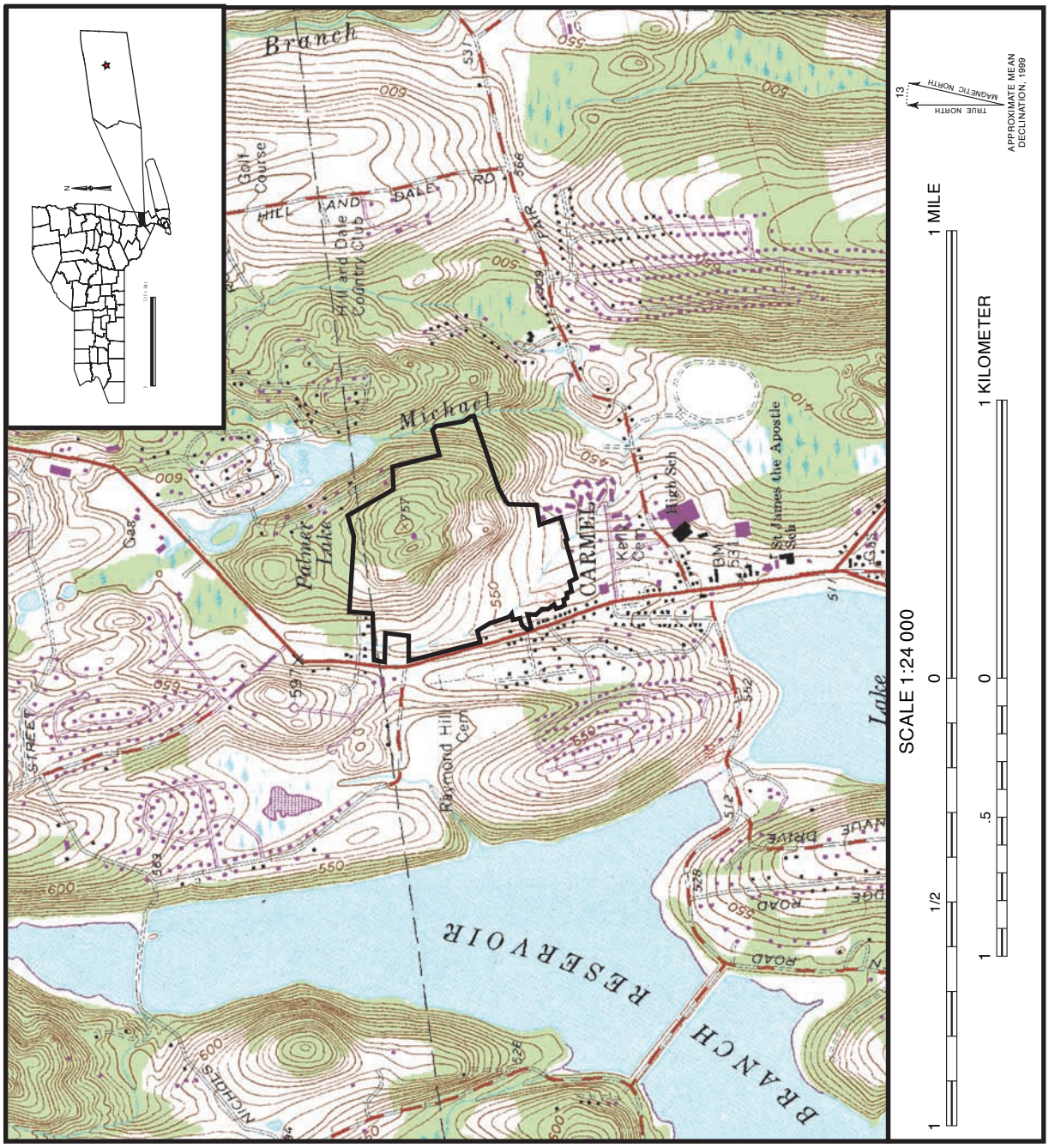
Beneficiation – is the working, improving, and reduction of ores (Fay 1947:75)

Dressing – cleaning an ore by breaking off fragments of gangue from the valuable material (Fay 1947:230)

Milling – the process of dressing an ore in a mill (Fay 1947:436)

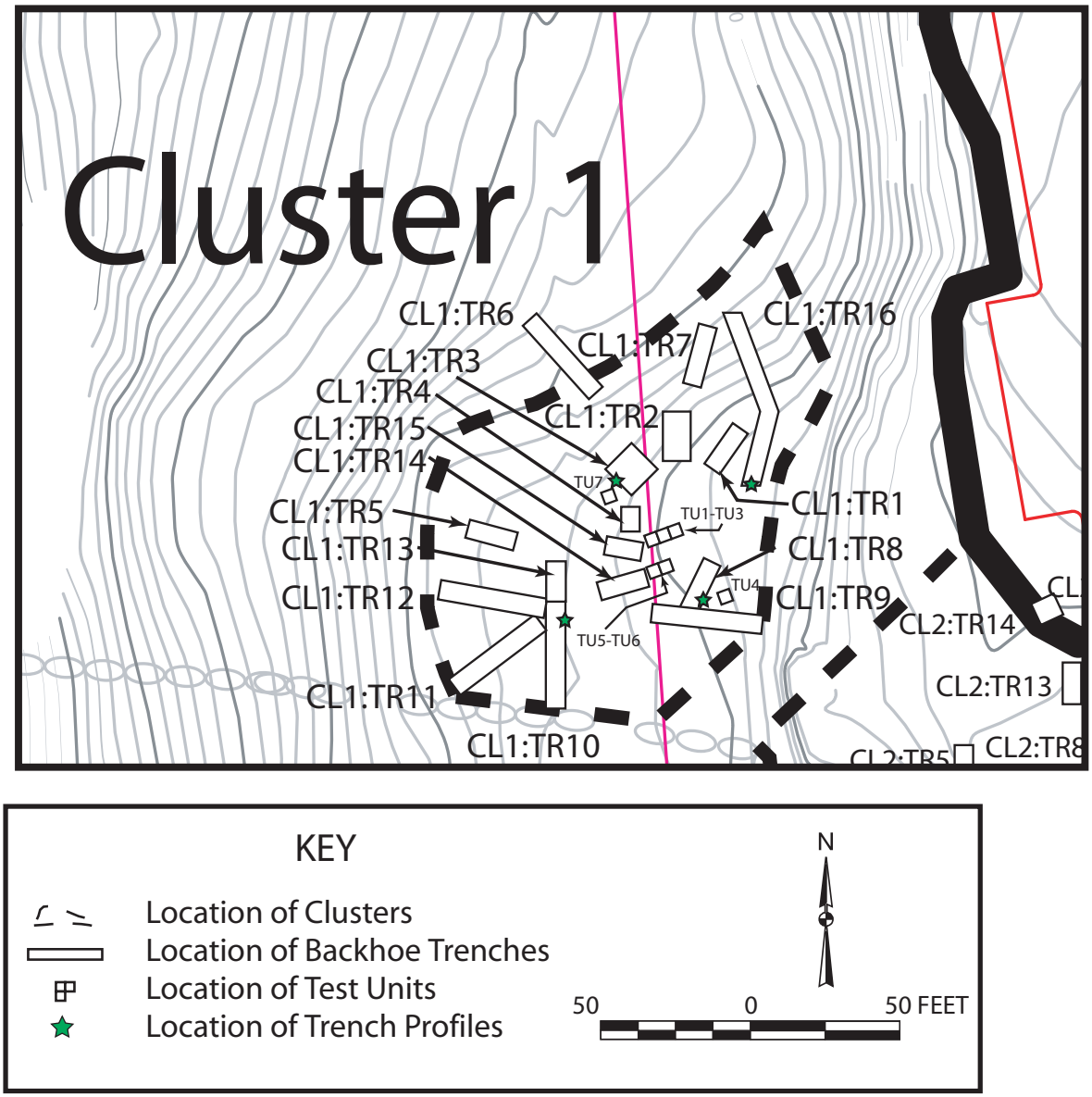
Ore – defined as: *in general* a mineral of sufficient value as quality and quantity which may be mined with *profit* (Fay 1947:475); a natural aggregation of minerals from which a metal or metallic compound can be recovered with profit on a large scale" (Richards and Locke 1940:1); more broadly defines as, "a naturally occurring complex of minerals from which any fraction of commercial value can be extracted and used" (Pryor 1965:815); broadens this to include liquids and gases, using the terms resources and reserves – dividing them into known (recoverable, marginal, and submarginal) and unknown (Flawn 1966:11-13).

Quarry – is a repetitive action of rock extraction on an ore/raw material visible on the surface or below overburden that does not require subsurface extraction (i.e. open workings).

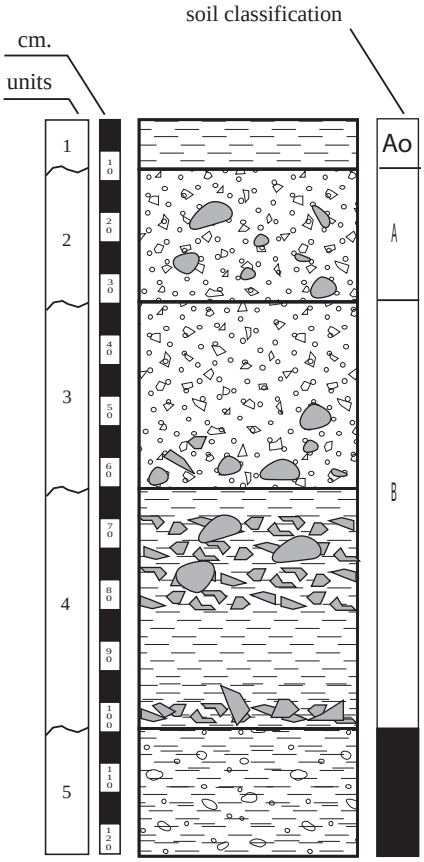


Location and topographic map of the general study area, with the location of the project area delineated in black. (Adapted from the Carmel 7.5' Quadrangle, USGS 1:24,000 scale).

Locations of the project area and other quartz and/or iron bearing locations mentioned on the text and plotted on the Hartford 250" sheet: (a) Hillcrest Commons; (b) Tilley Foster; (c) Croton Magnetic Iron Mine and Brady Farm shaft; (d) Clover Hill Mine; (e) Route 301 from Carmel to Coldspring; (f) Iron Furnace in Coldspring; (g) Sylvan Lake site; and (h) Landmark at Eastview prehistoric quartz quarries.



Cluster 1 map, showing backhoe trench and test unit locations.



Unit I - [0-7 cmbs]
Sediment: silt and clay
Soils: 'A0' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 3/2 (very dark grayish brown)

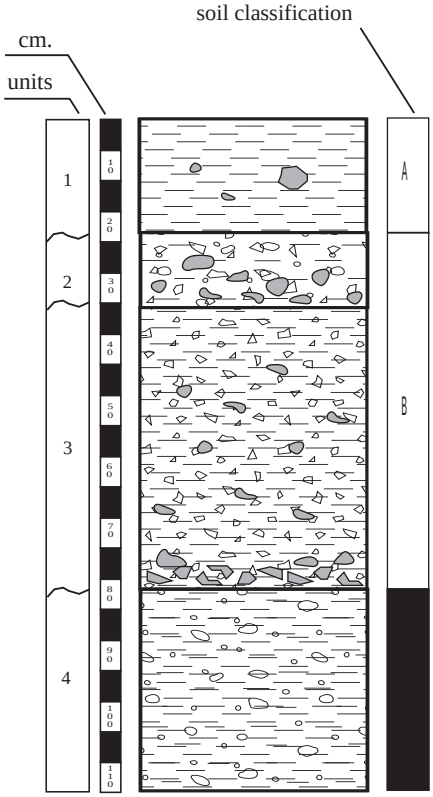
Unit II - [7-30 cmbs]
Sediment: very sandy and pebbly
Soils: 'A' horizon; numerous roots and rootlets
Archaeology: broken quartz, small hammerstones; probably brought up by roots
Munsell: 10YR 3/4 (dark yellowish brown)

Unit III - [30-60 cmbs]
Sediment: pebbles, silt, and fine sand; gradational upper contact
Soils: 'B' horizon
Archaeology: numerous quartz and crushed feldspar from mining
Munsell: 10YR 5/6 (yellowish brown)

Unit IV - [60-101 cmbs]
Sediment: very clay-rich silt grading upward to coarse silt and fine sand
Soils: 'B' horizon
Archaeology: artifact-bearing between 67-80 cmbs and at the contact between units IV and V at 101 cmbs; migmitite mine tailings and quartz debris at 67-80 cmbs
Munsell: 10YR 5/6 (yellowish brown)

Unit V - [101-120 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; upper surfae contains cobbles and possibly represents a zone of deflation
Soils: none
Archaeology: ventification and frost breakage; can be some artifacts; upper contact is a zone of deflation
Munsell: 5Y 6/1 (gray)

General Comments: Zone 1 of a major motion is 2.5 m away; quarriers working on lodgement till



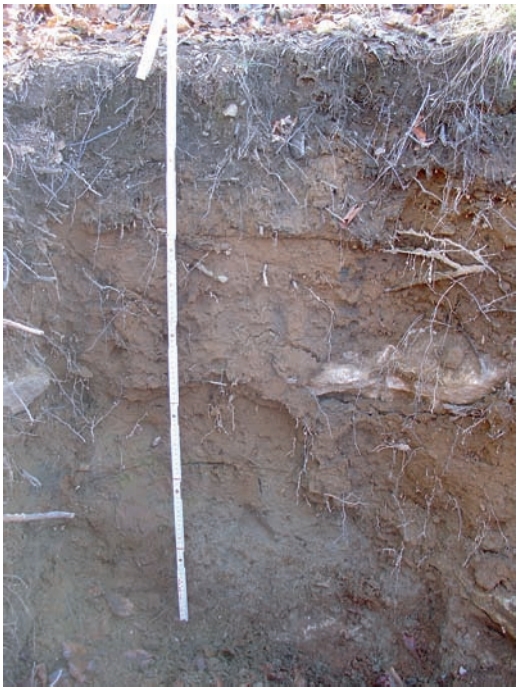
Unit I - [0-18 cmbs]
Sediment: silt and clay
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 3/2 (very dark grayish brown)

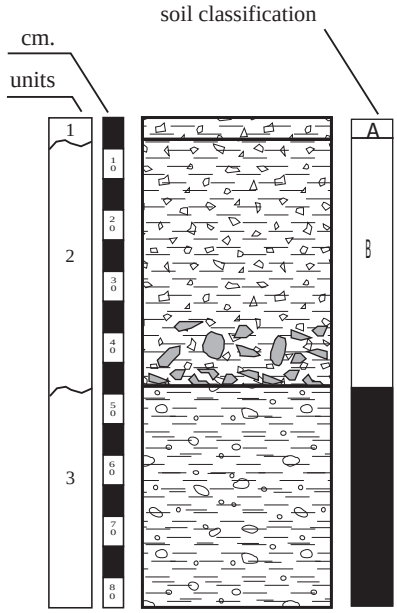
Unit II - [18-31 cmbs]
Sediment: pebbles, silt, and fine sand; gradational upper contact
Soils: 'B' horizon
Archaeology: numerous quartz and crushed feldspar from mining
Munsell: 10YR 5/6 (yellowish brown)

Unit III - [31-77 cmbs]
Sediment: silt and rock debris (colluvium)
Soils: 'B' horizon
Archaeology: finer, smaller, broken, and mixed artifacts
Munsell: 10YR 5/6 (yellowish brown)

Unit IV - [77-110 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; upper surfae contains cobbles and possibly represents a zone of deflation; upper surface is also an unconformity lined with broken cobbles and migmitite spalls
Soils: none
Archaeology: migmitite spalls from mining, not ventifications; large impact spalls
Munsell: 5Y 4/4 (olive)

General Comments: area of extraction; early extraction and early abondonment (see Unit III and Unit IV contact); buried by Unit III; stabilized by Unit II

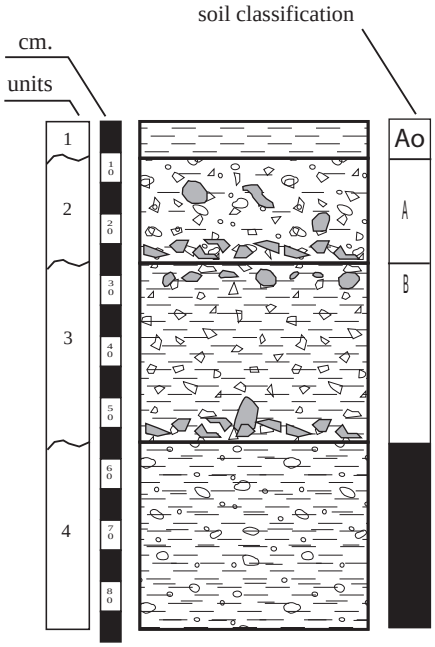




Unit I - [0-4 cmbs]
Sediment: very sandy and pebbly
Soils: 'A' horizon; numerous roots and rootlets
Archaeology: broken quartz, small hammerstones; probably brought up by roots
Munsell: 10YR 3/4 (dark yellowish brown)

Unit II - [4-44 cmbs]
Sediment: pebbles, silt, and fine sand; gradational upper contact
Soils: 'B' horizon
Archaeology: numerous quartz and crushed feldspar from mining
Munsell: 10YR 5/6 (yellowish brown)

Unit III - [44-80 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; upper surfae contains cobbles and possibly represents a zone of deflation
Soils: none
Archaeology: ventification and frost breakage; can be some artifacts; upper contact is a zone of deflation
Munsell: 5Y 5/3 (olive)



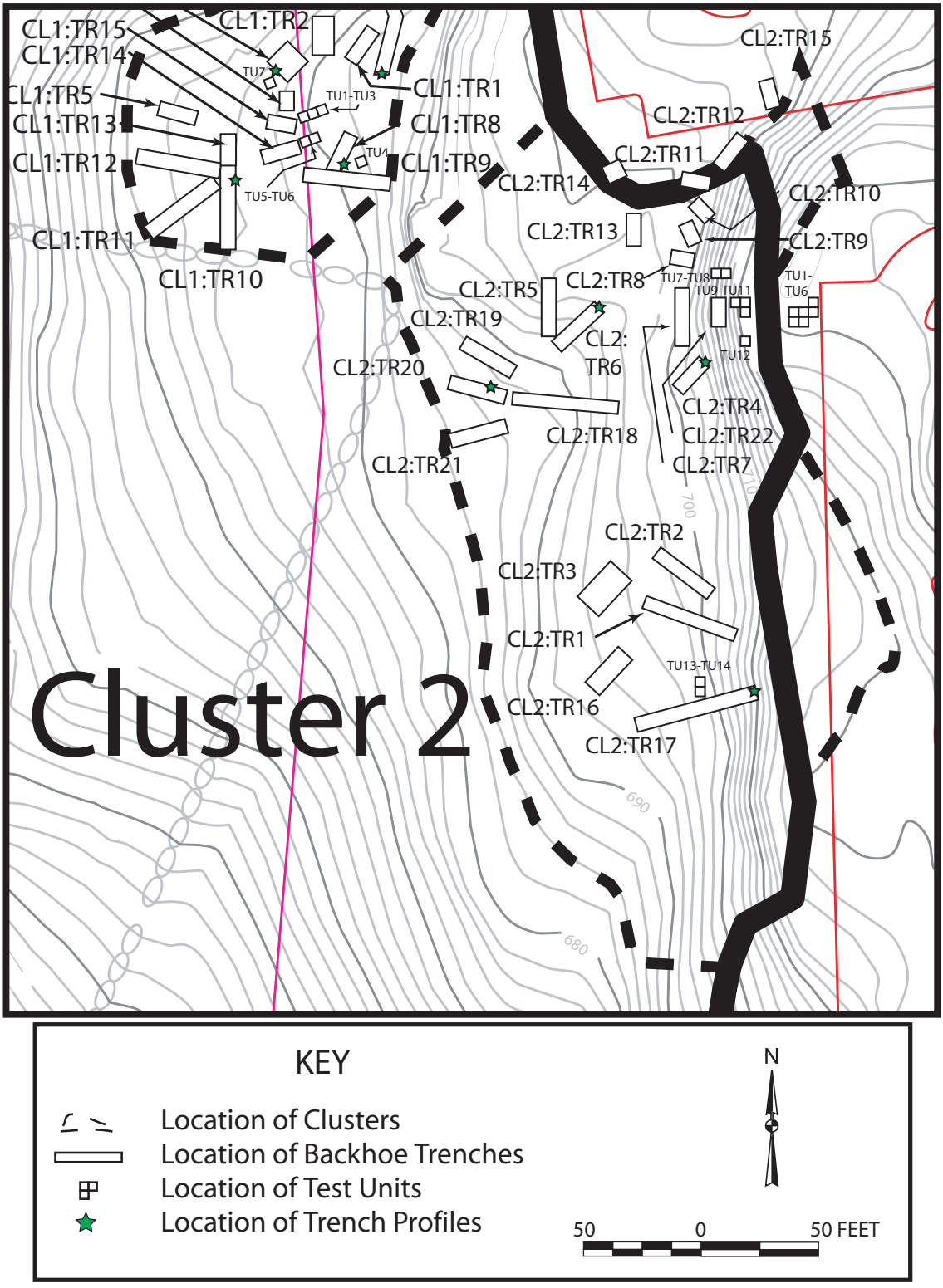
Unit I - [0-6 cmbs]
Sediment: silt and clay
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 3/2 (very dark grayish brown)

Unit II - [6-23 cmbs]
Sediment: very sandy and pebbly
Soils: 'A' horizon; numerous roots and rootlets
Archaeology: broken quartz, small hammerstones; probably brought up by roots
Munsell: 10YR 3/4 (dark yellowish brown)

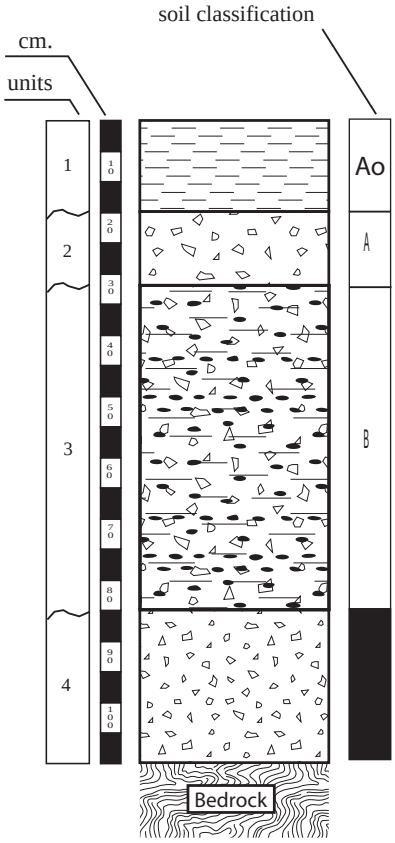
Unit III - [23-57 cmbs]
Sediment: pebbles, silt, and fine sand; gradational upper contact
Soils: 'B' horizon
Archaeology: numerous quartz and crushed feldspar from mining
Munsell: 10YR 5/6 (yellowish brown)

Unit IV - [57-83 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; upper surfae contains cobbles and possibly represents a zone of deflation
Soils: none
Archaeology: ventification and frost breakage; can be some artifacts; upper contact is a zone of deflation
Munsell: 2.5Y 5/6 (light olive brown)

General Comments: Intermediate sections look thicker and more well-developed; contacts are gradational; this was vegetated earlier than other profiles



Cluster 2 map, showing backhoe trench and test unit locations.

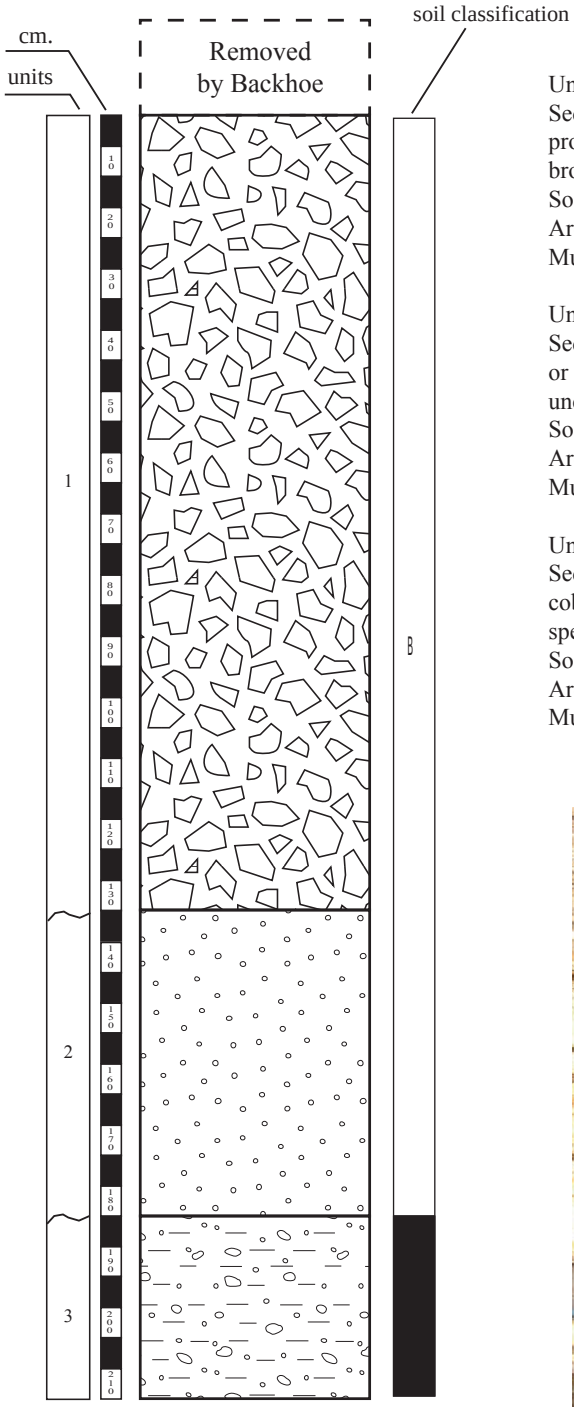


Unit I - [0-15 cmbs]
Sediment: black, organic, silt and clay; moss, organics
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

Unit II - [15-27 cmbs]
Sediment: brown medium to fine sand and silt; almost no clay
Soils: 'A' horizon; numerous roots and rootlets
Archaeology: broken quartz and feldspar; possible surface
Munsell: 10YR 3/3 (dark brown)

Unit III - [27-80 cmbs]
Sediment: fine sand and silt; 70/20/10 (fine sand/silt/clay); progressively darkens upwards
Soils: 'B' horizon
Archaeology: broken quartz; limonite; diffuse charcoal speckling
Munsell: 10YR 4/6 (dark yellowish brown)

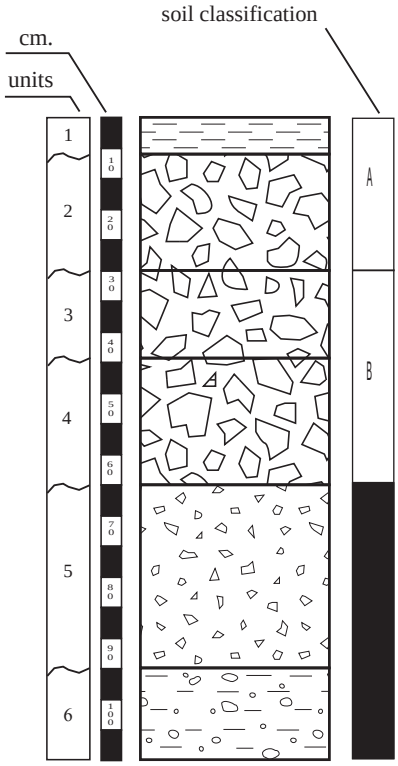
Unit IV - [80-105 cmbs]
Sediment: 70/30 silt over clay; sitting on bedrock; gradational upper contact; many broken pebbles and cobbles
Soils: Transitional 'B-C' horizon
Archaeology: none observed
Munsell: 10YR 5/6 (yellowish brown)



Unit I - [0-130 cmbs]
Sediment: fine sand and silt; 70/20/10 (fine sand/silt/clay); progressively darkens upwards; filled with tremendous quantity of broken migmitite, some even boulder size
Soils: 'B' horizon
Archaeology: none observed
Munsell: 10YR 4/6 (dark yellowish brown)

Unit II - [130-180 cmbs]
Sediment: gradational reworked sediment (possibly reworked loess or reworked ablation till); upper contact is abrupt, representing an unconformity
Soils: none
Archaeology: none observed
Munsell: 10YR 5/6 (yellowish brown)

Unit VI - [180-210 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; broken bedrock; no special orientation
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



Unit I - [0-15 cmbs]
Sediment: humic; organic with some silt and clay
Soils: 'A0' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

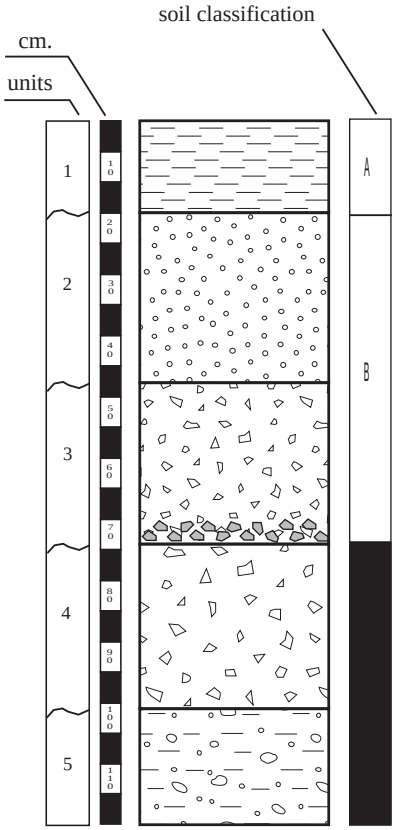
Unit II - [6-25 cmbs]
Sediment: humic silt and clay
Soils: 'A' horizon; roots and rootlets
Archaeology: broken quartz and migmitite
Munsell: 10YR 4/4 (dark yellowish brown)

Unit III - [25-39 cmbs]
Sediment: fine sand and silt; 70/20/10 (fine sand/silt/clay); progressively darkens upwards; filled with tremendous quantity of broken migmitite, some even boulder size
Soils: 'B' horizon
Archaeology: broken quartz; limonite; abundant broken migmitite
Munsell: 10YR 4/6 (dark yellowish brown)

Unit IV - [39-60 cmbs]
Sediment: colluvium filled with big migmitite pieces and quartz fragments
Soils: 'B' horizon
Archaeology: quartz fragments
Munsell: 10YR 5/6 (yellowish brown)

Unit V - [60-90 cmbs]
Sediment: transitional; silt/fine sand/clay (50/30/20); rotting migmitite; pebbles; hummocky upper contact
Soils: none
Archaeology: broken mined quartz
Munsell: 10YR 5/6 (yellowish brown)

Unit VI - [90-105 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; broken bedrock; no special orientation; hummocky upper contact
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



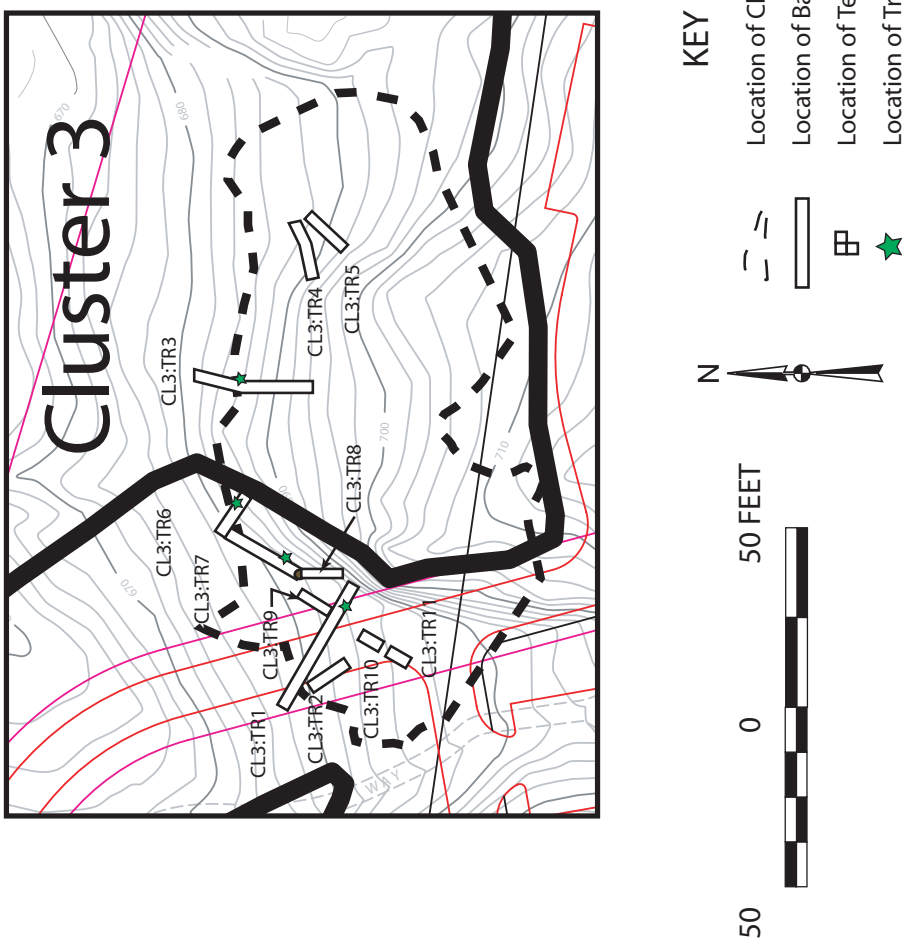
Unit I - [0-15 cmbs]
Sediment: humic; fine sand/silt/clay (15/60/25)
Soils: 'A0' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 3/3 (dark brown)

Unit II - [15-43 cmbs]
Sediment: similar to bottom of CL2:TR4 NW Profile (Unit III); medium to fine sand and silt; few scattered pebbles
Soils: 'B' horizon; roots and rootlets
Archaeology: none observed
Munsell: 10YR 4/6 (dark yellowish brown)

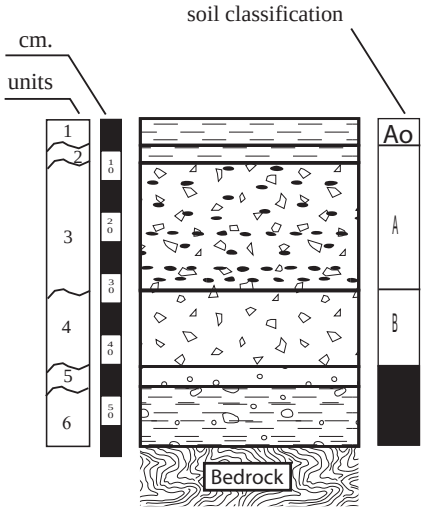
Unit III - [43-69 cmbs]
Sediment: medium sand/fine sand/silt/clay (10/20/40/10); finely dispersed pebbles; gradational upper contact
Soils: 'B' horizon
Archaeology: small fragments of broken quartz vein; large and small flakes of migmitite mining debris
Munsell: 10YR 5/8 (yellowish brown)

Unit IV - [69-96 cmbs]
Sediment: transitional; silt/fine sand/clay (50/30/20); rotting migmitite; pebbles; gradational upper contact
Soils: none
Archaeology: broken mined quartz
Munsell: 2.5Y 6/4 (light yellowish brown)

Unit V - [96-115 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; broken bedrock; no special orientation
Soils: none
Archaeology: none observed
Munsell: 2.5Y 6/4 (light yellowish brown)



Cluster 3 map, showing backhoe trench locations.



Unit I - [0-4 cmbs]
Sediment: black, organic, silt and clay; moss, organics; eroding off
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

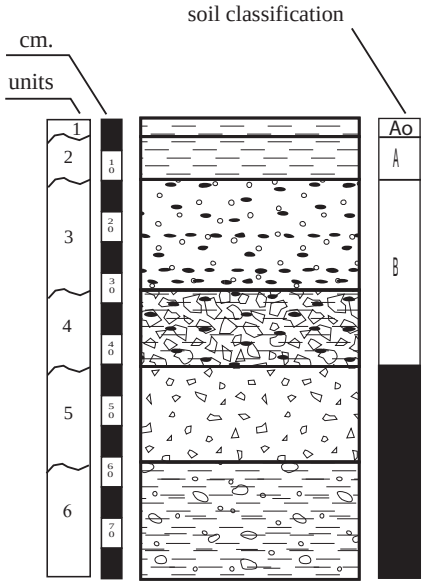
Unit II - [4-6 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; roots and rootlets
Archaeology: none observed
Munsell: 10YR 3/4 (dark yellowish brown)

Unit III - [6-28 cmbs]
Sediment: fine sand with silt and clay
Soils: 'A' horizon; lots of roots
Archaeology: lots of quartz fragments and hammerstone fragments; ores of all types
Munsell: 10YR 4/6 (dark yellowish brown)

Unit IV - [28-40 cmbs]
Sediment: coarse to fine sand with silt and clay (20-25); upper contact abrupt and lined with unmodified pebbles and cobbles
Soils: 'B' horizon; some roots; some organics
Archaeology: charcoal flecking; angular fragments of migmitite and quartz
Munsell: 10YR 5/6 (dark yellowish brown)

Unit V - [40-43 cmbs]
Sediment: transitional; medium to fine sand with little silt and clay; few pebbles
Soils: none
Archaeology: none observed
Munsell: 10YR 5/6 (dark yellowish brown)

Unit VI - [43-58 cmbs]
Sediment: lodgement till; intermixed cobbles and pebbles; no orientation; silt/clay (50) and fine sand; overlaying bedrock
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



Unit I - [0-3 cmbs]
Sediment: black, organic, silt and clay; moss, organics; eroding off
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

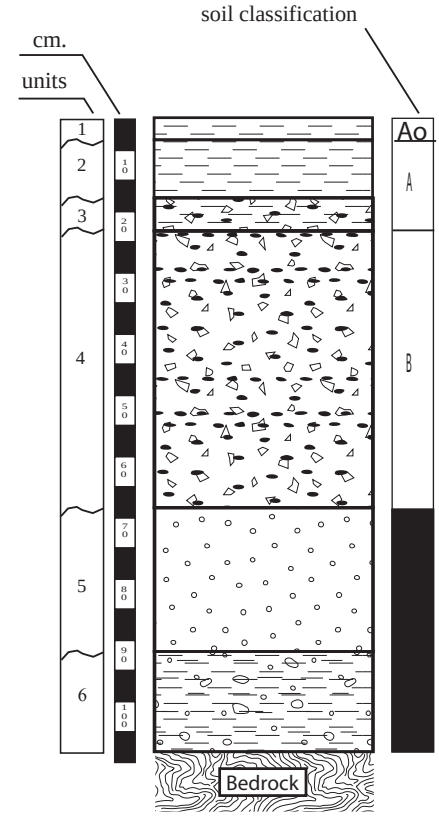
Unit II - [3-15 cmbs]
Sediment: silt and clay; transition to A-Horizon
Soils: 'A' horizon; roots and rootlets
Archaeology: burnt, land clearance event; quartz flake
Munsell: 10YR 3/4 (dark yellowish brown)

Unit III - [15-28 cmbs]
Sediment: sandy unit; pebbly
Soils: 'B' horizon; lots of roots
Archaeology: charcoal; P. LaPorta does not think old
Munsell: 10YR 4/6 (dark yellowish brown)

Unit IV - [28-41 cmbs]
Sediment: medium and fine sand (50) with silt and clay (50); thick colluvium; gradational change to unit above
Soils: 'B' horizon
Archaeology: charcoal flecking
fragments
Munsell: 10YR 4/6 (dark yellowish brown)

Unit V - [41-56 cmbs]
Sediment: transitional; coarse, medium, and sand with silt; no cobbles or pebbles
Soils: none
Archaeology: occassional pieces of quartz and migmitite at sparingly at top of unit
Munsell: 2.5Y 5/6 (light olive brown)

Unit VI - [56-75 cmbs]
Sediment: ablation till; cobbles and pebbles; very high clay content; hummocky upper surface
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



Unit I - [0-3 cmbs]
Sediment: black, organic, silt and clay; moss, organics; eroding off
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

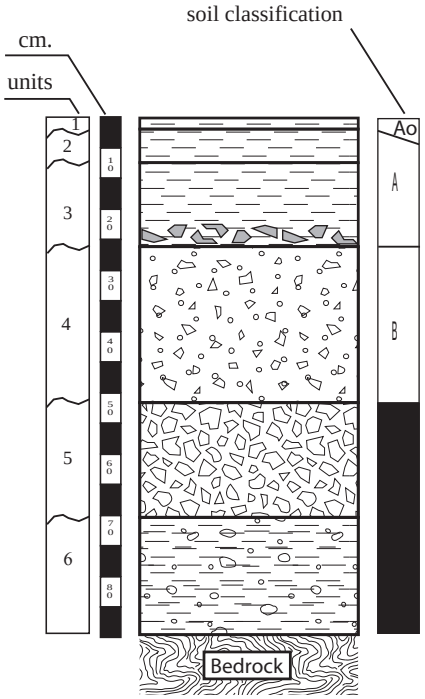
Unit II - [3-13 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; roots and rootlets
Archaeology: none observed
Munsell: 10YR 3/4 (dark yellowish brown)

Unit III - [13-18 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; lots of roots
Archaeology: quartz; charcoal flecks
Munsell: 10YR 3/4 (dark yellowish brown)

Unit IV - [18-68 cmbs]
Sediment: coarse to fine sand with silt and clay (20-25)
Soils: 'B' horizon; some roots
Archaeology: charcoal flecking; angular fragments of migmitite and quartz
Munsell: 10YR 4/6 (dark yellowish brown)

Unit V - [68-87 cmbs]
Sediment: transitional; medium to fine sand with little silt and clay; few pebbles
Soils: none
Archaeology: none observed
Munsell: 10YR 5/6 (dark yellowish brown)

Unit VI - [87-103 cmbs]
Sediment: lodgement till; intermixed cobbles and pebbles; no orientation; silt/clay (50) and fine sand; overlaying bedrock
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



Unit I - [0-1 cmbs]
Sediment: black, organic, silt and clay; moss, organics; eroding off
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

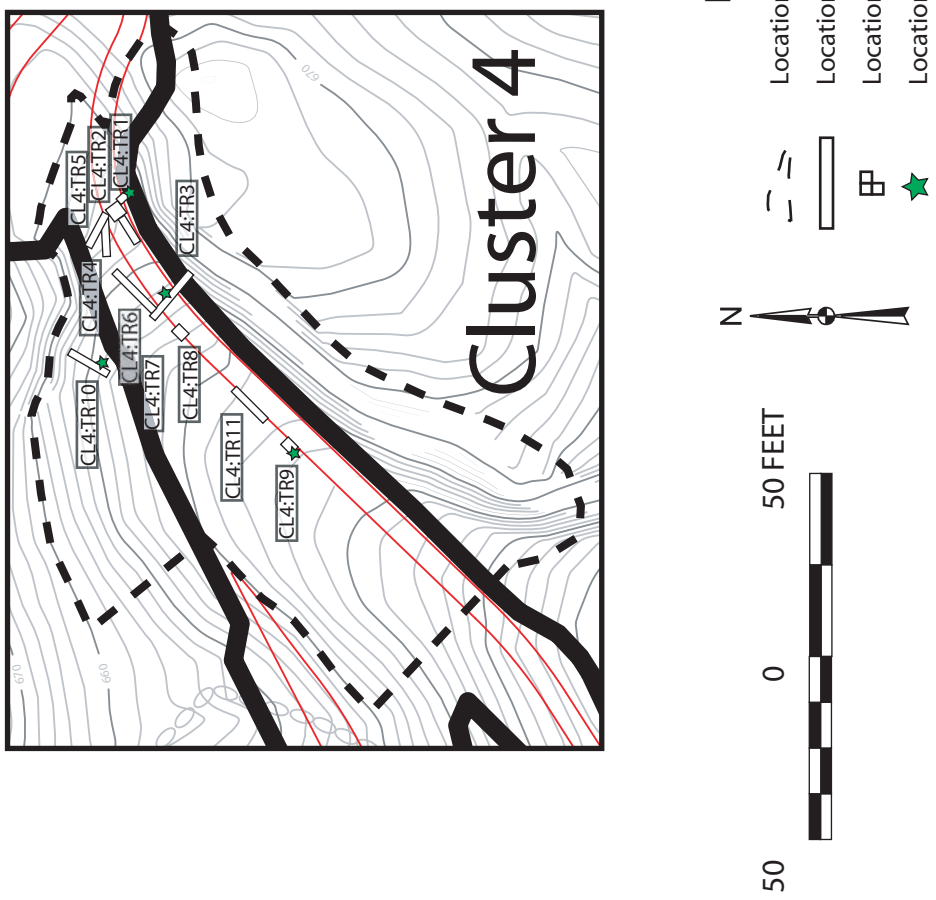
Unit II - [1-7 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; roots and rootlets
Archaeology: none observed
Munsell: 10YR 3/4 (dark yellowish brown)

Unit III - [7-21 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; lots of roots
Archaeology: large amount of quartz and hammerstones
Munsell: 10YR 4/6 (dark yellowish brown)

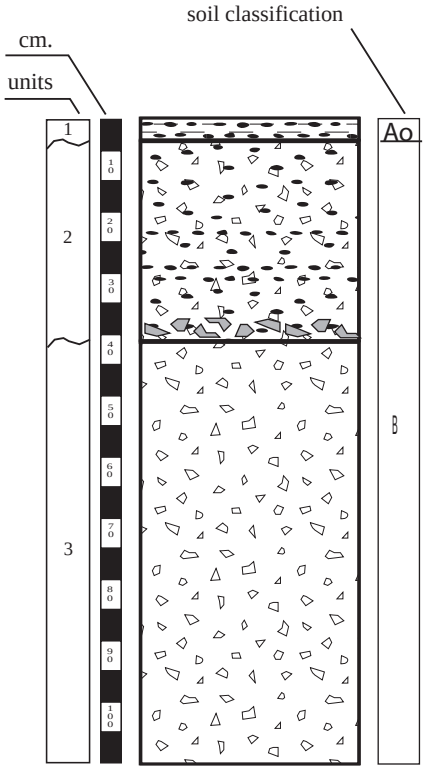
Unit IV - [21-46 cmbs]
Sediment: sandy colluvium; abrupt upper contact
Soils: 'B' horizon; some roots
Archaeology: angular fragments of migmitite and quartz; hammerstones; upper surface lined with hammerstones and quartz
Munsell: 10YR 5/6 (dark yellowish brown)

Unit V - [46-65 cmbs]
Sediment: transitional; sandy with pebbles
Soils: none
Archaeology: none observed
Munsell: 10YR 5/6 (dark yellowish brown)

Unit VI - [65-84 cmbs]
Sediment: lodgement till; intermixed cobbles and pebbles; no orientation; silt/clay (50) and fine sand; overlaying bedrock
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



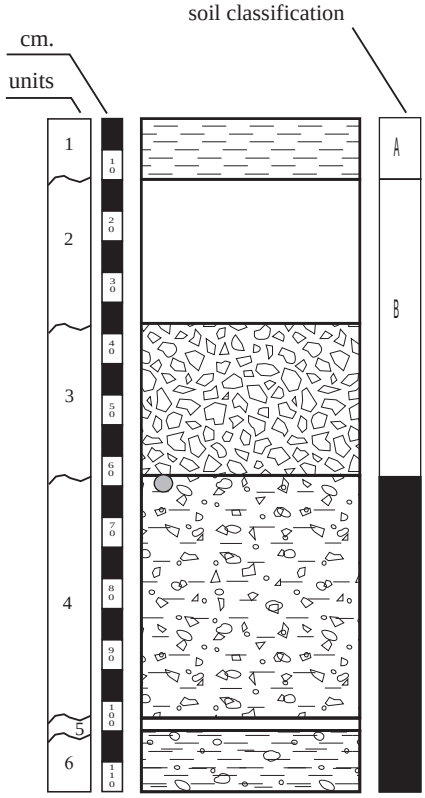
Cluster 4 map, showing backhoe trench locations.



