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PHASE IB SUPPLEMENTAL 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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January 31, 2008

With Addendum (Appendix H) in July, 2008

MANAGEMENT SUMMARY

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

Involved State and/or Federal Agencies: ***NOT KNOWN***

Phase of Survey: Phase IB (*Supplemental*)

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: 108
Number of Square Feet and Meters Excavated:
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: none
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: Cluster 1, Cluster 2, Cluster 3, and Cluster 4

Report Author(s): Philip C. LaPorta, Scott A. Minchak and Margaret C. Brewer-LaPorta

Date of Report: January 31, 2008

TABLE OF CONTENTS

FIGURES (in-text):

TABLES (in-text):

PHOTOS (after text)

PHOTOS (cont.):

APPENDICES

INTRODUCTION

This report presents the results of the supplemental Phase IA/IB 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 the Phase IB 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 conducted a supplemental Phase IB field investigation of the prehistoric quarry sites within the study area.

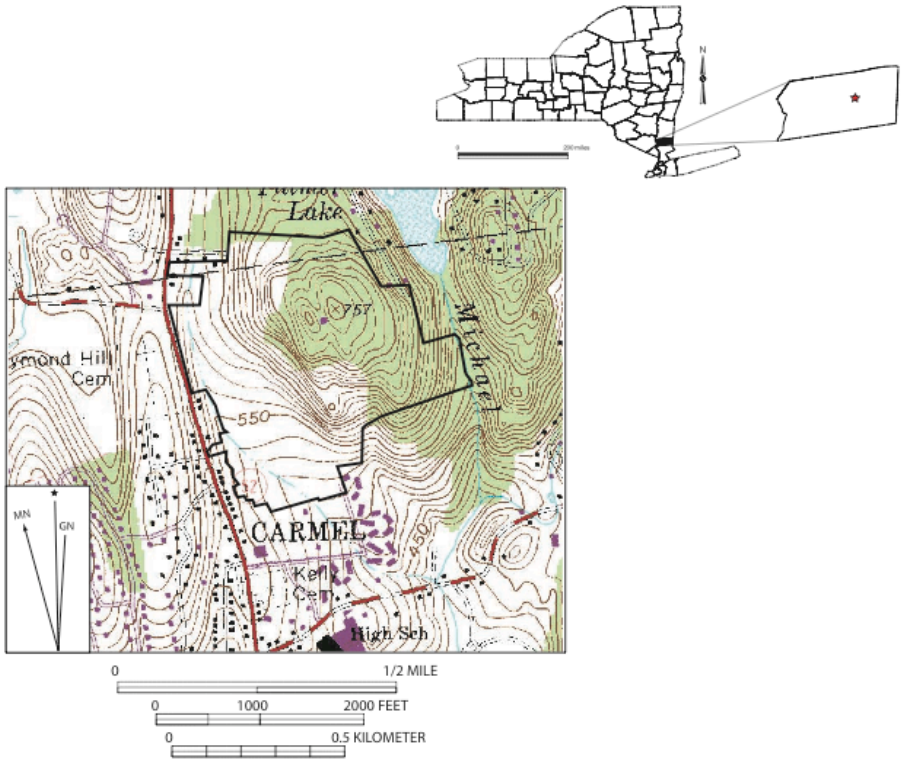


Figure 1. Locational and topographic map of the general study area, with the location of the project area delineated in black. (Adapted from the Carmel 7.5' Quadrangle, USGS 1:24,000 scale).

BACKGROUND AND SUMMARY OF PREVIOUS RESEARCH

I. ENVIRONMETAL AND PHYSICAL SETTING

A. Physiography

The planned Hillcrest Commons lies within the Hudson Highlands physiographic province, a belt of hilly uplands that extend from northern New Jersey (where they are known as the New Jersey Highlands or the Reading Prong) into southern New York State. The project area ranges in elevation from 757 ft (231 m) in the east/central part, to as low as 536 ft (163 m) in the valley that includes Michael Brook (Figure 1).

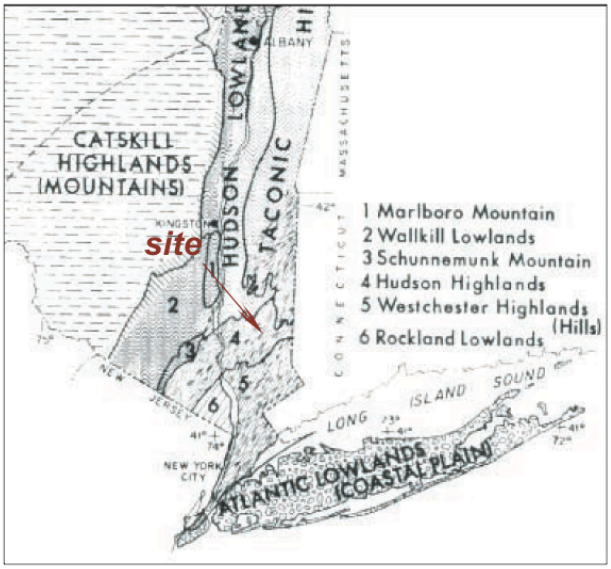


Figure 2. Physiographic map of southern New York State (Fisher, 1977), with the location of the project area denoted in red.

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 to 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 (bqpc). 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 (Table 1; Figure 3). The APE (see Appendix 1) includes, almost exclusively, four soil series (CrC, CsD, CtC, and CuD). Three soil series (WdB, Sh, and UwB) are located in the access road going east off Route 52. These are in the Sun Loam and Woodbridge loams. The remaining eight soil series (ClB, ClC, LcB, PnC, Sm, SuA, Ub, and Uc) are located outside the APE.

Table 1. Soil types found in the Hillcrest Commons project area.

Map Unit Symbol	Map Unit Name
ClB	Charlton loam, 2 to 8 percent slopes, very stony
ClC	Charlton loam, 8 to 15 percent slopes, very stony
CrC	Charlton-Chatfield complex, rolling, very rocky
CsD	Chatfield-Charlton complex, hilly, very rocky
CtC	Chatfield-Hollis-Rock outcrop complex, rolling
CuD	Chatfield-Hollis-Rock outcrop complex, hilly
LcB	Leicster loam, 3 to 8 percent slopes, stony
PnC	Paxton fine sandy loam, 8 to 15 percent slopes
Sh	Sun loam
Sm	Sun loam, extremely stony
SuA	Sutton loam, 0 to 3 percent slopes
Ub	Udorthents, smoothed
Uc	Udorthents, wet substratum
UwB	Urban land – Woodbridge Complex, 2 to 8 percent slope
WdB	Woodbridge loam, 3 to 8 percent slopes

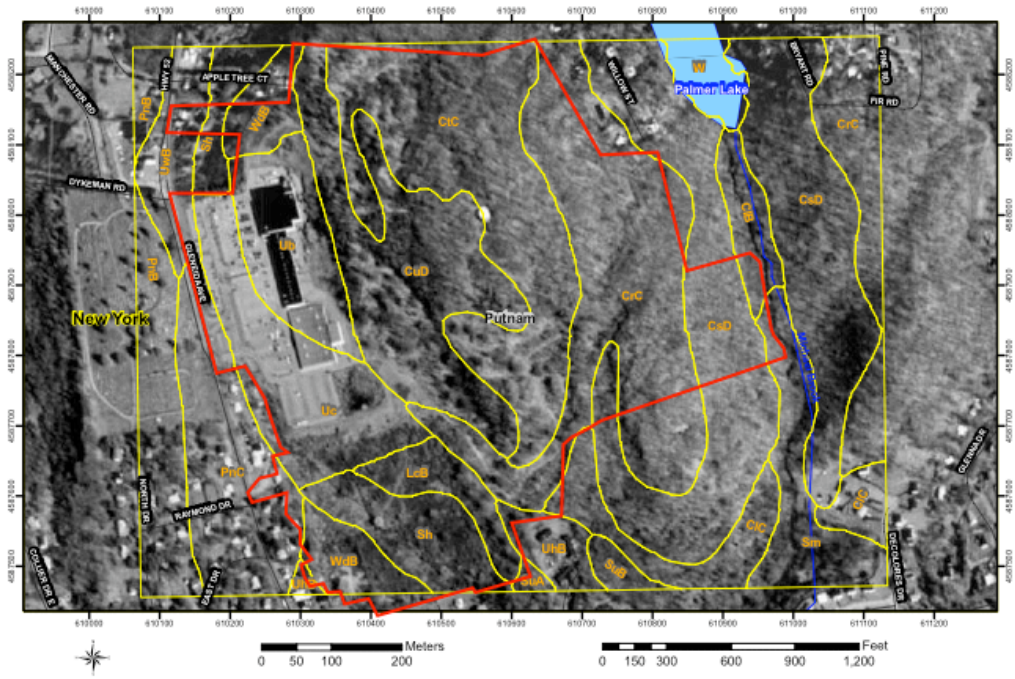


Figure 3. NRCS Soil classifications for the Hillcrest Commons project (delineated in red). Geospatial coordinates are in UTM (Zone 18).

The Charlton series consists of very deep, well drained loamy soils formed in till. They are 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 20 to 38 in (50 to 96 cm). Depth to bedrock is commonly more than 6 ft (1.8 m). Rock fragments range from 5 to 35 percent by volume to a depth of 40 in (100 cm) and up to 50 percent below 40 in (100 cm). Except where the surface layer is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. The O-horizon is a 2 in (5 cm) thick and contains decomposing organic matter. The A-horizon is a 1 to 6 in (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 20 in (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 38 in thick (96 cm), 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 20 to 40 in (50 to 100 cm). Solum thickness ranges from 16 to 36 in (40 to 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 or channers but include cobbles and flagstones, particularly just above the bedrock. The O-horizon is 0 to 2 in (0 to 5 cm) thick and contains decomposing organic matter. The A-horizon is a 2 in (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 acid; clear smooth boundary. The Bw is a 17 in (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 mainly 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 subrounded gravel except where the surface is stony. The soil has 20 percent or more silt in the particle-size control section. Depth to hard bedrock ranges from 10 to 20 in (25 to 50 cm). The O-horizon is 1 to 4 in (2 to 10 cm) thick and contains slightly to decomposing plant matter. The A-horizon is 1 to 6 in (2 to 15 cm) thick, very dark gray-brown, gravelly fine sandy loam, 10 percent gravel, and a clear smooth boundary. The Bw is 12 in (30 cm) thick, dark yellow-brown to brown, gravelly fine sandy loam, 10 percent gravel, and few very fine roots.

The two soil series for the road are described briefly, since they are deep loams that are less likely to contain prehistoric quarries (the location of which is the research focus for this Phase IB supplemental). The Sun series consists of very deep, poorly drained soils derived primarily from limestone and sandstone (type locality is in Oswego County, NY) with similar amounts of schist, shale, and granite in some areas (most likely schist in this project area). Slopes range from 0 to 3 percent and the soil series is found in low areas or depressions on till plains. Bedrock is below 60 in (153 cm) and solum thickness ranges between 20 and 40 in (50 and 100 cm). The Woodbridge series is formed from moderately well drained, loamy soils formed from glacial tills. They are nearly level to moderately steep (0 to 25 percent slope) soils on plains, hills, and drumlins. The solum thickness is 18 to 40 in (46 to 100 cm) and bedrock is noted as commonly 6 ft (1.83 m).

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 conducted the 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 1.4 mi (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 1.7 mi (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 1.7 mi (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 0.9 mi (1.4 km) east of the project area. The West Branch Reservoir Dam #1 (A079.01.0038) is located 1.3 mi (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 parts, as small camps, with below average potential for historic remains on the proposed Hillcrest Commons. Recommendations are for Phase IB subsurface testing of flatter parts, potential rock shelters, and outcrops of potential lithic resources.

B. Columbia Heritage Phase IB 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 come 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.

LPA PHASE IB RATIONALE AND METHODOLOGY

Phase IB methodology for Hillcrest Commons followed three intertwined steps from the 7-step procedure (designed for identification and further testing through Phase II and III) outlined by LPA for the Smiths Basin quarry project in Washington County, New York (LaPorta and Associates 2003:20-26). The steps are as follows:

Step 1. High resolution geological mapping.
Step 2. Photodocumentation and Identification of what needs further testing.
Step 3. Surface sampling prior to removal.

As previously stated, steps 1 and 2 are intertwined and the authors will address both together. LPA investigators traversed the APE of the property to locate potential prehistoric quartz quarries at the request of Columbia Heritage. Investigators used the outcrops as trends, which were approximately north-south. Quartz vein locations were identified, recorded, flagged, and georeferenced with a Garmin E-Trek GPS unit (in Lat/Long. coordinates). In addition, investigators noted the location of potential rockshelters, spots of geological interest, isolated artifact finds, and Columbia Heritage STP locations near outcrops. The geological mapping for the APE consisted of strike and dip measurements taken by Philip LaPorta using a Brunton compass. After reviewing the literature concerning the bedrock geology of the region (Prucha, 1956; Fischer et al., 1970), LPA decided that if quarries were present in the project area, they should first be placed in a bedrock geological context. Only from that position, in a matrix of petrofabric measurements and calculations, could cultural inferences be made concerning data exacted from rock surfaces. Therefore the following data sets are constructed from Brunton compass measurements and the use of stereographic projection. Four discrete clusters of quarry activity were elucidated using this methodology. The following descriptions support the concept of stratigraphic and structural constraints towards the development of successful Native American quarries (LaPorta, see attached vita). They also support the working theory (LaPorta, see attached vita) of a folk geology concept at work in prehistory.