Unit I - [0-4 cmbs]
Sediment: black, organic, silt and clay; moss, organics
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: charcoal, quartz, and angular migmitite
Munsell: 10YR 3/3 (dark brown)

Unit II - [4-41 cmbs]
Sediment: fine sand and silt; 70/20/10 (fine sand/silt/clay); progressively darkens upwards
Soils: 'B' horizon
Archaeology: broken quartz and feldspar; possible surface
Munsell: 10YR 4/6 (dark yellowish brown)

Unit III - [41-105 cmbs]
Sediment: coarse to medium to fine sand with silt (30/40/20/10); abrupt upper contact; overlaying regolith
Soils: 'B' horizon
Archaeology: broken quartz; angular migmitite; upper contact lined with artifacts
Munsell: 10YR 5/6 (dark yellowish brown)



Unit I - [0-10 cmbs]
Sediment: black, organic, silt and clay; moss, organics
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

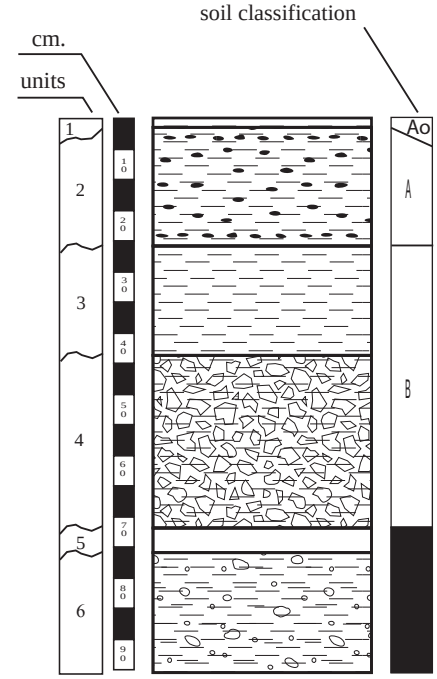
Unit II - [10-34 cmbs]
Sediment: coarse sand, medium sand, fine sand, and little silt
Soils: 'A' horizon; roots and rootlets
Archaeology: broken quartz and migmitite
Munsell: 10YR 4/4 (dark yellowish brown)

Unit III - [34-58 cmbs]
Sediment: colluvium; larger clasts than unit below; coarse sand/ medium sand/fine sand/silt/clay (20/20/10/35/5); gradational upper surface
Soils: 'B' horizon
Archaeology: mine tailings
Munsell: 10YR 5/6 (yellowish brown)

Unit IV - [58-98 cmbs]
Sediment: fine sand/silt/clay (25/60/15); cobbles and pebbles
Soils: 'B' horizon
Archaeology: quartz fragments; charcoal fragments
Munsell: 10YR 5/6 (yellowish brown)

Unit V - [98-100 cmbs]
Sediment: transitional; coarse sand; no cobbles or pebbles
Soils: none
Archaeology: broken mined quartz
Munsell: 10YR 5/6 (yellowish brown)

Unit VI - [98-110 cmbs]
Sediment: olive, clay-rich, cemented lodgement till; Precambrian cobbles alond with chert and quartz pebbles; broken bedrock; no special orientation; hummocky upper contact
Soils: none
Archaeology: none observed
Munsell: 2.5Y 5/6 (light olive brown)



Unit I - [0-1 cmbs]
Sediment: black, organic, silt and clay; moss, organics
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/1 (black)

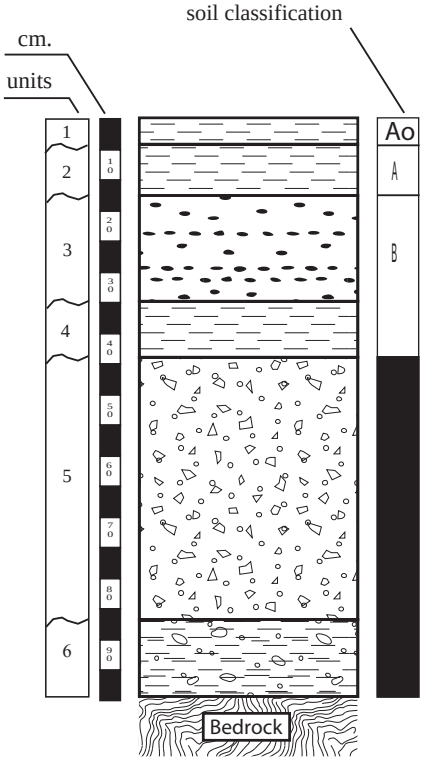
Unit II - [1-21 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; roots and rootlets
Archaeology: burnt, land clearance event; quartz flake
Munsell: 10YR 4/4 (dark yellowish brown)

Unit III - [21-39 cmbs]
Sediment: fine sand and silt; 40/50/10 (fine sand/silt/clay); progressively darkens upwards
Soils: 'B' horizon
Archaeology: broken quartz and feldspar; possible surface
Munsell: 10YR 4/6 (dark yellowish brown)

Unit IV - [39-67 cmbs]
Sediment: soft chestnut brown colluvium; medium sand (35) and silt (30) and clay (35)
Soils: 'B' horizon
Archaeology: quartz fragments; charcoal flecking; migmitite fragments
Munsell: 10YR 5/6 (yellowish brown)

Unit V - [67-71 cmbs]
Sediment: transitional; coarse sand; no cobbles or pebbles
Soils: none
Archaeology: none observed
Munsell: 10YR 4/4 (dark yellowish brown)

Unit VI - [71-91 cmbs]
Sediment: hard indurated sand pavement; coarse sand and fine mud overlain by a few centimeters of transitional unit; clay-rich
Soils: none
Archaeology: quartz
Munsell: 2.5Y 5/6 (light olive brown)



Unit I - [0-4 cmbs]
Sediment: black, organic, silt and clay; moss, organics
Soils: 'Ao' horizon; humic horizon with organics (root matter, pine scrub, early sedge)
Archaeology: none observed
Munsell: 10YR 2/2 (very dark brown)

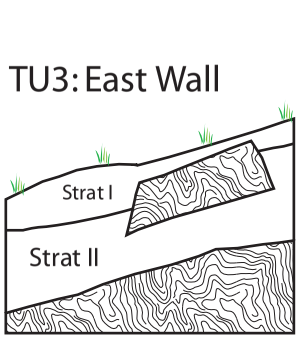
Unit II - [4-13 cmbs]
Sediment: silt and clay
Soils: 'A' horizon; roots and rootlets
Archaeology: none observed
Munsell: 10YR 2/2 (very dark brown)

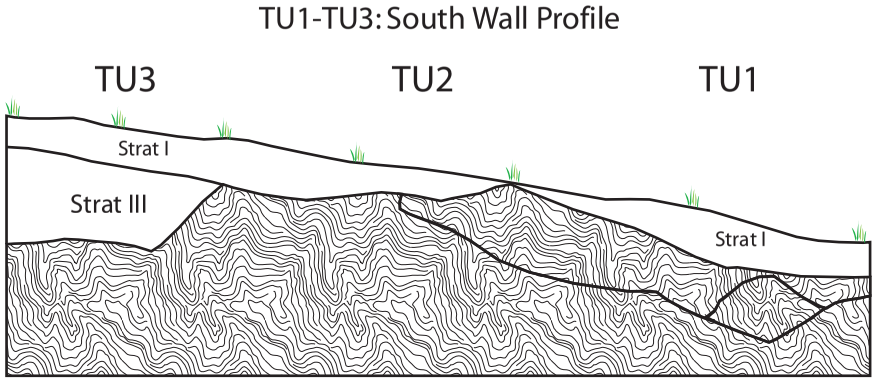
Unit III - [13-30 cmbs]
Sediment: chestnut brown; sandy
Soils: 'B' horizon; root-rich
Archaeology: charcoal flecking
Munsell: 7.5YR 3/2 (dark brown)

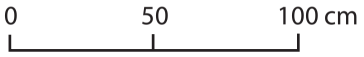
Unit IV - [30-39 cmbs]
Sediment: dark organic-rich; irregular in thickness
Soils: N/A
Archaeology: possible occupation level
Munsell: 7.5YR 4/6 (strong brown)

Unit V - [39-82 cmbs]
Sediment: very sandy and coarse with pebbles
Soils: none
Archaeology: spalls of migmitite
Munsell: 7.5YR 5/4 (brown)

Unit VI - [82-94 cmbs]
Sediment: transitional; clay-rich; overlaying bedrock; filled with pebbles and cobbles
Soils: none
Archaeology: none observed
Munsell: 7.5YR 4/6 (strong brown)



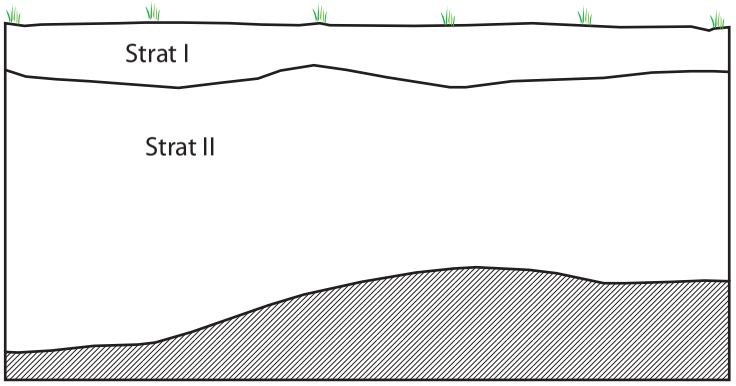


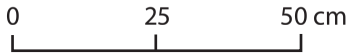


Cluster 1: Q17
TU1, TU2, and TU3 East and South Wall Profiles
Strat I - very dark grayish brown (10YR 3/2) loam
Strat II - dark yellowish brown (10YR 3/4) loam
Bedrock - contorted schist with quartz

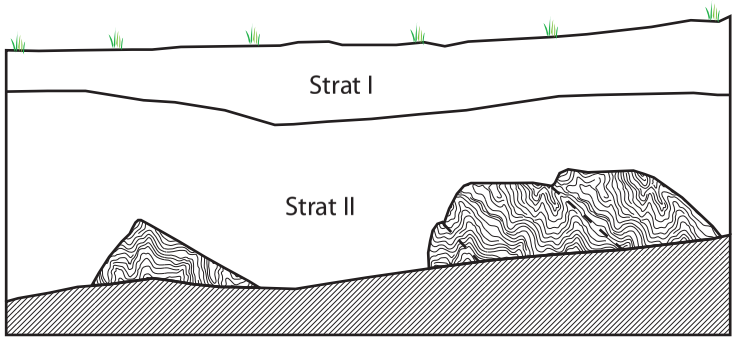
Figure 23

TU4: West Wall

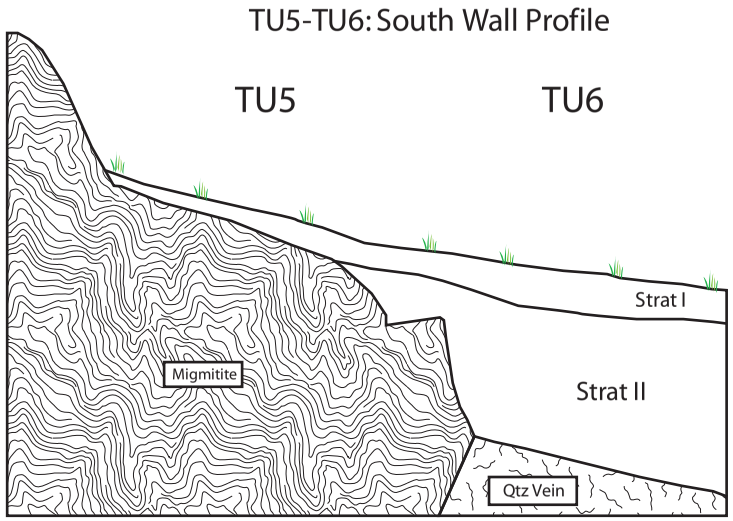


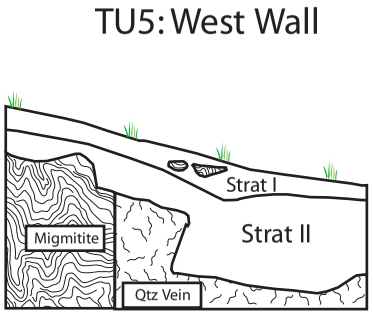


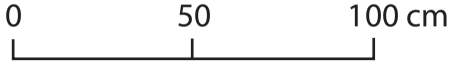
TU4: North Wall



Cluster 1: Q17
TU4: North and West Wall Profiles
Strat I - grayish brown (10YR 5/2) silty loam
Strat II - yellowish brown (10YR 5/6) loam
Substrat: Glacial Till (see geomorphology rofiles)

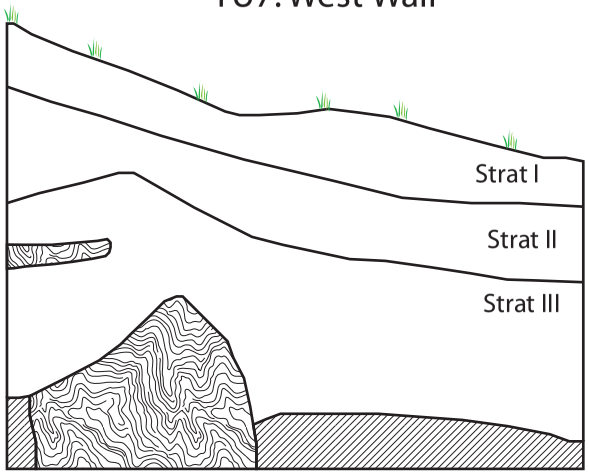


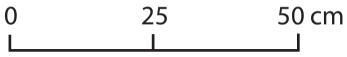




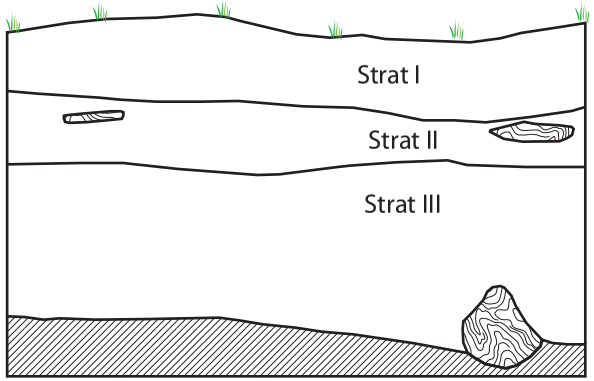
Cluster 1: Q17
TU5 and TU6 South and West Wall Profiles
Strat I - very dark brown (10YR 2/2) silty loam
Strat II - light yellowish brown (10YR 5/6) loam
Bedrock - contorted schist and quartz vein

TU7: West Wall





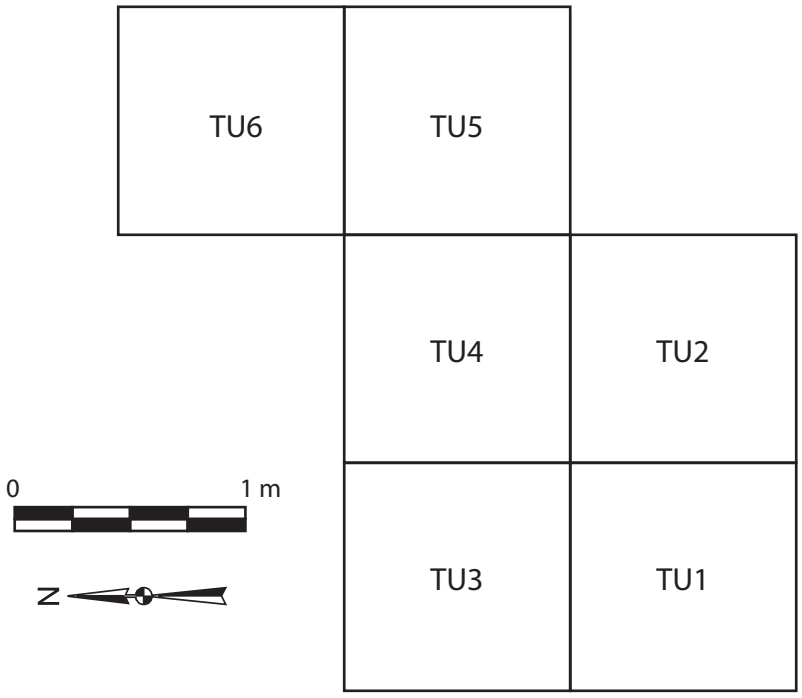
TU7: North Wall



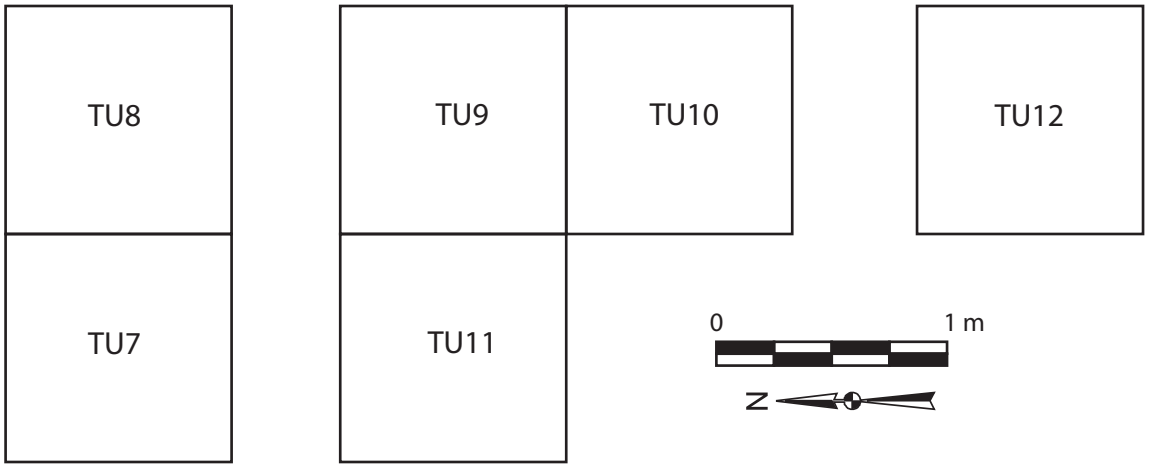
Cluster 1: Q17
TU7: North and West Wall Profiles

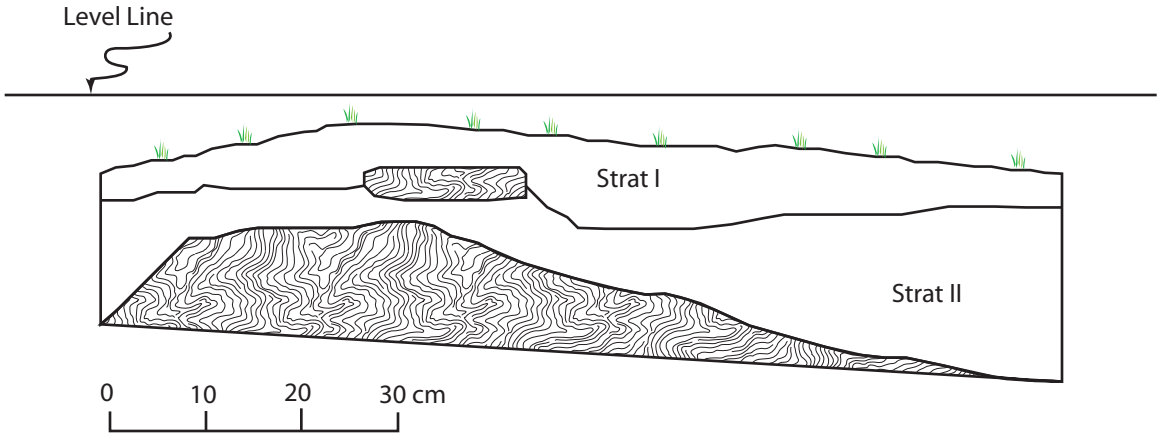
Strat I - very dark grayish brown (10YR 3/2) clayey loam
Strat II - dark yellowish brown (10YR 4/6) silt with clay
Strat III - light yellowish brown (10YR 5/6) silty loam
Substrat: Glacial Till (see geomorphology rofiles)

Six 1-x-1 m units above the adit (Q18)



Six 1-x-1 m units below the adit (Q18)

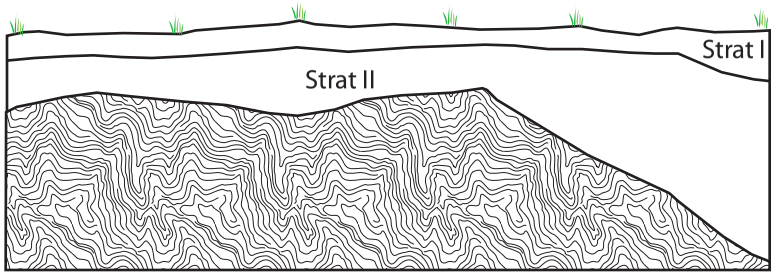


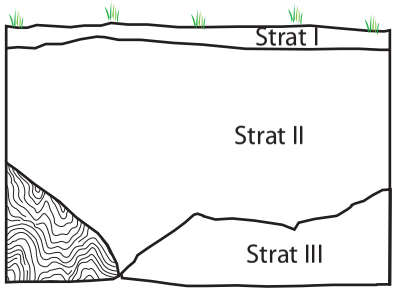


TU1: North Wall Profile

Strat I - silt (10YR3/4)
Strat II - silt with increased clay and pebble content (10YR4/6)
Bedrock - contorted schist

TU3 TU4 TU6

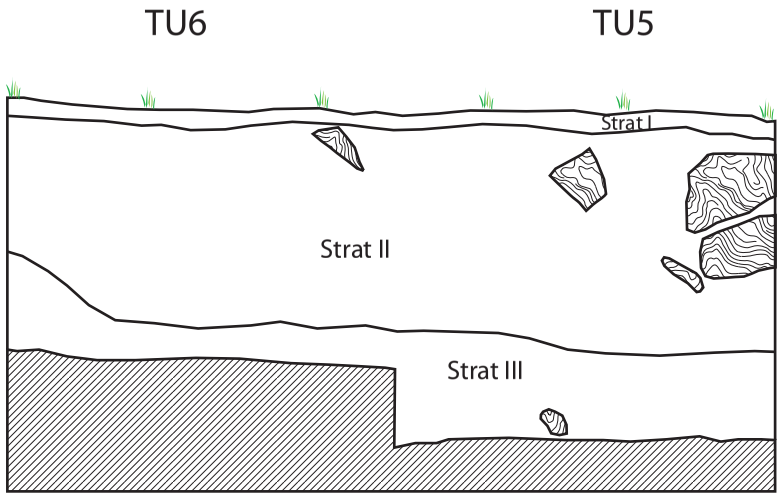


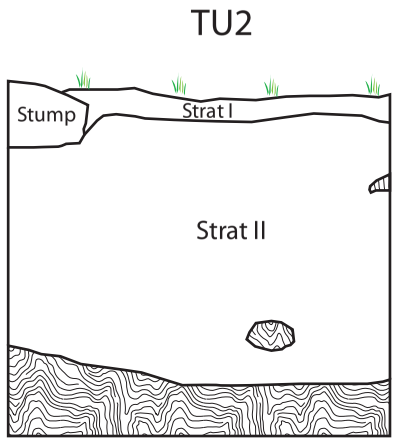


0 25 50 75 cm

TU3, TU4, amd TU6: North Wall Profiles

Strat I - silt (10YR3/4)
Strat II - silt with increased clay and pebble content (10YR4/6)
Strat III - light olive brown silt (2.5Y 5/6)
Bedrock - contorted schist

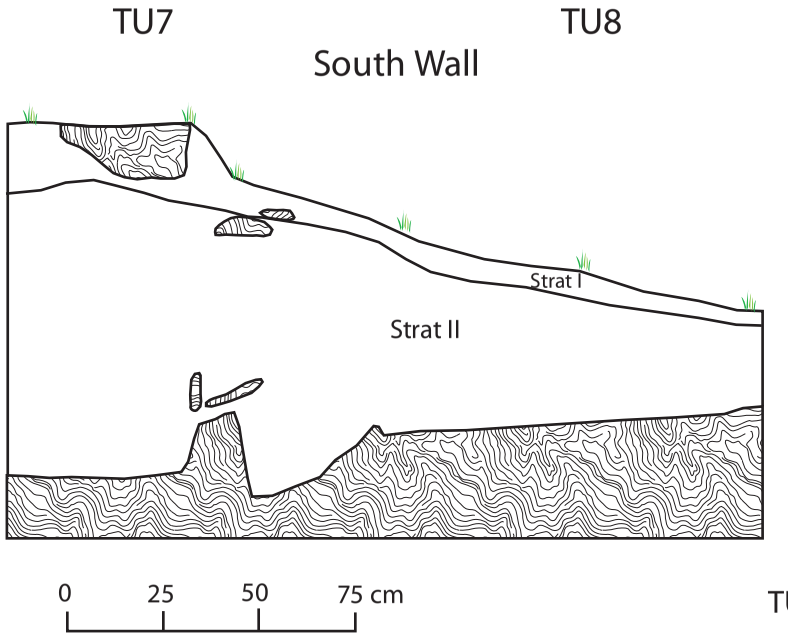


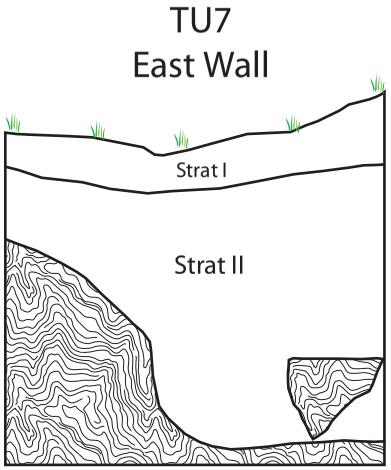


TU2, TU5, and TU6: East Wall Profiles

Strat I - silt (10YR3/4)
Strat II - silt with increased clay and pebble content (10YR4/6)
Strat III - light olive brown silt (2.5Y 5/6)
Unexcavated - glaciall till (see geomorphology profiles)
Bedrock - contorted schist

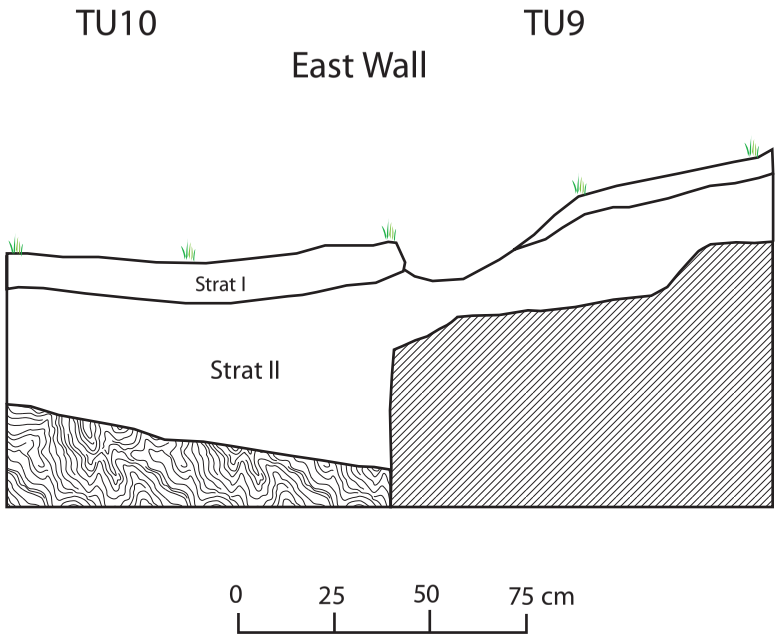
Figure 30

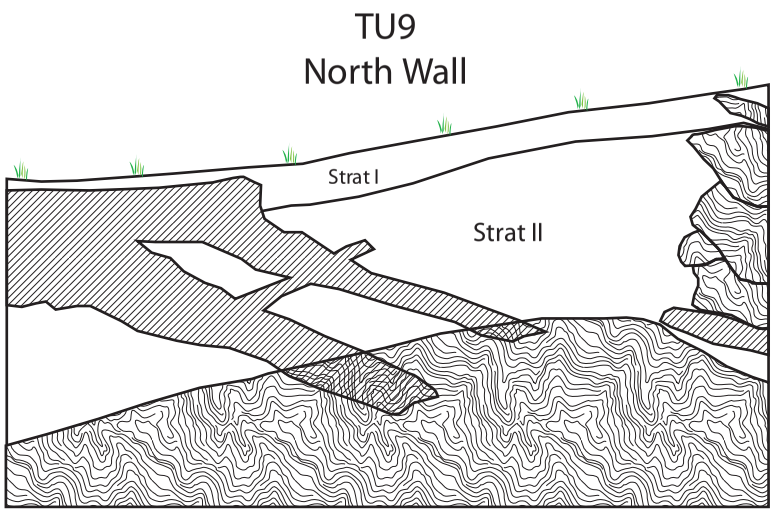




TU7 and TU8: South and East Wall Profiles

Strat I - very dark brown (10YR 2/2) silt
Strat II - brownish yellow (10YR 6/6) silt/sand coarsening downwards
Bedrock - contorted schist

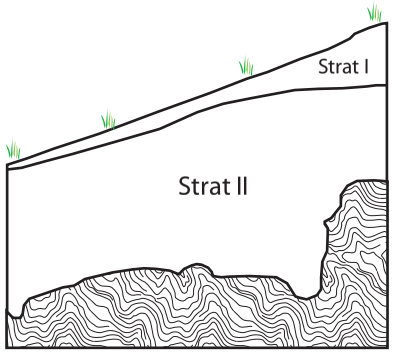




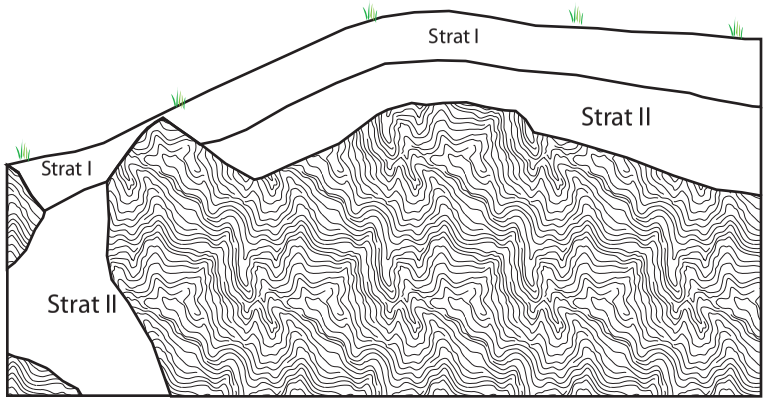
TU9 and TU10: North and East Wall Profiles

Strat I - black (10YR 2/1) silty loam
Strat II - dark yellowish brown (10YR 4/4) sandy loam with gravel
Bedrock - contorted schist

TU11
North Wall



TU12
North Wall East Wall

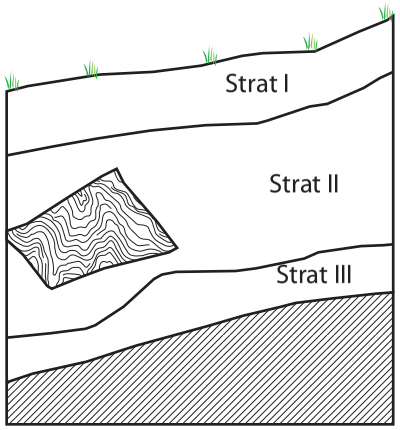


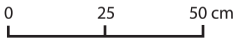
TU11 and TU12: North and East Wall Profiles

Strat I - black (10YR 2/1) silty loam
Strat II - dark yellowish brown (10YR 4/4) sandy loam with gravel
Bedrock - contorted schist

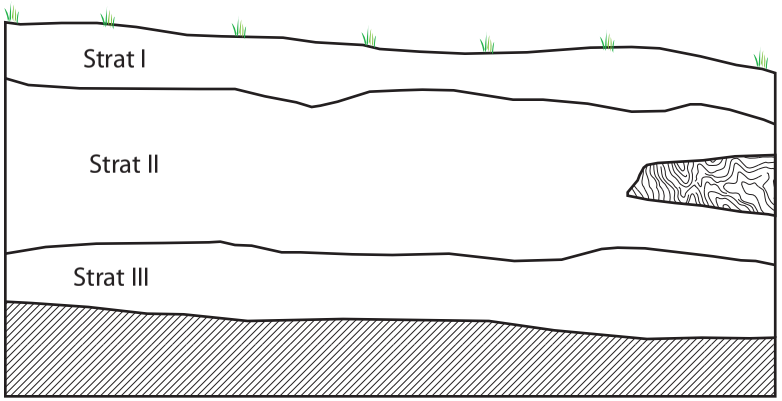
Figure 33

TU13: North Wall





TU13 and TU14: East Wall

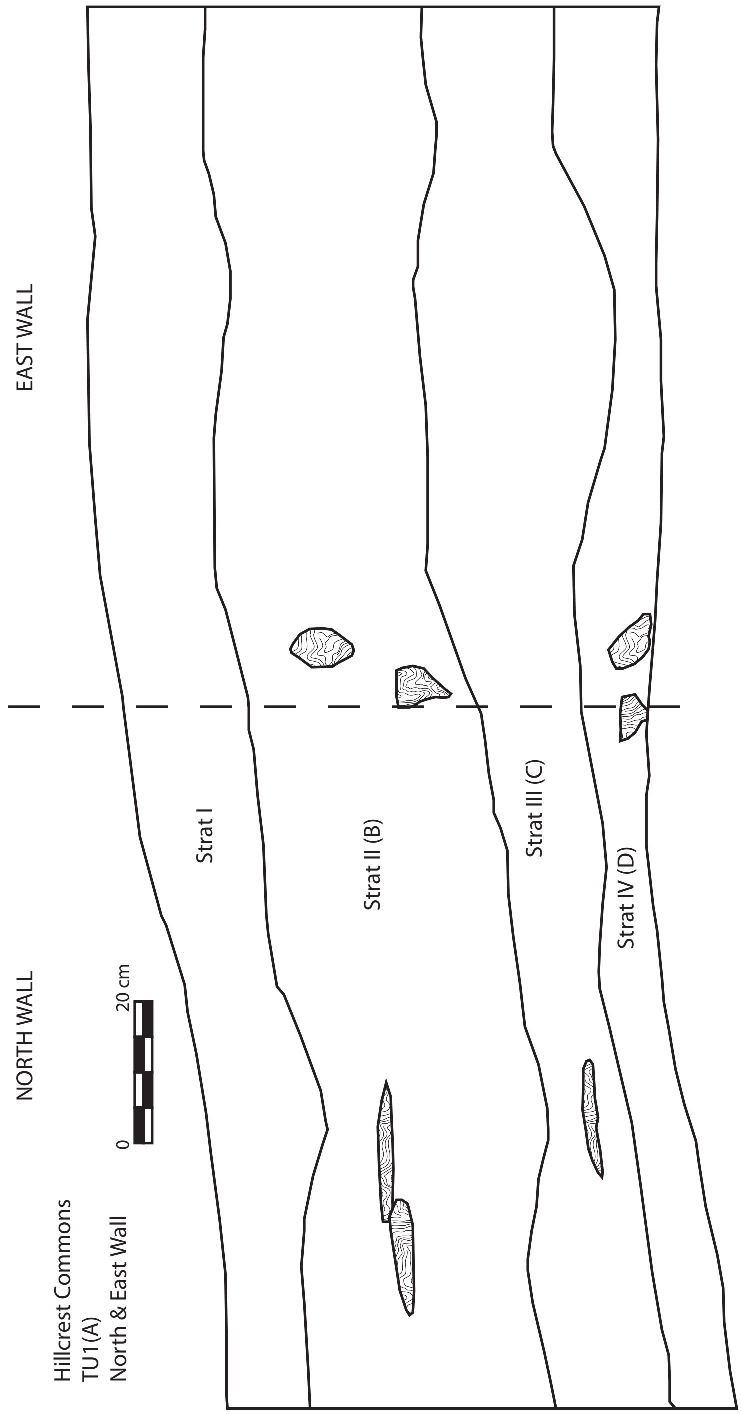


Cluster 1: TR17
TU13 and TU14: North and East Wall Profiles
Strat I - dark yellowish brown (10YR 3/4) loam
Strat II - strong brown (7.5YR 4/6) loam
Strat III - dark yellowish brown (10YR 4/6) loam with gravel
Substrat: Glacial Till (see geomorphology profiles)

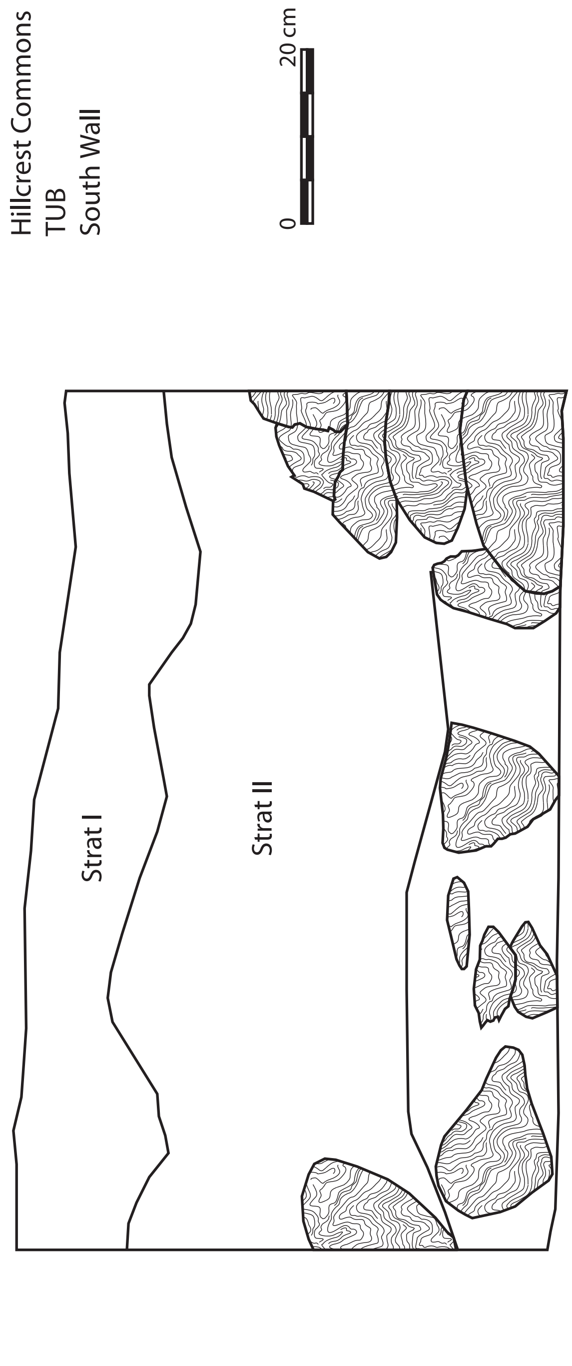
Figure 34


HILLCREST COMMONS
EAST WALL PROFILE
11 October 2006

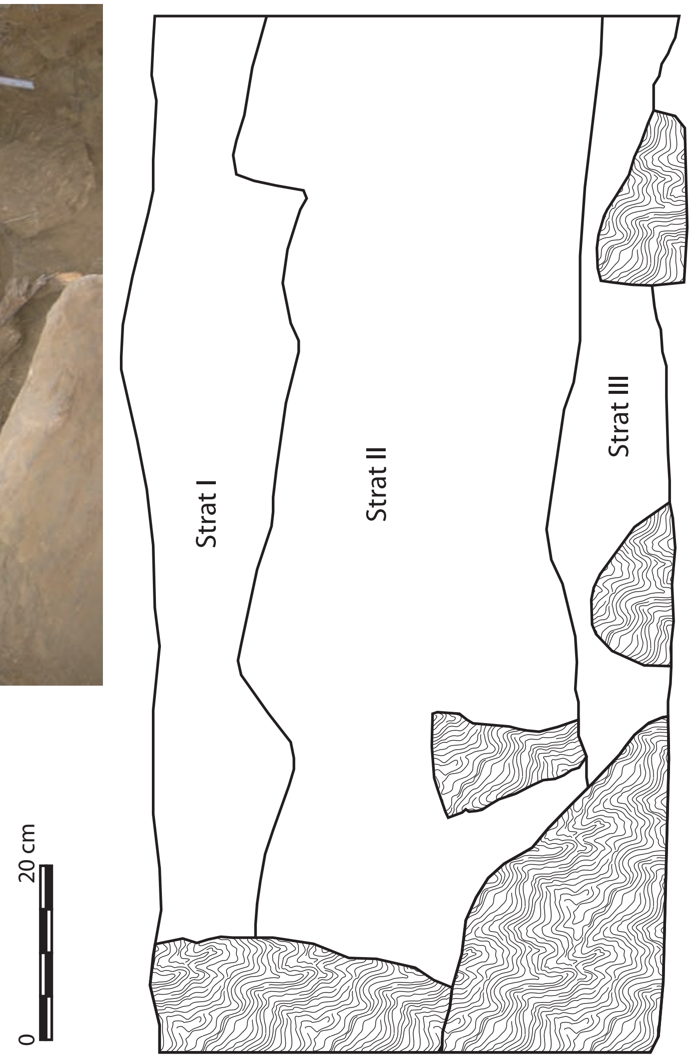

HILLCREST COMMONS
NORTH WALL PROFILE
11 October 2006

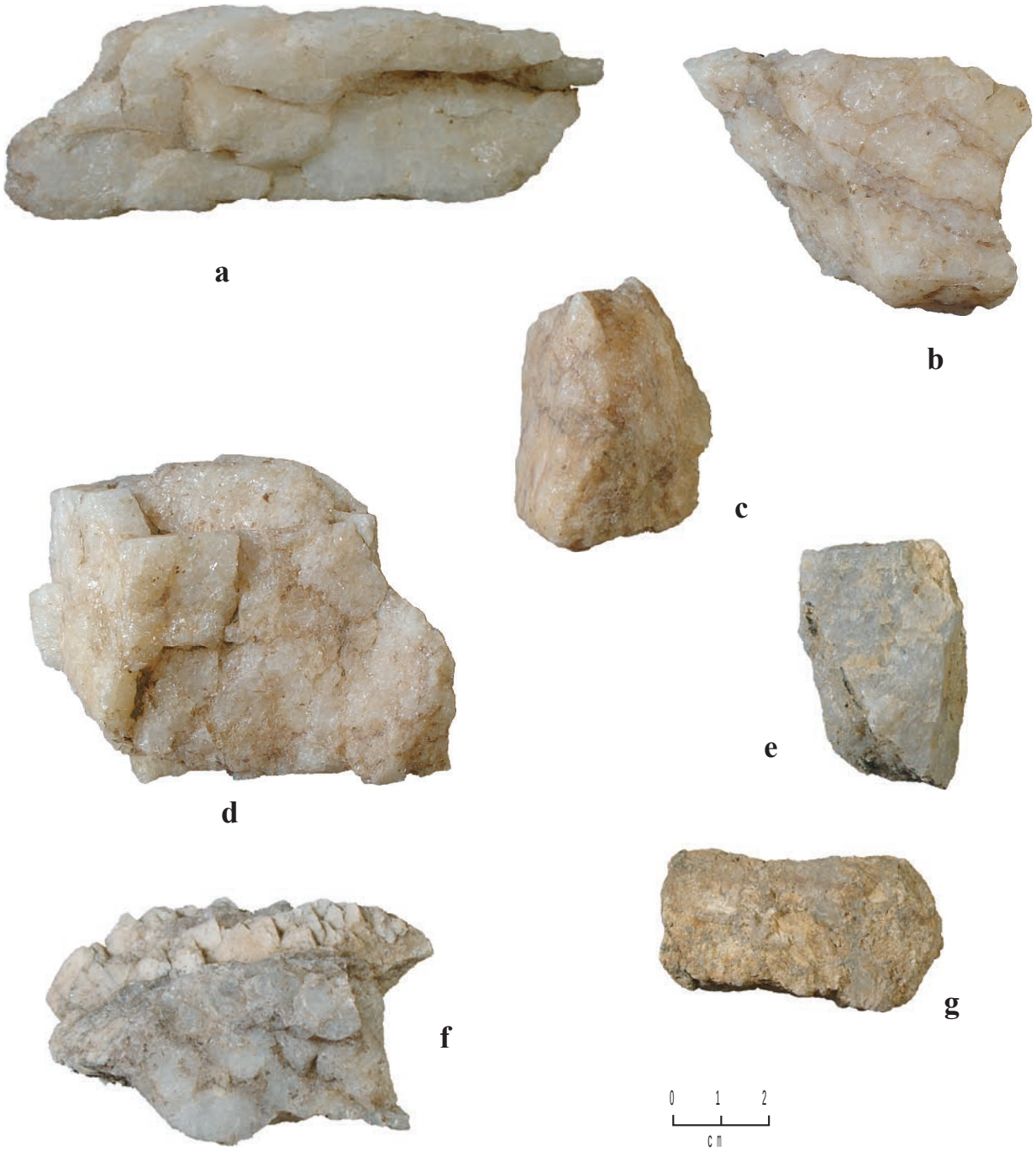

EAST WALL
NORTH WALL
Strat I
Strat II (B)
Strat III (C)
Strat IV (D)
0
20 cm
Hillcrest Commons
TU1(A)
North & East Wall


HILLCREST COMMONS
TU B SW CORNER
SOUTH WALL PROFILE
10 October 2006
MAC

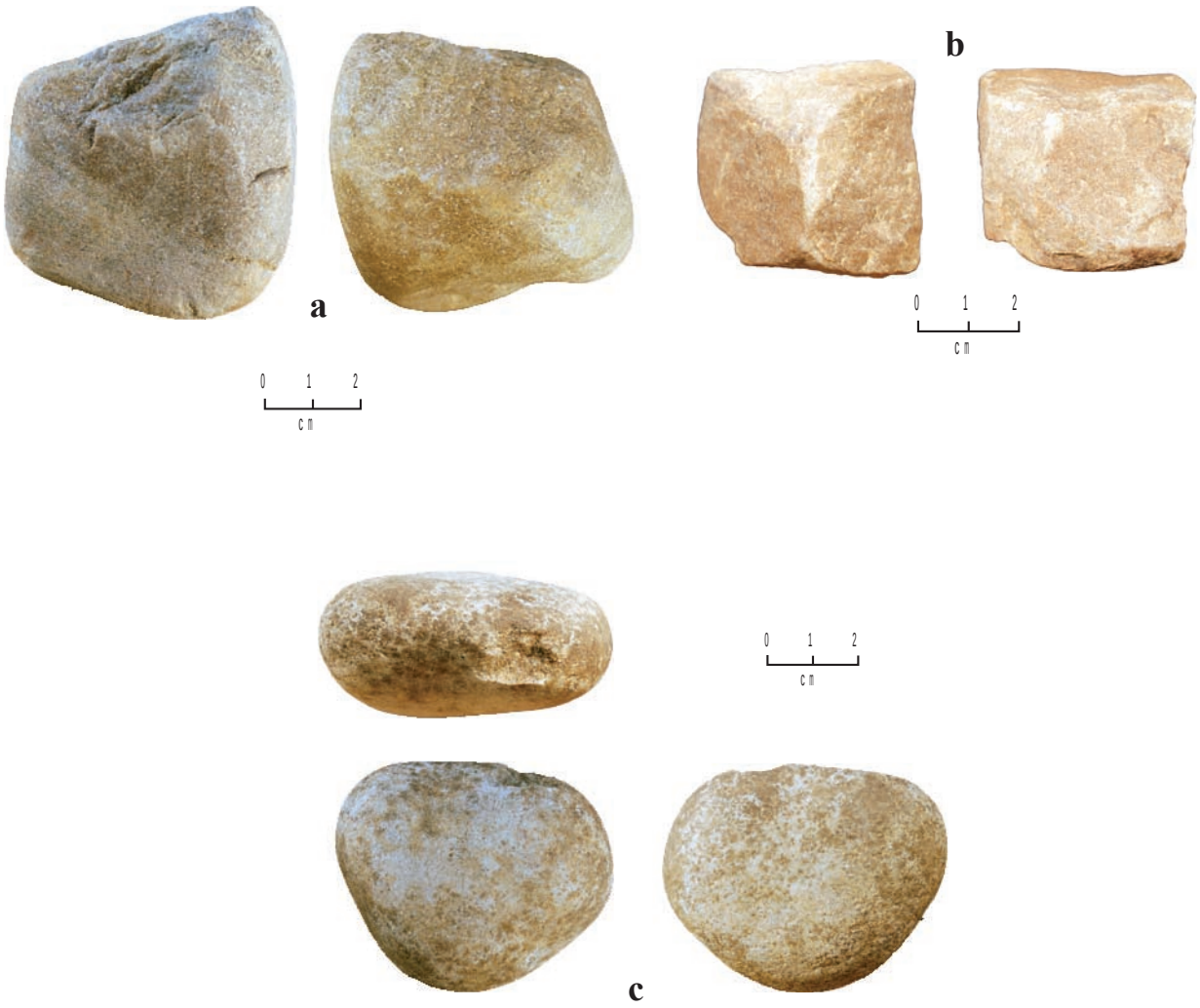

Hillcrest Commons
TUB
South Wall
0
20 cm
Strat I
Strat II

Hillcrest Commons
TUB
East Wall

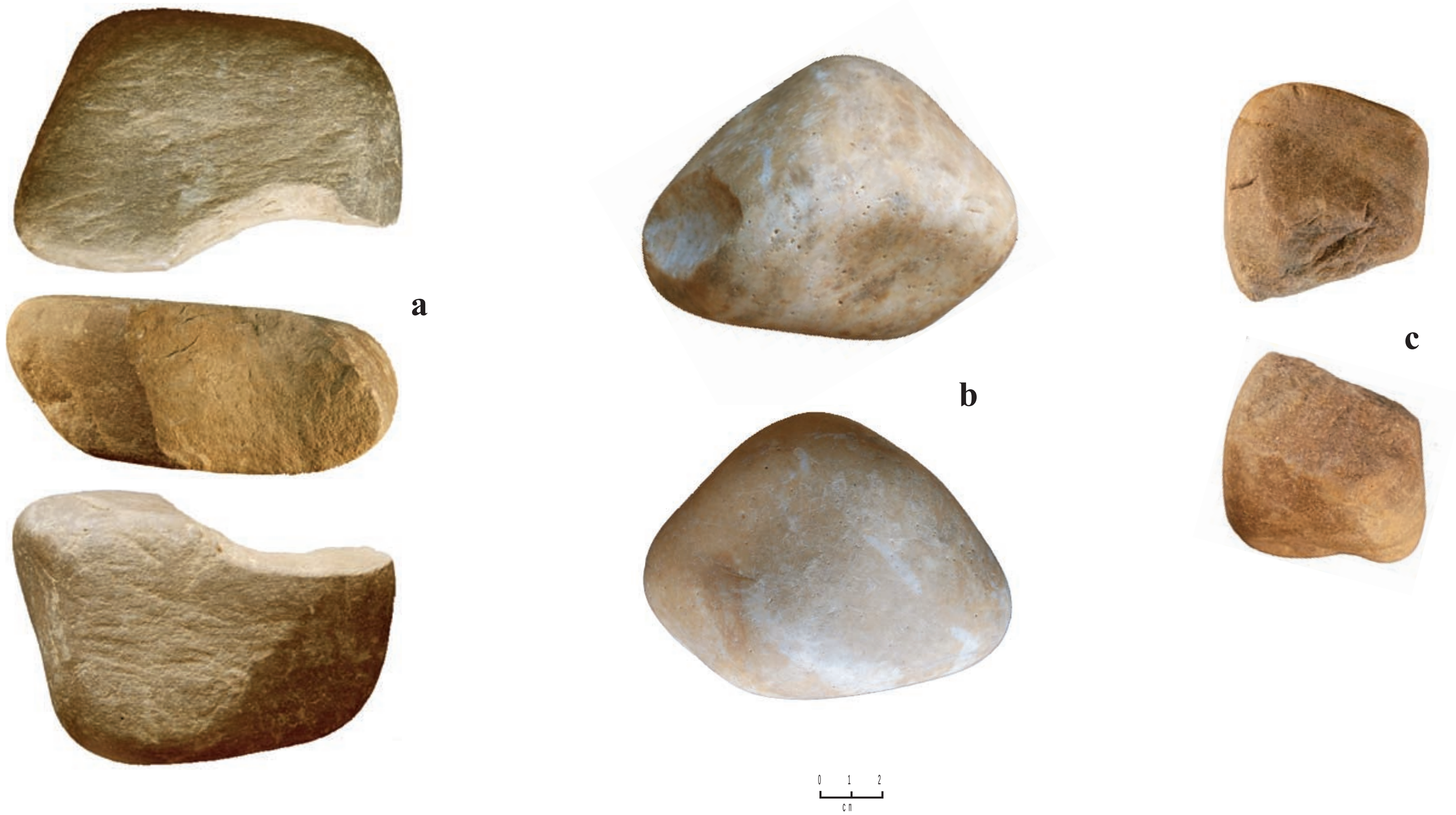




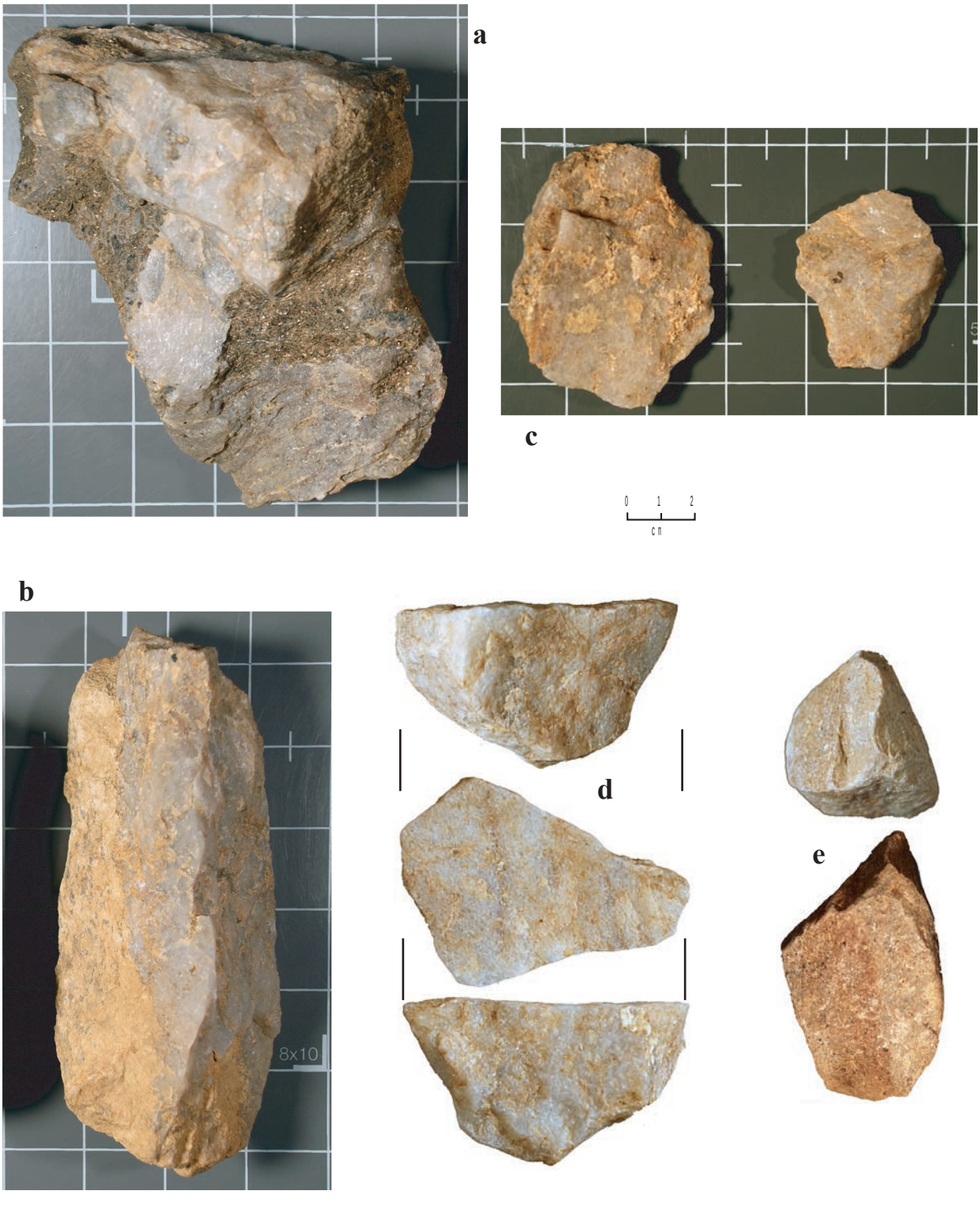
Ore from Cluster 1, Trench 4 (CL1:TR4) that includes: (a) lithon package; (b) lithon fragment; (d) core; (f) lean ore; and (g) tailing.



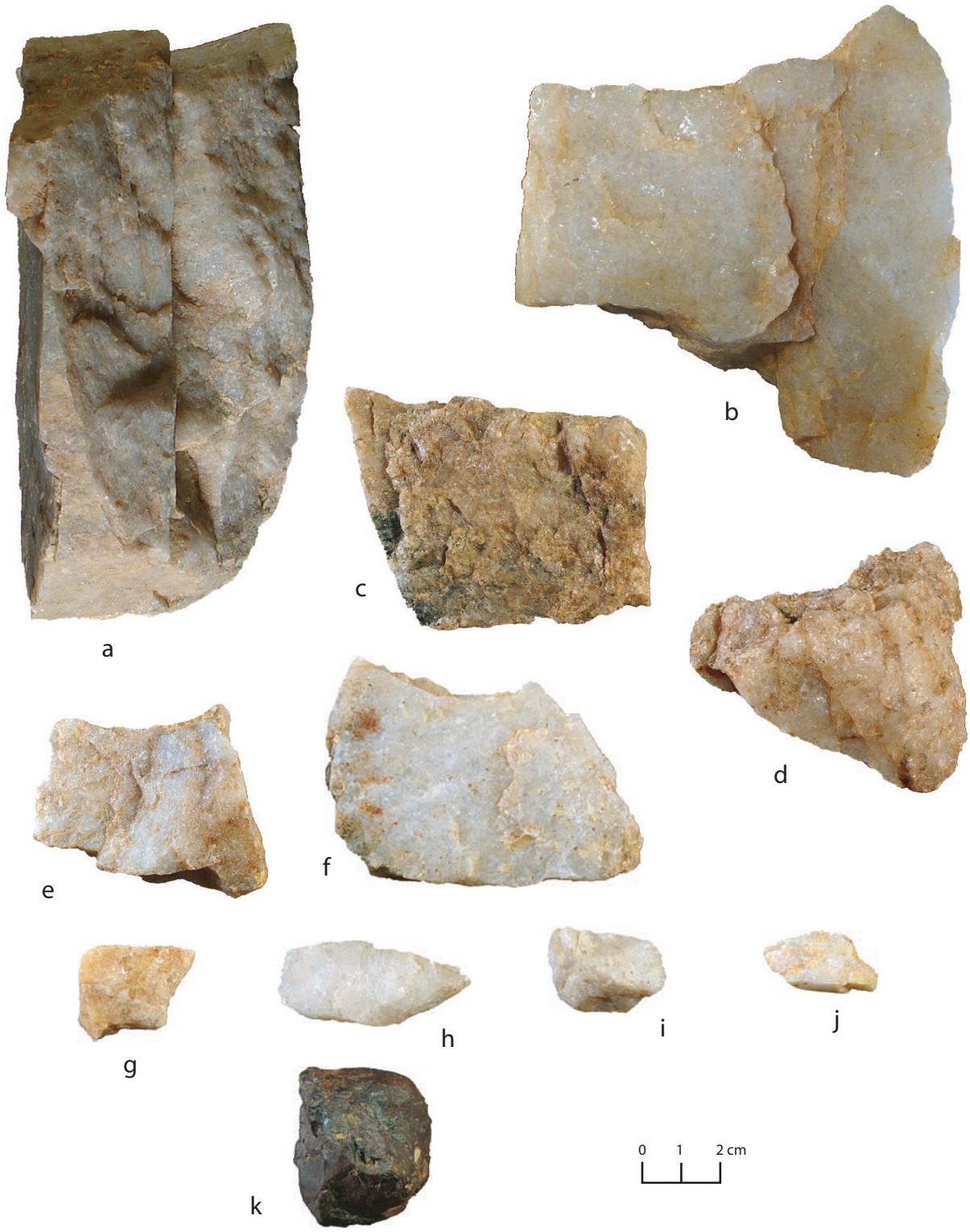
Instruments from Cluster 2, Trench 10 (CL2:TR10) that include: (a) round wedge CL2.TR10.H8; (b) focal hammer CL2.TR10.H10; and (c) milling hammer CL2.TR10.H9.



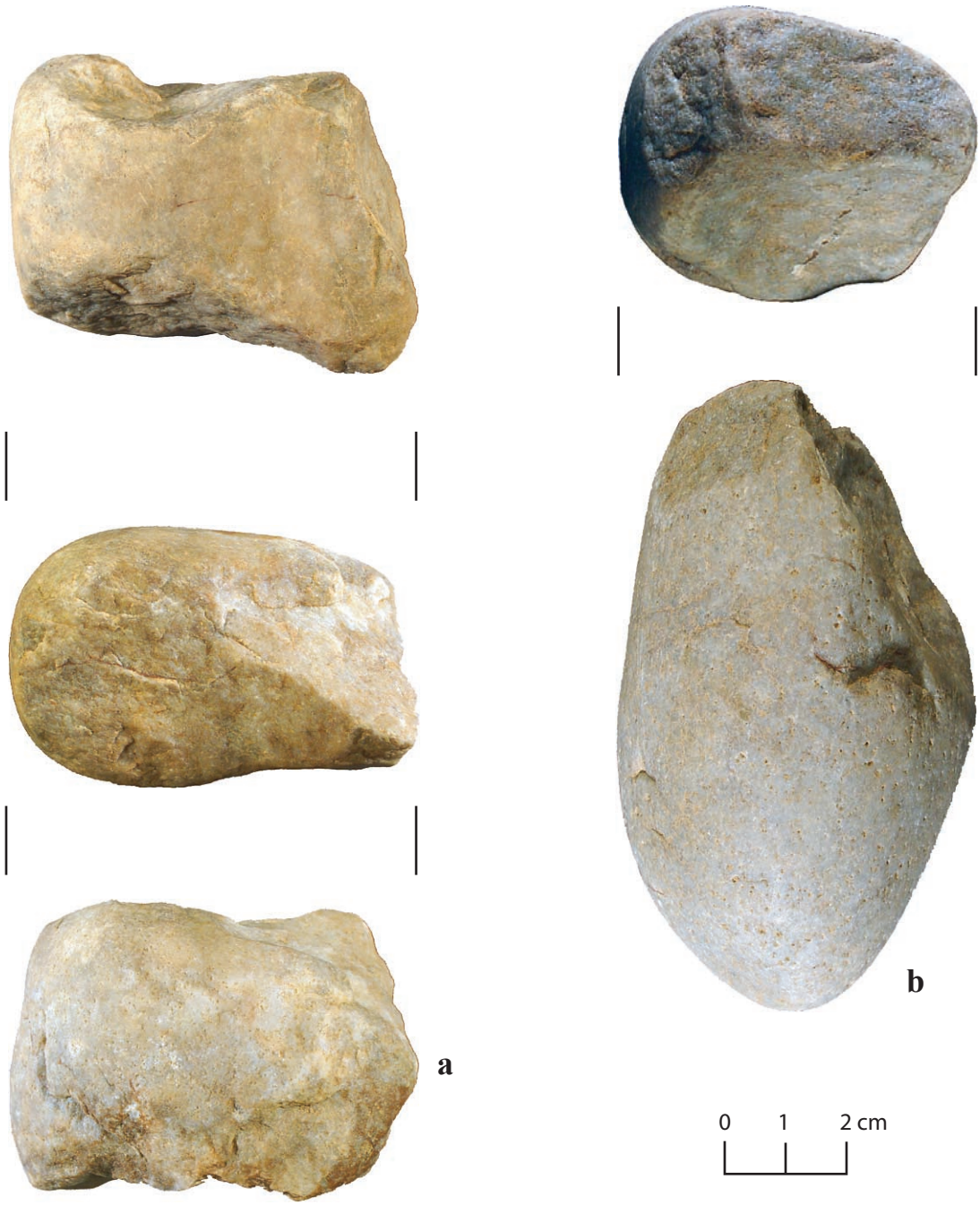
Instruments from Cluster 2, Trench 10 (CL2:TR10) that include: (a) cobbing hammer CL2.TR10.H7; (b) milling instrument CL2.TR10.H6; and (c) round wedge CL2.TR10.H8.



Ore and instrument from Cluster 3, Trench 3 (CL3:TR3) that includes: (a-b) lean ore; (c) quartz lithons; (d) quartz core; and (f) quartzite instrument. Note: grid (a-c) is 2.54 cm square.

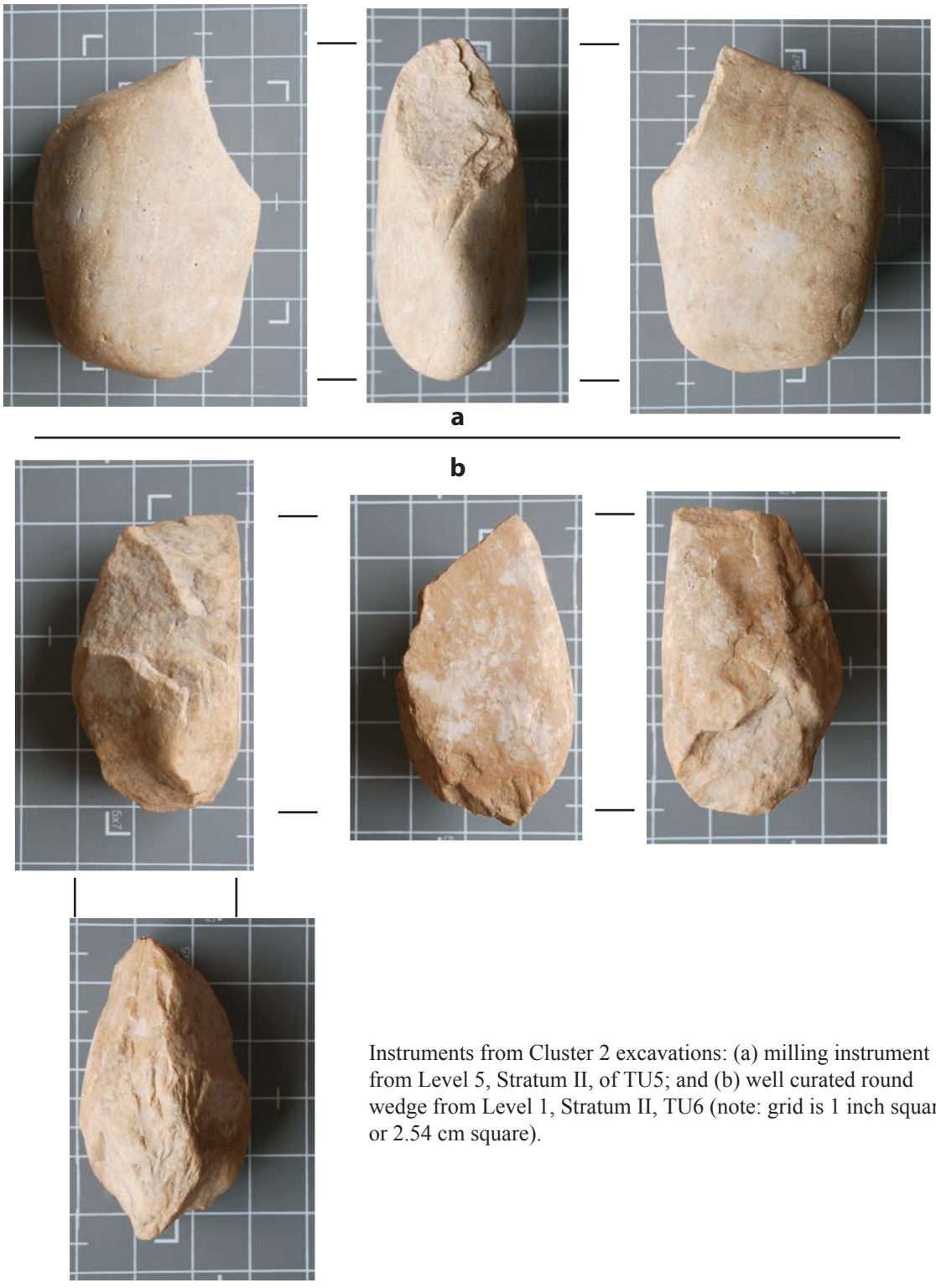


Ore from Cluster 4, Trench 1 (CL4:TR1) that includes: (a-b) quartzlithon packages; (c-d) lean ore; (e-f) microlithons; (g-j) scaling flakes; and (k) limonite goertite.

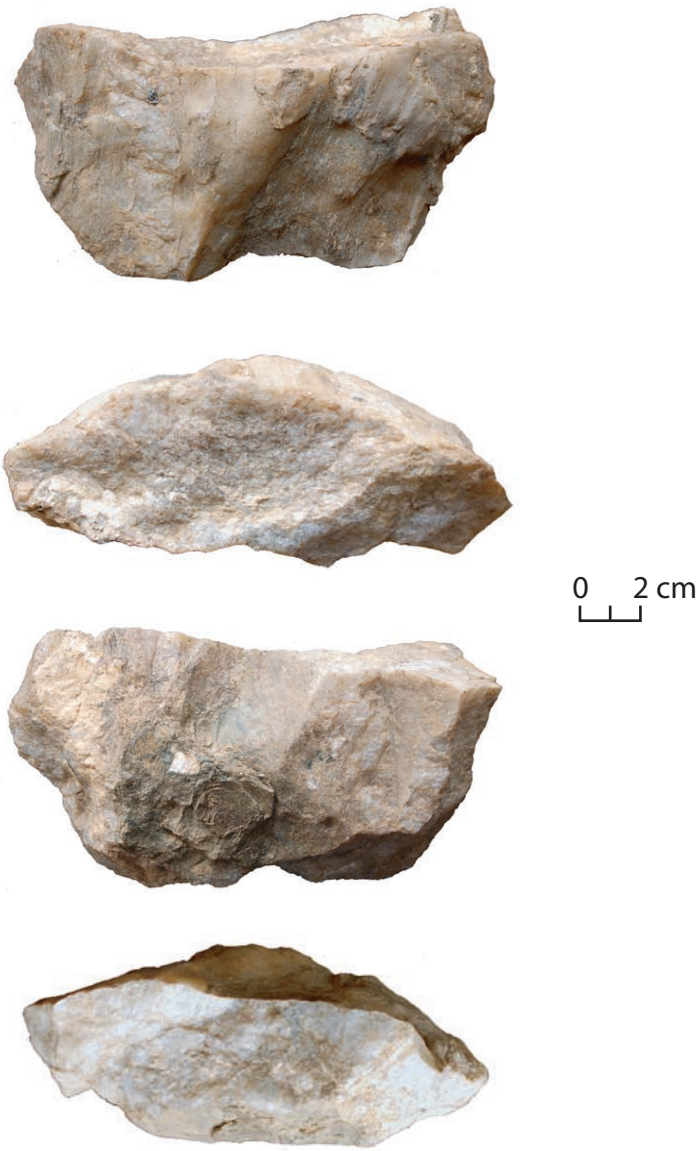


Hammerstones from Cluster 4 (CL4:TR5) that include: (a) hammer/beaked hammer/wedge CL4.TR5.H8; and (b) hammerstone/abrading hammer CL4.TR5.H6.

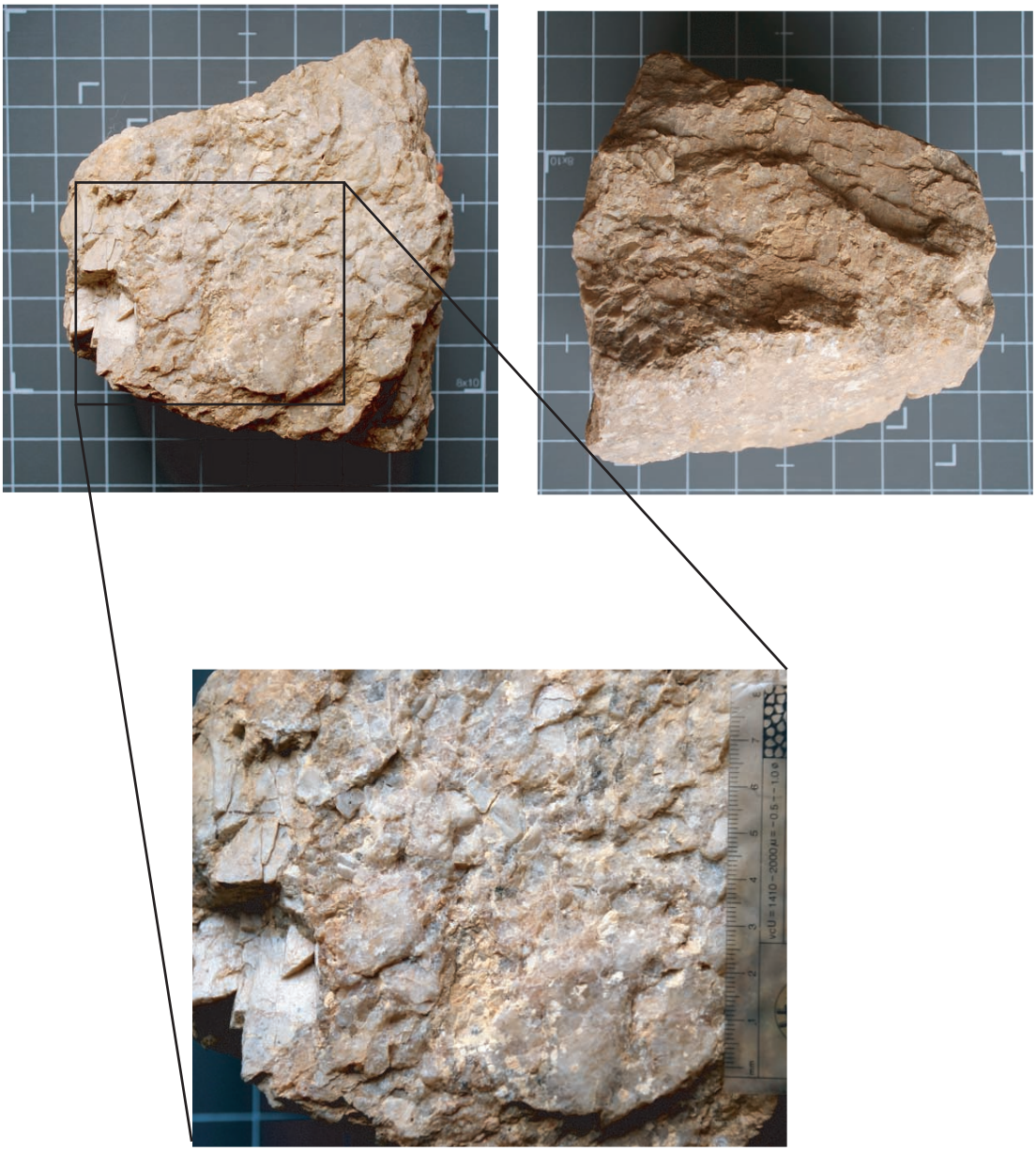
Heat-treated instrument from Stratum II, Level 1 of TU6 in Cluster 1 excavations
(note: grid is 1 inch square, or 2.54 cm square).



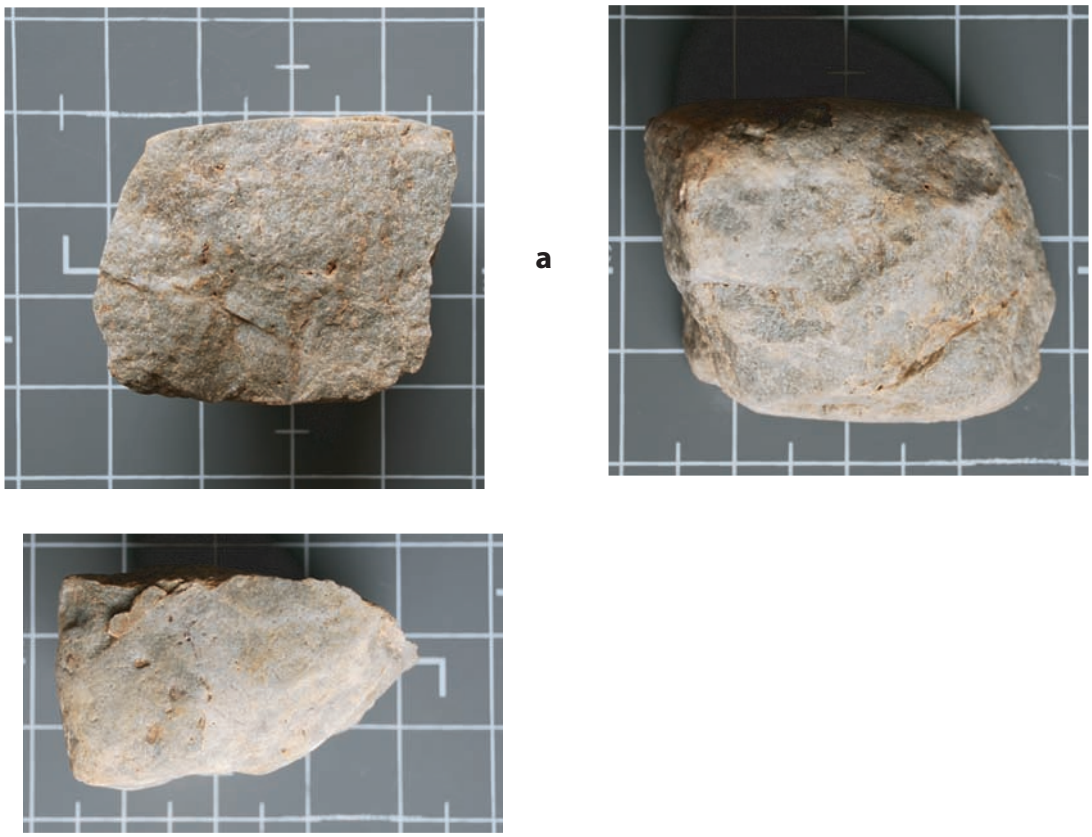
Instruments from Cluster 2 excavations: (a) milling instrument from Level 5, Stratum II, of TU5; and (b) well curated round wedge from Level 1, Stratum II, TU6 (note: grid is 1 inch square, or 2.54 cm square).