Surface samples were collected (Step 3) and bagged in a ziplock bag or placed in a 5 gal (18 l) masonry pail with identification on flagging tape. The collections were transported to the LPA repository, but not analyzed for the Phase IB.

PHASE IB LPA FIELD INVESTIGATIONS

I. Geological Mapping

Geological field mapping elucidated three types of quartz deposits within the Hillcrest Commons Property. These quartz deposits were subdivided by LPA analysts according to age, genesis and geological occurrence. As outlined in the General Bedrock Geology and Structure section of this document, the bedrock underlying the Hillcrest Commons property is Middle Proteorozoic (greater than 1.0 billion years) in age. This rock has experienced four types of mountain building (orogenic) processes; from oldest to youngest, Grenvillian, Taconian, Acadian and Alleghanian. The numerous tectonic episodes have all left their specific hallmark on the rocks underlying the property under investigation.

Type I quartz is developed within foliations interpreted by LPA analysts as having developed during the Grenvillian age folding. As such, this type of quartz is inferred to be Proterozoic in age. Type II quartz is formed from the magmatic intrusion of pegmatites (water-rich granites known for producing extremely large crystals of specific silicate minerals). The pegmatitic intrusion is interpreted as also having formed during the Grenvillian, as such Type II quartz shares a Proterozoic age with Type I quartz. Finally, Type III quartz has been mapped as vein quartz emplaced in the lower temperature ranges of hydrothermal metamorphism associated with the Taconian orogeny; hence the classification as cold emplaced. Type III quartzes are inferred as Taconic in age and they cross cut both Type I and Type II quartz veins.

A. **Cluster 1 Geological Mapping**

Cluster 1 includes five mapping stations; RS4, RS5, RS6, TR5, and Q17. It also includes several loci of surface collections, including Q1 and a surface expression of a quartz vein, marked on the map as "quartz vein". The fabric measurements described below for Cluster 1 are plotted on stereographic projection, specifically the vector orientations for fold hinges, foliations and joint surfaces. Planar surfaces are plotted as poles to planes on the stereographic projection. Lineations are plotted as lines indicating the direction of plunge (Appendix C). The most prominent geological structures elucidated include three fold hinges located at RS4, RS5 and RS6. The fold hinge measurements are as follows:

1). The fold hinge at RS4 bears N45E 90° dip.
2). The fold hinge at RS5 has a bearing of N54W, plunging 22°S.
3). The third fold hinge mapped at RS6 bears N60E and plunges 21°N.

These three folds, as defined by the recorded hinges, give rise to a plexus of foliations, the most prominent of which were exposed at RS4, RS5, RS6, and TR5.

The majority of the foliations strike northwest-southeast and contain moderate dips to the northeast. These include the following measurements:

1). TR5 (two measurements taken): N44W, dip at 32°NE; N41W, dip at 41°NE.
2). RS4 (two measurements taken): N71W, dip at 31°NE and N70W, dip at 47°NE.
3). RS5 (one measurement taken): N71W, dip at 31°NE.

These foliation measurements represent the moderately dipping limb of the N54W fold hinge discovered at RS5. It is along these foliations that the first type of quartz vein, located on the Hillcrest Property, was found (Type I quartz vein).

Prominent master joint sets, also related to the fold hinge at RS5, include conjugate joint sets:
1). Conjugates measured at TR5 bear N52E, dip at 34°SE and N27W, dip at 52°SW.
2). Conjugate set located at RS6 are aligned at N37E 90° dip and N31E 90° dip.

3). Hinge-joint relations at Q17, the quarry workshop site, bearing N33E, 90° dip.

This particular joint set is lined with a younger generation of quartz veins (here named Type III quartz vein). This quartz vein served as a primary ore target for Native American quarry activity.

B. Cluster 2 Geological Mapping

Cluster 2, the Adit, contains six prominent map stations, which include Q14, Q15, Q16, Q18, Q19, and Q20. The fabric measurements described below for Cluster 2 are plotted on stereographic projection, specifically the vector orientations for fold hinges, foliations and joint surfaces. Planar surfaces are plotted as poles to planes on the stereographic projection. Lineations are plotted as lines indicating the direction of plunge (Appendix D). The mapping exercise revealed the presence of five prominent sets of fold hinges, a wide variety of conjugate joints, and foliation patterns. Quartz veins representing several generations of geologic orogenic events were discovered, all of which were associated with some degree of Native American quarry activity.

There are five sets of fold hinges mapped in Cluster 2.

1): Two sets of fold-hinges, are exposed at Q14: N70E, plunge 53°N and bearings that range from N3 to N7W, plunging at 25° to 29° S.
2): Fold hinges exposed at Q16: N37W, plunging at 35°S
3): A hinge at the adit in Q18: N74W, plunging at 36°S
4): A hinge at Q19: E-W striking, plunging at 3°E.

Associated foliations have been mapped in Q14. Foliation dips are moderate, ranging from 25 to 53 degrees.

The master joints controlling quarry development are visible at stations Q14, Q15, Q16, Q18, Q19 and Q20. In general, these are hinge joints, and conjugate sets of joints aligned with hinge axes, some of which have been refolded by younger orogenic events.

1): Hinge joints in Q14 strike N81E and dip steeply to the southeast.
2): Conjugate joint sets in Q14 are oriented as follows: N40E, inclined 18°SW, while it's conjugate strikes N51W and is inclined 23°NE.

A mass of quartz veins in Q14, which are also mapped in Q18 and include the prehistoric adit, are developed along the N81E hinge-joint surface. The quartz veins are refolded, and as such are inferred to be Type III quartz veins, as discussed in the section outlining Cluster 1 geology.

Cluster 2 exposes Type I quartz veins located at mapping stations Q14, Q15 and Q18. The Type I quartz in Cluster 2 is associated with fold hinges, the master joints of which are aligned roughly N81E, N61E, N56E and N31E, all steeply dipping. Geological field observations made at Cluster 2 infer that Type II quartz veins originate within a simple pegmatite, which has bled from the surrounding migmitite and recrystallized as a coarse grained microcline-plagioclase-quartz pegmatite with minor magnetite, pyroxene and black tourmaline. This concentration of quartz can be seen clearly at Q18, located at the intersection of the N42E foliation with the intersection of master joint N81E, steeply dipping. The exposure of the plane foliation with the conjugate joint surfaces has revealed the quartz vein and permitted the development of a three meter long adit. The conjugates to these master joints can be seen at Q14 (N51W, dip 23°NE), at Q15 (N40W, dip 42°NE; N35W, dip 78°SW), at Q16 (N7W, dip 65°W), and at Q18 (N85W, dip 84°N). These sets of conjugate joints, some of which also bear the Type III quartz veins, set the geological constraints on quarry development.

C. Cluster 3 Geological Mapping

Cluster 3 includes mapping stations Q21, Q22, Q23, Q24A, and Q24B. The fabric measurements described below for Cluster 3 are plotted on stereographic projection, specifically the vector orientations for fold hinges, foliations and joint surfaces. Planar surfaces are plotted as poles to planes on the stereographic projection. Lineations are plotted as lines indicating the direction of plunge (Appendix E). Geologically the clusters define the presence of three fold hinges, all bearing approximately north-northeast. In concert with this are three subordinate fold hinges trending east-west, and one auxiliary hinge trending more north than east.

1). Mapping station Q22 and Q24B: E-W, plunging 20° to 24° W and E-W, plunging 20° to 24° E.
2). Mapping station Q23 reveals a fold hinge trending N30E and plunging 35°N.
3). Mapping station Q24A contains three undulating fold hinges; trending N48E, N47E, and N45 E. All plunge gently to the north.

The associated quartz veins are beautifully exposed in a plexus of accentuated conjugate joints, which align themselves along the fold hinges. The conjugate joints trend northeast-southwest and northwest-southeast. The conjugate joints exposed at Q21 have quartz veins present in the northeast-southwest trending joint. Pegmatite-type quartz (Type II) appears to be a minor component of this series of folds in Cluster 3. Also, quartz associated with moderately dipping foliations (Type I) is nearly absent at this location. The majority of quartz occurrences in Cluster 3 appear to be cold emplaced in conjugate joints (Type III), aligned en-echelon and intersecting along the fold hinge.

D. Cluster 4 Geological Mapping

Cluster 4 is delimited through the establishment of five mapping stations Q26A-D and mapping station 28. The fabric measurements described below for Cluster 4 are plotted on stereographic projection, specifically the vector orientations for fold hinges, foliations and joint surfaces. Planar surfaces are plotted as poles to planes on the stereographic projection. Lineations are plotted as lines indicating the direction of plunge (Appendix F). Extremely well developed fold hinges were located at all four Q26 stations (A-D).

1. Two of the dominant fold hinges trend roughly east-west and plunge to the east from 28° and 34°.
2. Another fold hinge, discovered at Q26A, trends S80E and plunges 19°S.
3. An ancillary hinge was discovered at Q26B, trending N16W and plunging 19°N.

The vast majority of conjugate joints bearing quartz veins are oriented north-northwest or south-southeast. The fold hinge bearing S80E at Q26A contains conjugate joints oriented at an average of N17W and S31E. Other sets of conjugate joints are associated with the E-W fold hinges: specifically the joints bear E-W, dipping 68°N; and E-W, dipping 41°S.

Foliation planes, also well developed in accordance with the fold hinges, are all moderately dipping. These foliations have orientations ranging from; S28E, dipping 37°NE and S36E, dipping14°SW. Very few of the foliation intersections contain appreciable volumes of quartz (Type I); therefore, they are not considered any further here.

The large quartz vein, and associated adit located at Q26A, occurs within the fold hinge oriented S18E. The principal ore target in Cluster 4 is Type II, cold emplaced quartz, again oriented inside the conjugate joint sets refolded within the fold axis of the hinge of the dominant fold at Q26C; bearing E-W, pluging 28°E.

II. Archaeological Survey

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.

Table 2. Results of the LPA Phase IB Supplemental investigation.

Field Designation	Description
Q01	strongly foliated quartz, few instruments
Q02	quartz vein, zone of extraction, (2) impact scars
Q03	strongly foliated amphibolite with quartz veins; undercut ledge from zone of extraction; backfill pile in front
Q04	freshly broken irregular joint surface with quartz; quartz broken along joint and is domainal; much archaeological debris in the form of lithon packages, ore blocks, dressed ore, tailings, and flake debris
Q05	massive pegmatite zone in strongly foliated schist; quarry developed on joint block; possibly expressions
Q06	feldspar pegmatite with quartz and possible rockshelter face
Q07	potential small rockshelter in between Q05 and dirt road going to the water tower
Q08	shelter developed in foliation with quartz vein grown in foliation
Q09	large slab of migmitite situated under a boulder; few signs of quartz
Q10	quartz vein in possible limb of fold; some tailings and possible quarry tools
Q11	pegmatite cutting through cold emplaced joint in nose of fold
Q12	quartz vein in fold hinge
Q13	quartz vein in fold hinge
Q14	~10 m of outcrop overhang; potential rockshelter; along same outcrop as Q15 and Q16
Q15	scree with exposed quartz veins in peeled rocks; along same outcrop as Q14 and Q15
Q16	large possible rockshelter at end of outcrop with Q14 and Q15
Q17	pegmatite feldspar with larger quartz veins (5-30 cm thick); slope down to the northwest
Q18	quartz adit; another vein running to the southeast
Q19	possible shelter with quartz vein; upper part shows 'action'; quartz vein in direction of foliage
Q20	possible shelter with quartz vein; quartz surface battered
Q21	quartz vein
Q22	rockshelter with quartz veins
Q23	quartz vein; up slope from Q21
Q24	quartz vein with exposed ore blocks in tree roots
Q24a	quartzite instrument
Q24b	two small quartzite outliers
Q25	quartz vein before drop-off in hill
Q26a	thick (50 cm) vein of quartz with smaller veins to the side and above
Q26b	rockshelter with quartz vein and fold in rock
Q26c	rockshelter with numerous quartz artifacts
Q26d	rockshelters on promontory with quartz vein
Q27	small quartz vein expression near water tower

Q28	possible rockshelter across ravine from Q26
ART-1	isolated find of quarry instrument found in disturbed area
Glacial Boulders	Three boulders, no artifacts or quartz veins seen
Quartz Subcrops	quartz barely above the surface; either outcrop or float
ΔH Qtz Subcrop	same as above; evidence of heat applied
RS-4	S. Oberon STP Location
RS-5	S. Oberon STP Location
RS-6	S. Oberon STP Location
TR5-3A	S. Oberon STP Location
Qtz Vein	Quartz veins (2) located between Oberon STPs RS-4 and RS-5

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.

A. LPA Designated Clusters

Cluster 1 (Appendix A; Photos 1-2) 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 cluster, while only containing one outcrop (Q17), also includes flat areas for potential workshops. The outcrop, Q17, contains a minimum of four quartz veins. Going north, down slope, a few large blocks were removed from the outcrop and investigators located a quartzite hammerstone, indicating prehistoric mining or lithic processing.

Cluster 2 (Appendix A; Photos 3-6) is located on the western side of the slope, southeast of Cluster 1. The north-south trending cluster includes Q12-16 and Q18-Q20. 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. Q12-Q16 are the southernmost locations, mostly along the same outcrop. Q12 is a thin quartz vein on a fold hinge. Going approximately 30 m (100 ft) north along the outcrop, Q13 is another small quartz vein on a fold hinge. Continuing north along the outcrop, Q14 is a ~ 10 m (~ 33 ft) stretch of potential rockshelter outcrop. North from Q14 is Q15, a quartz vein and associated scree downsloping to the west. Q16 is a possible rockshelter at the northern terminus of the Q12-Q16 outcrop.

Q18-Q20 are in the northern outcrop that includes an adit in a quartz vein, and two possible rockshelters with quartz veins. Q18, the centerpiece of Cluster 2, is an adit through a pegmatite vein in the bedrock where most of the quartz is removed. It is located halfway up the outcrop from the dirt road. Going north, Q19 is a possible rockshelter with a very thin quartz vein above the shelter. Q20, at the northern terminus of the Q18-Q20 outcrop, is another possible rockshelter with a quartz vein.

Cluster 3 (Appendix A; Photos 7-10) is located to the northeast of Clusters 1 and 2, and includes a northeast-southwest trending hill with a flat lying western 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 that trends northeast-southwest. Q21 is a small quartz vein in the outcrop with another small quartz vein (Q23) located upslope to the southeast. Q22 is potential rockshelter with a quartz vein at the top of the rockshelter that contains a metaconglomerate hammer. Q24/Q24a/b consists of three different localities that follow a trend of quartz and its workings. Location Q24 is a quartz vein with exposed ore blocks in tree roots. Q24a is a quartzite instrument south of Q24, while Q24b contains two small quartz outliers to the southwest of Q24a.

Cluster 4 (Appendix A; Photos 11-16) is located in a ravine in the southeast part of the property, before the slope to Michael Brook. The cluster 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 APE.

Of these, Q26a stands out with its 50 cm (19.7 in) thick vein of quartz that was partially mined. Q26b is a potential rockshelter located at the toe of the slope. Aside from containing a quartz vein, Q26b is also of geological note showing the nose of a fold (see geology section). Q26c is a potential rockshelter with numerous quartz artifacts littering the surface. Q26d contains a quartz vein in a promontory that has potential for a rockshelter. Q28 is a southeast facing outcrop across the ravine from Q26 that was first thought to be a potential outcrop. Further investigation located a historic prospecting drill hole.

B. Non-Clustered Locations

In the north of Cluster 1, in the northwest of the property, are mapped Columbia Heritage STP locations (RS-4, RS-5, RS-6, TR5-3A, and Qtz Vein) and Q01. The Columbia Heritage STP locations are located near potential rockshelters, while the "Qtz Vein" location represents two quartz veins between STP RS-4 and RS-5. Location Q01 is a strongly foliated quartz vein in a smaller outcrop exposed near the dirt road leading into the larger APE. South of Cluster 1 and west of Cluster 2 is the location of quartz in an old rock wall.

West of Cluster 2, in the center of the APE and bordering the road to the water tower, are locations to the east (Q03-Q07 and Q27) and to the west (Q08-Q10). Q03 to Q06 are thin quartz veins in north-south trending outcrops north of the water tower. Q07 is a potential rockshelter located near the water tower and in a possible footprint of land clearing and blasting for the tower. Q27 is a very thin quartz vein with little evidence for extraction. Q08 to Q10 represent small quartz (Q10) and potential glacial erratic related rock shelters (Q08 and Q09), with little surface evidence. South of the water tower, outside the APE and along another outcrop, is a pegmatite vein denoted as Q11.

The northeast part of the property contained one quartz vein (Q25), numerous isolated quartz vein subcrops (Quartz Subcrop and ΔH Qtz Subcrop), glacial erratics, and artifact finds (ART-1) not associated with quartz veins. The glacial erratics, while not containing quartz, were initially thought to contain possible rockshelters. LPA investigators, however, observed modern fires and camps. The small quartz vein (Q25) is located east and down slope of the three glacial erratics (Glacial Erratics) with little evidence for quarrying. Upslope from these, and to the west, is an isolated quarry tool find (ART-1) in a disturbed area. The quartz subcrops (Quartz Subcrop and ΔH Qtz Subcrop), to the north and south of the previously described locations, represent float pieces of quartz that LPA investigators could not tie to any outcrops or quarrying/processing tools.

RESULTS AND RECOMMENDATIONS

I. Results

A. Geology

In summary, all tectonic deformation evident at the Hillcrest Commons Property represents the intense orogenic deformation of a metapelite (a metamorphosed silt and/or mudstone), which may be genetically associated with the Brewster-Croton magnetite ore deposits. During intense periods of tectonic mountain building and associated regional metamorphism (such as what is currently occurring along the Alps and Himalayas of Europe and Asia), the sediments were converted to a fluidized rock permitting the segregation, or gravitational separation, of distinct classes of minerals, including magnetite lenses and quartz veins. Type I quartz developed as a series of simple pegmatites (water-rich granitic magmas capable of producing extremely large crystals of certain types of silicate minerals), developed within the cores of folds and occurring within moderately dipping foliations related to the primary fold hinges. Subsequent to this period of intense deformation, a younger mountain building event (called the Taconian orogeny) permitted the cold emplacement of hydrothermal quartz veins (Type II quartz) along joint sets developed within the earlier generation of folds. Type II quartz intersects the Type 1 quartz now exposed on the walls of the steeply inclined joint surfaces. Later, two younger mountain building events, known as Acadian and Alleghanian, refolded some of the orthogonal joint sets and permitted the development of a close-spaced fracture cleavage within the preexisting, quartz veins. Uplift, erosion, weathering, and finally glaciation have exposed and eroded the fold sequence to its present position, leaving behind a radiation of undulating folds penetrated by now accentuated joint surfaces, which have revealed two generations of quartz development.

The most prominent quarry and associated workshop, located in Cluster 1, is developed in Type II quartz veins. Type I quartz associations are all exploited as prospects (expressions - see Jointa Galusha reference). The Type I quartz veins are not developed into motions or movements (see Jointa Galusha reference) due to geological constraints and the lean nature of the ore.

Cluster 2 possesses the best developed, and architecturally intact, quarries (movements) on the Hillcrest Commons property. The adit developed within the Type II quartz is the best developed quarry within the study area. This quarry possesses all micro-, meso-, and macroscale characteristics that define a movement. This well developed quarry face is complimented by a full range of curated mining instruments, including nonportable anvils, impactors, impact wedges and the full spectrum of ore milling instruments. Apparently, the crystallized nature of the quartz, its associated fabric, and overall dimensions relegate this type of quartz to the level of a viable ore. Therefore, the extraction exercise performed here is repeated successfully to a depth of approximately 3 m into the bedrock wall. The resulting adit, a nearly horizontal shaft following the inclination of the quartz vein, is terminated when the mining technology at hand fails. All other quartz locations located within Cluster 2 fall into Type I and this variety of quartz associated with foliation only serves as prospects (expressions). These quartz rich outcrops, however, possibly serve as a field guide or marker for Native Americans prospecting for denser concentrations of quartz and more associated variety throughout the region.

Cluster 3 reveals Type II quartz occurring along joint surfaces. However, the most extensive of quartz veins is very tightly wedged inside of a fold hinge, the limb of which is the buttress for a potential shelter area occurring. This quartz vein is still present at the outcrop surface because it's position inside of the hinge precluded mining; it was rendered inaccessible to Native American technology, except possibly along its outermost surfaces. Therefore, this quartz vein, largely unmined, is still present today at the surface of the fold, trending diagonally along the surface of the hinge.

Finally, a well developed adit, containing a 0.5 m thick quartz vein, crops out in a recumbent fold hinge in Cluster 4. This flattened fold hinge (S80E) is mined to about 2m into the outcrop surface. The

mining takes place along a soft outer shell of amphibolite, which envelopes the quartz vein. The other quartz types are only poorly developed at this particular location and reveal scant evidence of prospecting or Native American quarry activity.

B. Archaeology

LPA investigators identified forty-two locations of quartz veins, geological interests, and archaeological interest. Twenty of these locations were divided into four clusters (Cluster 1, Cluster 2, Cluster 3, and Cluster 4) that included locations along approximately north to south trending migmitite outcrops. The remaining twenty-two locations were singular locations of thin quartz veins, quartz subcrops, and artifacts in the rest of the property.

Cluster 1, in the northwestern part of the property, encompasses an outcrop with four quartz veins (Q17) and adjacent level areas. Cluster 2 is in the west-central part of the property and contains eight locations of quartz veins and rockshelters (Q12-Q16 and Q18-Q20) along two north-to-south trending outcrops. Cluster 3 is in the north-central part of the property and contains six quartz vein locations (Q21-Q24b) along an outcrop on the west of a small hill and a low-lying outcrop on the eastern side of the small hill. Cluster 4 is in the southwestern part of the property and contains a north-to-south trending outcrop on its western side with quartz veins and potential rockshelters. On the western side of Cluster 4 is a possible rockshelter that has a historic mining drill hole.

II. Recommendations

Cluster 1 is just outside of the APE, but may be indirectly impacted since it is down slope of construction activity. The eastern slice of Cluster 2 is within the APE. The adit in Q18 prompted initial concern as to the origin (prehistoric or historic) of its working. 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 2 work (assessing the significance of the resource as per Secretary of the Interior and NYAC guidelines).

******NOTE: The following is from Appendix H (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 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.

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.

Fischer, Donald W., Yngvar W. Isachsen, and Lawrence V. Rickard
1970 *Lower Hudson Sheet, Geological Map of New York*. New York State Museum and Science Service Map and Chart Series No. 15.

LaPorta and Associates, L. L. C.
2003 *Amended Data Recovery Plan and Education Plan for Prehistoric Quarry Investigation and Mitigation at the Smiths Basin Site, Town of Hartford, Washington County, New York*. Prepared for Jointa Galusha, L. L. C., OPRHP Review No. 96PR0303.

Mather, William W.
1843 *Geology of the First Geological District*. Natural History of New York, Geology, Part 1. Carroll and Cook, Albany.

New York Archaeological Council
1994 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State*. Document on file with LPA.

Prucha, J.J.
1956 *Geology of the Brewster Magnetite District of Southeastern New York*. New York State Museum and Science Service, Circular 43, 48 p. (map included).

Photo 1: Cluster 1 quartz veins in outcrop at Q17, looking east.

Photo 2: Cluster 1 split in bedrock to north of Photo 1 at Q17, looking northeast.

Photo 3: Cluster 2 outcrop at Q14, looking east.

Photo 4: Cluster 2 outcrop and scree at Q15, looking east.

Photo 5: Cluster 2 quartz vein and adit in outcrop at Q18, looking east.

Photo 6: Cluster 2 squartz vein in outcrop at Q20, looking south.

Photo 7: Cluster 3 outcrop at Q21, looking south.

Photo 8: Cluster 3 instrument on top of Q22, looking northwest.

Photo 9: Cluster 3 quartz vein in outcrop at Q24, looking east.

Photo 10: Cluster 3 squartzite instrument at Q24a, looking east.

Photo 11: Cluster 4 50 cm thick quartz vein at Q26a, looking northeast.

Photo 12: Cluster 4 sfold in bedrock with quartz at Q26b, looking east.

Photo 13: Cluster 4 outcrop at Q26c, looking east/northeast.

Photo 14: Cluster 4 outcrop at Q26c, looking east/northeast.

Photo 15: Cluster 4 outcrop at Q28, looking northwest.

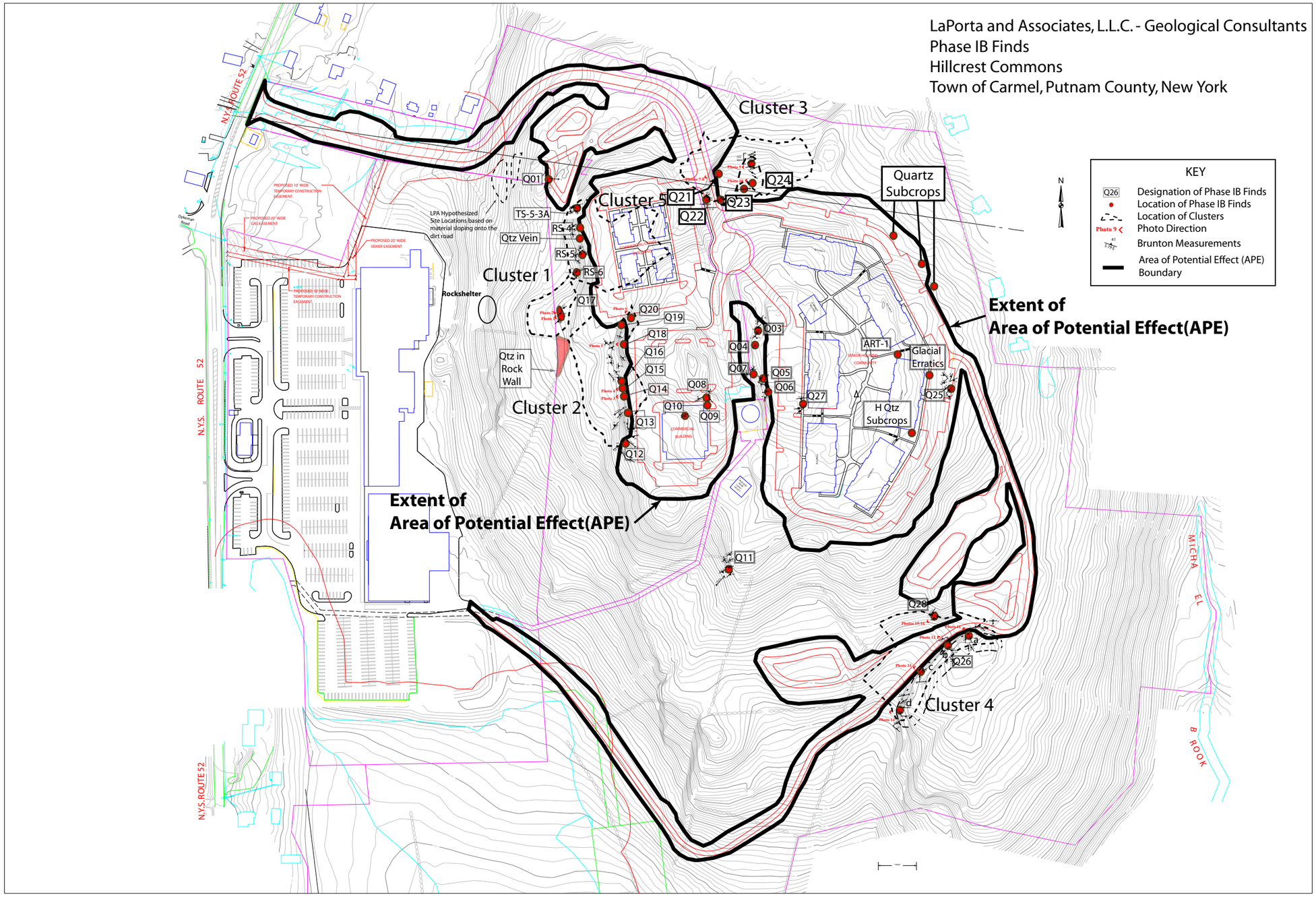
Photo 16: Cluster 4 drill hole in bedrock accentuating a joint surface at Q28, looking north.