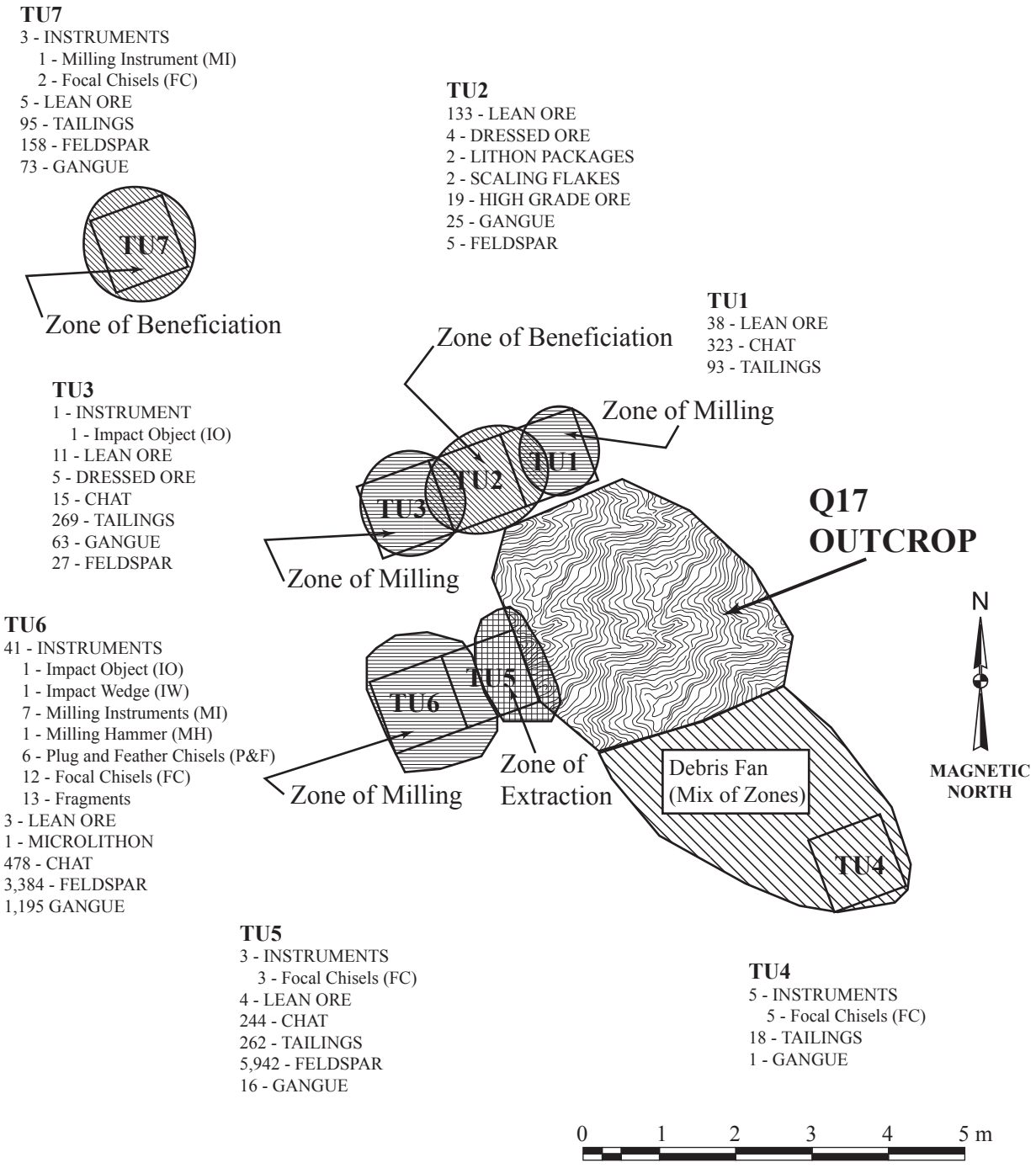
Middling core, from Level 1, Stratum II of TU9.



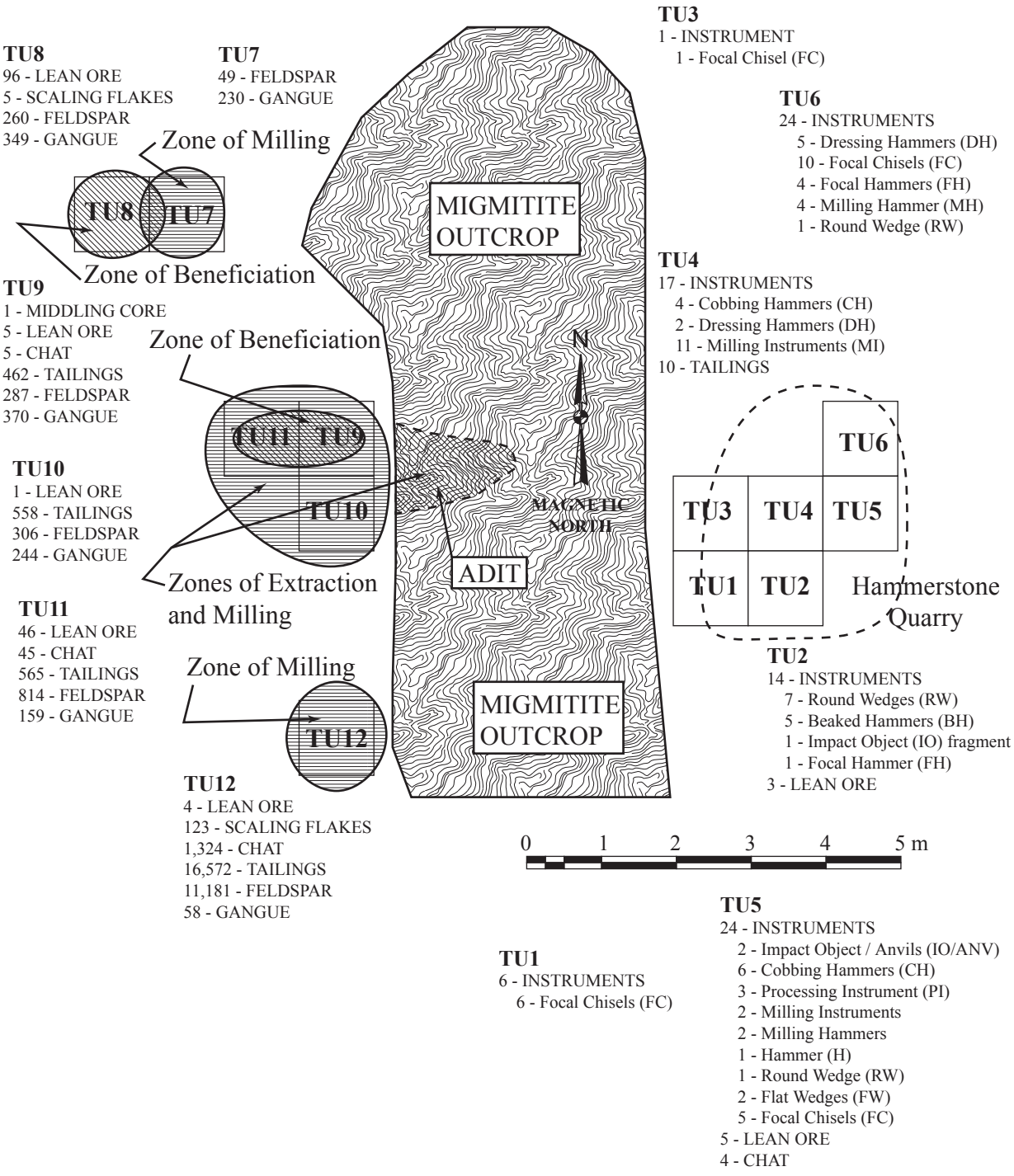
Lean ore, from Level 1, Stratum II of Cluster 2. with enlarged area showing quartz, feldspar, and migmitite mixture (note: grid is 1 inch square, or 2.54 cm square).



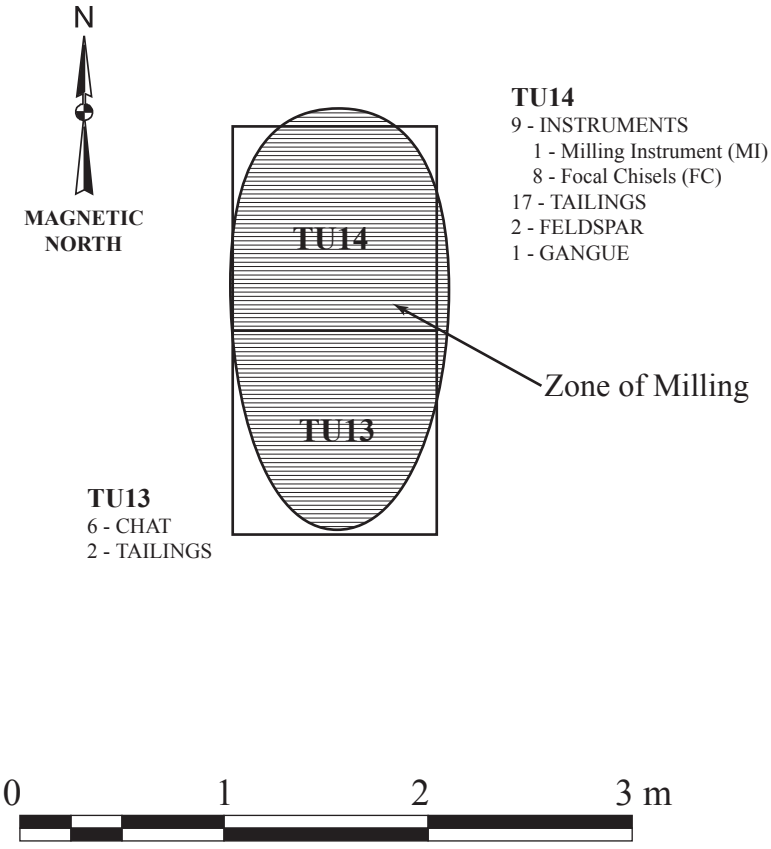
Instruments from excavations at Level 2, Stratum II of TU14 at Cluster:
(a) milling instrument fragment; and (b) focal chisels (note: grid is 1 inch square, or 2.54 cm square).



Cluster 1, Stratum II, zones of activity in relation to the quartz bearing outcrop (Q17) and artifact distribution.



Cluster 2, northern units (TU1-TU12), Stratum II,
zones of activity in relation to the adit (Q18) and artifact distribution.



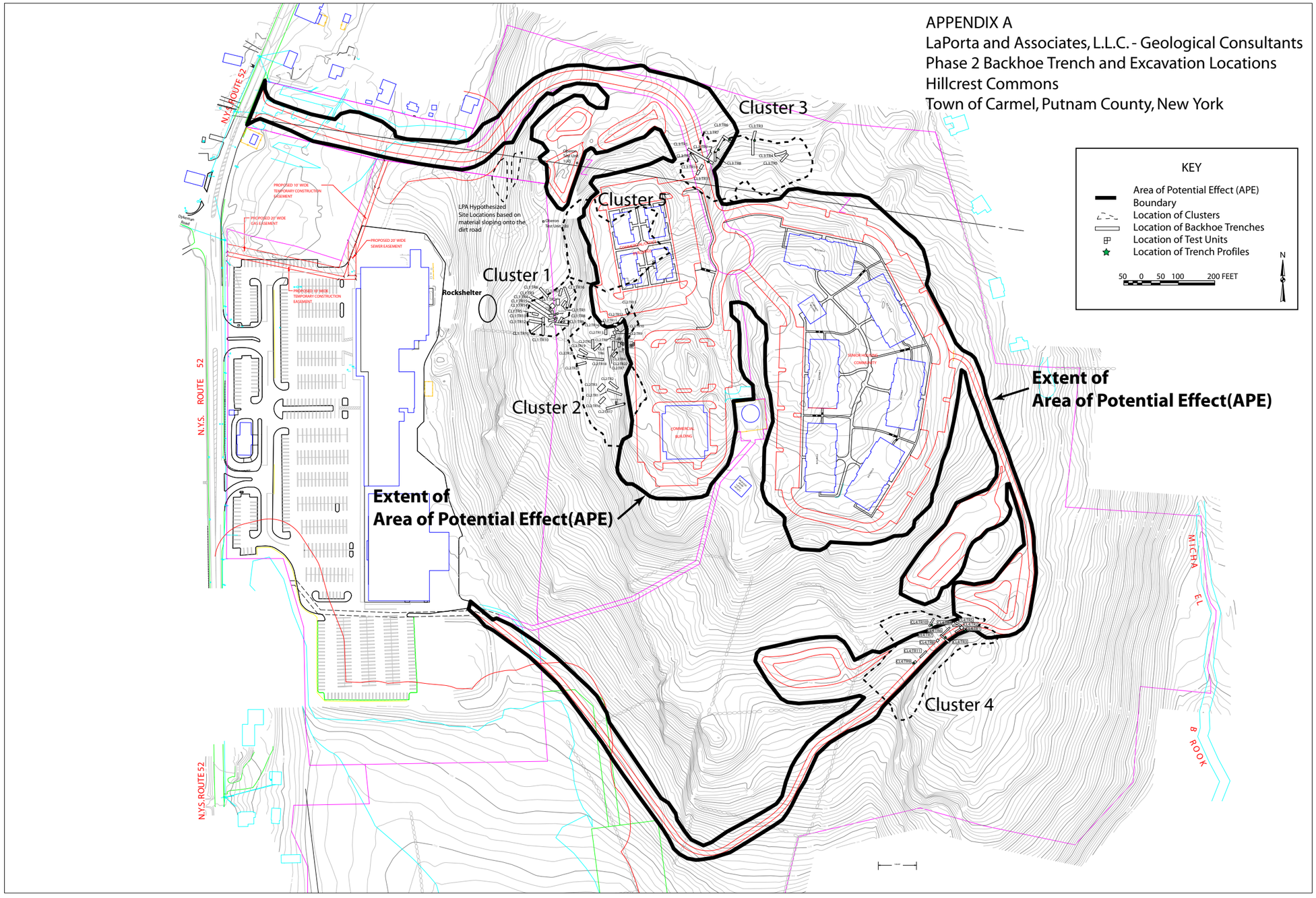
Cluster 2, southern units (TU13-TU14), Stratum II, zones of activity and artifact distribution.

APPENDIX A

HILLCREST COMMONS PHASE II PROJECT MAP

(larger version available, in PDF format, on accompanying CD)

APPENDIX A
LaPorta and Associates, L.L.C. - Geological Consultants
Phase 2 Backhoe Trench and Excavation Locations
Hillcrest Commons
Town of Carmel, Putnam County, New York



APPENDIX B

COLUMBIA HERITAGE PHASE IA REPORT

AND

COLUMBIA HERITAGE PHASE IB/II REPORT

TIM MILLER ASSOCIATES, INC.
*10 North Street, Cold Spring, New York 10516 * Telephone (845) 265-4400 * Fax (845) 265-4418*

FAX COVER SHEET

Date: 1/3/07 **Number of Pages Including Cover :** 16

Sender: Jared **Job Number:** 0373

To:	Name/Firm	Fax Number
1.	Tim LaPorte	9[illegible]-9988
2.	Seb Post Wilan-Baker	(914) 909-7328
3.		
4.		
5.		
6.		

Comments/Contents of Transmittal

Attached Phase 1A report + Phase 1B end of field letter, as prepared by Steve Osborn.

c:

PHASE IA CULTURAL RESOURCES SURVEY
SITE ASSESSMENT PHASE
PROPOSED HILLCREST COMMONS DEVELOPMENT
TOWNS OF CARMEL AND KENT, PUTNAM COUNTY, NEW YORK

Prepared for
Tim Miller Associates, Inc.
10 North Street
Cold Spring, New York 10516

Prepared by
Stephen J. Oberon
Columbia Heritage, Ltd.
56 North Plank Road - Suite 287
Newburgh, New York 12550

Report CA487A-1-11-04
November 2004

TABLE OF CONTENTS

INTRODUCTORY SUMMARY

Development of a retail center is proposed for an approximately 108-acre (43.7-hectare) parcel located in the northeastern part of the Town of Carmel and the southernmost portion of the Town of Kent in central Putnam County, New York. The topography of the affected area ranges from flat to gently sloping land adjacent to a small stream in the west to very steeply sloping upland formerly devoted to pasture in the central and eastern portions.

A Phase IA site assessment study was carried out in September and October 2004 to evaluate the potential for proposed construction to cause impact to standing or buried Native and/or European American era cultural resources. Based on known settlement patterns associated with these two occupations, documented cultural resources in the immediate vicinity of the parcel, and a walkover of the property to identify subareas of greater and lesser archaeological sensitivity, the flatter, western portions of the affected area were considered to have an above-average potential for containing buried Native American cultural remains. The study area is seen as unlikely to contain structural remains and cultural features related to the early European American era occupation of the area, based on the apparent use of the property for agricultural and pastoral purposes since the arrival of settlers in this area. An exception to this assessment was noted for the small portion of the affected area located adjacent to NYS Route 52, a road dating from at least the first half of the nineteenth century, where a potential was identified for structural remains and associated cultural features pertaining to early buildings that might have been razed prior to the publication in the mid-century decades of maps depicting individual buildings.

As part of the Phase IA study, standing structures adjacent to and within view of the study area were evaluated with regard to meeting minimum age requirements for inclusion on the State and National Register of Historic Places. No such structures were identified.

Based on these findings, a Phase IB site identification survey was recommended for subareas identified as having an elevated potential for containing archaeological remains to determine whether buried cultural resources might be present within the proposed construction zone.

PHASE IA SITE ASSESSMENT STUDY

PROJECT BACKGROUND

The study area encompasses approximately 108 acres (43.7 hectares) of flat to moderately to very steeply sloping terrain in central Putnam County, in southeastern New York. The parcel lies in the northeastern portion of the Town of Carmel and extends into the southern portion of the Town of Kent, just east of the hamlet of Carmel, the West Branch Reservoir and Lake Gleneida, and some 0.8 miles (1.3 kilometers) south-southwest of Lake Carmel. The property is bounded on the west by NYS Route 52, on the east by Michael Brook and on the north and south by open land and nucleated development north of Fair Street. The Middle branch of the Croton River flows approximately 0.8 miles (1.3 kilometers) to the east and the channel of the West Branch of the Croton River, now dammed to form the West Branch Reservoir, was located some 1.4 miles (2.3 kilometers) to the west.

Development of a retail complex is proposed for the western portion of the property adjacent to NYS Route 52, consisting of two large commercial buildings and one smaller commercial structure adjacent to the highway, along with parking facilities, islands, and internal access drives. A water tank owned by the Town of Carmel stands in the center of the property and an access road connecting it to NYS Route 52 crosses the northern portion of the study area. A 20-foot (6.1-meter)-wide easement will run south and west from the tank to connect it with the retail center.

The development adjacent to the study area along NYS Route 52 consists of a mix of retail stores and other commercial outlets, small service businesses and offices, while the areas adjacent to the Michael Brook and Fair Street, as well as just north of the property line are populated mainly by single-family residences dating from the middle and later decades of the twentieth century. This mix of structures is typical for this portion of Putnam County, which includes a growing suburban residential component, made up mostly of single-family houses and an expanding service sector to provide for their needs.

The proposed residential development site is located in the Hudson Hills portion of the New England Upland region of New York State. Also known as the Highlands of the Hudson, this subdivision is composed of crystalline rocks and its surface has been eroded by running water to form a rather rugged terrain, with the tops of hills reaching 1000 feet (304 meters) above the Hudson River. The portion of Putnam County in which the study area is located is characterized by igneous and metamorphic rocks and lies a short distance from limestone formations to the east and west, and contains shallow acid soils on glacial till in elevated subareas with well-drained to poorly-drained lower subareas adjacent to and overlooking Lake Gleneida and Michael Brook and its tributaries (Thompson 1966: Figs. 8 & 33).

As noted above, the ground surface of much of the study area consists of moderate to steep slopes, with flatter areas along NYS Route 52, where most development impact is proposed. This former agricultural setting is populated by young forest growth, scrub vegetation and some mature trees. Proposed development will skirt existing buildings in the area, none of which lie within the affected area.

This Phase IA site assessment study was performed in September and October 2004 by Stephen Oberon, serving as Principal Investigator, assisted by Kim Croshier, using the resources of the Newburgh Free Library, the New York State Museum, the New York State Office of Parks, Recreation and Historic Preservation, the New York State Library, and the New York State Archives in Albany. A walking reconnaissance of the study area was carried out by the Principal Investigator, during which the relative archaeological potential of the various subareas was assessed, any prior disturbance and other factors likely to reduce such potential were noted, along with any structures that have a view of the proposed development that meet minimum age requirements for inclusion on the State and National Register of Historic Places.

CULTURAL BACKGROUND AND SENSITIVITY ASSESSMENT

As mentioned, the study area consists flat to moderately sloping lower western portions, crossed by a small tributary of Michael Brook, to steeply sloping upland terrain formerly used for pasture. Dry-laid field stone farm walls delineate steeper subareas, pasture limits and property lines in this higher portion of the property. Most of the development site is populated by young forest and scrub vegetation, with some mature trees, particularly in former hedge rows.

No structures stand within the area for which construction is proposed. Reconnaissance noted no structural remains or anomalies likely to indicated the presence of buried structures or other cultural features.

Historic Structures

A search of the site files maintained by the NYS Office of Parks, Recreation and Historic Preservation in Albany indicated no structures currently listed, nominated or determined eligible for listing on the National Register of Historic Places located in the vicinity of the study area. No buildings that meet the minimum age requirements for listing were identified adjacent to or with a view of the proposed development.

Native American Era

Three sites of Native American occupation are listed in State Historic Preservation Office and New York State Museum (NYSM) files for this portion of the Croton River drainage within one and one half miles (2.4 kilometers) of the study area. Carmel Corporate Site 1 (OPRHP Site AO79-01-0064), described as a workshop, is located approximately 1.4 miles (2.3 kilometers) south of the study area. Carmel Corporate Site 2 (OPRHP Site AO79-01-0065), a camp and workshop associated with the Late Archaic Sylvan Lake culture (c. 2500-1500 BC) and determined to be eligible for listing on the National Register of Historic Places, is situated some 1.7 miles (2.7 kilometers) south of the study area. Carmel Corporate Site 3 (OPRHP Site AO79-01-0066), also described as a workshop and affiliated with the Late Archaic Vosburg and the succeeding Sylvan Lake culture (c. 2800-1800 BC) and also determined to be National Register-eligible, lies roughly 1.6 miles (2.6 kilometers) to the south of the study area, some 1000 feet (300 meters) east of Site 2.

Other sites documented in the Croton River drainage and in other nearby locations confirm the presence of aboriginal inhabitants in what is now Putnam County from the Archaic through the Late Woodland periods, spanning a time from approximately 4000 BC through the arrival of Europeans around AD 1680. In assessing the potential for Native American presence in the vicinity of the affected area, it must also be remembered that this area has never had the benefit of a systematic professional archaeological survey. Many sites identified by other means are encountered unexpectedly during construction of roads, railroads or buildings, and through the clearing and cultivation of agricultural fields. Few investigations of specific areas for which some

type of development or construction project is proposed, such as is represented by the present survey, have been conducted in the vicinity of the study area (LoRusso 1985; Hartgen 2000; Gimigliano 1995; Wiegand 2000; Oberon 2001, 2003). As a result, the number and range of Native American occupation sites present in this part of the towns of Carmel and Kent are likely to be underrepresented in the site files with regard to both temporal and spatial distribution.

The potential must therefore be recognized for better-drained, flatter portions of the study area, to have seen what would most likely have been seasonal occupations by small groups exploiting the riverbank environment just to the west. Occupations of such locations would most likely have been a component in the seasonal patterns of movement that characterized indigenous populations through at least the Archaic and Transitional periods, although small seasonal occupation and observation sites were also present during later times. The vistas provided by the upland portions of the study area may have provided observation points useful for hunting and defense. The water resource provided by the pond just to the north of the study area, known today as Palmer Lake, which is the source of the small stream that flows across the western and southern portions of the property on its way to join Michael Brook, may also have been attractive to the indigenous inhabitants of the area.

As noted, Native American archaeological remains likely to be present in the study area would probably consist of small, seasonally occupied camps that would have supported small numbers of people for short periods of time, probably on a recurring basis. Cultural remains associated with such sites typically are sparse, shallow and spatially restricted, although they may include hearths, storage pits and/or traces of structures. Larger sites may also include extensive refuse deposits and fortifications. Exposed veins of lithic resources suitable for the manufacture of stone tools, and rock formations such as caves and overhangs that could provide shelter, are also likely to have attracted the indigenous population of the area, as are certain natural phenomena, such as springs and unique rock formations, that would have held religious significance. The potential for the presence of Native American cultural remains pertaining to small, seasonally-occupied camps or observation sites during any of the time periods during which this region saw human occupation may be seen to exist within the study area, along with rock shelters. Reconnaissance revealed no exposed lithic resources useful in the manufacture of stone tools, but systematic observation during minimum leaf conditions would be needed to confirm this finding.

European American Era

European American era settlement of the portion of what are now the Town of Carmel and the southern portion of the Town of Kent in which the study area is located dates to the early decades of the eighteenth century. Early development focused around crossroads and locations with sufficient water power to drive small mills that served the surrounding area. The hamlet of Carmel was such a settlement, situated at the intersection of major east/west and north/south roadways and adjacent to Lake Gleneida and served as the county seat. Typical of the region, these small service centers catered to the needs of the outlying population, who occupied farmsteads scattered along early roadways. Development of Carmel was focused along the major roadways and the lake, with the scattered rural settlement pattern characterizing areas immediately outside the hamlet in each direction.

Two documented archaeological sites pertaining to this period of occupation are present within one and one half miles (2.4 kilometers) of the study area. A cellar hole associated with a former tenant house on the Dykeman farm (OPRHP Site AO79-01-0062) is located approximately 0.9 miles (1.4 kilometers) to the east of the eastern limits of the study area. West Branch Reservoir Dam #1 (OPRHP Site AO79-01-0038), determined eligible for listing on the National Register of Historic Places, was identified some 1.3 miles (2.1 kilometers) to the southwest of the limits the project property. Nineteenth century maps of the area depict no structures within the study area, which is located north of the nucleated settlement of Carmel and across what is now NYS Route 52 from the Raymond cemetery (O'Connor 1854; Beers 1867).

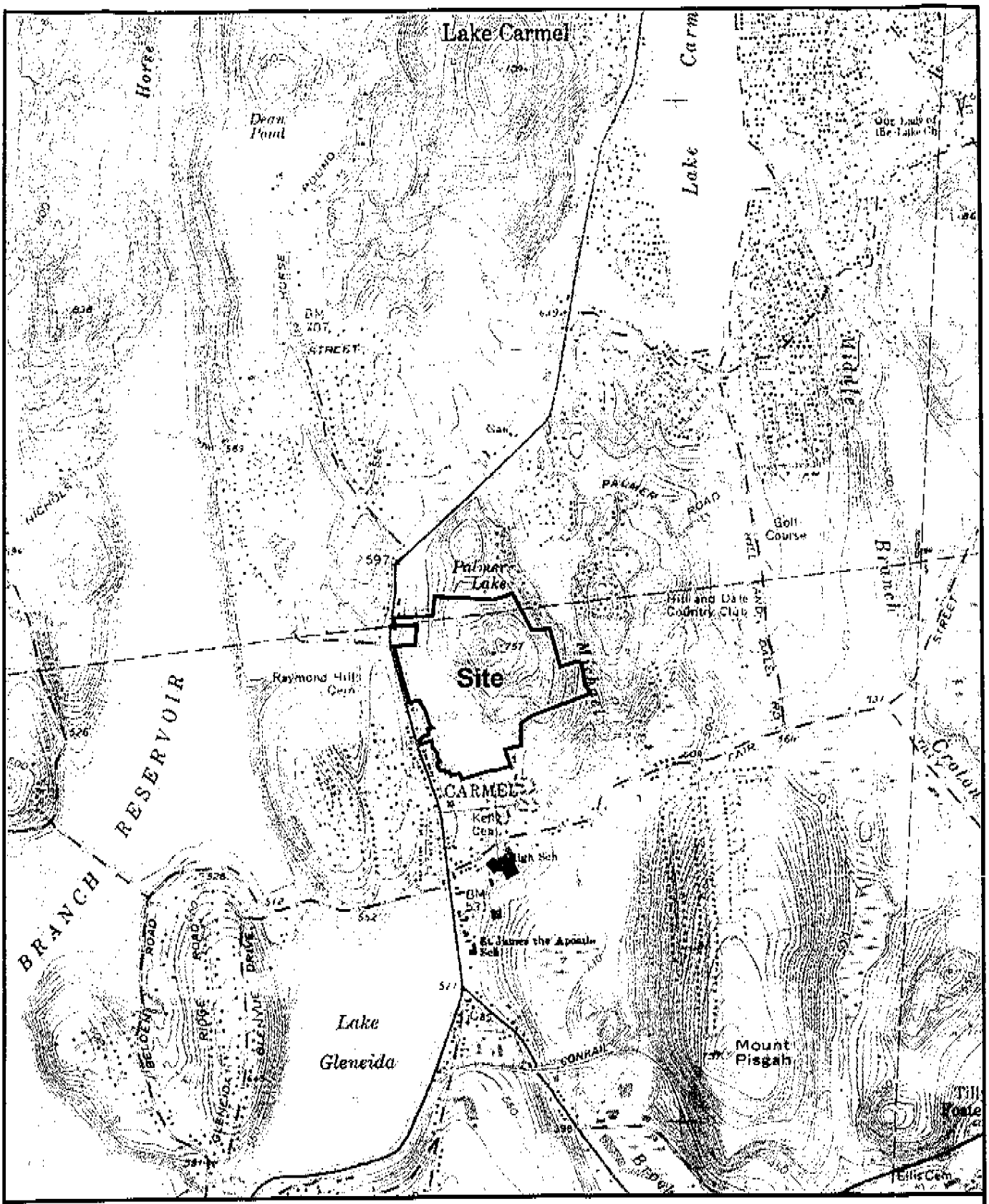
Based on known European American era settlement patterns, a walking reconnaissance of the property and a search of historical texts and maps, a below average potential is assessed for buried cultural remains pertaining to this period of occupation to be present within most of the study area. However, since the area was settled well before the publication in 1854 of the first maps depicting individual structures, a potential must be recognized for the presence of remains of early buildings that stood along major north/south highway, today known as NYS Route 52, that were razed prior to 1854. The portion of the study area adjacent to NYS Route 52 would therefore be considered to have a higher potential for the presence of buried European American era cultural remains.

RECOMMENDATIONS

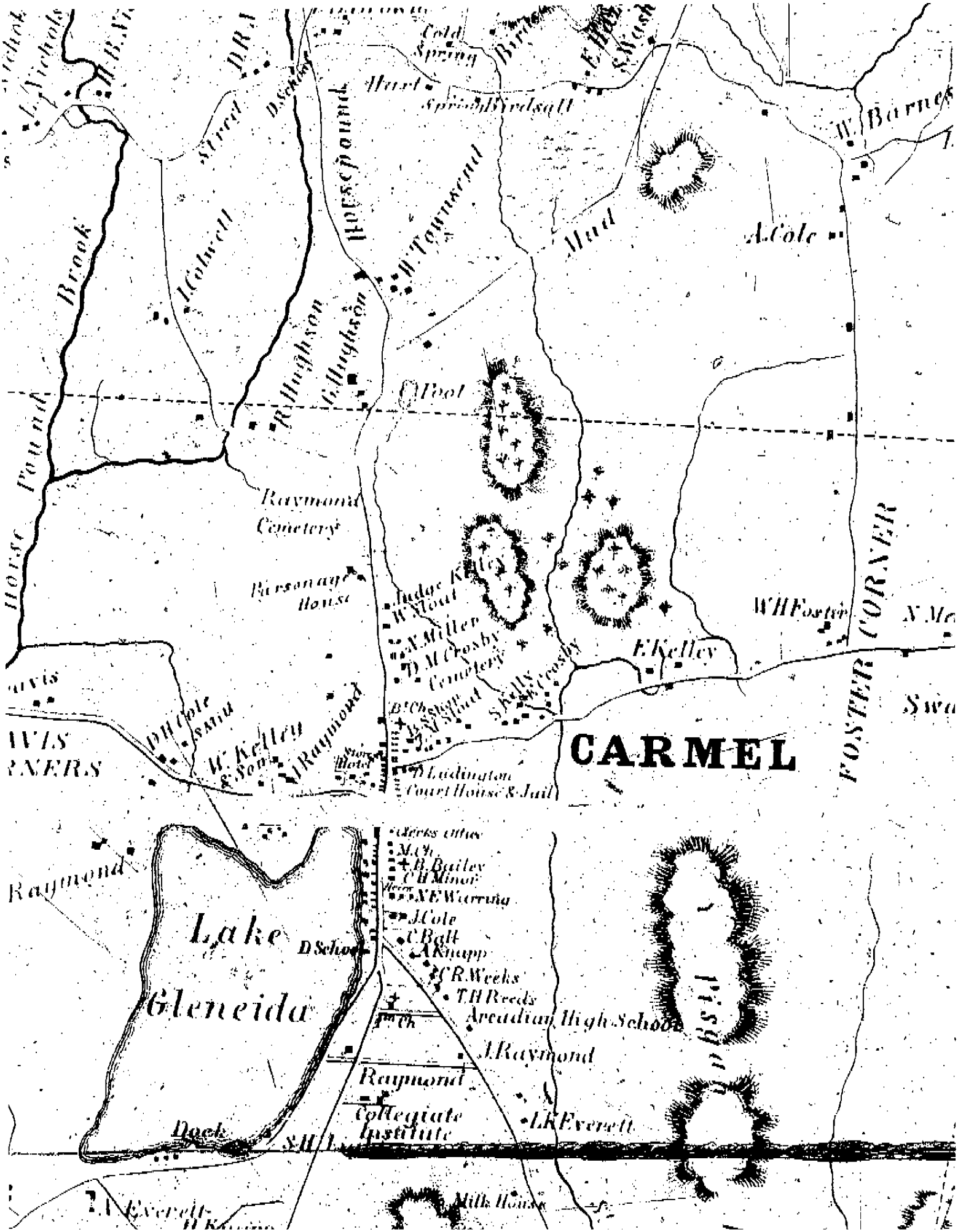
A Phase IB site identification survey consisting of subsurface archaeological sampling is recommended for the flatter portions of the affected area, as such locations in this physiographic setting must be considered to have an above-average potential for the presence of buried Native American cultural remains, as well as any rock shelters and outcrops of lithic resources useful in the manufacture of stone tools identified during systematic reconnaissance under minimum leaf conditions in portions of the property to be affected by proposed development.

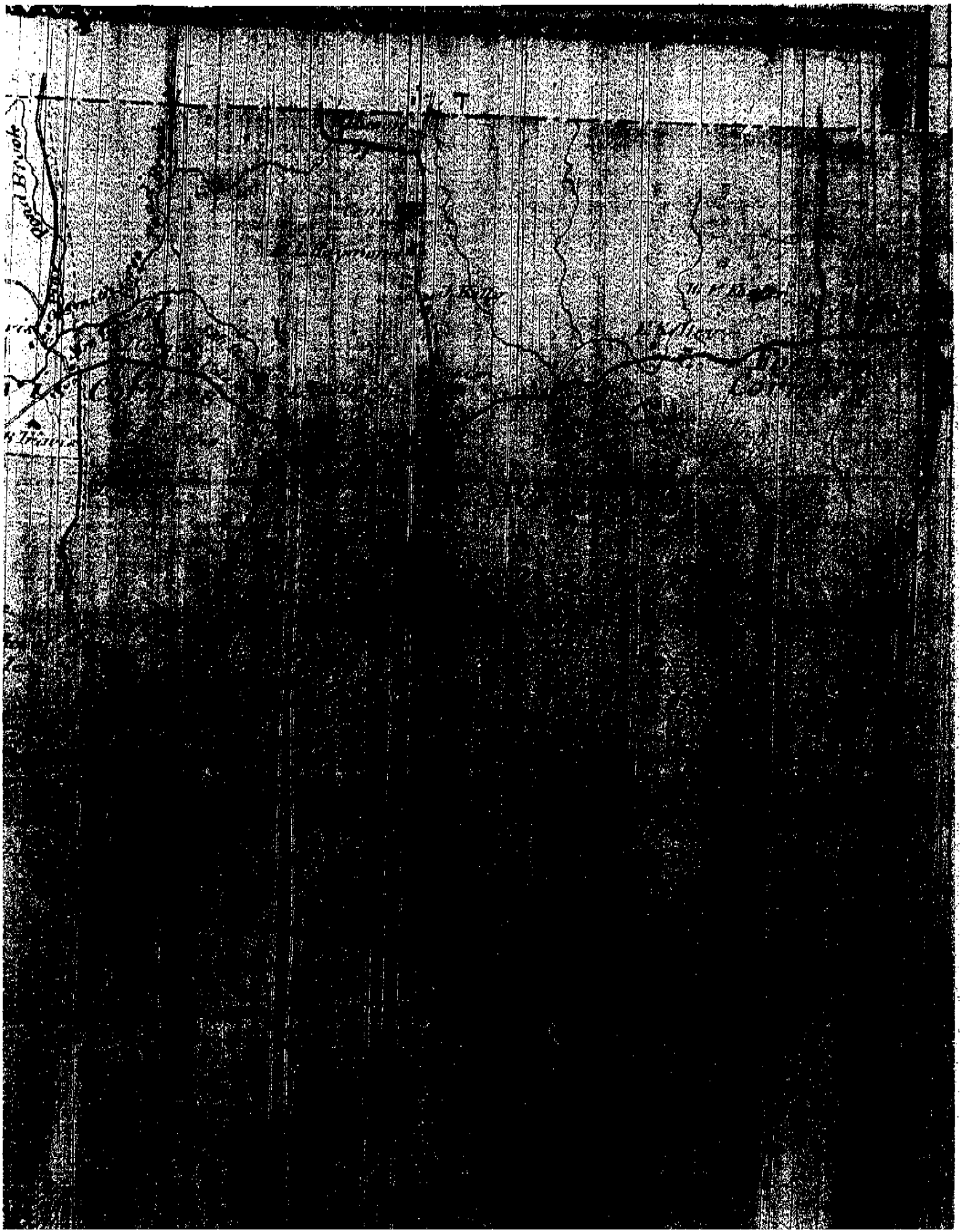
A below average potential was assessed for the presence of buried European American era cultural remains, with the exception of the portion of the affected area adjacent to NYS Route 52. In this westernmost subarea, subsurface sampling of locations to be affected by development that contain upper soils is recommended.

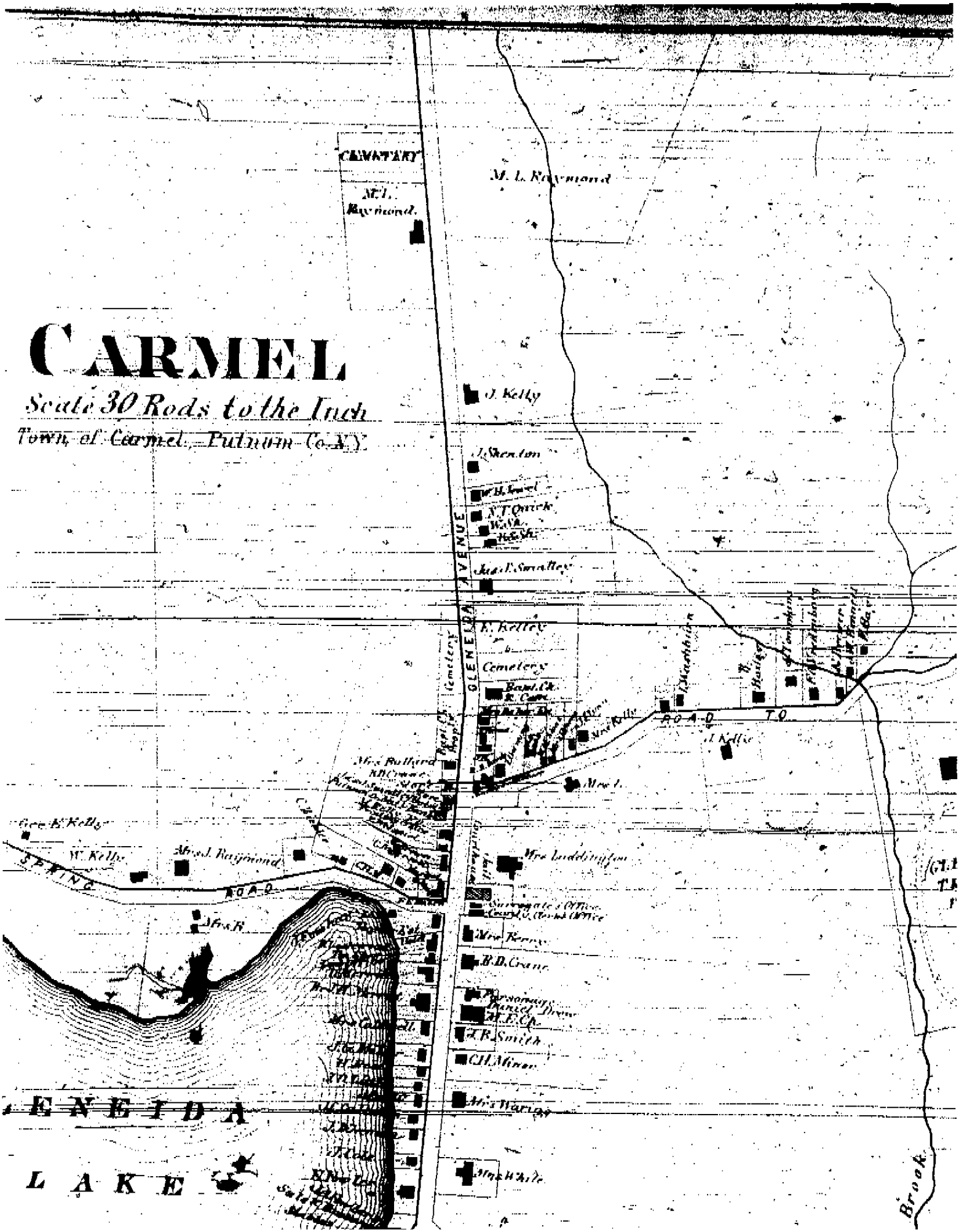
This Phase IB survey should employ sampling methods adequate for detecting traces of the small, seasonally occupied camps likely to occur in this physiographic setting, as well as any deposits associated with early European American era cultural activity areas and structures, as well as any larger occupation sites and/or activity areas that might be present.