APPENDIX A

HILLCREST COMMONS PHASE IB PROJECT MAP

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

LaPorta and Associates, L.L.C. - Geological Consultants
Phase IB Finds
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
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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).

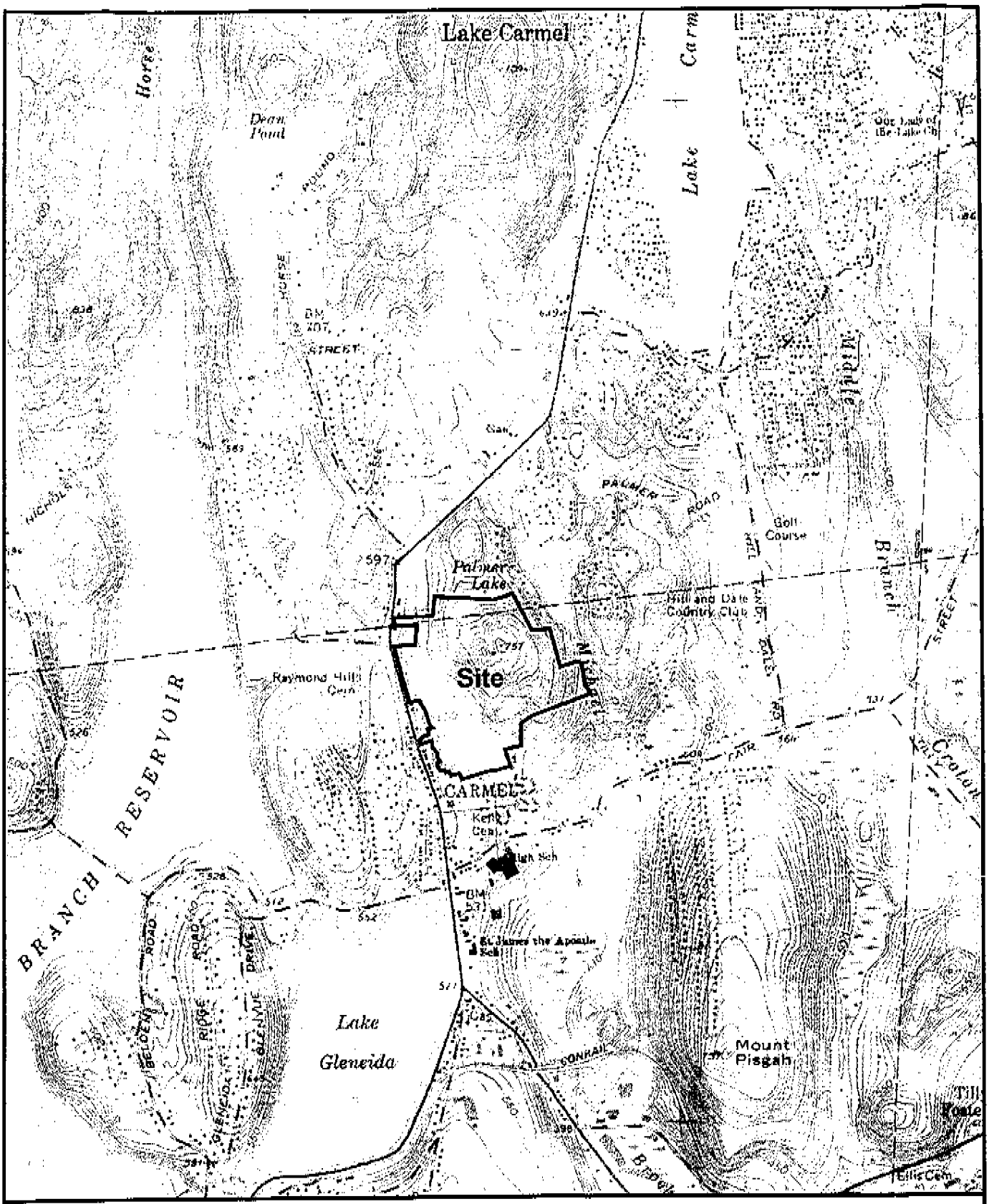
Based on known European American era settlement patterns, a walking reconnaissance of the property and a search of historical texts and maps, a below average potential is assessed for buried cultural remains pertaining to this period of occupation to be present within most of the study area. However, 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

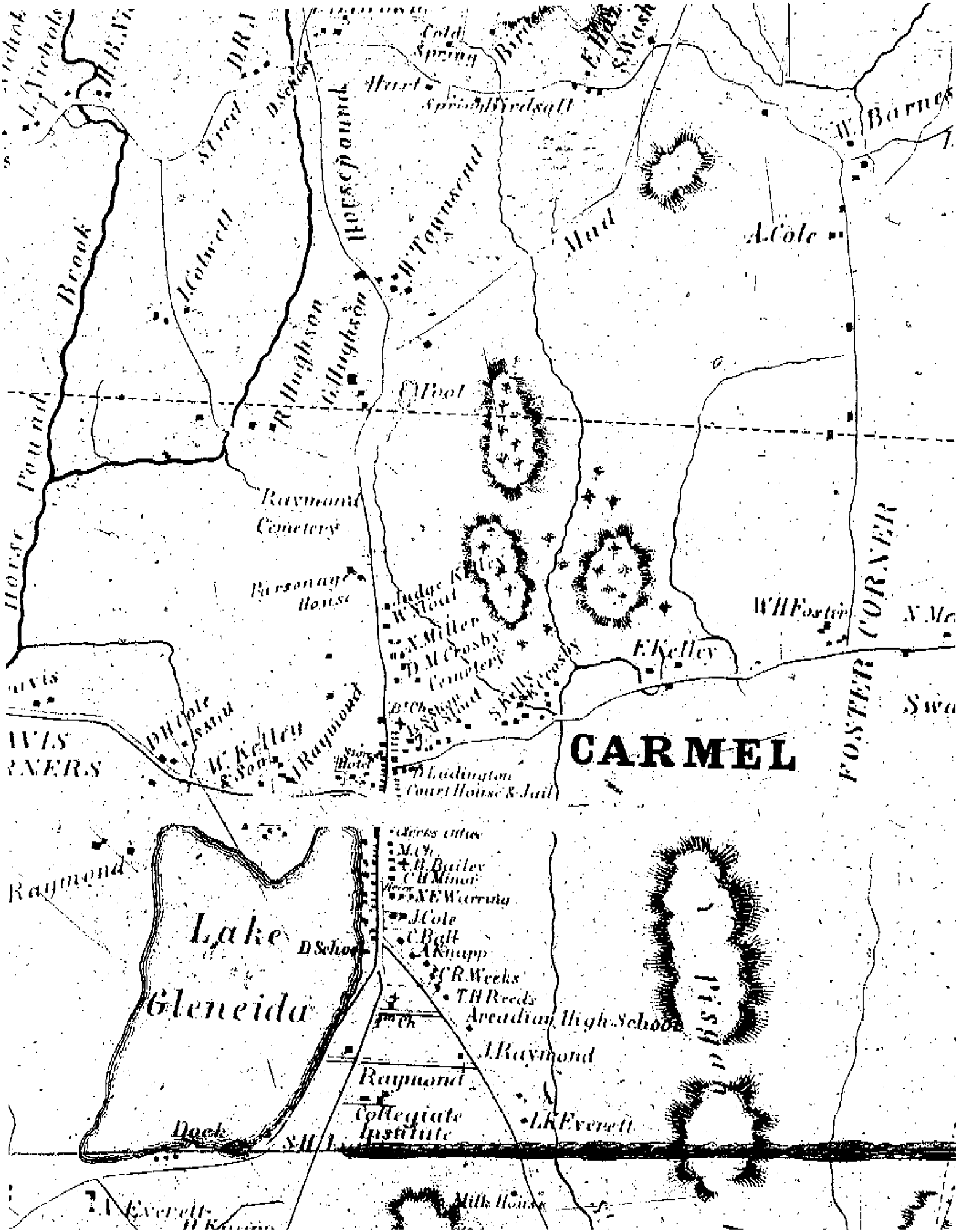
A Phase IB site identification survey consisting of subsurface archaeological sampling is recommended for the flatter portions of the affected area, as such locations in this physiographic setting must be considered to have an above-average potential for the presence of buried Native American cultural 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.

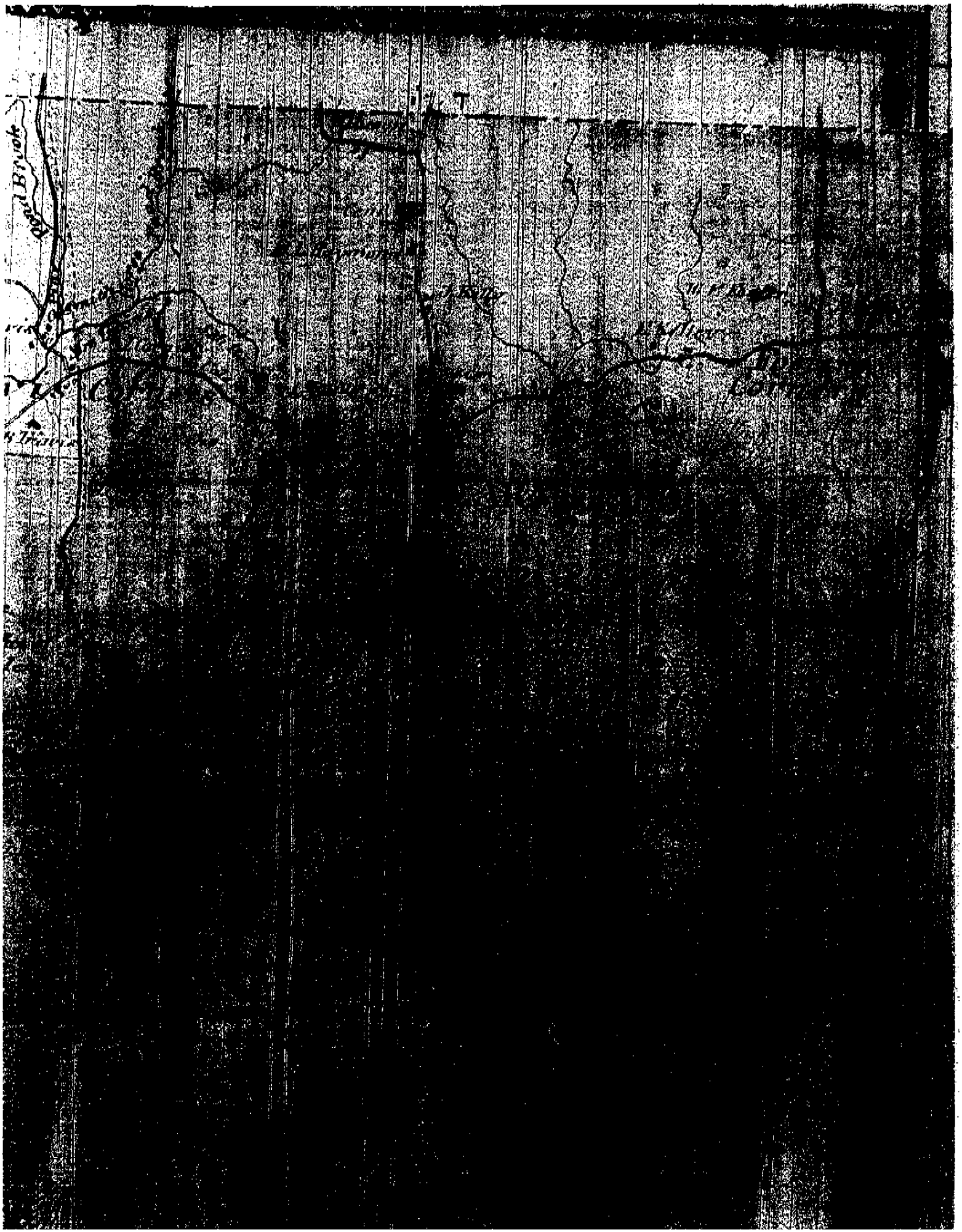
A below average potential was assessed for the presence of buried European American era cultural remains, with the exception of the portion of the affected area adjacent to NYS Route 52. In this westernmost subarea, subsurface sampling of locations to be affected by development that contain upper soils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

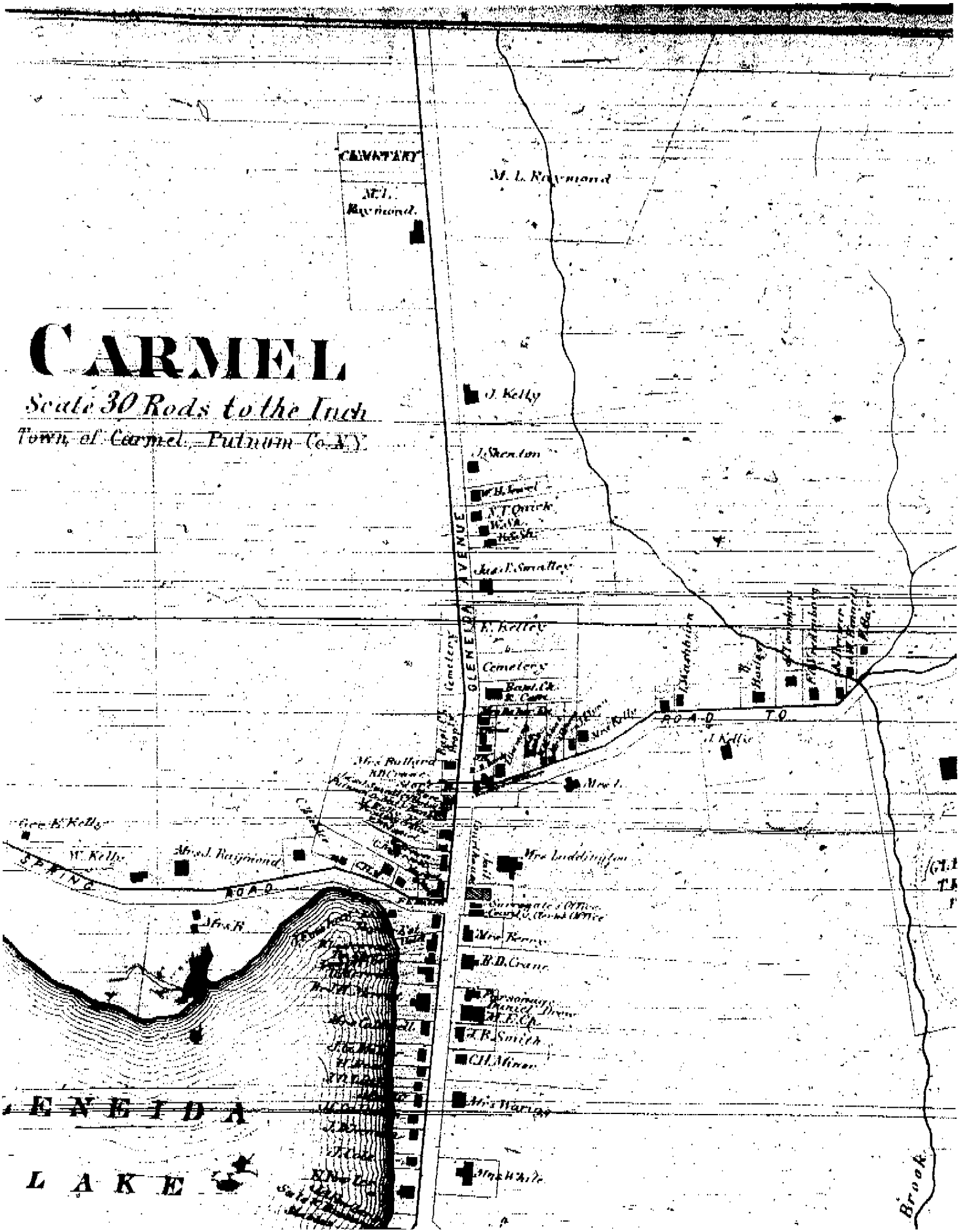
This Phase IB survey should employ sampling methods adequate for detecting traces of the small, seasonally occupied camps likely to occur in this physiographic setting, as well as any deposits associated with early European American era cultural activity areas and structures, as well as any larger occupation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

To:	Name/Firm	Fax Number
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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

TABLE OF CONTENTS

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.

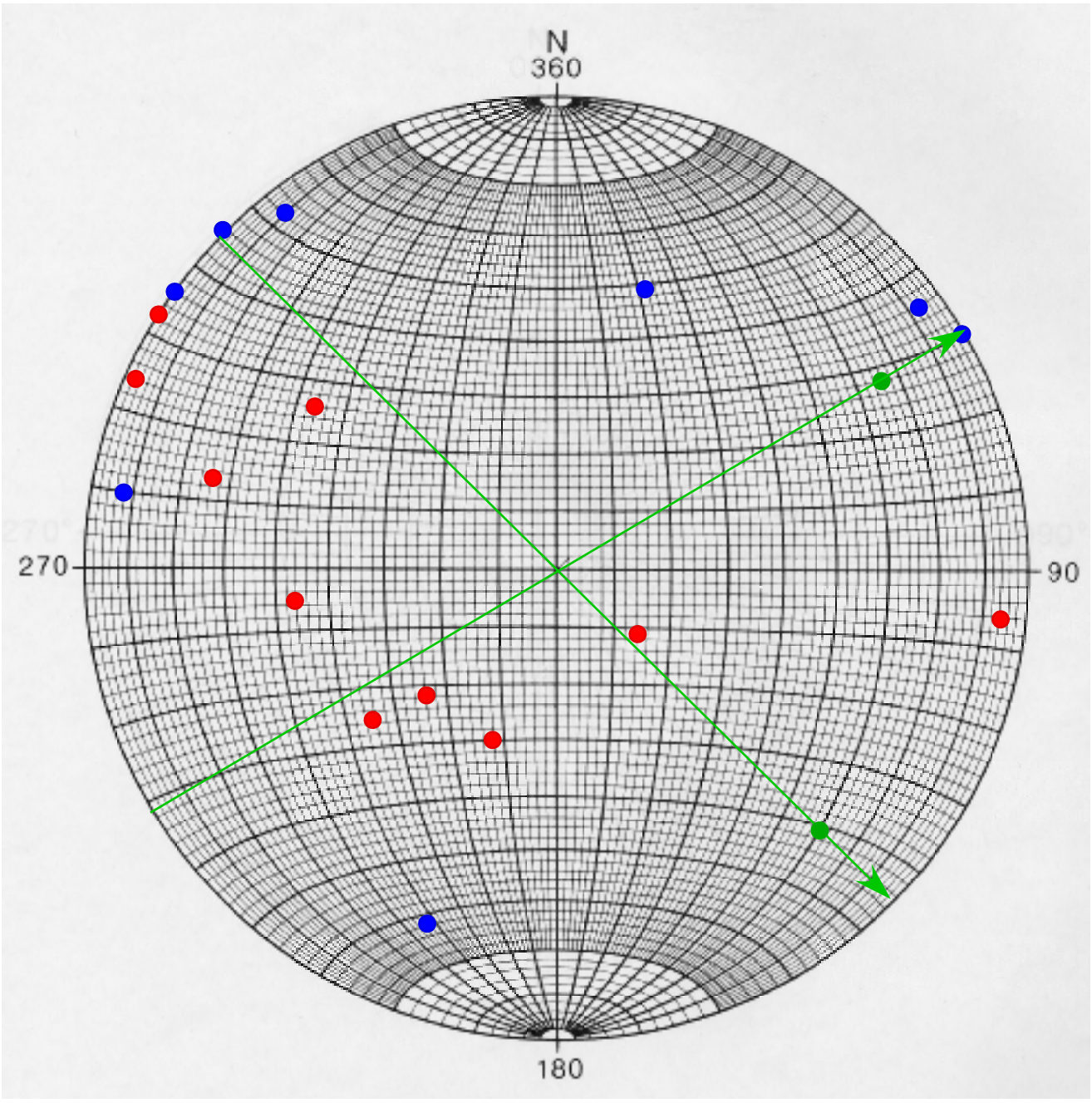
Given the quartz veins in the bedrock outcrop observed during the Phase I investigation and noted in a previous section of this report and the nature of the material encountered in the two test units begun in Locus 1 and Locus 2, it was considered prudent to consult a specialist in Native American quarries 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.