Location Map
Hillcrest Commons
Towns of Carmel & Kent
Putnam County, New York
Source: USGS Topographic Map, Lake Carmel Quad
Scale: 1" = 2,000'







COLUMBIA HERITAGE, LTD.
56 NORTH PLANK ROAD - SUITE 287
NEWBURGH, NEW YORK 12550

26 May 2005

Mr. Tim Miller, AICP
Tim Miller Associates, Inc.
10 North Street
Cold Spring, New York 10516

Re: Phase IB Cultural Resources Survey
Hillcrest Commons Development
Towns of Carmel and Kent, Putnam County, New York
Report CA487B-1-5-05

Dear Mr. Miller:

This end-of-field letter will confirm that we have completed our Phase IB cultural resources survey for the referenced development site and will briefly summarize our findings and recommendations.

After completing a Phase IA site assessment study to evaluate the potential for project impact to cultural remains on the property, we carried out a Phase IB site identification survey to determine whether any buried cultural resources are present within the areas proposed for development. Subareas identified as having an above-average potential for containing buried cultural resources pertaining to the Native and/or European American eras of occupation were sampled by means of screened hand-dug shovel test holes systematically placed in a grid pattern at intervals considered appropriate by state reviewers. Slopes of steeper than 12 percent and areas that had seen serious prior disturbance to upper soils were excluded from the sampling universe.

Evidence of Native American activity in the form of quartz tools, cores, reduction flakes and culturally modified fragments, as well as several examples of culturally modified chert, were encountered in three subareas of the proposed development site: the south-central portion, the northeastern portion and adjacent to a series of bedrock overhangs near the southern limits of the proposed development. This indicates that at least the processing of lithic resources and stone tool manufacture were being carried out at these locations. No temporally or culturally diagnostic items were found to indicate the time period (s) during which this activity took place or identify the culture(s) involved.

No early European American era cultural material was encountered in Phase IB sampling, and proposed development in other portions of the property is seen to have no effect on cultural remains. No further archaeological investigation is recommended for these areas.

Greater relative density of cultural items is usually an indication of more focused cultural activity. Such areas are in turn seen to have a greater potential for containing significant cultural information. Current OPRHP policy would require that the three subareas of the parcel where archaeological sites were identified be more intensively investigated as part of a Phase II site evaluation study. The goal of this effort would be to better define the limits of the cultural deposit and more clearly establish the locations of subareas of increased artifact density. Such subareas would then be subject to more limited but focused sampling so that their potential significance can be evaluated by state reviewers.

Our final Phase I report will present our Phase IB findings in greater detail. Do not hesitate to contact me if you or your client have any questions in the interim.

Sincerely,

Stephen J. Oberon
Principal Investigator

TIM MILLER ASSOCIATES, INC.
*10 North Street, Cold Spring, New York 10516 * Telephone (845) 265-4400 * Fax (845) 265-4418*

FAX COVER SHEET

Date: 3/2/07 **Number of Pages Including Cover:** 15

Sender: Tim Miller **Job Number:** 0373

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Comments/Contents of Transmittal

c:

PHASE IB AND PHASE II CULTURAL RESOURCES SURVEY SITE IDENTIFICATION AND SITE EVALUATION PHASES PROPOSED HILLCREST COMMONS DEVELOPMENT TOWNS OF CARMEL AND KENT, PUTNAM COUNTY, NEW YORK

Prepared for
Tim Miller Associates, Inc.
10 North Street
Cold Spring, New York 10516

Prepared by
Stephen J. Oberon
Columbia Heritage, Ltd.
56 North Plank Road - Suite 287
Newburgh, New York 12550

Report CA487BC-2-2-07
February 2007

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PHASE IB SITE IDENTIFICATION SURVEY

RESEARCH DESIGN

The Phase IA site assessment performed for this study area identified a potential for buried Native American cultural remains to be present within the portion of the proposed approximately 108-acre (43.7-hectare) development site that is to be developed as ~~a retail and~~ residential ~~center~~. This assessment was based on the proximity of known Native American occupation in this part of the Town of Carmel and adjacent edge of the Town of Kent, along with the results of a site reconnaissance that noted the presence of bedrock outcrops that might have served as rock shelters the fact that better-drained lands, even in an upland setting and away from a reliable source of water, are known to have been attractive to indigenous inhabitants of the region for special purpose use, typically seasonal basis.

Flatter, better-drained locations near a water source have been found to have been preferred by indigenous populations in the Northeast for occupations ranging from small camps to villages. In times of turmoil, defensive considerations were added to these criteria. Steeply sloping and poorly drained areas or wetlands would generally be seen as of low potential for the occurrence of Native American cultural resources. Upland areas such as the parcel under consideration here are known to have attracted indigenous people in small numbers and for very limited periods of time to take advantage of available vistas for hunting and defensive purposes and to provide access to such lithic and other exploitable resources as might be accessible. This preference for the location of occupation sites on flatter terrain would not preclude cultural activity in steeply sloping areas where lithic resources suitable for the production of stone tools would have been accessible to indigenous populations and/or where rock overhangs and caves that could have served as shelters are present. This particular parcel provides dramatic views to the west, southwest and south and, as noted above, contains bedrock outcrops that might have served as shelters from the elements while other activities were being performed.

Although poorly-drained areas would seldom be expected to contain habitation sites, the more elevated, better-drained peripheries of such places are likely to have been selected for camps from which the plant and animal resources of the wetter areas would be exploited. Such camps would have served as temporary habitation sites and locations where food was prepared, tools completed and repaired, and animal resources processed (i.e., skinned, butchered, smoked, dried) after being procured nearby.

Smaller sites, which predominate prior to the later Woodland Period and continue to occur during this time, are known to have been occupied by indigenous populations in conjunction with what was usually a seasonal exploitation of plant and animal resources. Generally, such camps would be inhabited for short periods of time, although such episodes of occupation are known to have continued on a regular basis over many centuries.

The Office of Parks, Recreation and Historic Preservation inventories of reported archaeological sites list three known sites of Native American occupation of this part of the Michael Brook and Croton River drainages within one and one half miles (2.4 kilometers) of the study area. Carmel

Corporate Site 1 (OPRHP Site AO79-01-0064), described as a workshop, is located some 1.4 miles (2.3 kilometers) south of the study area. Carmel Corporate Site 2 (OPRHP Site AO79-01 -0065), a camp and workshop associated with the Late Archaic Sylvan Lake culture (c. 2500 -1500 BC) and determined to be eligible for listing on the National Register of Historic Places, is situated some 1.7 miles (2.7 kilometers) south of the study area. Carmel Corporate Site 3 (OPRHP Site AO79-01-0066), also described as a workshop and affiliated with the Late Archaic Vosburg and the succeeding Sylvan Lake culture (c. 2800-1800 BC) and also determined to be National Register-eligible, lies roughly 1.6 miles (2.6 kilometers) to the south of the study area, some 1000 feet (300 meters) east of Site 2.

Other sites documented in the Croton River drainage and in other nearby locations confirm the presence of aboriginal inhabitants in what is now Putnam County from the Archaic through the Late Woodland periods, spanning a time from approximately 4000 BC through the arrival of Europeans around AD 1680. In assessing the potential for Native American presence in the vicinity of the affected area, it must also be remembered that this area has never had the benefit of a systematic professional archaeological survey. Many sites identified by other means are encountered unexpectedly during the construction of roads, railroads or buildings, and through the clearing and cultivation of agricultural fields. Few investigations of specific areas for which some type of development or construction project is proposed, such as is represented by the present survey, have been conducted in the vicinity of the study area (LoRusso 1985; Hartgen 2000; Gimigliano 1995; Wiegand 2000; Oberon 2001, 2003). As a result, the number and range of Native American occupation sites present in this part of the towns of Carmel and Kent are likely to be underrepresented in the site files with regard to both temporal and spatial distribution.

A potential must therefore be recognized for better-drained, flatter portions of the study area, to have seen what would most likely have been seasonal occupations by small groups taking advantage of the vistas to the east, southeast and south, making use of available rock shelters and associated flatter locations, and/or exploiting locally-available lithic resources. The occupation of such places would is likely have been a component in the seasonal patterns of movement that characterized indigenous populations through at least the Archaic and Transitional periods, although small seasonal occupation and observation sites were also present during later times. The vistas provided by the upland portions of the study area may have provided observation points useful for hunting and defense. The water resource provided by the pond just to the north of the study area, known today as Palmer Lake, which is the source of the small stream that flows across the western and southern portions of the property on its way to join Michael Brook, may also have been attractive to the indigenous inhabitants of the area.

isn't this a man made pond?

Human presence in this area may there be seen to have persisted from at least the Late Archaic through the Late Woodland period and on into the era of European American settlement during the later seventeenth and eighteenth century. Archaeological deposits present here could therefore date anywhere within a time frame extending from approximately 4000BC through AD 1680. Based on this information, the temporal and cultural affiliation of Native American era cultural remains that might be expected to occur in this part of what is now the townships of Carmel and Kent could represent any and all but the earliest phases of human culture in this region.

As mentioned above, occupation through at least the Middle Woodland Period was considered likely to have occurred on a seasonal basis and to have usually been associated with the exploitation of nearby plant and animal resources and available lithic deposits. The material remains of sites reflecting such behavior are most likely to be sparse, shallow and spatially restricted, although deeper cultural features and remains of structures may be present. Larger sites, usually pertaining to Woodland period occupations, may include deep refuse deposits, remains of more substantial structures and defensive constructions, such as stockades.

Reconnaissance encountered no structural remains other than dry-laid stone field walls and no visible surface anomalies that might indicate prior construction on or use of the affected area for other than farm-related purposes. Only localized disturbance of upper soils resulting from deep soils testing was noted within the area to be affected by proposed construction.

Because this part of Putnam County has seen European American era occupation since the turn of the eighteenth century, a general potential is noted for the presence of remains of very early structures and activity areas, particularly along early roadways, in whose proximity early buildings were usually constructed. Like smaller Native American sites, the archaeological remains of early buildings that were abandoned prior to the publication of area maps showing individual structures, eighteenth century military activity, and cultural features associated with such sites would be likely to be spatially restricted and characterized by sparse cultural material quite shallow in vertical extent and occurring near the ground surface in areas not characterized by stream or erosion deposition. Although what is now known as NYS Route 52 dates from the early period of European American settlement, only the western end of the proposed entrance drive approaches this roadway. Upland settings of this type were not typically selected for construction of residences prior to the Civil War era and area maps dating back to the middle decades of the nineteenth century depict no structures for the vicinity of the study area. The potential for project impact to European American era cultural remains was therefore considered below average. Nonetheless, methods selected for archaeological field investigation would need to be sensitive enough to detect the presence of smaller Native and European American era sites characterized by relatively sparse cultural material, as well as larger occupations.

METHODOLOGY

The affected area consists of flat to gently, moderately and steeply sloping upland forest apparently used in the past as pasture land, bordered on the west and southwest by steep slopes descending to the wetlands that border NYS 52. The development site is populated mostly by young forest growth and scrub vegetation, with grassy subareas in clearings. Surface rock is ubiquitous.

A subsurface archaeological sampling plan was developed that called locations within the affected area to be archaeologically sampled by means of hand-dug shovel test holes executed in a grid pattern and placed at intervals of approximately 50 feet (15 meters), with adjustments in spacing made as required to follow topographic features or avoid obstacles such as large trees, surface rock, and zones of obvious prior serious upper soil disturbance. Test holes roughly 24 inches (60 centimeters) in diameter would be dug using small hand tools and their contents would be screened through 1/4-inch (6.25-millimeter) hardware cloth to facilitate the recovery of smaller cultural items. Shovel tests would be dug by natural soil levels and would extend into culturally sterile subsoil.

Any Native American era cultural items recovered would be marked with a numbered pin flag and their location later recorded on the project map along with that of other sampling units. Any relative concentrations of pre-World War II European American era material that might be encountered would also be marked for further investigation. Any isolated locations that produced Native American cultural material or a relative concentration of European American era items would be more intensively sampled by means of eight additional shovel tests placed at 10-foot (3-meter) intervals at cardinal points around each find spot to determine whether a likely site of cultural activity or a stray find was indicated. Locations where a greater number of positive test holes occurred would be designated for close-interval sampling as part of a Phase II investigation. To facilitate record keeping. the affected area would be divided into seven sampling sectors, each given an alphabetic designation, based on physiographic features such as intervening ridges, rock outcrops or steep slopes. Test holes would be laid out in roughly parallel transects aligned cardinally or intercardinally as topography permitted. Test holes would be numbered sequentially within each sampling sector.

Such methods are considered adequate for detecting traces of smaller Native American camps, special purpose sites and early Euro-American era sites as well as any larger Native or European American era occupations that might be present. Testing as outlined would be less efficient in identifying the remains of structures such as wells and very small buildings, such as privies, which are less likely to be detected by the 50-foot (15-meter) interval. Since the vicinity of small buildings is usually characterized by some scatter of cultural material, it was hoped their presence would at least reveal this more concentrated presence of cultural items, which would in turn lead to the identification of these features and/or structural remains during the more intensive investigation that follows initial identification. Potential rock shelter sites would be individually tested within or outside the designated sampling sectors, as required.

Assessment of soils present within the affected area, which were found to contain gravels and rocky glacial deposits on or just beneath the ground surface, indicated a low potential for the presence of classic deeply buried potential culture-bearing soils. The uneven topography pointed to the likelihood of localized downslope deposition of colluvium.

FIELD INVESTIGATION

Phase IB field investigation of the proposed development site was performed in April and May 2005 under good to excellent field conditions, with moderate temperatures between 50 and 65 degrees Fahrenheit (10 and 18.3 degrees Centigrade) and little to no precipitation. Ground visibility both in areas populated by grasses and in zones of scrub and young forest was generally poor due to the density of growth and the presence of root and leaf mat. Soils were found to be dry to slightly damp in areas sampled. Phase IB field investigation was performed by the Principal Investigator assisted by Archibald Miller, Michael Dreadley, John Lott and Jaking Lott.

As outlined in the preceding section, shovel test transects were laid out and executed across the portions of the affected area not characterized by slopes greater than 12% or surface rock. The parcel was divided into seven sampling sectors, each given an alphabetic designation to facilitate record keeping and communication. The lengths and alignments of the transects varied to accommodate the topography and configuration of the various subareas of the project parcel, and to avoid obstacles such as large trees, surface rock and localized prior disturbance, such as from engineering-related deep testing. Test holes were executed using hand tools, measured approximately 24 inches (60 centimeters) in diameter and were placed roughly 50 feet (15 meters) apart. Adjustments in spacing were made to avoid large objects such as trees, and to follow contours or permit the sampling of less steeply sloping subareas along the margins of the affected area. Shovel tests were dug by natural soil levels and were extended into culturally sterile soil. Test hole contents were passed through 1/4-inch (6.25-millimeter) hardware cloth to facilitate the recovery of smaller cultural items and were numbered sequentially within each sampling sector. The sampling sectors progressed generally in a west-to-east direction, with Sector A encompassing the proposed access road to NYS Route 52 and Sector G the southeasternmost portion of the affected area.

Culturally sterile soil varied somewhat across the affected area, consisting yellowish brown loam in the westernmost sampling areas, tan brown to tan to yellowish tan loam or sandy loam with dense coarse, medium and fine gravel, often also with fractured bedrock, under medium to dark brown to dark greyish brown loam, silt loam or sandy loam, with often dense coarse, medium and fine gravel. Upper soils extended to depths ranging between 3.6 and 19 inches (9 and 47.5 centimeters) with deeper upper soils noted in the lower portion of Sector A and shallowest upper soils in the higher elevations and the northwestern and north-central parts of the property. No evidence of a developed plow zone was encountered, indicating this land was rarely plowed and instead was used as pasture and/or as a source of timber. No problems occurred that might have influenced the process or outcome of the Phase IB field investigation.

Archaeological sampling identified no European American items dating to prior to the last decades of the twentieth century. Cultural material associated with the Native American era of occupation was encountered in three subareas: to the northeast of the existing water tower adjacent to bedrock outcrops in the north-central portion of the affected area, and in the west-central part of the project site. Recovered cultural items consisted almost entirely of quartz fragments (apparently) modified by human action, with what appear to represent three initial reduction flakes, along with a hammer. The greatest number of positive shovel tests (6) occurred in the northwestern portion of the project area, which also produced the largest total quantity of cultural items (15). Sampling adjacent to the

possible rock shelter sites encountered a solid floor of fractured bedrock beneath root and leaf mat, possibly representing collapsed overhangs and/or rock face. The bedrock outcrops that contained the possible rock shelter sites were also noted to contain veins of quartz at and a short distance above the ground surface. This, along with the presence of a large quartz cobble in one of the farm walls in the southwestern part of the property, pointed to the potential for quarrying to have taken place within the affected area.

CONCLUSIONS AND RECOMMENDATIONS

Systematic archaeological sampling of portions of the approximately 108-acre (43.7-hectare) proposed development by means of hand-dug screened shovel test holes encountered no evidence of Native American cultural activity in three subareas, consisting of quartz debitage. Minimal traces of European American era occupation were noted, restricted to widely scattered late twentieth century trash in sampling areas nearest NYS Route 52 and the exising water tower located within the project.

Based on these findings, further archaeological investigation is recommended for the vicinity of the locations from which Native American cultural material was recovered in order to clarify the nature and extent of the cultural deposit and gather information that will permit a determination of its likely significance as a cultural resource.

PHASE II SITE EVALUATION STUDY

BACKGROUND AND STRATEGY

A Phase IA site reconnaissance performed for the portions of the proposed commercial development in the northeastern portion of the Town of Carmel and the southernmost portion of the Town of Kent in central Putnam County, New York identified a potential for the presence of buried Native American cultural remains in the flatter portions of the affected area and in the vicinities of bedrock outcrops that might have served as rock shelters, based on the presence of known indigenous occupation sites in this area and because the physiographic character of these subareas are known to have been used by native inhabitants of the region for special purpose sites that exploit the vistas and possible lithic resources. Systematic Phase IB archaeological sampling of these locations encountered evidence of Native American activity in three subareas of the project site, consisting of quartz debitage and a hammerstone.

Based on ORPHP guidelines and the recommendations of the Phase I report, a Phase II site evaluation study was recommended to clarify the spatial extent, nature, and the integrity of the three archaeological deposits, and to permit a determination of their potential for containing significant cultural information.

Relative density of cultural remains is seen as likely to indicate where cultural activity is most likely to have taken place. The subareas characterized by such distribution patterns would be seen as likely to have been associated with more focused cultural activity, which would in turn be considered to give them an elevated potential for containing intact remains of cultural features and/or possible structural remains. Such features are therefore most likely to contain significant cultural information regarding the occupation of the region by indigenous populations. At the same time, it is recognized that some cultural activities are not characterized by lithic debris and that such portions of an occupation site would not be captured by intensive investigation focused only on subareas with highest density of artifacts.

Encountering intact parts of cultural features and/or structural remains could yield significant cultural information about the prehistoric residents of the area, including the nature and size of the occupation, the time(s) of year it occurred, the time period and/or cultural phase with which it was associated, and whether different activities took place here at different times or in different subareas of the site. Locations where storage, processing and preparation of food, the manufacture and storage of tools, and the disposal of discarded items such as food waste and broken tools, took place would be most likely to contain cultural information that can prove useful in adding to existing knowledge regarding life in this part of the Croton River drainage during the Native American era.

As noted briefly above, the goal of the Phase II study was to collect information regarding the spatial extent of the archaeological deposit and to evaluate the quantity and nature of cultural information likely to be present here. On this basis, the Field Services Bureau of the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) would be able to determine eligibility of one or more of the sites for inclusion on the State and National Register of Historic Preservation and thereby the significance of the cultural resources being affected by proposed mining. Based on experience with other sites of this type in the area, it was decided that these goals could best be addressed by means of two field components, implemented progressively.

The first would involve the intensive archaeological sampling of the three subareas from which Native American cultural remains were recovered. Since the inspection of prepared fields was not feasible in this wooded setting, close-interval shovel testing would be carried out in the vicinity the three subareas that were characterized by the presence of cultural material in Phase IB sampling. The close-interval test holes would be placed in a grid pattern at 15-foot (4.5-meter) intervals in the subareas that produced the positive shovel tests.

Based on the relative densities of cultural material encountered in close-interval sampling, following the assumptions regarding the material record of human behavior outlined above, the locations with greater relative artifact density, which appeared most likely to contain the remains of focused cultural activity, would then be further investigated by means of standard archaeological test units to provide a larger sample of the cultural material present, and determine whether intact cultural features such as the remains of fire pits and/or support posts for dwellings, drying racks might be present. As was noted above, since the occurrence of activity areas and related cultural deposits is not restricted to subareas characterized by non-perishable items, at least one test unit would be placed in such "quiet" locations to serve as a control.

FIELD INVESTIGATION

The Phase II site evaluation study was performed in June and July 2005 by the Principal Investigator, assisted by Archibald Miller, Michael Dreadley, Jaking Lott and John Lott. Weather and field conditions were excellent throughout, with temperatures ranging from 75 to 85 degrees Fahrenheit (23.8 to 29.4 degrees Centigrade) and no work being carried out during precipitation. Soils were moderately dry to very dry. Recovered cultural material is stored at the Columbia Heritage repository facility in New Windsor, New York. No problems were encountered that might have adversely affected either component of the Phase II investigation.

As mentioned in the preceding section, one of the goals of the Phase II study was to more intensively investigate the subareas where cultural material had been recovered in order to determine first whether these may be characterized as locations of focused cultural activity. Where the distribution of recovered cultural items indicates such focused behavior is likely to have taken place and/or structural and cultural features are likely to be located, a second goal was to determine the spatial extent of the archaeological deposit and to ascertain whether the cultural features and/or structural remains might be present.

In order to achieve the first goal, it was considered necessary to better understand the distribution of cultural material in the subareas of the property where Phase IB investigation had encountered Native American cultural material. The subareas in question, located in the northwestern, north-central, and and central part of the project parcel, are characterized by young forest growth, scrub vegetation, and clearings populated by grasses. The three subareas just listed were designated Locus 1, Locus 2 and Locus 3, respectively to facilitate record keeping and description.

As outlined previously, the area designated Locus 1 had produced the largest number of positive Phase IB shovel tests and the greatest relative quantity of cultural material. This subarea was now systematically sampled by hand-dug shovel tests placed at 15-foot (5-meter) intervals in a grid pattern bounded by two negative Phase IB tests. Test hole contents were screened through 1/4-inch hardware cloth to facilitate the recovery of smaller cultural items. Close-interval Phase II shovel tests were numbered sequentially, preceded by the prefix "C" to distinguish them from Phase IB sampling.

Twenty-eight additional cultural items related to the indigenous occupation of the region were recovered from nine test holes in this component of the Phase II investigation of Locus 1. The distribution of finds across space is illustrated on the map of Phase II archaeological investigation included in the appendix of this document. All the items recovered during the close-interval sampling consisted of quartz debitage associated with the processing of lithic resources. Twenty six or fully 92.6% of the recovered items consisted of quartz fragments modified by human agency, along with two reduction flakes. Close-interval sampling of Locus 2 produced ten additional pieces of cultural material from four positive test holes, again almost entirely consisting of quartz fragments. Phase II sampling of Locus 3 only recovered one additional cultural item, a quartz fragment.

The second strategy for achieving the goals of the Phase II study involved increasing and refining our understanding not only of the distribution of cultural material but also of the character of the archaeological deposits and their potential for containing significant cultural information. As was noted in the previous section, it is usually assumed that relative density of cultural material present

reflects relative intensity of cultural activity in the past. Such focused activity areas where the remains of cultural activity such as food preparation or storage, refuse deposition, or in this case lithic resource processing, are found can contain significant cultural information relating to the temporal range, function, and internal characteristics of site occupation, the nature of activities carried out there, and details regarding the duration and the character of its occupation.

The Phase II investigation plan called for more intensively investigating a larger sample of the identified cultural deposits that held greatest promise for producing significant cultural information, through the execution of archaeological test units. These units measured 40 inches (one meter) on each side and were excavated in arbitrary 4-inch (10-centimeter) levels within natural soil strata to maximize vertical control of cultural information.

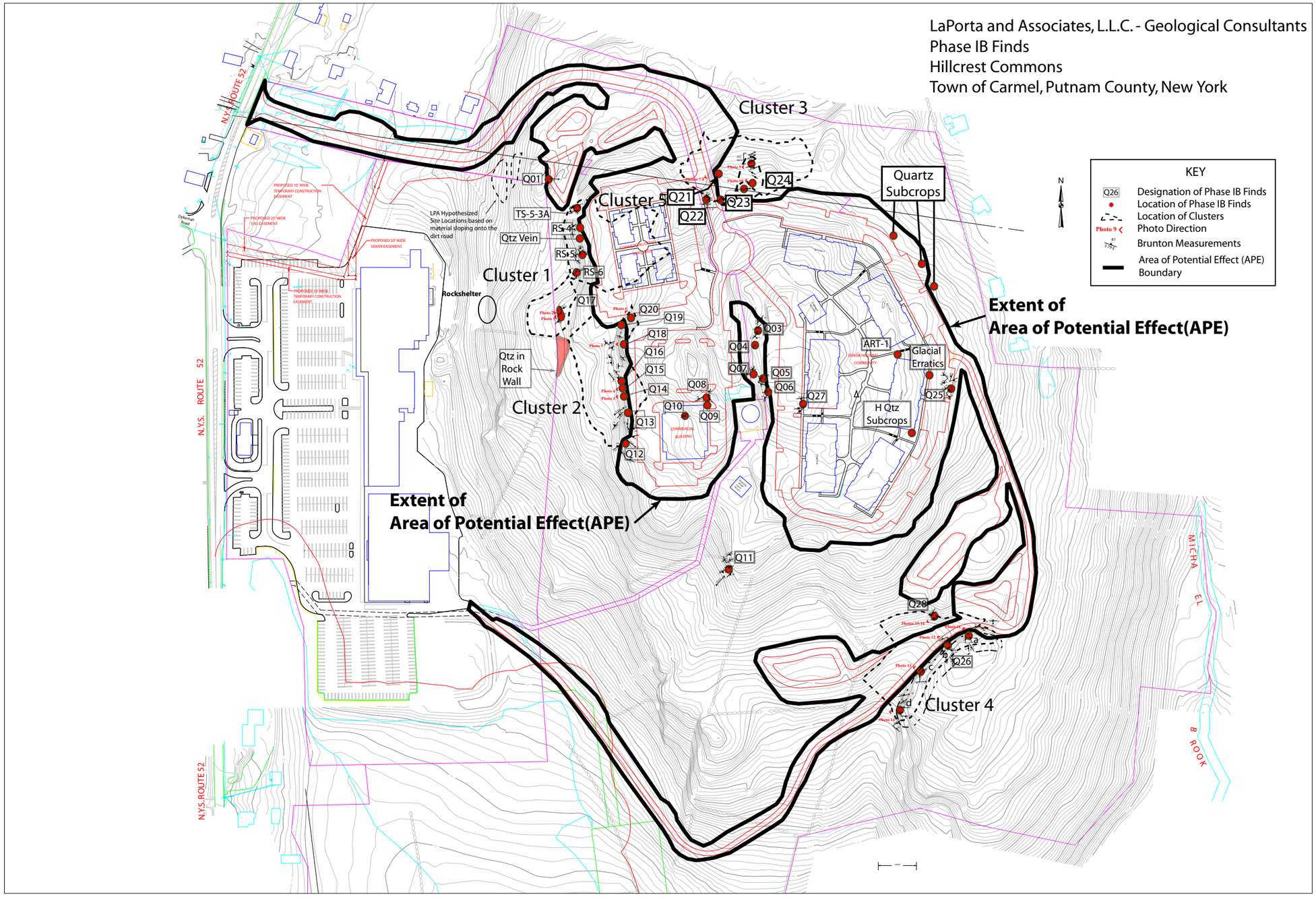
One test unit was placed in Locus 1 and another in Locus 2, amid positive test holes that had yielded the greatest relative quantity of cultural material. Progressing through the soils of each unit, it became clear that each contained a quantity of what appeared at first to represent naturally fractured quartz bedrock but it was found in fact to constitute culturally-produced material.

Given the quartz veins in the bedrock outcrop observed during the Phase I investigation and noted in a previous section of this report and the nature of the material encountered in the two test units begun in Locus 1 and Locus 2, it was considered prudent to consult a specialist in Native American quarries to determine the best course of action to appropriately deal with the cultural resources present on the Hillcrest Commons property. Excavation of the test units was suspended until such a determination could be made. Philip LaPorta of LaPorta and Associates, Geological Consultants of Warwick, New York was invited to examine the affected area upon his return from conducting field work abroad in October 2005. Following his visit to the site and assessment of the nature of the quarry-related resources present, it became clear that the exploitation of quartz resources was the dominant *raison d'etre* of Native American presence at this location. Consequently, the general archaeological investigation was subsumed in the effort to identify, define and sample the quarries and associated features, which were difficult to access using standard archaeological methods and could not readily be described, classified or analyzed using standard archaeological terminology. A Phase IB site identification survey and a Phase II site evaluation study prepared by LaPorta and Associates and dealing with the quarry-related aspects of the cultural resources study is included as a supplement to this Phase I/Phase II report.

ANALYSIS AND RECOMMENDATIONS

A Phase II site evaluation study performed for the subareas of the proposed development site where a relative concentration of Native American era cultural material had been encountered during Phase IB sampling clarified the spatial extent of the deposits, finding that one (Locus 3) was ephemeral but that two were associated with quartz procurement, reduction and refining activities that took place here. The relatively mundane assemblage of cultural material recovered in Phase II sampling and test units is likely to represent the periphery of a more intensive and focused series of activities that took place in the vicinity of the accessible quartz deposits present in the nearby bedrock outcrops. It is recommended that the investigation of this and other quarry-related resources on the property be carried on by a specialist in the field of geo-archaeology and Native American quarries, so that the cultural resources present here can be identified, classified and analyzed in terms of a model developed specifically for this purpose. The outcome of this analysis will enable OPRHP reviewers to be in a better position to evaluate the significance of these quarry resources and their potential for containing additional significant cultural information beyond that produced by the Phase IB and Phase II investigation.

LaPorta and Associates, L.L.C. - Geological Consultants
Phase IB Finds
Hillcrest Commons
Town of Carmel, Putnam County, New York



APPENDIX E – BACKHOE TRENCH ORE ARTIFACTS

PROJECT	CLUSTER	TRENCH	ART #	ARTIFACT CLASS	WEIGHT (g)	HEAT TREAT	COMMENTS
Hillcrest	1	4	1	1e	2400	0	has some of quartz vein, but majority (90%) is migmitite
Hillcrest	1	4	2	1e	1500	0	tabular in shape; migmitite
Hillcrest	1	4	3	1e	800	0	migmitite/feldspar
Hillcrest	1	4	4	1e	700	0	large feldspar cleavages
Hillcrest	1	4	5	1e	430	0	feldspar/migmitite/mica mixture
Hillcrest	1	4	6	1e	297.1	0	feldspar/migmitite/mica mixture
Hillcrest	1	4	7	1e	70	0	feldspar/migmitite/small amount of quartz mixture
Hillcrest	1	4	8	1e	107.2	0	migmititre with small amount of feldspar and very thin quartz veins shot throughout
Hillcrest	1	4	9	1e	82.7	1	quartz/feldspar/migmitite; quartz is red on one face
Hillcrest	1	4	10	1e	160.3	0	mimitite spall; faint tracce of quartz on one edge
Hillcrest	1	4	11	1e	195.7	0	migmitite/feldspar/mica mixed
Hillcrest	1	4	12	1e	140.2	0	migmitite/feldspar/mica mixed
Hillcrest	1	4	13	1e	151.5	0	migmitite/feldspar/mica mixed with a thin quartz stringy vein
Hillcrest	1	4	14	1e	50	0	feldspar/migmitite/small amount of quartz mixture
Hillcrest	1	4	15	1e	37.8	0	feldspar with small amount of migmitite
Hillcrest	1	4	16	1e	17.6	0	feldspar with small amount of migmitite
Hillcrest	1	4	17	1e	17.3	0	feldspar cleavage
Hillcrest	1	4	18	1e	16.4	0	migmitite with small feldspars
Hillcrest	1	4	19	1e	14.1	0	
Hillcrest	1	4	20	1e	14	0	feldspar cleavage
Hillcrest	1	4	21	1e	11.4	0	
Hillcrest	1	4	22	1e	7.9	0	feldspar cleavage
Hillcrest	1	4	23	1e	4	0	feldspar
Hillcrest	1	4	24	1e	3.8	0	feldspar cleavage
Hillcrest	1	4	25	1e	4.3	0	
Hillcrest	1	4	26	1e	3.9	0	
Hillcrest	1	4	27	1e	2.6	0	feldspar
Hillcrest	1	4	28	1f	2100	0	quartz vein bounded by migmitite; minimum 2 microlithons thick

Hillcrest	1	4	29	1f	1100	0	quartz vein; minumum 2 microlithons thick; one end has quartz and migmitite
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	1	4	30	1f	265	0	quartz vein, mixed with feldspar; bounded by migmitite
Hillcrest	1	4	31	1f	81.1	0	quartz mixed with feldspar amd migmitite
Hillcrest	1	4	32	1f	35.9	0	quartz mixed with feldspar amd migmitite; small black tourmaline crystals present
Hillcrest	1	4	33	1f	29.7	0	migmitite and feldspar with fragment of quartz vein
Hillcrest	1	4	34	1f	41.7	0	intermixed ore
Hillcrest	1	4	35	1f	27	0	quartz with migmitite and feldspar on one end
Hillcrest	1	4	36	1f	26.7	0	intermixed ore of quartz and migmitite
Hillcrest	1	4	37	1f	22.6	0	migmitite with blebs of quartz
Hillcrest	1	4	38	1f	22.8	0	thin quartz vein bounded by migmitite and feldspar
Hillcrest	1	4	39	1f	16.1	0	intermixed ore of quartz, feldspar, black tourmaline, and migmitite
Hillcrest	1	4	40	1f	22.8	0	quartz with migmitite and feldspar on one end
Hillcrest	1	4	41	1f	14.1	0	intermixed ore of quartz and migmitite
Hillcrest	1	4	42	1f	9.2	0	intermixed ore of quartz and migmitite
Hillcrest	1	4	43	2d	750	0	blocky; intermixed ore; numerous microlithons
Hillcrest	1	4	44	2d	229.6	0	high grade ore; feldspar on outer end where quarts is ground/abraded
Hillcrest	1	4	45	2d	124.1	0	corner off a larger mass; high grade ore
Hillcrest	1	4	46	3	1000	0	minumum 3 microlithons thick; high grade ore; 153x60x58 mm
Hillcrest	1	4	47	3	519.3	0	2 microlithons thick; high grade ore; 145x55x45 mm
Hillcrest	1	4	48	3	410.7	0	2 microlithons; high grade ore; tapers to one end; 124x80x42 mm
Hillcrest	1	4	49	2e	95.2	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
Hillcrest	1	4	50	2e	55.7	0	high grade ore; multifaceted; 2 microlithons in width;

							fragmented
Hillcrest	1	4	51	2e	62.1	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	1	4	52	2e	51.7	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
Hillcrest	1	4	53	2e	48.3	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
Hillcrest	1	4	54	2e	52.6	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
Hillcrest	1	4	55	2e	49.6	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
Hillcrest	1	4	56	2e	44.5	0	high grade ore; multifaceted; 2 microlithons in width; fragmented
Hillcrest	1	4	57	3	147.9	0	two thin microlithons; 104x64x19 mm; high grade ore
Hillcrest	1	4	58	3	104.4	0	100x40x40 mm; 2 microlithons; flaked within the thicker microlithon; high grade ore
Hillcrest	1	4	59	3	76.2	0	75x45x12 mm; 2 microlithons of varying thickness; intermixed ore
Hillcrest	1	4	60	3	68.3	0	76x27x28 mm; high grade ore; 3 microlithons thick
Hillcrest	1	4	61	3	62.4	0	89x37x16 mm; 3 microlithons, the middle of which is persistent throughout entire length
Hillcrest	1	4	62	4	34.8	0	60x31x13 mm; tapers to one end
Hillcrest	1	4	63	4	30.7	0	45x18x17 mm; rectangular and blocky; high grade ore
Hillcrest	1	4	64	4	27.3	0	47x15x17 mm; high grade ore; tapers to one end
Hillcrest	1	4	65	4	28.1	0	55x28x17 mm; tapers to one end; high grade ore
Hillcrest	1	4	66	4	26.2	0	47x15x22 mm; blocky and rectangular; high grade ore
Hillcrest	1	4	67	4	17.5	0	46x16x22 mm; high grade ore; tapers to one end
Hillcrest	1	4	68	4	19	0	41x24x12 mm; blocky; high grade ore; traces of migmitite on one end

Hillcrest	1	4	69	4	19.4	0	44x35x12 mm; more flat than others; tapers to end
Hillcrest	1	4	70	4	15.9	0	rejected microlithons
Hillcrest	1	4	71	4	15.8	0	rejected microlithons
Hillcrest	1	4	72	4	8.7	0	rejected microlithons
Hillcrest	1	4	73	4	6.7	0	rejected microlithons
Hillcrest	1	4	74	4	4.5	0	rejected microlithons
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	1	4	75	4	4.8	0	rejected microlithons
Hillcrest	1	4	76	4	14.9	1	rejected microlithons; lightly heated on one end
Hillcrest	1	4	77	4	9.9	1	rejected microlithons; reddened on one end
Hillcrest	1	4	78	2c	47.8	0	
Hillcrest	1	4	79	2c	31.5	0	
Hillcrest	1	4	80	2c	24.9	0	
Hillcrest	1	4	81	2c	18.6	0	
Hillcrest	1	4	82	2c	21.1	0	
Hillcrest	1	4	83	2c	17.2	0	
Hillcrest	1	4	84	2c	13.6	0	
Hillcrest	1	4	85	2c	10.2	0	
Hillcrest	1	4	86	2c	9.8	0	
Hillcrest	1	4	87	2c	9.4	0	
Hillcrest	1	4	88	2c	7.8	0	
Hillcrest	1	4	89	2c	7.2	0	
Hillcrest	1	4	90	2c	7	0	
Hillcrest	1	4	91	2c	5.7	0	
Hillcrest	1	4	92	2c	5.1	0	
Hillcrest	1	4	93	2c	5.4	0	
Hillcrest	1	4	94	2c	4.8	0	
Hillcrest	1	4	95	2c	5.5	0	
Hillcrest	1	4	96	2c	4.6	0	
Hillcrest	1	4	97	2c	5.8	0	
Hillcrest	1	4	98	2c	5	0	
Hillcrest	1	4	99	2c	2.1	0	
Hillcrest	1	4	100	6	3.7	0	
Hillcrest	1	4	101	6	3	0	
Hillcrest	1	4	102	6	2.6	0	
Hillcrest	1	4	103	8	12.8	0	limonite goertite
Hillcrest	3	3	1	1a	3000	0	1/2 migmitite and 1/2 high grade quartz
Hillcrest	3	3	2	2a	2000	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	3	2b	1000	0	heterogeneous ore; large flake; has quartz and mica mixed within

Hillcrest	3	3	4	2b	800	0	heterogeneous ore; large flake; has quartz and mica mixed within
Hillcrest	3	3	5	2b	600	0	elongate mixture like CL3.TR3.1
Hillcrest	3	3	6	2b	460.8	0	heterogeneous ore; large flake; has quartz and mica mixed within
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	3	3	7	2b	412.1	0	heterogeneous ore; large flake; has quartz and mica mixed within
Hillcrest	3	3	8	2b	338.6	0	heterogeneous ore, would otherwise be a lithon package; has quartz and mica mixed within
Hillcrest	3	3	9	2b	166.8	0	70/30 mix of quartz and high grade quartz
Hillcrest	3	3	10	2b	183.9	0	quartz bounded by mica; heterogeneous ore
Hillcrest	3	3	11	2b	94	0	heterogeneous ore, would otherwise be a lithon package; has quartz and mica mixed within
Hillcrest	3	3	12	1c	310.1	0	quartz with some migmitite and black tourmaline
Hillcrest	3	3	13	1c	226.5	0	quartz with feldspar and one black tourmaline crystal; looks like a prepared mineral specimen
Hillcrest	3	3	14	1c	212.8	0	mostly quartz with some migmitite and black tourmaline
Hillcrest	3	3	15	1c	182.2	0	quartz; three lithons; one is free of mixture, while the other two are mixed with migmitite, black tourmaline, feldspar, and mica
Hillcrest	3	3	16	1c	148.9	0	lean ore, would otherwise be a lithon package; quartz mixed with feldspar and black tourmaline
Hillcrest	3	3	17	1c	79.5	0	lean ore, would otherwise be a lithon package; quartz mixed with feldspar and black tourmaline
Hillcrest	3	3	18	2c	139.2	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	19	2c	98.5	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	20	2c	92.1	0	heterogeneous ore; has quartz and mica mixed within

Hillcrest	3	3	21	2c	63.3	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	22	2c	28.2	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	23	2c	37.6	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	24	2c	34	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	25	2c	36.9	0	heterogeneous ore; has quartz and mica mixed within
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	3	3	26	2c	14.7	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	27	2c	14	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	28	2c	11.7	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	29	2c	7.2	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	30	2c	7.5	0	heterogeneous ore; has quartz and mica mixed within
Hillcrest	3	3	31	1d	81.1	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	32	1d	63.4	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	33	1d	24.7	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	34	1d	17.7	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	35	1d	4.2	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	36	1d	3.6	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	37	1d	2.8	0	feldspar and migmitite mixed with quartz
Hillcrest	3	3	38	1b	19.4	0	migmitite and feldspar, very minimal quartz
Hillcrest	3	3	39	1b	14.7	0	migmitite and feldspar, very minimal quartz
Hillcrest	3	3	40	1b	10.3	0	migmitite and feldspar, very minimal quartz
Hillcrest	3	3	41	1b	8.6	0	migmitite and feldspar
Hillcrest	3	3	42	1b	8.8	0	migmitite and feldspar, very minimal quartz
Hillcrest	3	3	43	1b	4	0	migmitite and feldspar, very minimal quartz
Hillcrest	3	3	44	1b	4.1	0	migmitite and feldspar
Hillcrest	3	3	45	6	29.1	0	heterongeneous ore with little mica