APPENDIX C

STEREOGRAPHIC PROJECTION OF CLUSTER 1 FABRIC MEASUREMENTS

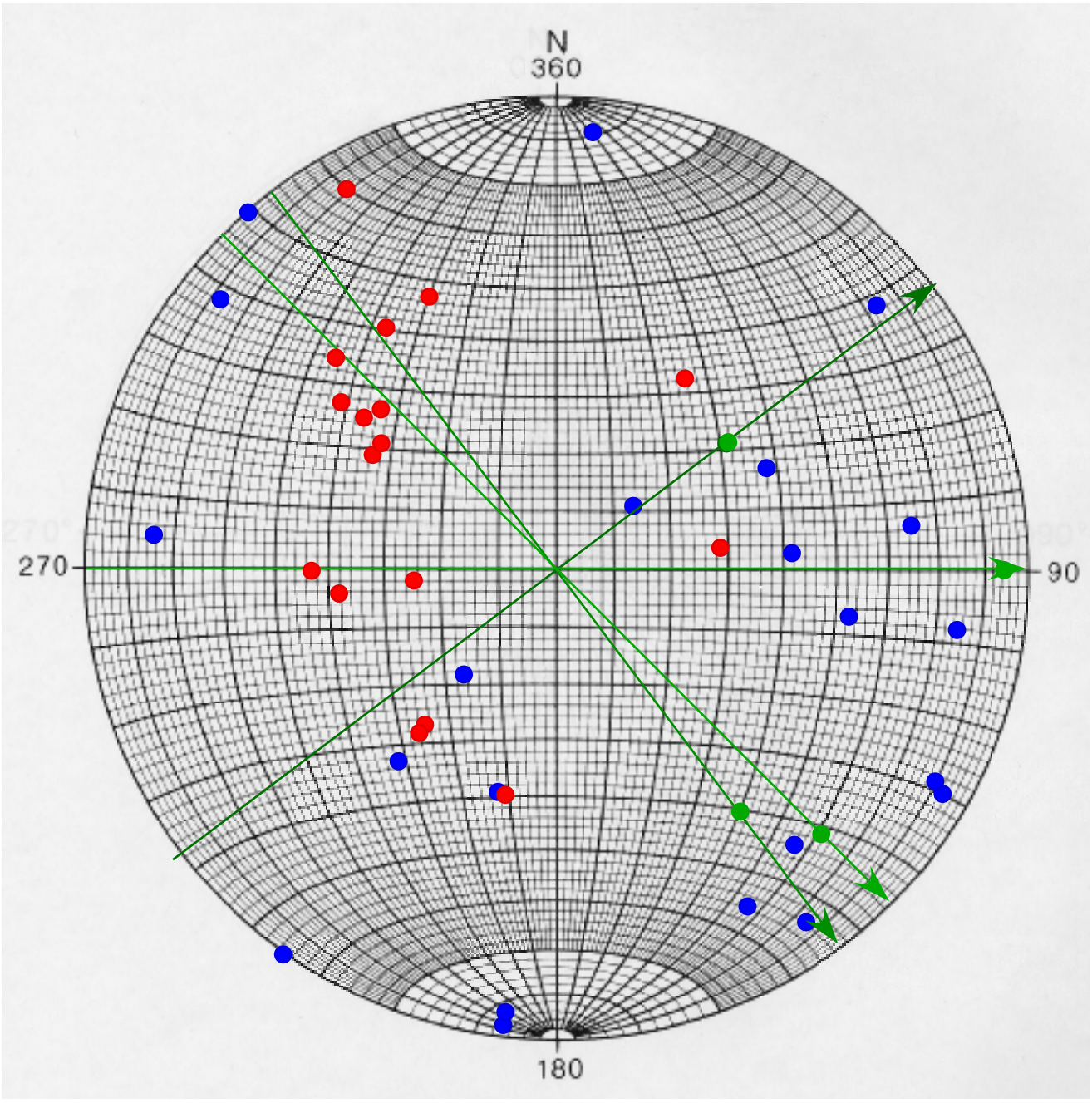


Cluster 1 Measurements

- Foliation strike/dip
- Joint strike/dip
- Hinge bearing/plunge

APPENDIX D

STEREOGRAPHIC PROJECTION OF CLUSTER 2 FABRIC MEASUREMENTS

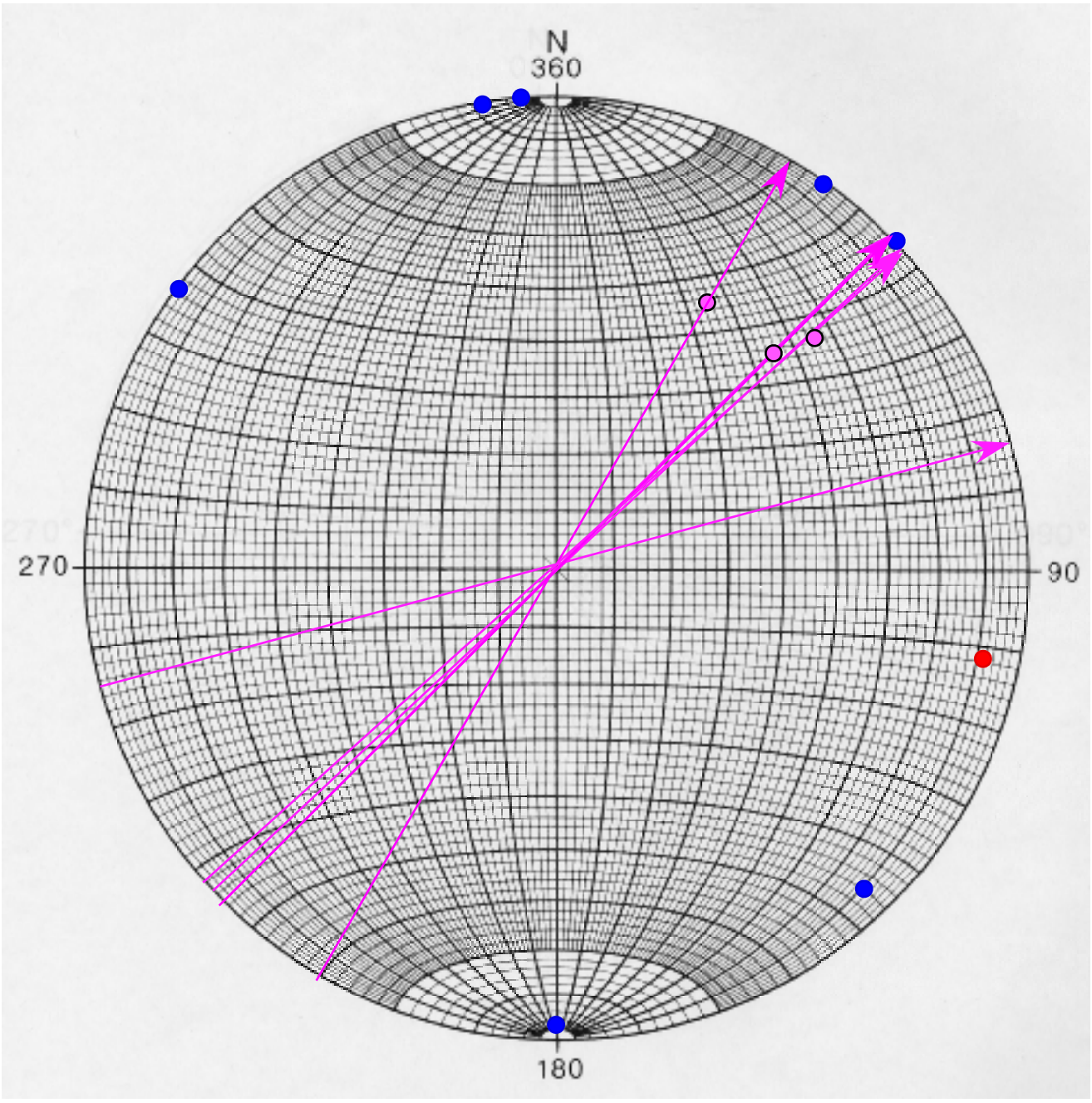


Cluster 2 Measurements

- Foliation strike/dip
- Joint strike/dip
- Hinge bearing/plunge
- Adit orientation

APPENDIX E

STEREOGRAPHIC PROJECTION OF CLUSTER 3 FABRIC MEASUREMENTS

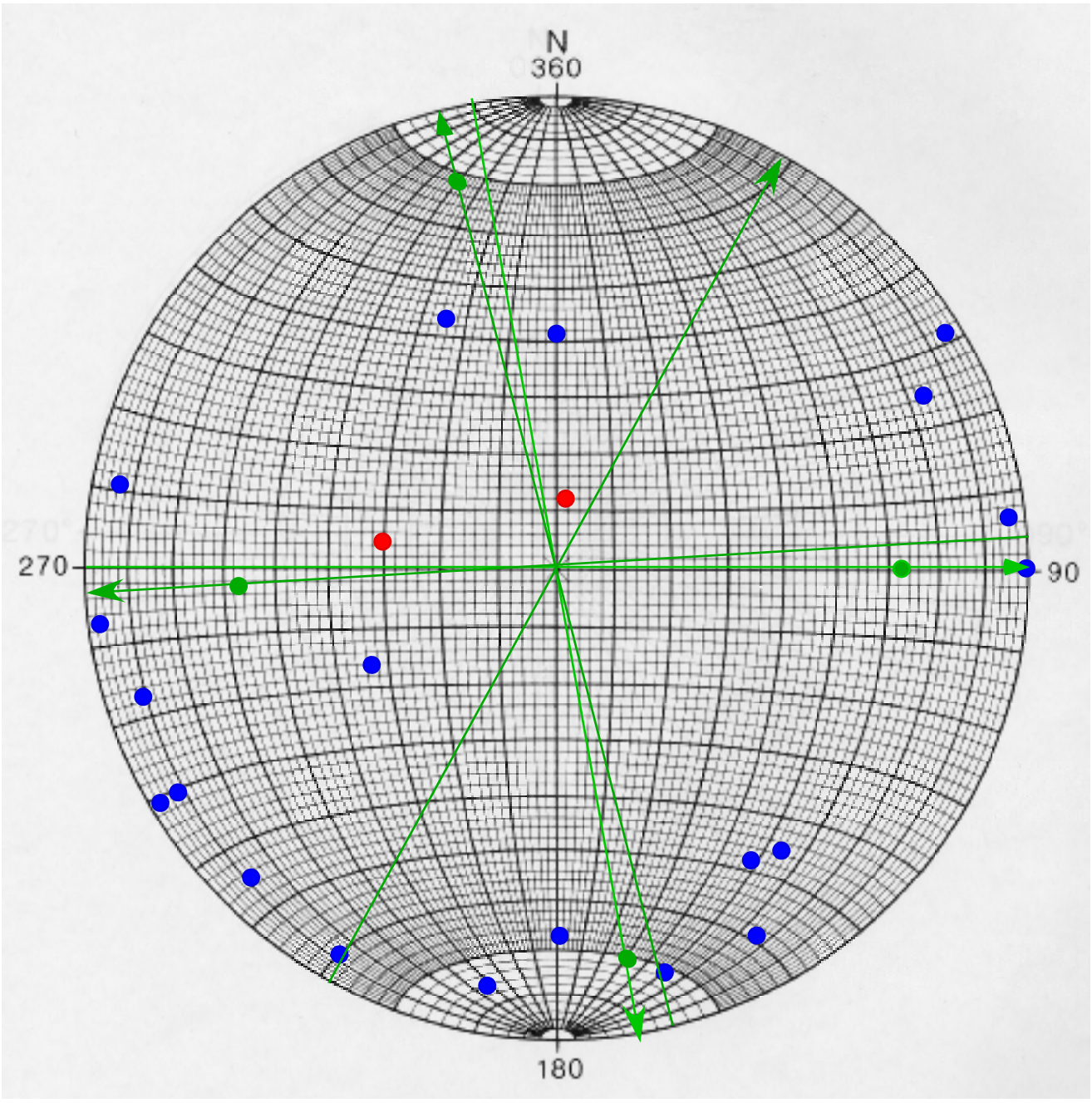


Cluster 3 Measurements

- Foliation strike/dip
- Joint strike/dip
- Hinge bearing/plunge
- Quartz Vein bearing

APPENDIX F

STEREOGRAPHIC PROJECTION OF CLUSTER 4 FABRIC MEASUREMENTS



Cluster 4

- Foliation strike/dip
- Joint strike/dip
- Hinge bearing/plunge
- Quartz Vein bearing

APPENDIX G

CURRICULUM VITA OF PHILIP C. LAPORTA

APPENDIX G: QUALIFICATIONS OF PRINCIPAL INVESTIGATOR

PHILIP C. La PORTA
Curriculum Vitae

CONTACT ADDRESS LaPorta and Associates, L.L.C., Geological Consultants
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EDUCATION

Ph.D. (geology/archaeological geology), City University of New York, 2009 (expected)

M.Phil. (geology), The Graduate Center of the City University of New York, 1996

M.A. (geology/archaeological geology), Queens College of the City University of New York, 1990

B.A. (anthropology/geology), Rutgers University, New Jersey, 1977

-- Attended graduate program in anthropology, State University of New York at Binghamton (1977-1979)

Dissertation title: The Stratigraphy and Structure of the Cambrian and Ordovician Carbonates of the Wallkill River Valley: The Nature of the Diagenesis of Chert: Part II: The Prehistoric Chert Quarries of the Hamburg-Franklin Metallogenic Province, Quarry Technology, Stratigraphic and Structural Considerations

Research interests:

archaeology: Northeastern United States hunter/gatherer prehistory, prehistoric quarries and quarry technology, archaeometry, trade and exchange systems, lithic provenance studies, Paleolithic of southern India, Israel and Egypt, industrial archaeology, ethnoarchaeology of mine and quarry communities, social stratification and ethnicity in historic mine and quarry communities, history of water power and mills

geology: Cambro-Ordovician carbonates, nodular and bedded cherts, Appalachian structural geology and stratigraphy, carbonate diagenesis and reef growth through time, economic ore deposits, history and philosophy of geology, history of mining and quarry technology

PROFESSIONAL EXPERIENCE

1993-present President, La Porta & Associates, L.L.C., Geological Consultants

(d/b/a LPA Geoarchaeological Consultants, L.L.C. in Pennsylvania)

Prehistoric quarry identification and mitigation, raw material analysis, regional geological studies, geomorphology and sedimentology of archaeological sites

2005-present Adviser, Education Committee-Franklin Mineral Museum, Franklin, New Jersey

2005-present Organizer and founder of Prehistoric Mines and Early Quarries Interest Group, sponsored by the Society of American Archaeology, Washington, D.C.

2005-present Mapping geologist/archaeological geologist, New Bulgarian University, Sophia, Bulgaria

-Geologic mapping, raw material and prehistoric quarry prospection and mapping of flint and obsidian raw material sources in the Danube River Valley.

1995-2005 Member, Board of Directors - Franklin Mineral Museum, Franklin, New Jersey

2000-present Mapping geologist/archaeologist, University of Tel Aviv Archaeological Geology Expedition, Jordan River Valley-Lake Galilee Region, Har Pua, Israel

- Evolution of wadi systems and site formation process on Neolithic quarry sites. Investigation of Lower and Lower-Middle Paleolithic quarries in the Lake Galilee and Mt. Carmel regions

1997 Mapping geologist/archaeologist, Smithsonian Institution Archeological Expedition, Southern India

-Archaeometric studies of Lower Acheulian axes and cleavers, Isampur Quarry, Karnataka, southern India. Mapping and structural geologist, Neoproterozoic Bhima Basin. Geomorphological aspects of limestone terranes.

- Archaeometric studies of Lower Paleolithic Acheulian axe quarries in the Kaladghi Basin. Mapping and structural geologist, Mesoproterozoic Kaladghi Basin. Neotectonic response and bajada development of the Kaladghi Basin.

1983-1984 Laboratory archaeologist, Louis Berger & Associates, East Orange, New Jersey

-Lithic and raw material analyst for Abbot Farm Investigation, Trenton, New Jersey.

Member of excavation crew for Barclay's Bank Project, Wall and Water Street, New York, New York.

1979-1980 Archivist, Bergen County, New Jersey

- Native American studies, contact, and proto-historic relations in Metropolitan New York region

1977-1979 Geologist and illustrator, Public Archaeology Facility, SUNY at Binghamton

-Produced 1100 plates of pen-and-ink illustrations of lithic, ceramic and bone artifacts recovered from the I-88 Highway Project, Hudson Lake, New York.

TEACHING EXPERIENCE

1995-1997 Co-director, Archaeological Field School, Montclair State University, Montclair, New Jersey

1995 Adjunct Lecturer in geology, Lehman College of the City University of New York

1990-1993 Director, Geological Field School, Economic Field Methods and Geological Mapping, Hunter College of the City University of New York, New York.

1989-1994 Adjunct Lecturer in geology, Hunter College of the City University of New York

1987 Adjunct Lecturer in geology, Queensborough Community College of the City University of New York

1986-1989 Adjunct Lecturer in geology, Queens College of the City University of New York

1982-1984 Lecturer/Docent in anthropology/geology, Newark Museum, Newark, New Jersey

1981-1983 Teaching Assistant in geology, Rutgers University, New Brunswick, New Jersey

PUBLICATIONS AND PRESENTATIONS

2004 **LaPorta, P.C**., A geological model for the development of bedrock quarries, with an ethnoarchaeological application, *in* Topping, P., and Lynott, M., eds., The Cultural Landscape of Prehistoric Mines, Oxbow Books, U.K, 214 p.

2002 **LaPorta, P.C**., The Bhima axe: A template construct with a quarry focus subsistence [abs.]: Society of American Archaeology, Annual Meeting Abstracts, v. 67, p. 174.

2002 **LaPorta, P.C**., Inorganic silica sources contributing to the formation of nodular cherts within the Kittatinny Supergroup carbonates, northwestern New Jersey [abs.]: Geological Society of America, v. 34, #6, p.17.

2001 **LaPorta, P.C.**, The stratigraphic and structural relations of prehistoric chert quarries in the Wallkill River Valley, New York and New Jersey [abs.]: Society for American Archaeology, Annual Meting Abstracts, v. 66, p. 54.

2000 **La Porta, P.C**., Geologic constraints on prehistoric quarry development, *in* Rammlmair, D., Mederer, J., Oberthur, T., Himann, R.B., and Pentinghaus (eds.):

Applied Mineralogy in Research, Economy, Technology, Ecology and Culture, vol. 2, A.A. Balkema, Rotterdam, 1013-1015.

2000 **La Porta, P.C**., Geological constraints on stone tool morphology: lithic technology at the Sage's Crossing Site, Unadilla Valley, New York [abs.]: New York State Archaeological Association, Annual Meeting Abstracts.

2000 **LaPorta, P.C**., The employment of geological techniques for archaeological provenance studies [abs.]: Geological Society of America, Archaeological Geology Division, Chair and Organizer, Session 188, p. A-415.

2000 **LaPorta, P.C**., The geology of Iron Hill, Delaware and its characterization as a source of ferruginous chert, *in* Kellogg, D., ed., Current Issues in Mid-Atlantic Geoarchaeology: Society for American Archaeology Geoarchaeology Interest Group, Guidebook for the First Annual Field Trip, Philadelphia, Pennsylvania, April 5, 2000.

2000 **La Porta, P.C**., The importance of a geological catchment for archaeological investigations on federal lands [abs]: Geological Society of America, Abstracts with Programs, v. 32(1), p. A-28.

2000 **LaPorta, P.C.**, The organization of prehistoric mining technology in the Wallkill River Valley of northwestern New Jersey: field and petrographic evidence [abs.]: Geological Society of America, Abstracts with Programs, v. 32(7), p. A-275.

1999 **La Porta, P.C**., Recent approaches to provenance studies and raw material analysis, from classical methods to modern technology [abs.]: Middle Atlantic Archaeological Conference, Session Organizer and Co-Chair, April 9-11, 1999.

1999 **La Porta, P.C**., Chert formation mechanisms and lithic raw material selection [abs.]: Presented at the VIII International Flint Symposium, Bochum, Germany, September 13-17.

1999 **La Porta, P.C**., Geological constraints on prehistoric quarry development [abs.]: Presented at the VIII International Flint Symposium, Bochum, Germany, September 13-17.

1999 **La Porta, P.C**., Prehistoric mining technology in the Central Appalachians [abs.]: Geological Society of America, Abstracts with Programs, v. 31(7), p. A-343.

1999 **La Porta, P.C**., Criteria for prehistoric quarry development in the eastern Appalachians [abs.]: Presented at the New York State Archaeological Association Annual Meeting.

1999 **La Porta, P.C**., The role of rock fabric in lithic selection for diagnostic stone tools recovered from the Whitehurst Freeway Project, Washington, D.C. [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 64, p. 171.

1999 **La Porta, P.C**., Diagenesis, stratigraphic and structural relationships and their role in quarry location and raw material selection through time [abs.]: Middle Atlantic Archaeological Conference, Annual Meeting Abstracts, p. 28.

1999 **La Porta, P.C**., The organization of prehistoric mining technology in the Wallkill River Valley of northwestern New Jersey [abs.]: Geological Society of America, Abstracts with Programs, v. 31(2), p. A-29.

1998 **La Porta, P.C**., The chemical characterization of ferruginous cherts: A case study from Lums Pond archaeological site, Iron Hill, Delaware [abs.]: Geological Society of America, Abstracts with Programs, v. 30(1), p. 31.

1998 **La Porta, P.C**., Chertification processes and silica sources: Examples from the Central Appalachians [abs.]: Geological Society of America, Abstracts with Programs, v. 30(7), p. A-333.

1998 **La Porta, P.C**., Diagenesis of Cambro-Ordovician cherts [abs.]: Geological Society of America, Abstracts with Programs, v. 30(1), p. 31.

1998 **La Porta, P.C.**, Geological catchment and lithic source identification for diagnostic stone tools recovered from the Whitehurst Freeway Project, Washington, D.C. [abs.]: Middle Atlantic Archaeological Conference, Annual Meeting Abstracts, Cape May, New Jersey. La Porta, P.C., 1998, The prehistoric mining landscape and evolution of ore exploitation: Eastern States Archaeological Federation, Annual Meeting Abstracts.

1997 **La Porta, P.C**., Geologic controls on lithic resource distribution and the development of prehistoric quarries [abs.]: Presented at the New York State Archaeological Association Annual Meeting.

1997 **La Porta, P.C.**, A geological framework for lithic provenance studies: A case study from Lums Pond at Iron Hill, Delaware [abs.]: Eastern States Archaeological Federation, Annual Meeting Abstracts.

1997 **La Porta, P.C**., The prehistoric mining technology of the Cambro-Ordovician carbonates of the Wallkill River Valley of northwestern New Jersey [abs.]: Geological Society of America, Abstracts with Programs, v. 29(6), p. A-146.

1996 **La Porta, P.C**., Raw Material, Lithics, and Quarry Workshop [abs.]: Canadian Archaeological Association Meeting, hosted by Dr. Stephen Davis, St. Mary's University, chaired by Dr. David Black, University of New Brunswick.

1996 **La Porta, P.C**., Lithostratigraphic models and the geographic distribution of prehistoric chert quarries within the Cambro-Ordovician lithologies of the Great Valley Sequence, Sussex County, New Jersey and Orange County, New York: Annual Field Conference - Geological Association of New Jersey, v. 13, p. 47-70.

1996 **La Porta, P.C.**, Lithostratigraphy as a predictive tool for prehistoric quarry investigations: Examples from the Dutchess Quarry Site, Orange County, New York, *in* Lindner, C., ed., A Golden Chronograph for Robert E. Funk: Occasional Papers in Northeastern Anthropology No. 15: Bethlehem, Connecticut, Archaeological Services, p. 73-84.

1996 **La Porta, P.C.**, Lithic analysis and databases for the Middle Atlantic states [abs.]: Society for American Anthropology, Annual Meeting Abstracts, v. 61.

1996 **La Porta, P.C**., The quarry is a place [abs.]: Presented at the First Appalachian Integrated Highland Conference, Albany, New York.

1996 **La Porta, P.C**., The tenor of an ore [abs.]: Presented at the First Appalachian Integrated Highland Conference, Albany, New York.

1996 **La Porta, P.C**., A geological approach to lithic provenance studies [abs.]: Society for American Anthropology Annual Meeting Abstracts, v. 61, p. 161

1995 **La Porta, P.C**., Petrographic identification of lithic sources [abs.]: Geological Society of America, Abstracts with Programs, v. 27(1), p. 62.

1995 **La Porta. P.C**., A catchment geology for the Sandt's Eddy Site [abs.]: Middle Atlantic Archaeological Conference, Annual Meeting Abstracts.

1995 **La Porta, P.C.**, Chert resource exploitation in the New York Metropolitan Area: The idea of a shared mining technology [abs.]: Professional Archaeologists of New York City, Annual Meeting Abstracts.

1994 **La Porta, P.C**., Lithostratigraphic models and the geographic distribution of prehistoric chert quarries within the Cambro-Ordovician lithologies of the Great Valley Sequence, Sussex County, New Jersey, *in* Bergman, C.A. and Doershuk, J.F., eds., Recent Research into the Prehistory of the Delaware Valley, Journal of Middle Atlantic Archaeology, v. 10, p. 47-66.

1994 **La Porta, P.C**., Prehistoric chert quarries within the Lower Ordovician Halcyon Lake Group: The elucidation of a prehistoric mining district in Orange County, New York [abs.]: New York State Archaeological Association, Annual Meeting Program and Abstracts, p. 15.

1994 **La Porta, P.C**., The Lewis M. Haggerty Collection [abs.]: Eastern States Archaeological Federation, Annual Meeting Abstracts, p. 16.

1993 **La Porta, P.C**., Prehistoric chert exploitation in the Cambro-Ordovician lithologies of the Wallkill River Valley [abs.]: Society of American Archaeology, Annual Meeting Abstracts, p. 81.

1993 **La Porta, P.C**., The application of cognitive models for lithic resource exploitation: Folk geology within the Wallkill River Valley [abs.]: New York State Archaeological Association, Annual Meeting Program and Abstracts, p. 11.

1992 **La Porta, P.C**., Nodular cherts of the Cambro-Ordovician Kittatinny Supergroup: Their diagenesis, stratigraphic relevance and archaeological potential [abs.]: Materials Research Society, Annual Meeting Abstracts.

1991 **La Porta, P.C**., A chert stratigraphy for the Cambro-Ordovician carbonates of the Kittatinny Supergroup: Their geological and human geographic potential [abs.]: Association of American Geographers, Middle States Division, 1991 Annual Meeting Abstracts.

1990 **La Porta, P.C**., The Stratigraphic Relevance and Archaeological Potential of the Cambro-Ordovician Kittatinny Supergroup of the Wallkill River Valley of Northern New Jersey: M.A. thesis, Queens College of the City University of New York, 50 p.

1989 **La Porta, P.C**., The stratigraphic relevance and archaeological potential of the chert-bearing carbonates within the Kittatinny Supergroup, in New York State Geological Association Field Trip Guidebook, 61st Annual Meeting, Middletown, New York.

1987 **La Porta, P.C**., Prehistoric resource analysis: field observations and petrographic characteristics of Cambrian-Ordovician chert [abs.]: Geological Society of America, Abstracts with Programs, v. 19(1), p. 24-25.

1986 **La Porta, P.C**., The archaeological potential of the Leithsville Formation: a Lower Cambrian chert-bearing carbonate in New Jersey [abs.]: Geological Society of America, Abstracts with Programs, v. 18(1), p. 28-29.

2001 **LaPorta, P.C**. and Bondar, G. H., Studying lithic economies in the new millennium [abs.]: Society for American Archaeology, Annual Meeting Session Co-Organizer and Co-Discussant, Annual Meeting Abstracts, v. 66, p. 79.

2004 **LaPorta, P.C**., and Brewer, M. C., A Prehistoric Quarry Landscape in the Taconic Appalachians: Conservation and Mitigation in the Shadows of Active Mining [abs.]: Geological Society of America, Annual Meeting Abstracts, v. 36, no. 5, p. 214.

2004 **LaPorta, P.C.,** and Brewer, M. C**.**, Cultural Resource Management of Prehistoric Quarry Landscapes [abs.]: Geological Society of America Program with Abstracts, Joint Meeting of Northeastern and Southeastern Sections, v.36, no. 2, p. 65.

1998 **La Porta, P.C**., and Petraglia, M.D., Geological controls on Acheulian quarries and artifact forms [abs.]: Society for American Archaeology, Annual Meeting Abstracts.

1994 **La Porta, P.C**., Szekielda, K., and Brewer, M.C., Prehistoric Late-Middle Archaic to Transitional Mining Practices in the Wallkill River Valley [abs.]: Eastern States Archaeological Federation, Annual Meeting Abstracts, p. 16.

2005 Barkai, R., Gopher, A., and **LaPorta, P.C**., Middle Pleistocene Landscape of Extraction: Quarry and Workshop Complexes in Northern Israel, *in,* Gorring-Inbar, N., ed.

2002 Barkai, R., Gopher, A., and **LaPorta, P.C**., Paleolithic Landscape of Extraction: Extensive Lower-Middle Paleolithic flint surface-quarries and workshops at Har Pua, Upper Galilee, The Journal Antiquity, v.76: p. 672-680.

1996 Bergman, C.A., Doershuk, J.F., **La Porta, P.C**., and Schuldenrein, J., An introduction to the Early and Middle Archaic occupations at Sandt's Eddy: Pennsylvania Archaeologist.

1993 Bergman, C.A., **La Porta, P.C**., Doershuk, J.F., Fassler, H., Rue, D., and Schuldenrein, J., The Padula Site (36Nm15) and chert resource exploitation in the

Middle Delaware River Valley: Archaeology of Eastern North America, v. 20, p. 39-66.

2006 Brewer, Margaret C., and **LaPorta, P.C.,** Cross-sectional Interpretation of the Tectonic History of the Hamburg 7.5' Quadrangle, Sussex County, New Jersey [abs.]: Geological Society of America, Annual Meeting Abstracts, in press.

2005 Brewer, Margaret C. and **LaPorta, P.C.,** Direct Procurement Quartz Quarries of the Lower Hudson River Estuary [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 70, p. 24

2002 Brewer, M.C. and **LaPorta, P.C**., Petrofabric and microfossil characteristics of chert as a provenance tool [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 67. p. 56.

2001 Brewer, M.C. and **LaPorta, P.C.,** Prehistoric lithic resource utilization in New Jersey [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 66, p. 101.

1999 Brewer, M.C., and **La Porta, P.C**., The prehistoric quarry landscape in the eastern Appalachians [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 64, p. 58.

1998 Brewer, M.C., and **La Porta, P.C**., Geological catchments for lithic provenance research: Case studies from eastern North America [abs.]: Society for American Archaeology, Annual Meeting Abstracts.

In prep. Brewer-LaPorta, Margaret, C., **LaPorta, Philip C**., and Minchak, Scott A., Petrofabric constraints on quarry development and stone tool design: North-central Appalachians, *in* Brewer-LaPorta, Margaret, C., Topping, Peter., and Burke, Adrian (eds.), Prehistoric Mines and Quarries: A Transatlantic Perspective: Oxbow Press, Oxford, U.K.