Hillcrest	3	3	46	6	25.9	0	iron content to the quartz
Hillcrest	3	3	47	6	19.3	0	heterongeneous ore with little mica
Hillcrest	3	3	48	6	21.3	0	
Hillcrest	3	3	49	6	17.2	0	heterongeneous ore with little mica
Hillcrest	3	3	50	6	19.1	0	heterongeneous ore with little mica
Hillcrest	3	3	51	6	11.3	0	heterongeneous ore with little mica
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	3	3	52	6	10.5	0	heterongeneous ore with little mica
Hillcrest	3	3	53	6	9.8	0	heterongeneous ore with little mica
Hillcrest	3	3	54	6	6.1	0	heterongeneous ore with little mica
Hillcrest	3	3	55	6	7.1	0	heterongeneous ore with little mica
Hillcrest	3	3	56	6	6.5	0	heterongeneous ore with little mica
Hillcrest	3	3	57	6	5.2	0	heterongeneous ore with little mica
Hillcrest	3	3	58	6	5.6	0	heterongeneous ore with little mica
Hillcrest	3	3	59	7	295.1	0	morphologically looks like a hammer; most of dorsal surface has glacial polish (most likely outcrop polish); rest of quartz used as a core with two large and one smaller flake detached
Hillcrest	3	3	60	7	242	0	similar to CL3.TR3.59; has some black tourmaline
Hillcrest	3	3	61	7	73.3	0	exhausted core, heterogeneous with migmitite
Hillcrest	3	3	62	7	119.1	0	very high grade ore
Hillcrest	3	3	63	3	263.4	0	small amount of rounding; some abrasion/polish on one face may be from original outcrop; minimum two microlithons thick
Hillcrest	3	3	64	3	238	0	high grade dressed ore; two microlithons thick
Hillcrest	3	3	65	3	203.5	0	barely two microlithons thick; some black tourmaline crystals on one face, otherwise high grade ore
Hillcrest	3	3	66	3	135.7	0	two microlithons thick; well bounded; longer than thick

Hillcrest	3	3	67	3	98.4	0	three microlithons; top and bottom have remains of contact between quartz and migmitite
Hillcrest	3	3	68	3	82.8	0	barely two microlithons thick; some black tourmaline crystals on one face, otherwise high grade ore
Hillcrest	3	3	69	3	36.2	0	two very thin microlithons thick; bottom has remains of contact between quartz and migmitite
Hillcrest	3	3	70	3	62.2	0	fragment that is at least two microlithons thick
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	3	3	71	3	59.2	0	thick and thin microlithons (2); top and bottom have remains of contact between quartz and migmitite
Hillcrest	3	3	72	3	67.7	0	two very thin microlithons thick; bottom has remains of contact between quartz and migmitite
Hillcrest	3	3	73	3	42.1	0	three microlithons; top and bottom have remains of contact between quartz and migmitite
Hillcrest	3	3	74	3	55.9	0	two microlithons; feldaspar on one face
Hillcrest	3	3	75	3	76.6	0	two microlithos broken; some black tourmaline; high grade ore
Hillcrest	3	3	76	3	54	0	two microlithons; feldaspar on one face
Hillcrest	3	3	77	3	28.9	0	two microlithons; high grade ore
Hillcrest	3	3	78	3	28.6	0	two microlithos broken; some black tourmaline
Hillcrest	3	3	79	3	14.9	0	two microlithons at an oblique angle;
Hillcrest	3	3	80	4	56	0	
Hillcrest	3	3	81	4	102.3	0	large flake; platfor visible; two lithons on dorsal visible, but one lithon is dominant and other is a relict feature
Hillcrest	3	3	82	5	56.3	0	flake within a microlithon; has black tourmaline crystals; heterogebeous ore
Hillcrest	3	3	83	4	35.6	0	high grade ore
Hillcrest	3	3	84	5	27.1	0	domain intersection on dorsal face

Hillcrest	3	3	85	5	19.4	0	s-curve in profle; possibly a microlithon, but one end has a feather termination
Hillcrest	3	3	86	4	31.9	0	has some mica and few black tourmaline crystals, otherwise high grade ore; one spot with fracture running in it - reason for non-use
Hillcrest	3	3	87	5	13.8	0	flake; well-defined platform; domain intersection on dorsal; step termination
Hillcrest	3	3	88	5	19.5	0	mica on top; close to s-curve in profile; similar to CL3.TR3.85
Hillcrest	3	3	89	5	14.8	0	
Hillcrest	3	3	90	5	11.6	0	dorsal face exhibits negative flake scars
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	3	3	91	5	8.5	0	thin flake taken off a surface with a ca. 45 degree angle
Hillcrest	3	3	92	4	7.5	0	fragment
Hillcrest	3	3	93	4	8.4	0	fragment; bounded on top and bottom by thin intermixed mica
Hillcrest	3	3	94	5	11.3	0	
Hillcrest	3	3	95	4	6.4	0	
Hillcrest	3	3	96	4	10.3	0	
Hillcrest	3	3	97	5	4.4	0	very thin flake
Hillcrest	3	3	98	5	4.8	0	
Hillcrest	3	3	99	4	6.3	0	
Hillcrest	3	3	100	4	5	0	fragment; high grade ore
Hillcrest	3	3	101	5	6.5	0	thick platform; intermediate to high grade ore
Hillcrest	3	3	102	4	4.6	0	fragment
Hillcrest	3	3	103	5	3.9	0	
Hillcrest	3	3	104	4	3.1	0	fragment
Hillcrest	3	3	105	4	2.9	0	fragment
Hillcrest	3	3	106	5	1.9	0	
Hillcrest	3	3	107	5	0.2	0	high grade ore; distal flake fragment
Hillcrest	3	3	108	1e	127.5	0	
Hillcrest	3	3	109	1e	46.9	0	
Hillcrest	3	3	110	1e	29.3	0	
Hillcrest	3	3	111	1e	22.1	0	
Hillcrest	3	3	112	1e	16.1	0	
Hillcrest	3	3	113	1e	12.2	0	
Hillcrest	3	3	114	1e	5.8	0	
Hillcrest	3	3	115	N/A	38.4	0	glacial gravel; quartzite

Hillcrest	3	3	116	N/A	30.3	0	glacial gravel; quartz
Hillcrest	4	1	1	1a	2500	0	ore block; bounded by migmitite on one end and mica/feldspar on the other; quartz thickness between 115 and 3 mm; mostly lean ore with small microlithons of high grade ore present
Hillcrest	4	1	2	2a	2550	0	two large domain bounded microlithons (33 and 38 mm thick); 155x134x73 mm; high grade ore; bounded on one end by remains of migmitite/black tourmaline and mica
Hillcrest	4	1	3	2d	600	0	dressed ore; high grade ore; free of country rock; 106x74x40 mm; minimum 3 microlithons within
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	4	1	4	2d	374.5	0	elongate dressed ore; faint remnants of migmitite and black tourmaline on both ends; 130x50x37 mm; prismatic faceting parallel to length; minimum 4 microlithons within
Hillcrest	4	1	5	3	106.9	0	40x37x32 mm; heterogeneous ore; 2-3 microlithons
Hillcrest	4	1	6	3	95.4	0	60x32x25 mm; blocky tapering off to one end; 2 microlithons; high grade ore
Hillcrest	4	1	7	3	125.6	0	70x35x28 mm; blocky tapering off to one end; 2 microlithons; high grade ore
Hillcrest	4	1	8	3	88.4	0	85x40x27 mm; two microlithons; high grade ore
Hillcrest	4	1	9	3	96.5	0	
Hillcrest	4	1	10	3	42.7	0	
Hillcrest	4	1	11	3	30.4	0	
Hillcrest	4	1	12	3	19.5	0	
Hillcrest	4	1	13	3	28.2	0	
Hillcrest	4	1	14	3	213.3	0	
Hillcrest	4	1	15	3	51.1	0	
Hillcrest	4	1	16	3	69.1	0	
Hillcrest	4	1	17	3	121.3	0	

Hillcrest	4	1	18	3	66.3	0	
Hillcrest	4	1	19	4	104.1	0	
Hillcrest	4	1	20	4	15.4	0	
Hillcrest	4	1	21	4	26.3	0	
Hillcrest	4	1	22	4	22.7	0	
Hillcrest	4	1	23	4	21.3	0	
Hillcrest	4	1	24	4	11.9	0	
Hillcrest	4	1	25	4	15.1	0	
Hillcrest	4	1	26	4	12	0	
Hillcrest	4	1	27	4	10.5	0	
Hillcrest	4	1	28	4	14	0	
Hillcrest	4	1	29	4	11.4	0	
Hillcrest	4	1	30	5	3.4	0	
Hillcrest	4	1	31	5	3.3	0	
Hillcrest	4	1	32	6	5.8	0	
Hillcrest	4	1	33	6	4.3	0	
Hillcrest	4	1	34	6	3.2	0	
PROJECT	**CLUSTER**	**TRENCH**	**ART #**	**ARTIFACT CLASS**	**WEIGHT (g)**	**HEAT TREAT**	**COMMENTS**
Hillcrest	4	1	35	1c	253.3	0	
Hillcrest	4	1	36	1c	240.6	0	
Hillcrest	4	1	37	1c	96.1	0	
Hillcrest	4	1	38	1c	88.5	0	
Hillcrest	4	1	39	1c	50.5	0	
Hillcrest	4	1	40	1c	27.8	0	
Hillcrest	4	1	41	1c	29.1	0	
Hillcrest	4	1	42	1e	23.2	0	
Hillcrest	4	1	43	1e	11.1	0	
Hillcrest	4	1	44	8	71.4	0	limonite; goertite; iron (Fe) ore and a source for ochre
Hillcrest	4	1	45	2b	39.2	0	
Hillcrest	4	5	1	1c	1300	0	thin vein of quartz within migmitite, feldspar, black tourmaline, and mica
Hillcrest	4	5	2	3	900	0	high grade ore; 140x81x58 mm; bounded at both ends (lengthwise) by traces of mica and feldspar
Hillcrest	4	5	3	3	600	0	minimum 3 microlithons; high grade ore. 135x58x72 mm; tapers to one end

APPENDIX F – BACKHOE TRENCH INSTRUMENT ARTIFACTS

PROJECT	CLUSTER	TRENCH	ARTIFACT #	TYPE(S)	HEAT TREAT	LENGTH (mm)	WIDTH (mm)	THICK (mm)	WEIGHT (g)	PETROLOGY	COMMENTS
Hillcrest	1	4	H1	IO	1	174	118	112	3400	quartzite	glacially-derived; round with numerous spall negatives on side; pitting and step scars on both faces
Hillcrest	1	4	H2	SH	0	113	96	72	1300	quartzite	glacial cobble; rounded rectangular; pitted bulbous portion; some backhoe marks independent of pitting
Hillcrest	1	4	H3	SH	0	71	63	33	222.6	antigorite, biotite, magnetite, schist	glacially-derived; abraded and spalled on tip; oval-shaped
Hillcrest	1	4	H4	C	0	59	52	51	214.2	quartzite	glacially-derived; broken on one end with negative spall on other; pitting near spall negative; spall and pitting opposite tapered end
Hillcrest	1	4	H5	C	1	61	54	31	165.1	quartzite	glacially-derived; possible heat treatment - cortex has general reddening, as does fractured end and the joint/cleavage running through; battering and step scars on end, which is focused to a point
Hillcrest	1	4	H6	C*	0	46	19	13	13.7	mylonite	plug and feather chisel; convex-triangular in cross-section; elongate in shpe; heavy step scars on tapered end
Hillcrest	1	4	H7	FC	0	N/A	N/A	N/A	33.6	quartzite	
Hillcrest	1	4	H8	FC	0	N/A	N/A	N/A	20.2	quartz	plano-triangular in cross-section
Hillcrest	1	4	H9	FC	0	N/A	N/A	N/A	19.7	migmitite	
Hillcrest	1	4	H10	FC	0	N/A	N/A	N/A	16.8	migmitite	
Hillcrest	1	4	H11	FC	0	N/A	N/A	N/A	16.7	migmitite	
Hillcrest	1	4	H12	FC	0	N/A	N/A	N/A	19.6	quartz	
Hillcrest	1	4	H13	FC	0	N/A	N/A	N/A	15.8	quartz	
Hillcrest	1	4	H14	FC	0	N/A	N/A	N/A	16	quartz	

PROJECT	CLUSTER	TRENCH	ARTIFACT #	TYPE(S)	HEAT TREAT	LENGTH (mm)	WIDTH (mm)	THICK (mm)	WEIGHT (g)	PETROLOGY	COMMENTS
Hillcrest	1	4	H15	FC	0	N/A	N/A	N/A	11.7	migmitite	
Hillcrest	1	4	H16	FC	0	N/A	N/A	N/A	12.7	migmitite	
Hillcrest	1	4	H17	FC	0	N/A	N/A	N/A	11.6	migmitite	
Hillcrest	1	4	H18	FC	0	N/A	N/A	N/A	6.8	quartz	
Hillcrest	1	4	H19	FC	0	N/A	N/A	N/A	6.2	migmitite	
Hillcrest	2	10	H1	IO	0	140	136	99	2600	quartzite	glacially-derived; fragment
Hillcrest	2	10	H2	MI	0	135	150	63	2400	quartzite	glacially-derived; fragment
Hillcrest	2	10	H3	FW	0	125	92	59	800	quartz	high grade ore; rounded and abraded edges; breaks on tapering ends
Hillcrest	2	10	H4	SH	0	107	83	61	750	quartzite	glacially-derived; step scars and irregular breaks on large end; little pitting on tapered end
Hillcrest	2	10	H5	DH	0	147	83	42	700	phyllite	glacially-derived cobble; elongate; negative spall on end and break on side
Hillcrest	2	10	H6	CH	0	120	95	82	1100	quartzite	glacia cobble; only shows one negative spall
Hillcrest	2	10	H7	SH	0	132	89	58	900	quartzite	brown glacial cobble with pitting on both dorsal and ventral faces; occassional grrooves on both sides
Hillcrest	2	10	H8	RW	0	68	66	46	294.7	quartzite	glacially-derived; heavy battering and numerous step scars on tapered end; abrasion also present
Hillcrest	2	10	H9	MH	0	69	57	35	188.1	quartzite	glacially-derived
Hillcrest	2	10	H10	FH	0	68	43	31	120.8	quartzite	faceted
Hillcrest	2	10	H11	FH	0	37	45	29	76.1	quartzite	glacially-derived; tapered to end on one side; for plug and feather
Hillcrest	2	10	H12	A	0	81	60	42	215.4	sandstone	quick failure; wrong rock type
Hillcrest	2	18	1	IO	0	318	212	145	14400	quartzite	large and heavy; glacially-derived; battered and pitted on sides and ventral face; heavy step scars on side; front is beaked by spalls but back shows no battering (not as a large wedge)

PROJECT	CLUSTER	TRENCH	ARTIFACT #	TYPE(S)	HEAT TREAT	LENGTH (mm)	WIDTH (mm)	THICK (mm)	WEIGHT (g)	PETROLOGY	COMMENTS
Hillcrest	3	3	H1	MI	0	99	63	28	244.6	sandstone	glacially-derived; flaking and pitting on dorsal; some pitting and shallow grooves on ventral; two backhoe marks also on ventral, but on other side of grooves; grooves and breaks not fresh
Hillcrest	3	3	H2	RW	0	83	45	47	184.1	quartzite	glacially-derived; plug and feather wedge
Hillcrest	3	3	H3	FH	0	52	38	23	74.1	quartzite	glacially-derived; focus hammer or possible chisel; spall negatives on end
Hillcrest	3	3	H4	FH	0	56	40	28	95	quartz	glacial polished quartz; migmitite on ventral face
Hillcrest	3	3	H5	FC	0	N/A	N/A	N/A	29	quartz	ruptured or broken
Hillcrest	3	3	H6	FC	0	N/A	N/A	N/A	17.1	quartz	ruptured or broken
Hillcrest	3	3	H7	FC	0	N/A	N/A	N/A	11	quartz	ruptured or broken
Hillcrest	3	3	H8	FC	0	N/A	N/A	N/A	4.7	quartz	ruptured or broken
Hillcrest	3	3	H9	FC	0	N/A	N/A	N/A	11.5	quartzite	ruptured or broken
Hillcrest	3	3	H10	FC	0	N/A	N/A	N/A	4.4	quartzite	ruptured or broken
Hillcrest	3	6	H1	IO, RW, BH	0	290	190	115	7300	quartzite	glacially-derived; combination hammer; two large spalls created beak on side
Hillcrest	3	6	H2	IO, RW	0	241	154	142	7300	quartzite	glacially-derived; impactor and wedge; heavy flake scars
Hillcrest	3	6	H3	CH, MH	0	144	98	92	1700	quartzite	glacially-derived; premature fracture; split rouchly halfwise; impact point on dorsal and ventral represented by localities with heavy step scars visible on breaks
Hillcrest	3	6	H4	RW	0	152	105	103	2400	quartzite	glacially-derived; elongate; pointed end; used for splitting ore from joints

PROJECT	CLUSTER	TRENCH	ARTIFACT #	TYPE(S)	HEAT TREAT	LENGTH (mm)	WIDTH (mm)	THICK (mm)	WEIGHT (g)	PETROLOGY	COMMENTS
Hillcrest	3	6	H5	FH	0	61	32	31	103.6	sandstone	heavily spalled on one end, less so on other end; few small backhoe marks on ventral, did not cause spalls or pitting; some pitting visible on ventral
Hillcrest	3	6	H6	MH	0	100	108	56	900	quartzite	glacially-derived; two large spall negatives on dorsal; two bachoe marks on ventral (not associated with dorsal spalls); ore dressing hammer
Hillcrest	3	6	H7	MH	0	122	101	81	1100	quartzite	glacially-derived; ore dressing hammer; heavy steps scars on tip and ventral (associated with tip)
Hillcrest	3	6	H8	H	0	91	69	62	600	quartzite	glacially-derived; rectangular in shape; broken on front; grooves (small, thin, and shallow) eminating from break
Hillcrest	4	1	H1	MI	0	99	68	61	700	quartzite	elongate and glacially-derived; flaking on one end and pitted on other end
Hillcrest	4	1	H2	RW	0	42	35	26	56.5	quartzite	glacially-derived; plit halfwise then spalls created afterwards; little to no pitting on bulbous end
Hillcrest	4	1	H3	FH, RW	0	34	28	13	17.6	quartz	glacially-derived; opposing tips have flake scars; potential beak on one side
Hillcrest	4	5	H1	IO, RW	0	172	118	89	2200	quartzite	glacially-derived; large spalls removed from sides; step scars visible on places, indicating more than one used for one location
Hillcrest	4	5	H2	BH	0	130	105	74	1300	quartz	glacially-derived; hammer with a beak; battering visible on beak; focused abrasion on ventral

PROJECT	CLUSTER	TRENCH	ARTIFACT #	TYPE(S)	HEAT TREAT	LENGTH (mm)	WIDTH (mm)	THICK (mm)	WEIGHT (g)	PETROLOGY	COMMENTS
Hillcrest	4	5	H3	MI	0	93	82	89	1500	quartzite	glacially-derived; blocky shape due to glacial faceting; some spalls off edges
Hillcrest	4	5	H4	MH	0	107	81	64	700	sandstone	potential differential weathering on upper (dorsal) surface; bedding visible; pitting visible on ventral surface; possible pitting on one side
Hillcrest	4	5	H5	RW	0	116	70	55	600	quartzite	glacially-derived; wedge or large chisel; tapering end showing some battering and possible striations
Hillcrest	4	5	H6	H	0	111	56	58	497.5	quartzite	glacially-derived; elongate oval in shape; spalled on one end; heavy abrasion in convexity of the spall tip
Hillcrest	4	5	H7	RW	0	106	73	55	490.5	sandstone	red sandstone; glacially-derived; multiple uses
Hillcrest	4	5	H8	H, BH, RW	0	65	51	46	249.8	quartzite	glacially-derived; elongate in shape; battering and step scars on both faces; small beak present; along same edge it is sloping

APPENDIX G – LPA EXCAVATION ARTIFACTS

PART A – CLUSTER 1 ARTIFACTS

** - The "CAT" column pertains to the Stratum II analysis.*

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	1	1	1	1	lean ore	9	7,600	large	
1	1	1	1	1	quartz	108	2,200	medium	
1	1	1	1	1	quartz	7	2,200	large	
1	1	1	1	1	quartz	5	800	large	
1	1	1	1	1	quartz	209	600	small	
1	1	1	1	1	feldspar	18	400	small+medium	
1	1	1	1	1	feldspar	35	33	small	
1	1	1	1	1	mixed	6	6,800	large	
1	1	1	1	1	mixed	52	2,400	medium	
1	1	1	1	1	mixed	48	400	small	
1	1	1	1	1	glacial	6	27	small	
1	1	1	1	1	hammer	1	1,600	large	
1	3	2	1	1	mixed	8	12800	large	
1	3	2	1	1	quartz	9	4200	large	
1	3	2	1	1	feldspar	331	600	medium to small	
1	3	2	1	1	mixed	137	500	medium	
1	3	2	1	1	quartz	908	1100	small	
1	3	2	1	1	mixed	1005	800	small	
1	3	2	1	1	mixed	90	2900	medium to large	
1	3	2	1	1	dressed ore	30	2300	large to medium	
1	3	2	1	1	quartz	350	5600	large to medium	
1	3	2	1	1	biotite mica	5	0.4		
1	3	2	1	1	garnet schist	7	5.1		
1	3	2	1	1	tourmaline	1	1.4		
1	3	2	1	1	shale	8	12.9		
1	5	3	1	1	quartz	11	4800	x-large	
1	5	3	1	1	mixed	11	5500	x-large	
1	5	3	1	1	dressed ore	4	1300	x-large	
1	5	3	1	1	quartz	14	1800	large	
1	5	3	1	1	dressed ore	5	700	large	
1	5	3	1	1	dressed ore	3	200	medium to large	
1	5	3	1	1	quartz	26	1800	medium to large	
1	5	3	1	1	mixed	13	1000	medium to large	
1	5	3	1	1	mixed	35	511.4	medium	
1	5	3	1	1	feldspar	3	46.2	medium	
1	5	3	1	1	glacial	3	44.3	medium	
1	5	3	1	1	dressed ore	17	299.5	medium	
1	5	3	1	1	quartz	172	3000	medium	

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	5	3	1	1	feldspar	135	102.7	small	
1	5	3	1	1	glacial cobble	1	234.2	large	
1	5	3	1	1	glacial pebbles	180	149.1	small	
1	5	3	1	1	mixed	885	800	small	
1	5	3	1	1	quartz	1084	1400	small	
1	5	3	1	1	limonite goertite	9	6.8	small	
1	5	3	1	1	instrument fragments	4	280	medium	
1	5	3	1	1	biotite mica	14	3.6	small	
1	6	3	1	1	ore block	1	26800	large	
1	7	3	1	1	ore block	1	22000	large	
1	8	3	1	1	ore block	1	12,200	large	
1	9	3	1	1	ore block	1	7000	large	
1	13	4	1	1	mixed ore	5	5.7	small	
1	16	5	1	1	quartz	55	80	small	
1	16	5	1	1	mixed	44	158	small	
1	16	5	1	1	feldspar	937	483	small	
1	16	5	1	1	limonite goertite	1	1	small	
1	16	5	1	1	glacial	27	28	small	
1	17	5	1	1	feldspar	136	100	small	
1	17	5	1	1	quartz	7	8	small	
1	17	5	1	1	glacial	3	4	small	
1	18	5	1	1	feldspar	1,100	500	small	
1	18	5	1	1	feldspar	8	400	large	
1	18	5	1	1	feldspar	36	100	medium	
1	18	5	1	1	quartz	88	100	small	
1	18	5	1	1	mixed	20	100	medium	
1	18	5	1	1	limonite goertite	10	8	small	
1	18	5	1	1	glacial	18	100	small	
1	21	6	1	1	feldspar	23	500	medium	
1	21	6	1	1	feldspar	400	300	small	
1	21	6	1	1	mixed	1	1,000	large	
1	21	6	1	1	mixed	24	100	small+medium	
1	21	6	1	1	quartz	37	100	small+medium	
1	21	6	1	1	limonite goertite	60	100	small	
1	21	6	1	1	glacial	253	200	small	
1	21	6	1	1	glacial	31	900	medium+large	
1	21	6	1	1	instrument fragments	2	127	medium	

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	22	6	1	1	feldspar	980	600	small	
1	22	6	1	1	mixed	24	100	small	
1	22	6	1	1	quartz	42	100	small	
1	22	6	1	1	limonite goertite	102	100	small	
1	22	6	1	1	glacial	772	900	small	
1	22	6	1	1	instrument fragments	6	100	small	
1	30	7	1	1	quartz	27	161	medium	
1	30	7	1	1	mixed	23	504	small	
1	30	7	1	1	feldspar	39	133	small	
1	30	7	1	1	dressed ore	3	86	large	
1	30	7	1	1	limonite goertite	4	28	medium	
1	30	7	1	1	glacial	7	255	large	
1	30	7	1	1	instrument fragments	3	60	large	
1	30	7	1	1	instrument fragments	2	345	large	
1	2	1	2	2	quartz	16	4100	x-large	
1	2	1	2	2	dressed ore	14	3400	x-large	
1	2	1	2	2	mixed	6	2500	x-large	
1	2	1	2	2	feldspar	7	102.2	medium	1f
1	2	1	2	2	dressed ore	7	299.8	medium	2c
1	2	1	2	2	mixed	12	355.2	medium	1d
1	2	1	2	2	quartz	75	1700	medium	1d(n=38); 2c(n=37)
1	2	1	2	2	mixed	43	186.9	small	1d
1	2	1	2	2	feldspar	31	63.7	small	1f
1	2	1	2	2	quartz	323	1300	small	6
1	2	1	2	2	glacial pebbles	2	0.9	small	glacial
1	4	2	2	2	quartz	153	3000	large to small	3(2); 2b(14); 2d(1); 2c(15); 1f(121)
1	4	2	2	2	dressed ore	36	3400	large to small	2e(19); 2d(3); 2c(2); 1c(12)
1	4	2	2	2	mixed	25	1500	large to small	1e
1	4	2	2	2	feldspar	5	18.6	small	9
1	4	2	2	2	glacial quartz	2	7.9	small	glacial
1	10	3	2	2	quartz	9	4500	x-large	3(2); 2d(3); 2e(3); 7(1)
1	10	3	2	2	dressed ore	14	6400	x-large	2b(8); 1c(5); 2c(1)
1	10	3	2	2	mixed	10	5000	x-large	9(3); 2b(7)
1	10	3	2	2	hammer	1	800	x-large	BH
1	10	3	2	2	quartz	15	1600	large	1f(10); 2d(5)
1	10	3	2	2	dressed ore	17	2100	large	1b
1	10	3	2	2	mixed	27	3200	large	1e

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	10	3	2	2	quartz	44	1100	medium	6(n=15); 1d(n=29)
1	10	3	2	2	dressed ore	17	579.3	medium	2c
1	10	3	2	2	mixed	17	800	medium	1e(n=16); 10(n=1)
1	10	3	2	2	mixed	19	201.6	small	1e
1	10	3	2	2	feldspar	24	62.8	small	9
1	10	3	2	2	dressed ore	19	341.4	small	2c
1	10	3	2	2	quartz	223	1400	small	1d
1	10	3	2	2	glacial pebbles	3	6.5	small	glacial
1	11	3	2	2	ore block	1	4000	large	1c
1	12	3	2	2	ore block	1	3400	large	2b/10
1	14	4	2	2	mixed	3	500	medium+small	1b
1	14	4	2	2	quartz	15	100	small	1b
1	14	4	2	2	glacial pebbles	7	100	small	glacial
1	14	4	2	2	limonite goertite	2	284	small+medium	glacial
1	14	4	2	2	glacial	4	454	small+large	glacial
1	14	4	2	2	tool/istrument frags	5	229	medium	FC
1	20	5	2	1	quartz	4	400	large	1c
1	23	6	2	1	hammer	1	1,500	large	IW
1	24	6	2	1	instrument fragments	1	3,200	large mapped piece	IO
1	25	6	2	1	feldspar	1	400	large	9
1	25	6	2	1	feldspar	6	700	medium+large	9
1	25	6	2	1	feldspar	36	700	medium	9
1	25	6	2	1	feldspar	1310	900	small	9
1	25	6	2	1	feldspar	1600	1,000	small	9
1	25	6	2	1	quartz	20	500	small	1b
1	25	6	2	1	quartz	442	500	small	6
1	25	6	2	1	mixed	5	4,100	large	1e
1	25	6	2	1	mixed	7	500	medium	1e
1	25	6	2	1	mixed	17	900	medium	1e
1	25	6	2	1	mixed	300	900	small	1e
1	25	6	2	1	limonite	311	400	small	1e
1	25	6	2	1	limonite	528	400	small	1e
1	25	6	2	1	garnet schist	2	1	small	glacial
1	25	6	2	1	glacial	44	1,200	medium	glacial
1	25	6	2	1	glacial	1,800	1,000	small	glacial
1	25	6	2	1	glacial	800	500	small	glacial
1	25	6	2	1	glacial	1,400	1,000	small	glacial
1	25	6	2	1	glacial	140	600	small+medium	glacial
1	25	6	2	1	mixed	1	325	medium+large	1e

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	25	6	2	1	instrument fragments	1	489	large	MH
1	25	6	2	1	instrument fragments	6	444	medium	PF
1	25	6	2	1	instrument fragments	1	6	small	FC
1	25	6	2	1	instrument fragments	1	3	small	FRAG
1	26	6	2	2	mixed	2	300	large	1e
1	26	6	2	2	mixed	24	400	medium	1e
1	26	6	2	2	feldspar	168	500	small+medium	9
1	26	6	2	2	quartz	36	200	small	6
1	26	6	2	2	limonite goertite	5	28	small	glacial
1	26	6	2	2	lean ore	3	500	large	1f
1	26	6	2	2	glacial	15	400	medium+large	glacial
1	26	6	2	2	instrument fragments	9	196	medium	FC
1	27	6	2	2	hammer/instr frags	5	4,000	large	MI
1	28	6	2	2	feldspar	257	800	small	9
1	28	6	2	2	feldspar	6	300	medium+large	9
1	28	6	2	2	glacial	96	107	small	glacial
1	28	6	2	2	glacial	3	156	medium	glacial
1	28	6	2	2	mixed	25	400	medium	1b
1	28	6	2	2	mixed	4	400	medium+large	1b
1	28	6	2	2	quartz	49	300	medium	2c
1	28	6	2	2	chert	2	10	small	glacial
1	28	6	2	2	limonite goertite	9	30	small	8
1	28	6	2	2	lean ore	1	300	large	4
1	28	6	2	2	instrument fragments	2	12	small	FC
1	28	6	2	2	instrument fragments	12	400	medium	FRAG
1	28	6	2	2	instrument fragments	2	535	medium+large	MI (FRAG)
1	28	6	2	2	glacial	2	416	medium+large	glacial
1	29	6	2	2	instrument fragments	1	2,700	large	MI
1	31	7	2	1	feldspar	2	54	medium	9
1	31	7	2	1	dressed ore	1	29	large	4
1	31	7	2	1	quartz	9	600	medium+large	1f(n=8); 7(n=1)
1	31	7	2	1	mixed	10	1,400	small+medium	1e
1	31	7	2	1	instrument fragments	3	1,500	medium+large	FH(n=2); MI(n=1)
1	19-1	5	2	1	lean ore	4	1,300	large	1e

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	19-1	5	2	1	lean ore	12	700	medium	1e
1	19-1	5	2	1	feldspar	1,700	900	small	9
1	19-1	5	2	1	feldspar	82	500	medium	9
1	19-1	5	2	1	mixed	33	300	medium	1b
1	19-1	5	2	1	mixed	58	100	small	1b
1	19-1	5	2	1	quartz	80	100	small	1b
1	19-1	5	2	1	limonite goertite	36	33	small	glacial
1	19-1	5	2	1	glacial	358	200	small	glacial
1	19-1	5	2	1	glacial	45	150	small	glacial
1	19-1	5	2	1	instrument fragments	3	14	small	FC
1	19-2	5	2	1	mixed	8	800	medium+large	1d
1	19-2	5	2	1	mixed	44	500	medium	1d
1	19-2	5	2	1	mixed	167	300	small	6
1	19-2	5	2	1	feldspar	1,500	900	small	9
1	19-2	5	2	1	feldspar	900	400	small	9
1	19-2	5	2	1	feldspar	150	100	small	9
1	19-2	5	2	1	quartz	77	100	small	6
1	19-2	5	2	1	limonite goertite	41	26	small	glacial
1	19-2	5	2	1	glacial	379	400	small	glacial
1	19-3	5	2	1	feldspar	1,600	1,100	small	9
1	19-3	5	2	1	feldspar	10	500	medium	9
1	19-3	5	2	1	quartz	71	100	small	1b
1	19-3	5	2	1	mixed	20	100	small+medium	1b
1	19-3	5	2	1	limonite goertite	21	15	small	glacial
1	19-3	5	2	1	glacial	414	400	small	glacial
1	32	7	2	1	mixed	5	500	medium+large	1f
1	32	7	2	1	mixed	63	700	medium+large	1e
1	32	7	2	1	feldspar	32	500	medium	9
1	32	7	2	1	feldspar	124	300	small	9
1	32	7	2	1	quartz	96	800	medium+large	1d
1	32	7	2	1	limonite goertite	6	100	small	glacial
1	32	7	2	1	glacial	11	120	medium	glacial
1	32	7	2	1	glacial	6	500	medium	glacial
1	33	7	3	1	limonite goertite	5	88.2	1st 20 cm of level/strat	
1	33	7	3	1	feldspar	18	51.7	1st 20 cm of level/strat	
1	33	7	3	1	quartz	11	162.8	1st 20 cm of level/strat	
1	33	7	3	1	mixed	14	269	1st 20 cm of level/strat	

Cluster	FS#	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
1	33	7	3	1	instrument fragments	7	1100	1st 20 cm of level/strat	
1	33	7	3	1	glacial	10	397.4	1st 20 cm of level/strat	
1	33	7	3	1	feldspar	18	52	small	
1	33	7	3	1	quartz	11	163	small+large	
1	33	7	3	1	mixed	14	269	medium+large	
1	33	7	3	1	limonite goertite	5	88	small	
1	33	7	3	1	glacial	3	71	small	
1	33	7	3	1	instrument fragments	13	14	small	
1	34	7	3	1	glacial quartz	1	232.6	large	
1	34	7	3	1	quartz	2	9.5	small	
1	34	7	3	1	mixed	3	19.2	small	
1	34	7	3	1	instrument fragments	3	206.2	medium	

PART B – CLUSTER 2 ARTIFACTS – ORE PROCESSING ANALYSIS

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
1	2	1	1	1	feldspar	2	4.2	
1	2	1	1	1	glacial	18	100	
1	2	1	1	1	glacial quartz	21	31.1	
1	2	1	1	1	limonite goertite	2	10.2	
2	2	1	2	1	glacial	8	43.9	glacial gravel andgravel frags
2	2	1	2	1	glacial quartz	6	4.5	
3	2	1	2	1	amphibolite	1	3.2	
3	2	1	2	1	glacial	17	320	
3	2	1	2	1	glacial quartz	67	364	
3	2	1	2	1	inst/frag	6	144.6	
3	2	1	2	1	limonite goertite	3	13.4	
3	2	1	2	1	mixture	4	136	
4	2	1	2	2	glacial	7	86.3	
4	2	1	2	2	glacial quartz	14	57.1	
4	2	1	2	2	limonite goertite	1	3.7	
5	2	2	1	1	feldspar	1	1.3	
5	2	2	1	1	jasper	1	1.2	possible limonite
5	2	2	1	1	mixture	24	108	
5	2	2	1	1	quartz	25	27.4	
6	2	2	1	1	glacial	14	527.8	
6	2	2	1	1	glacial quartz	55	430	
6	2	2	1	1	inst/frag	3	130	one nice fragment
6	2	2	1	1	limonite goertite	3	48.5	
6	2	2	1	1	mixture	3	169	
6	2	2	1	1	quartz	1	4.6	reddened
7	2	2	2	1	glacial	57	1200	
7	2	2	2	1	glacial quartz	35	160	
7	2	2	2	1	limonite goertite	4	138.8	
8	2	2	2	3	glacial quartz	14	134.1	
8	2	2	2	3	limonite goertite	8	85.1	
8	2	2	2	3	inst/frag	1	145.3	
8	2	2	2	3	glacial	23	1230	
9	2	3	1	1	glacial	16	800	
9	2	3	1	1	glacial quartz	24	376.3	
9	2	3	1	1	inst/frag	3	60.7	
9	2	3	1	1	limonite goertite	2	28	
9	2	3	1	1	mixture	3	178.4	
9	2	3	1	1	shale	1	1.2	
10	2	3	2	1	glacial	22	700	
10	2	3	2	1	glacial quartz	22	1000	
10	2	3	2	1	limonite goertite	1	2.8	
11	2	4	1	1	glacial	7	10.8	
11	2	4	1	1	glacial quartz	7	20.2	
12	2	4	2	1	glacial	5	387.1	
12	2	4	2	1	glacial quartz	5	28.9	
12	2	4	2	1	inst/frag	11	600	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
13	2	3	2	2	glacial quartz	17	244.8	
13	2	3	2	2	glacial	9	600	
13	2	3	2	2	inst/frag	1	13.4	
13	2	3	2	2	limonite goertite	1	3.3	
14	2	4	2	2	glacial	16	500	
14	2	4	2	2	glacial quartz	38	217.3	
14	2	4	2	2	inst/frag	4	344	
14	2	4	2	2	limonite goertite	4	76	
14	2	4	2	2	mixture	10	1500	
15	2	4	2	3	garnet schist	1	55	
15	2	4	2	3	glacial	9	226.3	
15	2	4	2	3	glacial quartz	6	86	
15	2	4	2	3	inst/frag	2	600	
15	2	4	2	3	limonite goertite	11	183.5	
15	2	4	2	3	mixture	5	341.8	
16	2	4	2	4	glacial	10	488	
16	2	4	2	4	limonite goertite	1	30	
16	2	4	2	4	mixture	1	51.2	
17	2	4	2	5	glacial	1	12.5	
17	2	4	2	5	glacial quartz	1	11	
17	2	4	2	5	mixture	1	119	
18	2	2	2	3	glacial	13	341.2	
18	2	2	2	3	glacial quartz	11	259	
18	2	2	2	3	inst/frag	4	123.4	
18	2	2	2	3	limonite goertite	6	170	
18	2	2	2	3	mixture	3	177.2	
19	2	2	2	4	glacial	5	123	
19	2	2	2	4	glacial quartz	2	4.1	
19	2	2	2	4	inst/frag	5	456	
19	2	2	2	4	limonite goertite	1	14.6	
20	2	2	2	4	mixture	1	5700	
21	2	2	2	5	glacial	6	1100	
21	2	2	2	5	glacial quartz	6	166	
21	2	2	2	5	inst/frag	2	160.7	
21	2	2	2	5	limonite goertite	1	36	
21	2	2	2	5	mixture	6	455.4	
22	2	2	2	6	glacial	3	160	
22	2	2	2	6	inst/frag	1	36	
23	2	2	2	7	garnet schist	1	19.4	
23	2	2	2	7	limonite goertite	1	16.1	
24	2	5	1	1	glacial quartz	7	11.5	
24	2	5	1	1	inst/frag	1	6.6	faceted fragment
24	2	5	1	1	mixture	2	224.6	
25	2	5	2	1	glacial	18	1500	
25	2	5	2	1	glacial quartz	26	600	
25	2	5	2	1	inst/frag	3	183.4	
25	2	5	2	1	limonite goertite	9	66.2	
26	2	5	2	1	glacial	8	600	anvils,wedges,and focal chisels

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
26	2	5	2	1	inst/frag	5	1400	
26	2	5	2	1	limonite goertite	2	16.3	
26	2	5	2	1	mixture	2	70	
27	2	5	2	1	mixture	1	15900	
28	2	5	2	1	mixture	1	21500	
29	2	5	2	2	chert	1	25.2	
29	2	5	2	2	glacial	22	1400	
29	2	5	2	2	glacial quartz	6	222.3	
29	2	5	2	2	glacial quartz	15	129.3	
29	2	5	2	2	inst/frag	7	600	
29	2	5	2	2	limonite goertite	7	147.3	
29	2	5	2	2	mixture	4	314	
30	2	5	2	2	glacial	10	1500	
30	2	5	2	2	inst/frag	3	466	
30	2	5	2	2	mixture	2	600	
31	2	5	2	2	glacial	1	6300	
32	2	5	2	3	glacial	5	290	
32	2	5	2	3	glacial quartz	45	307	
32	2	5	2	3	inst/frag	3	110.5	
32	2	5	2	3	limonite goertite	1	2.7	
32	2	5	2	3	mixture	19	600	
33	2	5	2	4	biotite mica	1	0.6	
33	2	5	2	4	glacial	7	750	
33	2	5	2	4	glacial quartz	30	423	
33	2	5	2	4	inst/frag	2	113.6	
33	2	5	2	4	limonite goertite	1	15	
33	2	5	2	4	mixture	4	42.1	
34	2	5	2	5	glacial	3	211.7	
34	2	5	2	5	glacial quartz	18	600	
34	2	5	2	5	inst/frag	2	2000	spall off one cobble hammer
35	2	5	2	6	glacial	6	700	
35	2	5	2	6	glacial quartz	12	190	
35	2	5	2	6	limonite goertite	1	15.4	
36	2	5	2	7	glacial	7	900	
36	2	5	2	7	glacial quartz	6	180	
37	2	5	3	1	glacial	3	138.6	
37	2	5	3	1	glacial quartz	4	46.6	
37	2	5	3	1	inst/frag	3	113	includes small focal hammer
37	2	5	3	1	limonite goertite	1	36.1	
37	2	5	3	1	mixture	2	46.1	
37	2	5	3	1	tourmaline	1	9.8	
38	2	6	1	1	glacial quartz	22	49.1	
38	2	6	1	1	inst/frag	1	42.8	
39	2	6	2	1	chert	1	6.9	
39	2	6	2	1	garnet schist	2	86.9	
39	2	6	2	1	glacial	48	1295	
39	2	6	2	1	inst/frag	6	896.2	one well curated edge
39	2	6	2	1	limonite goertite	45	37.2	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
39	2	6	2	1	mixture	3	96.1	
39	2	6	2	1	quartz	96	525.2	
40	2	6	N/A	N/A	glacial	13	204.4	
40	2	6	N/A	N/A	glacial quartz	49	265.3	
40	2	6	N/A	N/A	inst/frag	2	172.6	
40	2	6	N/A	N/A	limonite goertite	3	33.7	
40	2	6	N/A	N/A	mixture	5	82.8	
41	2	6	2	2	glacial	11	782.8	
41	2	6	2	2	glacial quartz	125	1300	
41	2	6	2	2	inst/frag	4	168.5	
41	2	6	2	2	limonite goertite	3	66.1	
41	2	6	2	2	mixture	3	386.9	
42	2	7	1	1	feldspar	5	22.2	
42	2	7	1	1	mixture	12	605	
42	2	7	1	1	quartz	8	14.6	
43	2	8	1	2	biotite mica	1	2.9	
43	2	8	1	2	feldspar	4	4.3	
43	2	8	1	2	mixture	4	7.6	
43	2	8	1	2	quartz	11	17.3	
44	2	7	2	1	feldspar	36	89.3	
44	2	7	2	1	limonite goertite	1	10.2	
44	2	7	2	1	mixture	120	397.9	
44	2	7	2	1	quartz	60	170	
45	2	7	2	2	feldspar	10	39.5	
45	2	7	2	2	mixture	16	174	
45	2	7	2	2	quartz	12	135.9	
45	2	7	2	2	tourmaline	2	7.5	
46	2	7	2	3	chert	1	10.4	glacial
46	2	7	2	3	limonite goertite	1	2.9	
46	2	7	2	3	mixture	22	85.4	
46	2	7	2	3	quartz	8	23.9	
46	2	7	2	3	quartzite	1	44.4	glacial
46	2	7	2	3	tourmaline	2	10.8	
47	2	7	2	4	feldspar	3	4.5	
47	2	7	2	4	mixture	4	167.7	
47	2	7	2	4	quartz	5	65	
48	2	7	2	3	glacial	1	27.5	
48	2	7	2	3	quartz	2	26.5	
49	2	8	1	1	mixture	2	4	
49	2	8	1	1	quartz	1	0.3	
50	2	8	2	1	feldspar	70	74.1	
50	2	8	2	1	glacial	4	57.1	
50	2	8	2	1	mixture	96	1387.9	
50	2	8	2	1	quartz	78	157.2	
51	2	8	2	2	biotite mica	1	1.8	
51	2	8	2	2	feldspar	57	61.2	
51	2	8	2	2	glacial	5	69.4	
51	2	8	2	2	limonite goertite	1	5.1	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
51	2	8	2	2	mixture	112	657.2	
51	2	8	2	2	quartz	68	122.5	
51	2	8	2	2	tourmaline	2	33.8	
52	2	8	2	3	biotite mica	2	0.2	
52	2	8	2	3	feldspar	53	67	
52	2	8	2	3	mixture	96	368	
52	2	8	2	3	quartz	75	92.5	
53	2	8	2	4	feldspar	43	42.8	
53	2	8	2	4	mixture	110	800	
53	2	8	2	4	quartz	67	80.4	
54	2	6	2	3	glacial	11	937.1	
54	2	6	2	3	glacial quartz	8	772.3	
54	2	6	2	3	inst/frag	2	453.2	
54	2	6	2	3	mixture	1	177.3	
55	2	6	2	3	glacial	103	1000	
55	2	6	2	3	glacial quartz	121	257.2	
55	2	6	2	3	inst/frag	3	45.5	focal chisel
55	2	6	2	3	limonite goertite	2	7.6	
56	2	6	2	4&5	chert	1	0.7	
56	2	6	2	4&5	glacial	17	1500	
56	2	6	2	4&5	glacial quartz	227	590.1	
56	2	6	2	4&5	inst/frag	3	421.6	
56	2	6	2	4&5	limonite goertite	2	13.4	
56	2	6	2	4&5	mixture	16	312.5	
57	2	6	2	4&5	chert	1	34	small uniface core
57	2	6	2	4&5	glacial quartz	88	573.8	
57	2	6	2	4&5	glacial	16	388.4	
57	2	6	2	4&5	inst/frag	2	16	
57	2	6	2	4&5	mixture	5	108.6	
58	2	6	2	6&7	glacial	20	459.4	
58	2	6	2	6&7	glacial quartz	192	600	
58	2	6	2	6&7	inst/frag	5	497.1	
59	2	8	2	5	biotite mica	3	0.7	
59	2	8	2	5	bone	1	0.1	
59	2	8	2	5	feldspar	20	43.8	
59	2	8	2	5	mixture	103	420.8	
59	2	8	2	5	quartz	40	35.5	
60	2	8	2	6	biotite mica	4	3	
60	2	8	2	6	feldspar	17	51.4	
60	2	8	2	6	glacial	16	350.4	
60	2	8	2	6	mixture	48	147.7	
60	2	8	2	6	quartz	5	16.6	
61	2	8	3	1	feldspar	3	16.1	
61	2	8	3	1	limonite goertite	1	9	
61	2	8	3	1	mixture	16	116.5	
61	2	8	3	1	quartz	11	23.5	
62	2	8	3	2	feldspar	5	3.3	
62	2	8	3	2	mixture	44	266.5	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
62	2	8	3	2	quartz	16	32.7	
63	2	9	1	1	mixture	1	9600	
64	2	9	1	1	mixture	1	1600	
65	2	9	1	1	biotite mica	17	8.5	
65	2	9	1	1	feldspar	104	73	
65	2	9	1	1	mixture	220	2300	
65	2	9	1	1	quartz	115	94.5	
65	2	9	1	1	tourmaline	17	1300	
66	2	9	2	1	mixture	1	2400	
67	2	9	2	1	feldspar	11	12.3	
67	2	9	2	1	mixture	42	800	
67	2	9	2	1	quartz	4	1.2	
68	2	9	2	1	biotite mica	4	1.1	
68	2	9	2	1	feldspar	44	48.5	
68	2	9	2	1	mixture	105	500	
68	2	9	2	1	quartz	30	28	
68	2	9	2	1	tourmaline	26	600	
69	2	9	2	1	biotite mica	4	6	
69	2	9	2	1	feldspar	83	60.6	
69	2	9	2	1	mixture	186	1300	
69	2	9	2	1	quartz	59	87	
69	2	9	2	1	tourmaline	25	1000	
70	2	9	2	1	root cast	1	N/A	degrading wood
71	2	9	2	1	biotite mica	1	0.6	
71	2	9	2	1	feldspar	55	38.1	
71	2	9	2	1	mixture	184	1800	
71	2	9	2	1	quartz	44	28.2	
72	2	9	2	2	root cast	1	N/A	degrading wood
73	2	9	2	3	feldspar	69	26.3	
73	2	9	2	3	mixture	133	463.8	
73	2	9	2	3	quartz	26	16.2	
73	2	9	2	3	tourmaline	20	308.5	
74	2	9	2	3	root cast	1	N/A	degrading wood
75	2	9	2	4	biotite mica	1	3.9	
75	2	9	2	4	feldspar	25	13.3	
75	2	9	2	4	mixture	65	1100	
75	2	9	2	4	quartz	5	7.2	
76	2	9	2	5	mixture	10	46.7	
76	2	9	2	5	quartz	1	1.6	
77	2	10	1	1	biotite mica	5	2	
77	2	10	1	1	feldspar	321	322.3	
77	2	10	1	1	mixture	298	1600	
77	2	10	1	1	quartz	265	310.9	
78	2	10	1	1	biotite mica	5	4.1	
78	2	10	1	1	feldspar	59	162.2	
78	2	10	1	1	mixture	79	1900	
78	2	10	1	1	quartz	53	86.2	
79	2	10	2	1	biotite mica	11	6.7	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
79	2	10	2	1	feldspar	156	244.3	
79	2	10	2	1	hematite mix	11	43.2	
79	2	10	2	1	mixture	244	3600	
79	2	10	2	1	quartz	87	126.2	
79	2	10	2	1	tourmaline	13	787.2	
80	2	10	2	1	feldspar	89	212.1	
80	2	10	2	1	hematite mix	12	112	
80	2	10	2	1	mixture	246	2300	
80	2	10	2	1	quartz	61	91	
80	2	10	2	1	tourmaline	10	498.4	
81	2	10	2	1	mixture	1	5500	
82	2	10	2	2	feldspar	61	81.4	
82	2	10	2	2	mixture	131	1300	
82	2	10	2	2	quartz	33	42.5	
83	2	11	1	1	feldspar	103	310.9	
83	2	11	1	1	mixture	172	5200	
83	2	11	1	1	quartz	121	121.9	
83	2	11	1	1	serpentine	1	4.4	
84	2	11	1	1	feldspar	49	141.7	
84	2	11	1	1	hematite mix	3	12.1	
84	2	11	1	1	mixture	72	668.6	
84	2	11	1	1	quartz	72	80.2	
84	2	11	1	1	tourmaline	1	0.6	
85	2	11	1	1	mixture	1	1900	
86	2	11	2	1	biotite mica	4	12.3	
86	2	11	2	1	feldspar	124	245.5	
86	2	11	2	1	hematite mix	11	29.3	
86	2	11	2	1	mixture	150	2000	
86	2	11	2	1	quartz	156	314.8	
86	2	11	2	1	tourmaline	7	142.4	
87	2	11	2	1	biotite mica	3	0.3	
87	2	11	2	1	feldspar	87	252.4	
87	2	11	2	1	hematite mix	12	27.8	
87	2	11	2	1	mixture	143	1100	
87	2	11	2	1	quartz	76	86	
88	2	11	2	1	feldspar	15	43.4	
88	2	11	2	1	mixture	46	1400	
88	2	11	2	1	quartz	8	8.5	
88	2	11	2	1	tourmaline	4	363.4	
89	2	11	2	1	biotite mica	1	16.9	
89	2	11	2	1	feldspar	2	12.1	
89	2	11	2	1	mixture	22	1300	
89	2	11	2	1	quartz	2	2.6	
90	2	11	2	1	mixture	1	8700	
91	2	11	2	2	feldspar	256	600	
91	2	11	2	2	mixture	64	3200	
91	2	11	2	2	quartz	45	183	
92	2	11	2	2	feldspar	38	71.8	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
92	2	11	2	2	mixture	14	1000	
93	2	11	2	3	feldspar	225	427.8	
93	2	11	2	3	mixture	50	503.5	
93	2	11	2	3	quartz	19	43.6	
94	2	11	2	4	feldspar	67	114.6	
94	2	11	2	4	mixture	8	105.7	
95	2	12	1	1	feldspar	144	222.5	
95	2	12	1	1	mixture	52	3500	
95	2	12	1	1	quartz	18	99.9	
96	2	12	1	1	feldspar	187	302.2	
96	2	12	1	1	mixture	71	3400	
96	2	12	1	1	quartz	19	52.5	
97	2	12	2	1	mixture	1	1300	
98	2	12	2	1	mixture	1	3200	
99	2	12	2	2	mixture	1	3200	
100	2	12	2	1	biotite mica	70	57.5	
100	2	12	2	1	feldspar	3150	2500	
100	2	12	2	1	mixture	6479	12100	
100	2	12	2	1	mixture	10	10600	larger ones
100	2	12	2	1	quartz	256	749.7	
100	2	12	2	1	tourmaline	47	213	
101	2	12	2	1	mixture	1	22500	
102	2	12	2	2	biotite mica	100	93	
102	2	12	2	2	feldspar	4187	5700	
102	2	12	2	2	garnet	3	8.2	
102	2	12	2	2	mixture	13	3739	larger ones
102	2	12	2	2	mixture	2320	4500	
102	2	12	2	2	mixture	2873	3400	
102	2	12	2	2	mixture	2632	4700	
102	2	12	2	2	quartz	1264	1800	
102	2	12	2	2	serpentine	39	39.1	
103	2	12	2	2	mixture	1	3900	
104	2	12	2	2	mixture	1	12.3	
105	2	12	2	2	mixture	1	5600	
106	2	12	2	3	biotite mica	30	13.6	
106	2	12	2	3	feldspar	1700	3900	
106	2	12	2	3	garnet	5	4	
106	2	12	2	3	limonite goertite	4	4.8	
106	2	12	2	3	mixture	1350	5300	
106	2	12	2	3	mixture	9	9153.5	larger ones
106	2	12	2	3	quartz	485	661.8	
106	2	12	2	3	serpentine	28	18.2	
107	2	12	2	4	feldspar	847	1800	
107	2	12	2	4	garnet	1	2	
107	2	12	2	4	mixture	125	1400	
107	2	12	2	4	quartz	8	590	
108	2	12	2	4	mixture	1	1800	
109	2	12	2	4	mixture	1	1500	

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments
110	2	12	2	5	feldspar	1297	1400	
110	2	12	2	5	mixture	177	1900	
110	2	12	2	5	quartz	116	335.4	
111	2	13	1	1	quartz	4	19.6	some qtz reddened
111	2	13	1	1	mixture	4	21.8	
111	2	13	1	1	glacial quartz	4	37.6	
112	2	13	2	2	quartz	6	64.9	
112	2	13	2	2	mixture	2	62.2	
112	2	13	2	2	glacial quartz	16	184.9	
112	2	13	2	2	limonite goertite	1	8.1	
113	2	14	1	1	glacial quartz	2	2.7	
113	2	14	1	1	mixture	1	5.8	
114	2	14	2	2	quartz	17	129.4	some reddened pieces
114	2	14	2	2	feldspar	2	9.8	
114	2	14	2	2	limonite goertite	2	40.7	
114	2	14	2	2	inst/frag	9	657.3	nice large (400+g) split qtzite
114	2	14	2	2	mixture	1	12.4	
114	2	14	2	2	chert	1	2.2	glacial
115	2	14	3	3	quartz	3	151.7	
115	2	14	3	3	inst/frag	3	258.1	one nice wedge

PART C – CLUSTER 2 ARTIFACTS – ORE PROCESSING ANALYSIS

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
2	2	1	2	1	glacial	8	43.9	glacial gravel and gravel frags	1b
2	2	1	2	1	glacial quartz	6	4.5		1b
3	2	1	2	1	amphibolite	1	3.2		1e
3	2	1	2	1	glacial	17	320		glacial
3	2	1	2	1	glacial quartz	67	364		glacial
3	2	1	2	1	inst/frag	6	144.6		FC
3	2	1	2	1	limonite goertite	3	13.4		8
3	2	1	2	1	mixture	4	136		1e
4	2	1	2	2	glacial	7	86.3		glacial
4	2	1	2	2	glacial quartz	14	57.1		1b
4	2	1	2	2	limonite goertite	1	3.7		8
7	2	2	2	1	glacial	57	1200		glacial
7	2	2	2	1	glacial quartz	35	160		glacial
7	2	2	2	1	limonite goertite	4	138.8		8
8	2	2	2	3	glacial quartz	14	134.1		1d
8	2	2	2	3	limonite goertite	8	85.1		8
8	2	2	2	3	inst/frag	1	145.3		FW
8	2	2	2	3	glacial	23	1230		glacial
18	2	2	2	3	glacial	13	341.2		glacial
18	2	2	2	3	glacial quartz	11	259		glacial
18	2	2	2	3	inst/frag	4	123.4		BH
18	2	2	2	3	limonite goertite	6	170		8
18	2	2	2	3	mixture	3	177.2		1c
19	2	2	2	4	glacial	5	123		glacial
19	2	2	2	4	glacial quartz	2	4.1		glacial
19	2	2	2	4	inst/frag	5	456		RW
19	2	2	2	4	limonite goertite	1	14.6		8
20	2	2	2	4	mixture	1	5700		IO fragment
21	2	2	2	5	glacial	6	1100		glacial
21	2	2	2	5	glacial quartz	6	166		1d
21	2	2	2	5	inst/frag	2	160.7		RW
21	2	2	2	5	limonite goertite	1	36		8
21	2	2	2	5	mixture	6	455.4		1e
22	2	2	2	6	glacial	3	160		glacial
22	2	2	2	6	inst/frag	1	36		FH
23	2	2	2	7	garnet schist	1	19.4		glacial
23	2	2	2	7	limonite goertite	1	16.1		8
10	2	3	2	1	glacial	22	700		glacial
10	2	3	2	1	glacial quartz	22	1000		glacial
10	2	3	2	1	limonite goertite	1	2.8		8
13	2	3	2	2	glacial quartz	17	244.8		1b
13	2	3	2	2	glacial	9	600		glacial
13	2	3	2	2	inst/frag	1	13.4		FC
13	2	3	2	2	limonite goertite	1	3.3		8
12	2	4	2	1	glacial	5	387.1		glacial

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
12	2	4	2	1	glacial quartz	5	28.9		glacial
12	2	4	2	1	inst/frag	11	600		MI
14	2	4	2	2	glacial	16	500		glacial
14	2	4	2	2	glacial quartz	38	217.3		1b
14	2	4	2	2	inst/frag	4	344		CH
14	2	4	2	2	limonite goertite	4	76		8
14	2	4	2	2	mixture	10	1500		1b
15	2	4	2	3	garnet schist	1	55		glacial
15	2	4	2	3	glacial	9	226.3		glacial
15	2	4	2	3	glacial quartz	6	86		glacial
15	2	4	2	3	inst/frag	2	600		DH
15	2	4	2	3	limonite goertite	11	183.5		8
15	2	4	2	3	mixture	5	341.8		1e
16	2	4	2	4	glacial	10	488		glacial
16	2	4	2	4	limonite goertite	1	30		8
16	2	4	2	4	mixture	1	51.2		1e
17	2	4	2	5	glacial	1	12.5		glacial
17	2	4	2	5	glacial quartz	1	11		glacial
17	2	4	2	5	mixture	1	119		glacial
25	2	5	2	1	glacial	18	1500		glacial
25	2	5	2	1	glacial quartz	26	600		glacial
25	2	5	2	1	inst/frag	3	183.4		CH(n=1); FC(n=1)
25	2	5	2	1	limonite goertite	9	66.2		8
26	2	5	2	1	glacial	8	600		glacial
26	2	5	2	1	inst/frag	5	1400		CH
26	2	5	2	1	limonite goertite	2	16.3		8
26	2	5	2	1	glacial	2	70		glacial
27	2	5	2	1	glacial	1	15900		IO/ANV
28	2	5	2	1	glacial	1	21500		IO/ANV
29	2	5	2	2	chert	1	25.2		glacial
29	2	5	2	2	glacial	22	1400		glacial
29	2	5	2	2	glacial quartz	6	222.3		glacial
29	2	5	2	2	glacial quartz	15	129.3		glacial
29	2	5	2	2	inst/frag	7	600		H(1); RW(1); (FW(2); FC(3)
29	2	5	2	2	limonite goertite	7	147.3		8
29	2	5	2	2	mixture	4	314		1e
30	2	5	2	2	glacial	10	1500		glacial
30	2	5	2	2	inst/frag	3	466		PI
30	2	5	2	2	mixture	2	600		1e
31	2	5	2	2	glacial	1	6300		IW
32	2	5	2	3	glacial	5	290		glacial
32	2	5	2	3	glacial quartz	45	307		glacial
32	2	5	2	3	inst/frag	3	110.5		glacial
32	2	5	2	3	limonite goertite	1	2.7		8
32	2	5	2	3	mixture	19	600		glacial
33	2	5	2	4	biotite mica	1	0.6		8
33	2	5	2	4	glacial	7	750		glacial

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
33	2	5	2	4	glacial quartz	30	423		glacial
33	2	5	2	4	inst/frag	2	113.6		MH
33	2	5	2	4	limonite goertite	1	15		8
33	2	5	2	4	mixture	4	42.1		6
34	2	5	2	5	glacial	3	211.7		glacial
34	2	5	2	5	glacial quartz	18	600		glacial
34	2	5	2	5	inst/frag	2	2000	spall off one cobble hammer	MI
35	2	5	2	6	glacial	6	700		glacial
35	2	5	2	6	glacial quartz	12	190		glacial
35	2	5	2	6	limonite goertite	1	15.4		8
36	2	5	2	7	glacial	7	900		glacial
36	2	5	2	7	glacial quartz	6	180		glacial
39	2	6	2	1	chert	1	6.9		glacial
39	2	6	2	1	garnet schist	2	86.9		glacial
39	2	6	2	1	glacial	48	1295		glacial
39	2	6	2	1	inst/frag	6	896.2	one well curated edge	RW(n=1); FC(n=5)
39	2	6	2	1	limonite goertite	45	37.2		8
39	2	6	2	1	mixture	3	96.1		1e
39	2	6	2	1	quartz	96	525.2		glacial
41	2	6	2	2	glacial	11	782.8		glacial
41	2	6	2	2	glacial quartz	125	1300		glacial
41	2	6	2	2	inst/frag	4	168.5		FH
41	2	6	2	2	limonite goertite	3	66.1		8
41	2	6	2	2	mixture	3	386.9		DH
54	2	6	2	3	glacial	11	937.1		glacial
54	2	6	2	3	glacial quartz	8	772.3		glacial
54	2	6	2	3	inst/frag	2	453.2		MH(n=1); DH(n=1)
54	2	6	2	3	mixture	1	177.3		DH
55	2	6	2	3	glacial	103	1000		glacial
55	2	6	2	3	glacial quartz	121	257.2		1b
55	2	6	2	3	inst/frag	3	45.5	focal chisel	FC
55	2	6	2	3	limonite goertite	2	7.6		8
56	2	6	2	4&5	chert	1	0.7		glacial
56	2	6	2	4&5	glacial	17	1500		glacial
56	2	6	2	4&5	glacial quartz	227	590.1		1d
56	2	6	2	4&5	inst/frag	3	421.6		MH
56	2	6	2	4&5	limonite goertite	2	13.4		8
56	2	6	2	4&5	mixture	16	312.5		glacial
57	2	6	2	4&5	chert	1	34		glacial
57	2	6	2	4&5	glacial quartz	88	573.8		glacial
57	2	6	2	4&5	glacial	16	388.4		glacial
57	2	6	2	4&5	inst/frag	2	16		FC
57	2	6	2	4&5	mixture	5	108.6		1c
58	2	6	2	6&7	glacial	20	459.4		glacial
58	2	6	2	6&7	glacial quartz	192	600		1e
58	2	6	2	6&7	inst/frag	5	497.1		glacial
44	2	7	2	1	feldspar	36	89.3		9

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
44	2	7	2	1	limonite goertite	1	10.2		8
44	2	7	2	1	mixture	120	397.9		1e
44	2	7	2	1	quartz	60	170		1e
45	2	7	2	2	feldspar	10	39.5		9
45	2	7	2	2	mixture	16	174		1e
45	2	7	2	2	quartz	12	135.9		glacial
45	2	7	2	2	tourmaline	2	7.5		12
46	2	7	2	3	chert	1	10.4	glacial	glacial
46	2	7	2	3	limonite goertite	1	2.9		8
46	2	7	2	3	mixture	22	85.4		1e
46	2	7	2	3	quartz	8	23.9		1e
46	2	7	2	3	quartzite	1	44.4	glacial	glacial
46	2	7	2	3	tourmaline	2	10.8		12
48	2	7	2	3	glacial	1	27.5		glacial
48	2	7	2	3	quartz	2	26.5		glacial
47	2	7	2	4	feldspar	3	4.5		9
47	2	7	2	4	mixture	4	167.7		1e
47	2	7	2	4	quartz	5	65		glacial
50	2	8	2	1	feldspar	70	74.1		9
50	2	8	2	1	glacial	4	57.1		glacial
50	2	8	2	1	mixture	96	1387.9		1f
50	2	8	2	1	quartz	78	157.2		1d
51	2	8	2	2	biotite mica	1	1.8		10
51	2	8	2	2	feldspar	57	61.2		9
51	2	8	2	2	glacial	5	69.4		glacial
51	2	8	2	2	limonite goertite	1	5.1		8
51	2	8	2	2	mixture	112	657.2		1b
51	2	8	2	2	quartz	68	122.5		1b
51	2	8	2	2	tourmaline	2	33.8		12
52	2	8	2	3	biotite mica	2	0.2		10
52	2	8	2	3	feldspar	53	67		9
52	2	8	2	3	mixture	96	368		1e
52	2	8	2	3	quartz	75	92.5		1d
53	2	8	2	4	feldspar	43	42.8		9
53	2	8	2	4	mixture	110	800		1e
53	2	8	2	4	quartz	67	80.4		1b
59	2	8	2	5	biotite mica	3	0.7		10
59	2	8	2	5	bone	1	0.1		BONE
59	2	8	2	5	feldspar	20	43.8		9
59	2	8	2	5	mixture	103	420.8		1e
59	2	8	2	5	quartz	40	35.5		1e
60	2	8	2	6	biotite mica	4	3		10
60	2	8	2	6	feldspar	17	51.4		9
60	2	8	2	6	glacial	16	350.4		glacial
60	2	8	2	6	mixture	48	147.7		1b
60	2	8	2	6	quartz	5	16.6		2c
66	2	9	2	1	mixture	1	2400		2a
67	2	9	2	1	feldspar	11	12.3		9

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
67	2	9	2	1	mixture	42	800		12
67	2	9	2	1	quartz	4	1.2		6
68	2	9	2	1	biotite mica	4	1.1		10
68	2	9	2	1	feldspar	44	48.5		9
68	2	9	2	1	mixture	105	500		1d
68	2	9	2	1	quartz	30	28		1b
68	2	9	2	1	tourmaline	26	600		12
69	2	9	2	1	biotite mica	4	6		10
69	2	9	2	1	feldspar	83	60.6		9
69	2	9	2	1	mixture	186	1300		1e
69	2	9	2	1	quartz	59	87		1b
69	2	9	2	1	tourmaline	25	1000		12
70	2	9	2	1	root cast	1	N/A	degrading wood	WOOD
71	2	9	2	1	biotite mica	1	0.6		10
71	2	9	2	1	feldspar	55	38.1		9
71	2	9	2	1	mixture	184	1800		1e
71	2	9	2	1	quartz	44	28.2		1b
72	2	9	2	2	root cast	1	N/A	degrading wood	glacial
73	2	9	2	3	feldspar	69	26.3		9
73	2	9	2	3	mixture	133	463.8		1b
73	2	9	2	3	quartz	26	16.2		1b
73	2	9	2	3	tourmaline	20	308.5		12
74	2	9	2	3	root cast	1	N/A	degrading wood	WOOD
75	2	9	2	4	biotite mica	1	3.9		10
75	2	9	2	4	feldspar	25	13.3		9
75	2	9	2	4	mixture	65	1100		1d
75	2	9	2	4	quartz	5	7.2		1f
76	2	9	2	5	mixture	10	46.7		10
76	2	9	2	5	quartz	1	1.6		6
79	2	10	2	1	biotite mica	11	6.7		10
79	2	10	2	1	feldspar	156	244.3		9
79	2	10	2	1	hematite mix	11	43.2		8
79	2	10	2	1	mixture	244	3600		1e
79	2	10	2	1	quartz	87	126.2		1b
79	2	10	2	1	tourmaline	13	787.2		12
80	2	10	2	1	feldspar	89	212.1		9
80	2	10	2	1	hematite mix	12	112		8
80	2	10	2	1	mixture	246	2300		1b
80	2	10	2	1	quartz	61	91		1b
80	2	10	2	1	tourmaline	10	498.4		12
81	2	10	2	1	mixture	1	5500		1f
82	2	10	2	2	feldspar	61	81.4		9
82	2	10	2	2	mixture	131	1300		1b
82	2	10	2	2	quartz	33	42.5		1b
86	2	11	2	1	biotite mica	4	12.3		10
86	2	11	2	1	feldspar	124	245.5		9
86	2	11	2	1	hematite mix	11	29.3		1b
86	2	11	2	1	mixture	150	2000		1b

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
86	2	11	2	1	quartz	156	314.8		1d
86	2	11	2	1	tourmaline	7	142.4		12
87	2	11	2	1	biotite mica	3	0.3		10
87	2	11	2	1	feldspar	87	252.4		9
87	2	11	2	1	hematite mix	12	27.8		8
87	2	11	2	1	mixture	143	1100		1b
87	2	11	2	1	quartz	76	86		1b
88	2	11	2	1	feldspar	15	43.4		9
88	2	11	2	1	mixture	46	1400		1f
88	2	11	2	1	quartz	8	8.5		1b
88	2	11	2	1	tourmaline	4	363.4		12
89	2	11	2	1	biotite mica	1	16.9		10
89	2	11	2	1	feldspar	2	12.1		9
89	2	11	2	1	mixture	22	1300		1e
89	2	11	2	1	quartz	2	2.6		1b
90	2	11	2	1	mixture	1	8700		1e
91	2	11	2	2	feldspar	256	600		9
91	2	11	2	2	mixture	64	3200		1e
91	2	11	2	2	quartz	45	183		6
92	2	11	2	2	feldspar	38	71.8		9
92	2	11	2	2	mixture	14	1000		1e
93	2	11	2	3	feldspar	225	427.8		9
93	2	11	2	3	mixture	50	503.5		1e
93	2	11	2	3	quartz	19	43.6		1b
94	2	11	2	4	feldspar	67	114.6		9
94	2	11	2	4	mixture	8	105.7		1e
97	2	12	2	1	mixture	1	1300		1e
98	2	12	2	1	mixture	1	3200		1e
100	2	12	2	1	biotite mica	70	57.5		10
100	2	12	2	1	feldspar	3150	2500		9
100	2	12	2	1	mixture	6479	12100		1b
100	2	12	2	1	mixture	10	10600	larger ones	1e(n=9); 2b(n=1)
100	2	12	2	1	quartz	256	749.7		1d
100	2	12	2	1	tourmaline	47	213		12
101	2	12	2	1	mixture	1	22500		1f
99	2	12	2	2	mixture	1	3200		1f
102	2	12	2	2	biotite mica	100	93		10
102	2	12	2	2	feldspar	4187	5700		9
102	2	12	2	2	garnet	3	8.2		11
102	2	12	2	2	mixture	13	3739	larger ones	1e(n=11); 9(n=2)
102	2	12	2	2	mixture	2320	4500		1b
102	2	12	2	2	mixture	2873	3400		1b
102	2	12	2	2	mixture	2632	4700		1d
102	2	12	2	2	quartz	1264	1800		6
102	2	12	2	2	serpentine	39	39.1		glacial
103	2	12	2	2	mixture	1	3900		1e
104	2	12	2	2	mixture	1	12.3		1f
105	2	12	2	2	mixture	1	5600		1e

FS#	Cluster	Unit #	Strat	Lvl	Raw Mat	Count	Weight (g)	Comments	CAT
106	2	12	2	3	biotite mica	30	13.6		10
106	2	12	2	3	feldspar	1700	3900		9
106	2	12	2	3	garnet	5	4		11
106	2	12	2	3	limonite goertite	4	4.8		8
106	2	12	2	3	mixture	1350	5300		1b
106	2	12	2	3	mixture	9	9153.5	larger ones	1e
106	2	12	2	3	quartz	485	661.8		1d
106	2	12	2	3	serpentine	28	18.2		glacial
107	2	12	2	4	feldspar	847	1800		9
107	2	12	2	4	garnet	1	2		11
107	2	12	2	4	mixture	125	1400		6(n=60); 1e(n=65)
107	2	12	2	4	quartz	8	590		1f(n=1); 2c(n=7)
108	2	12	2	4	mixture	1	1800		1e
109	2	12	2	4	mixture	1	1500		1e
110	2	12	2	5	feldspar	1297	1400		9
110	2	12	2	5	mixture	177	1900		1d
110	2	12	2	5	quartz	116	335.4		2c
112	2	13	2	2	quartz	6	64.9		6
112	2	13	2	2	mixture	2	62.2		1b
112	2	13	2	2	glacial quartz	16	184.9		glacial
112	2	13	2	2	limonite goertite	1	8.1		8
114	2	14	2	2	quartz	17	129.4	some reddened pieces	1d
114	2	14	2	2	feldspar	2	9.8		9
114	2	14	2	2	limonite goertite	2	40.7		8
114	2	14	2	2	inst/frag	9	657.3	nice large (400+g) split qtzite	MI(n=1); FC(n=8)
114	2	14	2	2	mixture	1	12.4		1e
114	2	14	2	2	chert	1	2.2	glacial	glacial

APPENDIX H

HILLCREST COMMONS LPA SITE FORMS FOR: CLUSTER 1, CLUSTER 2, CLUSTER 3, AND CLUSTER 4

NEW YORK STATE PREHISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

NYS OFFICE OF PARKS, RECREATION & HISTORIC PRESERVATION
(518) 237-8643

For Office Use Only--Site Identifier_____

Project Identifier Hillcrest Commons Date January 2, 2008

Your Name Scott Minchak Phone (845-986-7733)
Address 5 First Street, #73 Warwick, NY 10990

Organization (if any) LaPorta and Associates, L.L.C. – Geological Consultants

1. SITE IDENTIFIER(S) Cluster 1
2. COUNTY Putnam One of the following: CITY_____
TOWNSHIP Carmel
INCORPORATED VILLAGE_____
UNINCORPORATED VILLAGE OR HAMLET_____

3. PRESENT OWNER Wilder Balter
Address 570 Taxter Road, Elmsford, NY 10523

4. SITE DESCRIPTION (check all appropriate categories):

Site

___Stray Find	___Cave/Rockshelter	___Workshop
___Pictograph	_X_Quarry	___Mound
___Burial	___ Shell Midden	___Village
_X_Surface Evidence	___Camp	___Material in plow zone
___Material below plow zone	_X_Buried evidence	___Intact Occupation floor
___Single component	___Evidence of features	___Stratified
	___Multicomponent	

Location

___Under cultivation	___Never cultivated	____Previously cultivated
___Pastureland	_X_Woodland	____Floodplain
_X_ Upland		___ Sustaining erosion

Soil Drainage: excellent ___ good _X_ fair ___ poor___
Slope: flat ___ gentle ___ moderate _X_ steep ___
Distance to nearest water from site (approx.) 275 ft. east of unnamed tributary of Michael Brook
Elevation: 700-710 ft. asl

5. SITE INVESTIGATION (append additional sheets, if necessary):
Surface--date(s) November - December, 2005
____Site map (Submit with form)
____Collection

Subsurface--date(s) Fall 2006 (backhoe) and Summer 2007 (excavations)
Testing: shovel _____ other 16 – backhoe trenches unit size variable
no. of units 16 (Submit plan of units with form)
Excavation: unit size 1 m sq. no. of units 7

Investigator Philip C. LaPorta, Principle Investigator

Manuscript or published report(s) (reference fully):

LaPorta. Philip C., Scott A. Minchak, Margaret C. Brewer
2008 Phase IB Supplemental Cultural Resource Investigation of the Proposed Hillcrest Commons, Town of Carmel, Putnam County, New York. Prepared by LaPorta and Associates, L.L.C. for Wilder Balter Partners, Inc., Elmsford, New York. NYSOPRHP No. 03PR05207.

LaPorta. Philip C., Scott A. Minchak, Margaret C. Brewer
2008 Phase II Supplemental Cultural Resource Investigation of the Proposed Hillcrest Commons, Town of Carmel, Putnam County, New York. Prepared by LaPorta and Associates, L.L.C. for Wilder Balter Partners, Inc., Elmsford, New York. NYSOPRHP No. 03PR05207.

Present repository of materials LaPorta and Associates, L.L.C. – Geological Consultants

6. COMPONENT(S) (cultural affiliation/dates):

prehistoric/undetermined date

7. LIST OF MATERIAL REMAINS (be specific as possible in identifying object and material):

Location. Cluster 1 is located in the western portion of the property boundary, from Q17 west to the end of a flat area overlooking the present-day location of ShopRite. The outcrop, Q17, contains a minimum of four quartz veins.

Materials. The western wall of CL1:TR4 uncovered the subsurface continuation of Q17. LPA investigators recovered 123 artifacts (103 pieces of quartz ore, 19 hammerstones, and one piece of limonite goertite ore). Forty-two pieces (40.8% of the total CL1:TR4 collected ore) of the material was gangue/country rock (n=27) and gangue/lean ore (n=15), representing the non quartz-bearing rocks and mixture of quartz with the migmitite, feldspar, and mica. Three pieces (2.9% of the total CL1:TR4 collected ore) of dressed ore and 8 (7.8% of the total CL1:TR4 collected ore) of high-grade ore are characterized by high-grade quartz and slight abrasion on CL1.TR4.44. Accompanying these are 22 (21.3% of the total CL1:TR4 collected ore) scaling flakes that result from dressing quartz. Eight (7.8% of the total CL1:TR4 collected ore) lithon packages are 2-3 microlithons in thickness. Sixteen (15.5% of the total CL1:TR4 collected ore) microlithons, the single most divisible unit of quartz. Three (2.9% of the total CL1:TR4 collected ore) small pieces of chat, crushed ore, were recovered. One (0.1%) limonite goertite iron ore was found, representing a possible source of ochre. LPA investigators recovered 19 instruments from the backdirt piles of CL1:TR4 (Table 6). The impact object (IO) is a 3.4 kg (7.5 pounds) round-shaped glacially derived quartzite with numerous negative spall scars. Two shaping hammers (CL1.TR4.H2-H3) were recovered. The first (CL1.TR4.H2) is fashioned from a 1.3 kg (2.9 punds) glacially derived quartzite cobble with pitting. Backhoe marks are evident on the artifact, but they are independent of the older pitting. The second shaping hammer (CL1.TR4.H3) is fashioned from a glacially derived, oval-shaped antigorite/biotite/magnetite/schist that is spalled and abraded on one end. Two chisels (CL.TR4.H4-H5) are fashioned from glacially derived quartzites that are tapered to one end and battered on the other end. The third chisel (CL.TR4.H6) is a mylonite plug and feather chisel, an elongate artifact that is heavily battered on one end and used to accentuate joints. Thirteen (68.4% of the total CL1:TR4 collected instruments) are focal chisels (FC), fashioned from migmitite and quartz.

LPA excavated seven 1 m^2 units. TU1-TU3, three contiguous units in front of and resting on a quartz outcrop (CL1:Q17), contain a majority of quartz per unit (TU1=743 at 71.6%; TU2=1420 at 45.7%; and TU3=1,613 at 51.9%). The next highest percentage is mixed ore. Feldspar, although visible in the outcrop, account for only 5.2% to 10.8%. All of these were almost exclusively recovered from Stratum I. In addition, the presence of six large ore blocks in TU3, lend to the LPA inference of this as a Zone of Extraction (Zone I) with the beginning of milling (Zone II). Since the artifacts are confined mostly to Stratum I, we infer little sedimentation after quarrying. TU4, located to the south and above TU1-TU3, was the sparsest of the units in terms of total pieces (41). Fifteen of the recovered pieces are processed quartz, while five are instruments/instrument fragments and 11 are glacial. The contiguous TU5-TU6 rests on outcrop (CL1:Q17) of feldspar and quartz and account for 73.7% of the recovered Cluster 1 excavation pieces (22,561 of 30.593). The presence of quartz in the outcrop, as well as the low percentage of processed quartz (TU5=3.7%; TU6=5.1%), makes this an ideal Zone of Extraction (Zone I). The highest number of instruments/instrument fragments (42) and high percentage of feldspar (TU5=8,159 at 79.3%; and TU6=4,798 at 39.1%. The high percentage of glacial pebbles and cobbles (43.7%) in TU6 (Stratum I=1,062; Stratum II=4,300) indicates a glacial sediment trap where only the exposed vertical quartz was quarried. No evidence of extraction was visible on the quartz uncovered in the bedrock floor of TU6. The lone TU7, north of and down slope from TU1-TU3, is located in-between CL1:TR3 and CL1:TR4. The unit

yielded 748 pieces, or 2.4%, of the pieces excavated from TU7. Processed quartz accounts for 38.7% (290) of the TU7 total, followed by 48% mixed ore/feldspar (365), and 4.9% (37) instruments/instrument fragments. The processed quartz, mixed ore, and feldspar were almost wholly confined to Stratum I. The instruments came from Stratum III at the interface between Stratum II and the glacial till.

If historic materials are evident, check here and fill out historic site form __No historic materials evident.___

8. MAP REFERENCES

USGS 7.5 Minute Series Quad. Name Lake Carmel

UTM Coordinates 610417 4587811

9. Photography

Figure 1. Q17 location in Cluster 1 showing multiple quartz veins in an outcrop.

Figure 2. Quartz vein at location Q17 in Cluster 1.

10. Subsurface Excavation Plan:

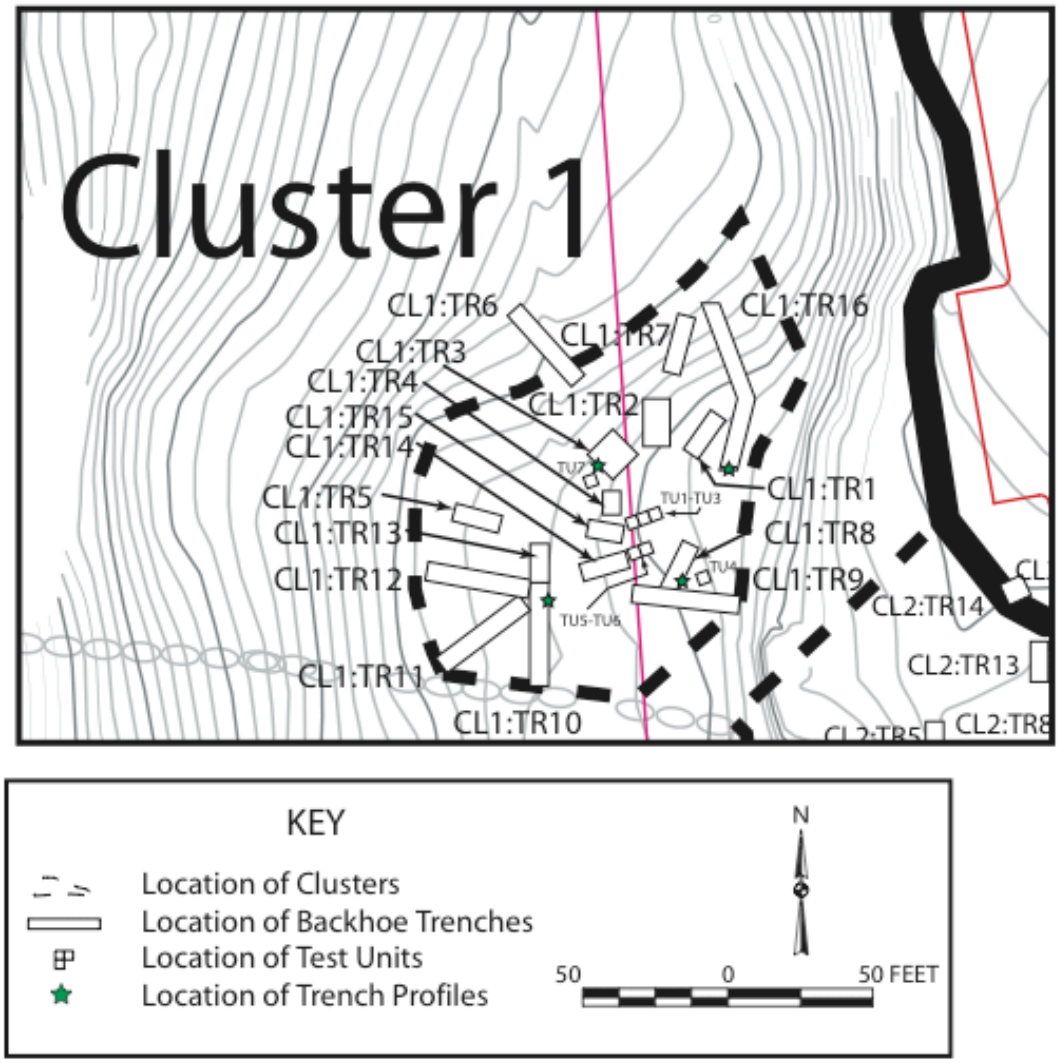


Figure 3. Cluster 1 backhoe trench and excavation unit locations.

NEW YORK STATE PREHISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
NYS OFFICE OF PARKS, RECREATION & HISTORIC PRESERVATION
(518) 237-8643

For Office Use Only--Site Identifier_____

Project Identifier Hillcrest Commons Date January 2, 2008

Your Name Scott Minchak Phone (845-986-7733)
Address 5 First Street, #73 Warwick, NY 10990

Organization (if any) LaPorta and Associates, L.L.C. – Geological Consultants

1. SITE IDENTIFIER(S) Cluster 2
2. COUNTY Putnam One of the following: CITY_____
TOWNSHIP Carmel
INCORPORATED VILLAGE_____
UNINCORPORATED VILLAGE OR HAMLET_____

3. PRESENT OWNER Wilder Balter
Address 570 Taxter Road, Elmsford, NY 10523

4. SITE DESCRIPTION (check all appropriate categories):
Site

___Stray Find	___Cave/Rockshelter	___Workshop
___Pictograph	_X_Quarry	___Mound
___Burial	___ Shell Midden	___Village
_X_Surface Evidence	___Camp	___Material in plow zone
___Material below plow zone	_X_Buried evidence	___Intact Occupation floor
___Single component	___Evidence of features	___Stratified
	___Multicomponent	

Location

___Under cultivation	___Never cultivated	____Previously cultivated
___Pastureland	_X_Woodland	____Floodplain
_X_ Upland		___ Sustaining erosion

Soil Drainage: excellent ___ good _X_ fair ___ poor___
Slope: flat ___ gentle ___ moderate _X_ steep _X_
Distance to nearest water from site (approx.) 300 ft. east of tributary to Michael Brook
Elevation: 710-730 ft. asl

5. SITE INVESTIGATION (append additional sheets, if necessary):
Surface--date(s) November - December, 2005
____Site map (Submit with form)
____Collection

Subsurface--date(s) Fall, 2007 (backhoe); Summer, 2006/2007 (excavation)
Testing: shovel _____ other 22 – backhoe trenches unit size variable
no. of units 22 (Submit plan of units with form)
Excavation: unit size 1 m sq. no. of units 14

Investigator Philip C. LaPorta, Principle Investigator

Manuscript or published report(s) (reference fully):

LaPorta. Philip C., Scott A. Minchak, Margaret C. Brewer
2008 Phase IB Supplemental and Phase II Cultural Resource Investigation of the Proposed Hillcrest Commons, Town of Carmel, Putnam County, New York. Prepared by LaPorta and Associates, L.L.C. for Wilder Balter Partners, Inc., Elmsford, New York. NYSOPRHP No. 03PR05207.

Present repository of materials LaPorta and Associates, L.L.C. – Geological Consultants

6. COMPONENT(S) (cultural affiliation/dates):

prehistoric/undetermined date

7. LIST OF MATERIAL REMAINS (be specific as possible in identifying object and material):

Cluster 2 is located on the western side of the slope, southeast of Cluster 1. The north-to-south trending cluster includes Q12-16 and Q18-Q20. Q12-Q16 are the southernmost locations, mostly along the same outcrop. Q18-Q20 are in the northern outcrop that include an adit in a quartz vein, and two possible rockshelters with quartz veins. Below most of these locations is a stable slope, represented in the northern portion by a dirt road that may have been placed according to a structurally supported flat slope.

LPA investigators recovered twelve instruments from CL2:TR10, which is located to the north of Q18, along the outcrop. These represent a wide array of different instruments from extraction to beneficiation and maintenance. The impact object (Cl2.TR10.H1 – 2.6 kg, or 5.7 pounds) and milling instrument Cl2.TR10.H2 – 2.4 kg, or 5.3 pounds) represent the largest instruments collected and are both fashioned from glacially derived quartzites. One milling hammer (Cl2.TR10. H9) is fashioned from glacially derived quartzite. Investigators recovered two scaling hammers (CL2.TR10.H4 and H7), both fashioned from glacially derived quartzites. The recovered dressing hammer (CL2.TR10.H5) is fashioned from a glacially derived elongate cobble of phyllite that exhibits negative spalling on one end with a break on the side. The cobbing hammer (CL2.TR10.H6) is a 1.1 kg (2.4 pounds) glacially derived quartzite cobble with only one negative spall. CL2.TR10.H4 is characterized by step scars and pitting. CL2.TR10.H7 is a flattened cobble that has pitting and grooves on both faces. LPA investigators collected two wedges (CL2.TR10.H3 and H8). The flat wedge (CL2.TR10.3) is a faceted wedge with abraded edges and fashioned from high-grade quartz ore. The round (blunt) wedge (CL2.TR10.H8) is a triangular-shaped instrument fashioned from glacially derived quartzite that exhibits abrasion and step scars on the tapered end. The Two focal hammers (CL2.TR10.H10-CL2.TR10.H11) are fashioned from glacially derived quartzites. CL2.TR10.H10 is faceted and CL2.TR10.H11 is tapered to one end. A small anvil (CL2.TR10.H12), fashioned from porous glacially derived sandstone, was cracked in half and represents a failure most likely due to a lack of strength in the sandstone. Only one instrument (Cl2.TR18.H1) was analyzed from CL2:TR18, a large and heavy glacially-derived impact object (IO). This glacially-derived quartzite instrument is a 14.4 kg (31.7 pounds) impactor with battering and pitting focused on one end. The instrument is also battered and pitted on sides and ventral face, with heavy step scars one side.

In addition, investigators recovered 40,700 pieces from the 14 1-x-1 m excavation units. Of these, 38,727 are non-glacial. TU12 contains 30,125 of the pieces. Few artifacts were found above the adit (most pieces are glacially-derived and do not show cultural modification), consisting primarily of instruments and few quartz or feldspar pieces. Most of the instruments from the Cluster 2 excavations (99 of 111) come from the units above the adit ad are fashioned from quartzite, metaquartzite, sandstone, and metasilt glacial cobbles from the till. A majority of the 38,727 artifacts were mixed quartz and surrounding country rock (n=19,908) and feldspar (n=13,880, frequently associated with the quartz). These are the remains of quartz extraction and milling (cleaning of the country rock and country rock/quartz). Mixtures and feldspar are prevalent in the units below the adit (TU7-TU12) and primarily come from TU12 (n=27,631). Quartz, relatively free of country rock, accounts for 4,067 pieces, from which more than half (n=2,166) are from TU12. Like the mixture and feldspar, the quartz is almost exclusively from below the adit (TU7-TU12). In addition, the contiguous TU13-TU14, at the southern portion of Cluster 2, contained few pieces. Most of these are processed quartz (some reddened) and hammers (exclusively in TU14.

If historic materials are evident, check here and fill out historic site form No historic materials evident.

8. MAP REFERENCES

USGS 7.5 Minute Series Quad. Name Lake Carmel

UTM Coordinates 610468 4587750

9. Photography

Figure 1. Location Q18, adit in quartz vein.

Figure 2. Quartz vein next to adit at location Q18.

10. Subsurface Excavation Plan:

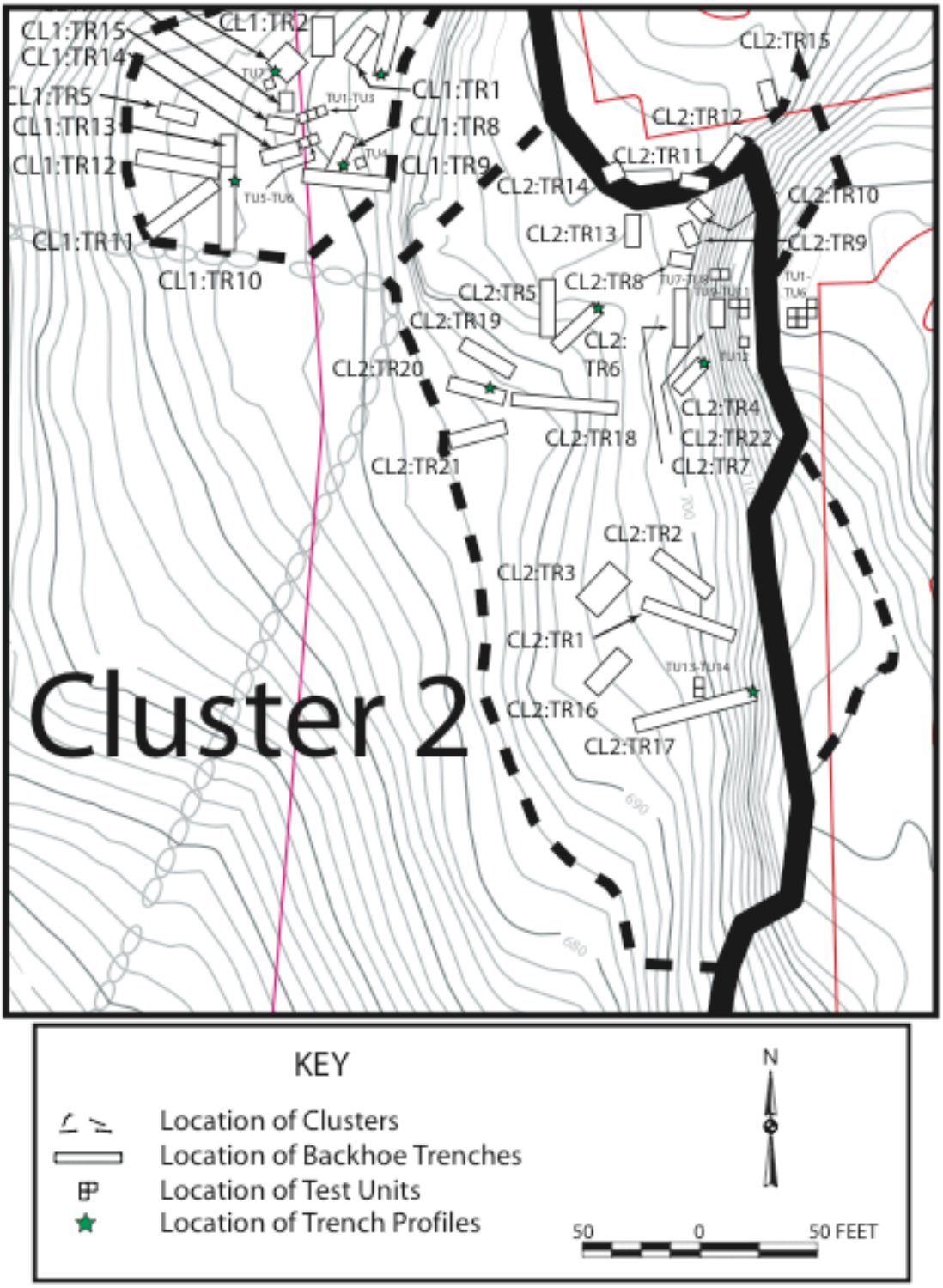


Figure 3. Cluster 2 (with Cluster 1) location of backhoe trenches and excavation units.

NEW YORK STATE PREHISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
NYS OFFICE OF PARKS, RECREATION & HISTORIC PRESERVATION
(518) 237-8643

For Office Use Only--Site Identifier_____

Project Identifier Hillcrest Commons Date January 2, 2008

Your Name Scott Minchak Phone (845-986-7733)
Address 5 First Street, #73 Warwick, NY 10990

Organization (if any) LaPorta and Associates, L.L.C. – Geological Consultants

1. SITE IDENTIFIER(S) Cluster 3
2. COUNTY Putnam One of the following: CITY_____
TOWNSHIP Carmel
INCORPORATED VILLAGE_____
UNINCORPORATED VILLAGE OR HAMLET_____

3. PRESENT OWNER Wilder Balter
Address 570 Taxter Road, Elmsford, NY 10523

4. SITE DESCRIPTION (check all appropriate categories):
Site

___Stray Find	___Cave/Rockshelter	___Workshop
___Pictograph	_X_Quarry	___Mound
___Burial	___ Shell Midden	___Village
_X_Surface Evidence	___Camp	___Material in plow zone
___Material below plow zone	_X_Buried evidence	___Intact Occupation floor
___Single component	___Evidence of features	___Stratified
	___Multicomponent	

Location

___Under cultivation	___Never cultivated	____Previously cultivated
___Pastureland	_X_Woodland	____Floodplain
_X_ Upland		___ Sustaining erosion

Soil Drainage: excellent ___ good _X_ fair ___ poor___
Slope: flat ___ gentle _X_ moderate _X_ steep _X_
Distance to nearest water from site (approx.) 200 ft. west of Palmer Lake
Elevation: 710-730 ft. asl

5. SITE INVESTIGATION (append additional sheets, if necessary):
Surface--date(s) November - December, 2005
____Site map (Submit with form)
____Collection

Subsurface--date(s) Fall, 2006
Testing: shovel _____ other 11 – backhoe trenches unit size variable
no. of units 11 (Submit plan of units with form)
Excavation: unit size _____ no. of units _____

Investigator Philip C. LaPorta, Principle Investigator

Manuscript or published report(s) (reference fully):

LaPorta. Philip C., Scott A. Minchak, Margaret C. Brewer
2008 Phase IB Supplemental Cultural Resource Investigation of the Proposed Hillcrest Commons, Town of Carmel, Putnam County, New York. Prepared by LaPorta and Associates, L.L.C. for Wilder Balter Partners, Inc., Elmsford, New York. NYSOPRHP No. 03PR05207.

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Present repository of materials LaPorta and Associates, L.L.C. – Geological Consultants

6. COMPONENT(S) (cultural affiliation/dates):

prehistoric/undetermined date

7. LIST OF MATERIAL REMAINS (be specific as possible in identifying object and material):

Cluster 3 is located to the northeast of Clusters 1 and 2, and includes a hill with a northwestern flat lying area. This east-to-west trending cluster includes locations Q21-Q24. Q21 to Q23 are quartz veins with a large potential rockshelter in front of Q21. Q24 consists of three different localities that follow a trend of quartz and its working.

From collected materials, LPA investigators analyzed 126 artifacts (116 pieces of ore and 10 hammerstones) from CL3:TR3. Twenty-eight (24.1% of the total CL3:TR3 collected ore) are the remains from milling quartz. A large 3 kg (6.6 pounds) ore block is composed of 1/2 migmitite and 1/2 quartz. The seven (6% of the total CL3:TR3 collected ore) pieces of tailings are migmitite with minimal to no quartz. The six pieces of lean ore are quartz mixed with migmitete, feldspar, mica, and/or black tourmaline. The seven pieces of lean ore are feldspar mixed with quartz. The seven pieces of gangue/country rock are migmitite, feldspar, and/or mica without quartz. Twenty-three (19.8% of the total CL3:TR3 collected ore) artifacts are the remains from ore beneficiation. One 2 kg (4.4 pounds) middling core was collected and contains high-grade ore and mica. Nine pieces of mixed heterogeneous ore consist of quartz with intermixed mica. Thirteen ore scaling flakes represent the residual from dressing ore and are composed of heterogeneous ore. Seventeen (14.6% of the total CL3:TR3 collected ore) are on average 2 microlithons of varying thickness. While the lithon packages from CL1:TR4 were clean of non-ore, the ones from CL3:TR3 have the occasional negligible small amount of mica, black tourmaline, or migmitite on the ends. Thirteen (11.2% of the total CL3:TR3 analyzed ore) microlithons were recovered from CL3:TR3. Six of these are whole, while eight are broken (referred to as "rejected"). Two of the "rejected" microlithons are reddened on one of their ends. Fifteen (12.9% of the total CL3:TR3 collected ore) flakes are well defined. Fourteen (12.1% of the total CL3:TR3 collected ore) pieces of chat, crushed ore, were recovered. Four (3.4% of the total CL3:TR3 collected ore) cores (CL3.TR3.59-62) were recovered from CL3:TR3. Two of these (CL3.TR3.59 and 60) are glacially polished masses with flake scar negatives and some black tourmalie (in CL3.TR3.60). CL3.TR3.61 is a faceted and exhausted heterogenous core. CL3.TR3.62 is a fashioned from a high grade ore. The two non-artifacts (referred to as "N/A") are glacially derived gravel-size quartz with no modification. LPA investigators also recovered 10 instruments from the backdirt piles of CL3:TR3 (Table 9). CL3.TR3.H1 is a milling instrument fashioned from glacially derived sandstone with a break and grooved on one end. The other end of the artifact exhibits backhoe marks, independent of the previously mentioned older grooves and break. CL3.TR3.H2 is a round (blunt) wedge fashioned from glacially derived quartzite and used for plug and feathering. Two small focal hammers (CL3.TR3.H3-H4) are fashioned from glacially derived quartzite and quartz respectively. Six (60% of the total CL3:TR3 collected instruments) are focal chisels (CL3.TR3.H5-H10), fashioned from quartz and quartzite.

If historic materials are evident, check here and fill out historic site form No historic materials evident.

8. MAP REFERENCES

USGS 7.5 Minute Series Quad. Name Lake Carmel

UTM Coordinates 610567 4587915

SCALE 1:24 000

0 1/2 1 MILE

0 .5 1 KILOMETER

13

TRUE NORTH

MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1999

9. Photography

Figure 1. Location Q22, rockshelter/quartz quarry.

Figure 2. Location 24, quartz in outcrop and hammer.

10. Subsurface Excavation Plan:

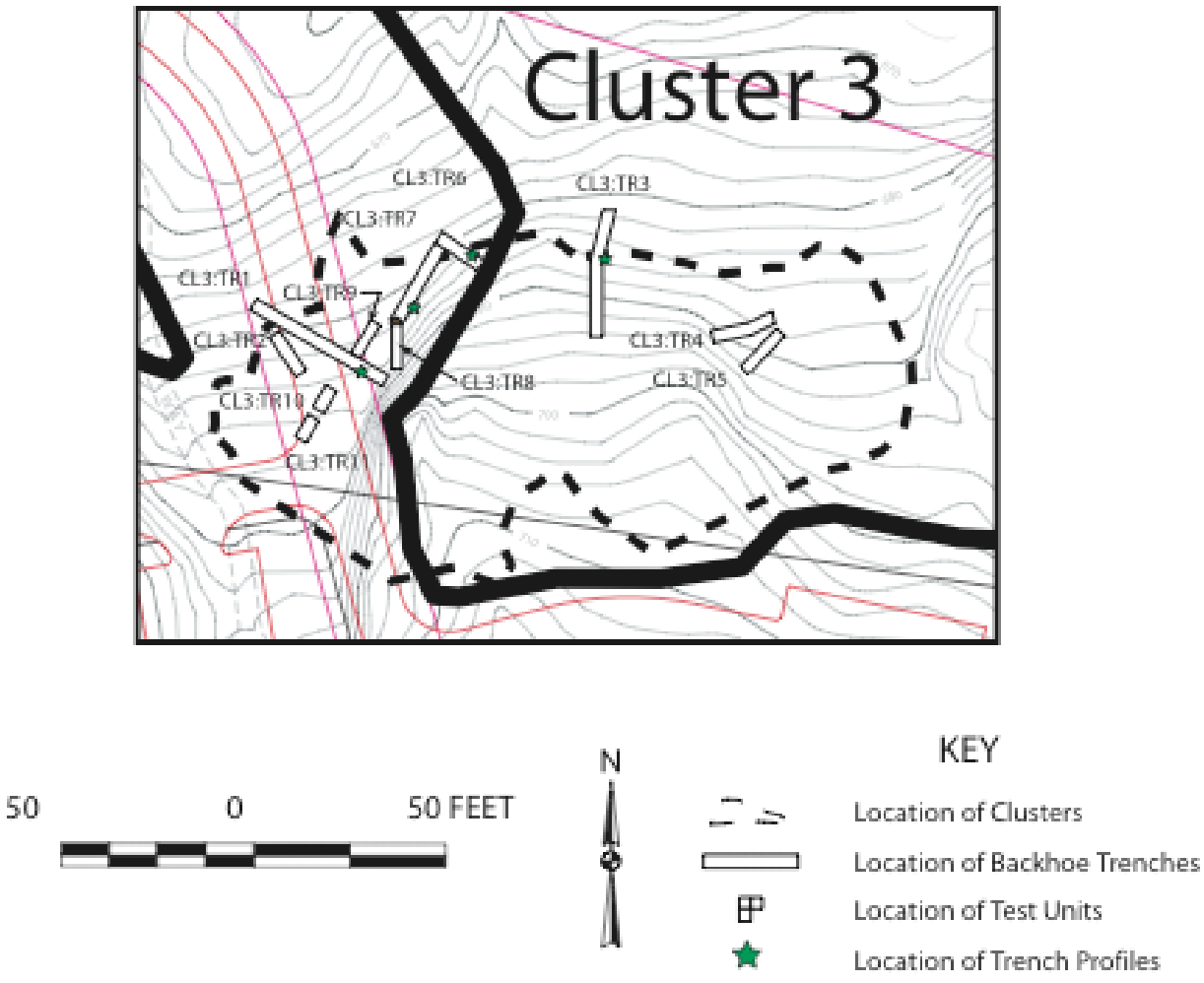

Figure 3. Backhoe trench locations in Cluster 3.

NEW YORK STATE PREHISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
NYS OFFICE OF PARKS, RECREATION & HISTORIC PRESERVATION
(518) 237-8643

For Office Use Only--Site Identifier_____

Project Identifier Hillcrest Commons Date January 2, 2008

Your Name Scott Minchak Phone (845-986-7733)
Address 5 First Street, #73 Warwick, NY 10990

Organization (if any) LaPorta and Associates, L.L.C. – Geological Consultants

1. SITE IDENTIFIER(S) Cluster 4
2. COUNTY Putnam One of the following: CITY_____
TOWNSHIP Carmel
INCORPORATED VILLAGE_____
UNINCORPORATED VILLAGE OR HAMLET_____

3. PRESENT OWNER Wilder Balter
Address 570 Taxter Road, Elmsford, NY 10523

4. SITE DESCRIPTION (check all appropriate categories):

Site

___Stray Find	___Cave/Rockshelter	___Workshop
___Pictograph	_X_Quarry	___Mound
___Burial	___ Shell Midden	___Village
_X_Surface Evidence	___Camp	___Material in plow zone
___Material below plow zone	_X_Buried evidence	___Intact Occupation floor
___Single component	___Evidence of features	___Stratified
	___Multicomponent	

Location

___Under cultivation	___Never cultivated	____Previously cultivated
___Pastureland	_X_Woodland	____Floodplain
_X_ Upland		___ Sustaining erosion

Soil Drainage: excellent ___ good _X_ fair ___ poor___
Slope: flat ___ gentle _X_ moderate _X_ steep _X_
Distance to nearest water from site (approx.) 250 ft. west of Michael Brook
Elevation: 600-650 ft. asl

5. SITE INVESTIGATION (append additional sheets, if necessary):
Surface--date(s) November - December, 2005
____Site map (Submit with form)
____Collection

Subsurface--date(s) Fall, 2006
Testing: shovel _____ other 11 – backhoe trenches unit size variable
no. of units 11 (Submit plan of units with form)
Excavation: unit size _____ no. of units _____

Investigator Philip C. LaPorta, Principle Investigator

Manuscript or published report(s) (reference fully):

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Present repository of materials LaPorta and Associates, L.L.C. – Geological Consultants (Warwick, NY)

6. COMPONENT(S) (cultural affiliation/dates):

prehistoric/undetermined date

7. LIST OF MATERIAL REMAINS (be specific as possible in identifying object and material):

Cluster 4 is locates in a ravine in the southeast portion of the property, before the slope to Michael Brook. The cluster includes and includes the four aspects of Q26 (Q26a-Q26d) and Q28. Q26 is an outcrop, with a series of quartz veins and potential rockshelters, that stretches to beyond the property line. Of these, Q26a stands out with its 50 cm thick vein of quartz that was partially mined. Q28 is a southeast-facing outcrop across the ravine from Q26.

LaPorta and Associates (LPA) investigators collected and analyzed 45 artifacts from the backdirt piles of CL4:TR1 (Backhoe Trench #1 in Cluster 4). Ten (1a-1e – 22.2% of the total CL4:TR1 collected ore) are the remains from milling quartz. The 2.5 kg (5.5 pounds) ore block (CL4.TR1.1) is bounded on one end by migmitite and by felspar and mica on the other end. Seven pieces of lean ore are quartz mixed with migmitete, feldspar, mica, and/or black tourmaline. The two pieces of gangue/country rock are migmitite, feldspar, and/or mica without quartz. Four (2a-2c – 8.9% of the total CL4:TR1 collected ore) artifacts are the remains from ore beneficiation. The 2.55 kg (5.6 pounds) ore block (CL4.TR1.2) is two thick microlithons bounded on one end by migmitite and by felspar and mica on the other end. One piece of mixed heterogeneous ore, consisting of quartz with intermixed mica, was recovered. Two dressed ore pieces were recovered, one of which (CL4.TR5.3) is a high-grade quartz freed from the migmitite while the second (CL4.TR5.4) has faint remains of migmitite and black tourmaline on both ends. Fourteen (31.1% of the total CL4:TR1 collected ore) lithon packages were removed from the backdirt piles, each representing high grade ore 2-3 microlithon in thickness. Eleven (24.4% of the total CL4:TR1 collected ore) of the collected pieces are microlithons, the lowest divisible unit of quartz ore. Two flakes and three pieces of chat, the latter of which is crushed quartz, are further evidence of quartz reduction. Finally, one piece of limonite goertite iron ore (CL4.TR5.44) was recovered. LPA investigators also recovered 3 instruments from CL4:TR1 (Table 12). The lone milling instrument (CL4.TR1.H1) is fashioned from an elongate glacially derived cobble that has spall negatives on one end and pitting on the other end. CL4.TR1.H2 is a round (blunt) wedge fashioned from a glacially derived quartzite cobble and was split before the spall negatives were removed. CL4.TR1.H3 is a combination focal hammer and round wedge fashioned from glacially derived quartzite and exhibits spall scars on opposing tips.

If historic materials are evident, check here and fill out historic site form No historic materials evident.

8. MAP REFERENCES

USGS 7.5 Minute Series Quad. Name Lake Carmel

UTM Coordinates 610714 4587614

SCALE 1:24 000

0 1/2 1 MILE

0 .5 1 KILOMETER

13

TRUE NORTH

MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1999

9. Photography

Figure 1. Location 26a, a quarried 50 cm thick quartz vein.

Figure 2. Location 26a in Cluster 4, prehistoric quartz quarry in fold.

10. Subsurface Excavation Plan:

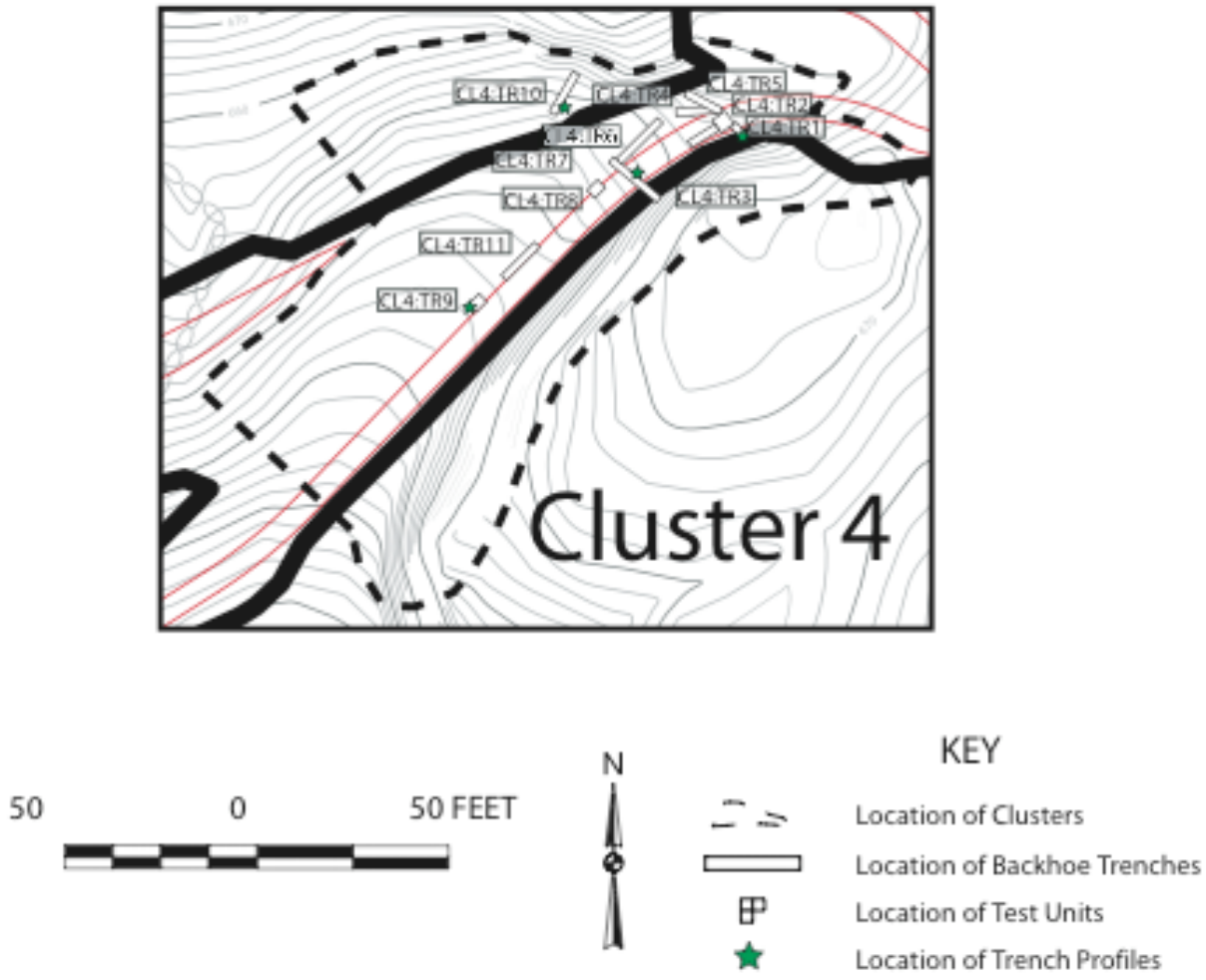


Figure 3. Layout of backhoe trenches in Cluster 4.

APPENDIX I: LPA's Assessment of Artifacts and New Data from Columbia Heritage's Phase IB Report

After LPA's Phase IB and Phase II investigations (2006-2007), LPA was able to review Columbia Heritage's (2007) Phase IB STP sampling (including March, 2008 additional testing), along with the 20 recovered STP artifacts. In addition, Columbia Heritage graciously lent LPA the artifacts for a quarry chain of operation analysis conducted by LPA in Phase II investigations (LPA, 2008). The summary of the Columbia Heritage Phase IB (Columbia Heritage, 2004) and Phase II (Columbia Heritage, 2007) reports does not change, since the report text did not change (see this appendix for attached map with Columbia Heritage STP locations). Most of the positive STPs (TP-54, 55, 59, and 64) are located north-to-northeast of LPA Cluster 1. Two STPs (TP-81 and TP-83) are located to the east and closest (TP-83 actually falls in Cluster 3) to LPA Cluster 3. The final positive STP (TP-231) is located on a terrace above, and to the west, of LPA Cluster 4.

Artifacts

Fifteen of the twenty artifacts (75%) are tailings (category 1b). Two flakes (category 5) were recovered. The first flake (from TP-54) is the distal fragment of a quartz flake. The lone chert flake (TP-83), recovered from an STP in LPA Cluster 3, retains a well-defined bulb and erraillure scar. Glacial polish is evident on the dorsal face. Two pieces of gangue/country lean ore (category 1e) were recovered from TP-81, near Cluster 3. Lastly, one piece of gangue/country rock (category 1f) was recovered from TP-55.

INVSTGTR	STP #	LVL	RAW MAT	CAT
Columbia Hrtg	TP-54	2	QTZ	5
Columbia Hrtg	TP-54	2	QTZ	1b
Columbia Hrtg	TP-55	2	QTZ	1b
Columbia Hrtg	TP-55	2	QTZ	1b
Columbia Hrtg	TP-55	2	MIXED	1f
Columbia Hrtg	TP-59	2	QTZ	1b
Columbia Hrtg	TP-59	2	QTZ	1b
Columbia Hrtg	TP-59	2	QTZ	1b
Columbia Hrtg	TP-59	2	QTZ	1b
Columbia Hrtg	TP-64	2	QTZ	1b
Columbia Hrtg	TP-64	2	QTZ	1b
Columbia Hrtg	TP-64	2	QTZ	1b
Columbia Hrtg	TP-81	2	MIXED	1e
Columbia Hrtg	TP-81	2	MIXED	1e
Columbia Hrtg	TP-81	2	QTZ	1b
Columbia Hrtg	TP-83	2	CHERT	5
Columbia Hrtg	TP-83	2	QTZ	1b
Columbia Hrtg	TP-83	2	QTZ	1b
Columbia Hrtg	TP-231	2	QTZ	1b
Columbia Hrtg	TP-231	2	QTZ	1b

Conclusions and Recommendations

Based on LPA's Phase IB/II (LPA, 2007, 2008) work and Columbia Heritage's Phase IB (Columbia heritage, 2004) work, LPA recognizes more activity on positive STPs (TP-54, 55, 59, and 64) are located to the north of LPA Cluster 1. The tailings recovered west of, and donwnslope of, LPA Cluster 1 are inferred by LPA investigators as sheet midden of beneficiation remains from quartz quarrying (see LPA Phase II investigation) at Cluster 1 or near the small quartz veins in the outcrop trend to the north (LPA Phase IB locations "QTZ VEIN," RS-4, RS-5, and RS-6). LPA recognizes an additional cluster (Cluster 5) based on Columbia Heritage's positive STP locations, artifact findings, and proximity to quartz in outcrops.

LPA recommends no additional work in Cluster 5. However, due to the proximity of Cluster 5 to clusters 1 and 2, as well as the recognized rockshelter down the slope and right behind ShopRite, LPA infers a site complex (Cluster 1, Cluster 2, Cluster 5, rockshelter, and stream) that likely utilized the stream and flats directly under the present-day ShopRite and the associated plaza. LPA does recommend additional work if the APE were to be shifter further west. Geological investigations of the LPA Phase IB (LPA, 2007) of the quartz quarries (now in Cluster 5) indicated that these outcrops represented expressions or prospects, and were very weakly developed. The recent discoveries of Columbia Heritage's STPs suggest that the quarry cluster (Cluster 5) is discreet and separate from Cluster 1. However, the findings of Columbia Heritage do not provide the need to elevate Cluster 5 beyond a series expressions or failed prospects. More importantly, two small quarry support sites (see Appendix A), discovered by LPA through artifacts eroding downslope onto the dirt road, occur at small breaks in topography below Cluster 5. Surface findings for the two small sites include quartz tailings that the authors hypothesize as originating from Cluster 5, as well as flaked chert artifacts fashioned from glacially derived cobbles. These two small sites are positioned outside the old and new APE. Thus, LPA does not recommend work unless the APE was expanded to include the two locations.

References Cited

Columbia Heritage, Ltd.

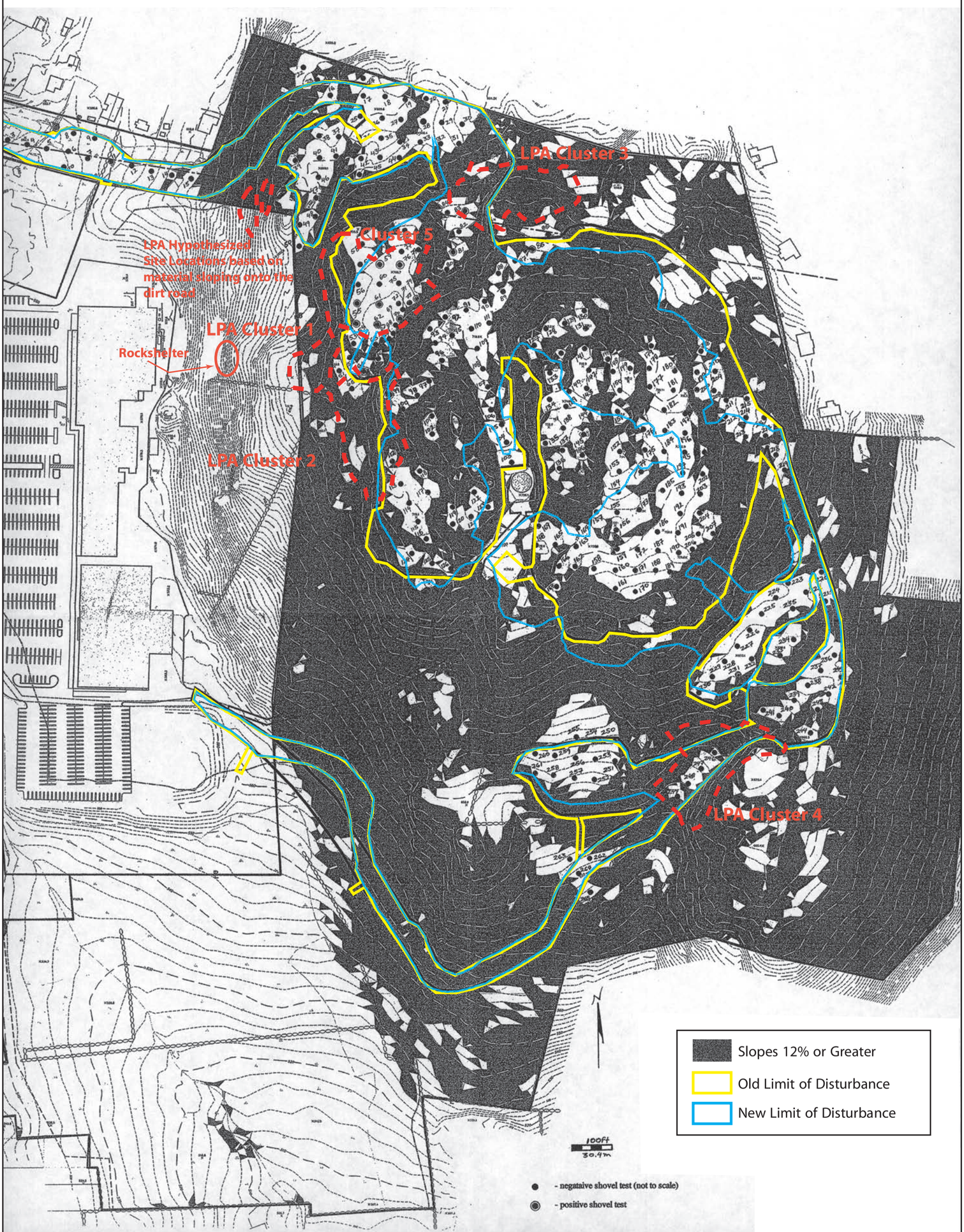
2004 *Phase IA Cultural Resources Survey Site Assessment Phase, Proposed Hillcrest Commons Development, Town of Carmel and Kent, Putnam County, New York*. Prepared by Columbia Heritage, Newburgh, New York for Tim Miller and Associates, Cold Spring, New York. Columbia Heritage Report CA487A-1-11-04.

2007 *Phase IB and Phase II Cultural Resources Survey Site Identification and Site Evaluation Phases, Proposed Hillcrest Commons Development, Town of Carmel and Kent, Putnam County, New York*. Prepared by Columbia Heritage, Newburgh, New York for Tim Miller and Associates, Cold Spring, New York. Columbia Heritage Report CA487BC-2-2-07.

LaPorta and Associates, L. L. C. (LPA)

2007 *Phase IB Supplemental Resource Investigation of the Proposed Hillcrest Commons, Town of Carmel, Putnam County, New York*. Prepared for Wilder Balter Partners, Inc. OPRHP Review No. 03PR05207.

2008 *Phase II Supplemental Resource Investigations of the Proposed Hillcrest Commons, Town of Carmel, Putnam County, New York*. Prepared for Wilder Balter Partners, Inc. OPRHP Review No. 03PR05207.



N
W E
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Proposed Development Impact and Phase IB Sampling
Hillcrest Commons
Towns of Carmel and Kent, Putnam County, New York
Scale: As shown

File 0373 4/08/08
JS/0373

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418