2000 Brewer, M.C., Minchak, S.A., and **La Porta, P.C**., A mineral resource approach to raw material analysis and quarry investigations: Examples from the Central Appalachians [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 65, p. 64.

2000 Crowell, E.A., and **La Porta, P.C**., Revising Holmes' quarries: A new look at the quartzites from Piney Branch [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 65, p. 96.

1995 Lozny, L.R., and **La Porta, P.C**., Patterns of chert exploitation in the northeastern U.S.A [abs.].: VII International Flint Symposium, Warsaw, Poland, September 4-8.

2002 Minchak, S.A., and **LaPorta, P.C**., The Gilpin Falls Member of the James Run Volcanic Group: A Cambro-Ordovician radiolarian chert Paleo-Indian quarry source [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 67, p. 205.

1999 Petraglia, M., **La Porta, P.C**., and Paddayya, K., The first Acheulian quarry in India: Stone tool manufacture, biface morphology, and behaviors: Journal of Anthropological Research, v. 55, p. 39-70.

2001 Raemsch, C., and **LaPorta, P.C**., Geological constraints on stone tool and debitage morphology at the Sage's Crossing Site, Unadilla Valley, New York [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 66, p. 57.

2000 Raemsch, C.A., and **La Porta, P.C.,** Redefining lithic debitage: specialized stone tool manufacturing in the Unadilla Valley [abs.]: New York State Archaeological Association, Annual Meeting Abstracts.

1999 Robertson, V., Shields, C., and **La Porta, P.C.**, Prehistoric ceramics from the Whitehurst sites, Washington, D.C [abs.].: Society for American Archaeology, Annual Meeting Abstracts, v. 64, p. 242.

1998 Roberston, V., Shields, C., and **La Porta, P.C**., Early to Late Woodland ceramic industries [abs.]: Middle Atlantic Archaeological Conference, Programs and Abstracts, Cape May, New Jersey.

2002 Sohl, L.E., and **LaPorta, P.C**., The prehistoric quarry landscape in contemporary mine settings [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 67, p. 271.

2000 Sohl, L.E., and **La Porta, P.C**., Geological Constraints on Quarry Development in the Central Appalachians [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 65, p. 311.

1999 Sohl, L.E., and **La Porta, P.C**., Fundamental criteria for prehistoric quarry development [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 64, p. 268.

1997 Sohl, L.E., and **La Porta, P.C**., Models for quarry development in a prehistoric mining district [abs.]: Society for American Archaeology, Annual Meeting Abstracts.

2001 Sohl, L.E., **LaPorta, P.C**., and Brewer, M.C., Prehistoric quarry landscapes and cultural resource management [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v 66, p. 58.

2002 Werner, A.J., and **LaPorta, P.C**., The Killoran site, New Jersey: Floodplain construction over a Pleistocene age glacial lace succession [abs.]: Society for American Archaeology, Annual Meeting Abstracts, v. 67, p. 306.

Professional meeting organization

2006 **LaPorta, P.C.,** Brewer, M.C., and Minchak, S. A., Stratigraphy of the Cambrian and Lower Ordovician Carbonates of the Kittatinny Supergroup, Northwestern New Jersey: Special Attention to the Nature and Timing of Silica Diagenesis and the Origin of Nodular Cherts: Geological Society of American Annual Meeting, Premeeting Field Trip, Philadelphia, Pennsylvania.

2006 **LaPorta, P. C**., Brewer, M. C**.,** and Minchak, S. A., Prehistoric Quarries and Early Mines in the New York-New Jersey-Pennsylvania Tri-State Area: Geological Society of America Annual Meeting, Postmeeting Field Trip, Philadelphia, Pennsylvania.

2006 Topping, P; Field, D.; Teather, A.; Storemyr, P.; Gatsov, I.; Rosen, S.; Burke, A. L.; Brewer, M., C**.;** Minchak, S.; Abbott, L.; Tykot, R. L.; **LaPorta, P**.; [discussants], Quarries, Mines, Workshops and Factories: Standardizing Nomenclature for the Archaeological Community Working Group: Society for American Archaeology, Annual Meeting 71, p.73.

2005 Abbott, L., **LaPorta, P. C**., and Brewer, M. C., Quartz and quartzite technology: Problems in extraction, provenance studies and nomenclature: Society for American Archaeology, Annual Meeting Symposium, Symposium Co-Organizer.

CONTRIBUTIONS TO CULTURAL RESOURCE MANAGEMENT PROJECTS

Projects in progress denoted by "in prog."

Projects with Philip C. LaPorta as Principal Investigator (*) or Co-Principal Investigator(#)

#1994 Contributions to Chapters 2, 7, 9 and 10 (covering regional geology, predictive models for prehistoric quarry locations, and lithic analysis) submitted as part of *An Archaeological Survey of the Wallpack Valley Portion of the Delaware Water Gap National Recreation Area, Sussex County, New Jersey, Project No. C7228.01:* Report prepared by 3D/Environmental Services, Inc., Cincinnati, Ohio for National Park Service, Washington, D.C.

#1993 "Predictive Model for Quarry Locations, Delaware Water Gap National Recreational Area, Phase I Report Project No. C7228.01": Submitted to 3D/Environmental Services, Inc., Cincinnati, Ohio for National Park Service, Washington, D.C.

Prehistoric Quarry Investigations

in prog. "Phase III Investigations of the Chert Quarries at the Smiths Basin Mine Site, Town of Hartford, Washington County, New York. Geological Mapping and Excavation of Chert Quarries and Associated Open Air Sites, OPRHP Review No. 96PRO303": Report to be submitted to Jointa Galusha, L.L.C., Glens Falls, New York and Office of Parks, Recreation and Historic Preservation, Peebles Island, New York.

2003 "Field Reconnaissance Report for the Prehistoric Quarry Investigation at the Chester Golf Course, Town of Chester, Orange County, New York": Report submitted to Sherman Associates, Inc., Ramsey, New Jersey.

2001 "Data Recovery Plan and Educational Program for Prehistoric Quarry Investigation and Mitigation at the Smiths Basin Mine Site, Town of Hartford, Washington County, New York, OPRHP Review No. 96PRO303": Submitted to Jointa Galusha L.L.C, Glens Falls, New York.

2001 "Quartz Quarry Studies in the Precambrian of East Fishkill, Orange County, New York. Geological Mapping and Characterization of Quartz Vein Bedrock Quarries": Submitted to Thalle Industries, East Fishkill, New York.

2000 "Phase 1B Cultural Resources Survey-Supplement, Characterization of Prehistoric Quarry Development, Smiths Basin Mine Site, Washington County, New York, OPRHP Review No. 96PRO303: Submitted to Spectra Environmental Group Inc., Latham, New York.

2000 "Historic Mining Landscape and Geological Reconnaissance of the Elizabeth Mine, South Strafford, Orange County, Vermont": Submitted to Hartgen Archaeological Associates, Inc. Putney, Vermont.

1992 "Phase II Testing at the Dutchess Quarry Site, Orange County, New York": Submitted as part of Dutchess Quarry & Supply Co., Inc. Cultural Resources Survey, Stages 1 and 2, Goshen Quarry Future Mining Area, Town of Goshen, Orange County, New York, prepared by Dunn Geoscience, Inc. and Hartgen & Associates, Inc., Troy, New York for the Dutchess Quarry & Supply Co., Goshen, New York.

Geomorphological and Quantitative Sedimentological Investigations in Glacial (Till Fabric/Till Petrology), Periglacial, Fluvial, Pluvial, Coastal and Estuarine Environments

in prog. "Geological Catchment, Raw Material and Geomorphological Assessment of the Martin Luther King Boulevard Site, Luzurne County, Pennsylvania": Report to be submitted to Pan Cultural, Inc., Pittstown, Pennsylvania.

in prog. "Geological Catchment and Geomorphological Assessment of the Shohola Site (36PI169), Pike County, Pennsylvania": Submitted to Cultural Heritage Research Services, Inc., North Wales, Pennsylvania.

2003 "Geomorphological Analysis for the Phase I Investigation of the Felix Dam Site, Berks County, Pennsylvania": Report to be submitted to Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania.

2003 "Geomorphological Analysis of the Hopewell Junction Site, Town of Poughkeepsie, Dutchess County, New York": Report submitted to J.R.Cohen Archaeological Associates, Inc., New York, New York.

2002 "Phase II/III Investigation, Unadilla Valley Central School District, Town of New Berlin, Chenango County, New York - 99PR0746: Raw Material, Petrofabric, and Geomorphological Analysis of Glacial Terraces (Olean and Binghamton Glacial Advances)": Submitted to Hartgen Archaeological Associates, Inc., Rennselaer, New York.

2002 "Raw Material Analysis and Geomorphological Investigations of Paleochannel Development of the Passaic River Basin: Edwards Road/Killoren Site Route 280/Edwards Road Interchange, New Jersey": Submitted to The RBA Group, Morristown, New Jersey and Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania.

2001 "Phase IA Geomorphological Assessment, Belvidere, New Jersey": Geomorphological Analysis: Submitted to Kittatinny Archaeological Research, Stroudsburg, Pennsylvania.

2001 "Phase IA/IB Geomorphological Investigations of Crevasse Splays and Levee Development, Westfall Township, Pike County, Pennsylvania": Submitted to Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania.

2001 "Phase IA Supplemental Geomorphological Study and Geological Reconnaissance of the Black Creek Site (28-Sx-297), Vernon Township, Sussex County, New Jersey and Lithic Analysis of Artifacts Associated with the Black Creek Site": Submitted to Vernon Township, Sussex County, New Jersey.

2001 "Phase III Investigation of Historic Port Albany, Albany, NY, Geomorphological Analysis of the Albany Clay and Landscape Reconstruction": Submitted to Hartgen Archaeological Associates, Inc., Troy, New York.

2001 "Phase III Raw Material and Geomorphological Investigation of 40 Howard Street, Albany, New York": Submitted to Hartgen Archaeological Associates, Inc., Troy, New York.

1999 "A Geomorphological and Archaeological Analysis of Potential Dredged Material Management Alternative Sites in the New York Harbor-Apex Region": Submitted to Battelle Research Corp. for the Army Corps of Engineers - New York District.

1999 "Phase IA Geomorphological Assessment, Westfall Township, Pike County, Pennsylvania": Submitted to Kittatinny Archeological Research, Inc., Stroudsburg, Pennsylvania.

1997 "Geomorphological Assessment of the Surficial Deposits within a Transgressive Estuarine Complex, Bridgeport Municipal Airport, Stratford, Connecticut": Submitted to URS Greiner, Inc., Florence, New Jersey.

1995 "The Saxtant Site, C7537.02: Rathbone, Steuben County, New York: Part I, Lithic Catchment; Part II, Geomorphology and Soils Classification": Submitted to 3D/ESI, Inc., Cincinnati, Ohio for CNG Transmission Corporation, Clarksburg, West Virginia.

1995 Soil Survey for Tenneco Pipeline, Project No. C7373.02, Morgan County, Ohio": Submitted to 3D/ESI, Inc., Cincinnati, Ohio.

Geological Catchments, Raw Material Analysis and Lithic Analysis Reports

in prog. "Geological Catchment and Raw Material Analysis for the Country Club of the Poconos Sites, Monroe County, Pennsylvania": Report to be submitted to Kittatinny Archaeological Associates, Inc., Stroudsburg, Pennsylvania.

in prog. "Geological Catchment, Raw Material and Lithic Analysis of the Deer Park Site, Wyoming County, Pennsylvania": Report to be submitted to Pan Cultural, Inc., Pittstown, Pennsylvania.

2002 "Geological Catchment for the Ulster County Jail Prehistoric Quarry Site, Town of Kingston, Ulster County, New York": Submitted to Hartgen Archaeological Associates, Inc., Rennselaer, New York.

2002 "Raw Material Characterization, with Special Emphasis on the Origin of Argillite Artifacts, Recovered from the Phase II Investigation of Site 36MG112, Rivercrest

Development, Upper Providence Township, Montgomery County, Pennsylvania": Submitted to Kittatinny Archaeological Research Inc., Stroudsburg, Pennsylvania.

2000 Contributions to "*Phase III Data Recovery Excavations at the Neal Garrison Paleoindian Site (1.8ME), Eliot, York County, Maine: Raw Material Identification":* Submitted to John Milner Associates, West Chester, Pennsylvania.

2000 "Raw Material Analysis of Lithic Artifacts Recovered from the Phase II Investigation of Site 36MG112, Rivercrest Development, Upper Providence Township, Montgomery County, Pennsylvania": Submitted to Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania.

1999 "Lithic Analysis of Artifacts Recovered during the Phase III Investigation of the Philip's Meadow Site, Charles County, Maryland, Project No. 39582-001": Submitted to Dames & Moore, Bethesda, Maryland.

1998 Contributions to *Archaeological Evaluation of Six Sites, Lee County, Virginia, United States Penitentiary, Lee Pennington Gap, Virginia", Appendix D: Analysis of Hornfels Artifact:* Submitted to Louis Berger and Associates, Inc., Richmond, Virginia.

1998 Contributions to *Data Recovery and Excavations of the Whitehurst Freeway, Sites 51NW103, 51NW104 and 51NW117,* including a) The Geological Catchment for the Capitol District, b) Petrographic Atlas of Quartzite Textures, and c) Petrographic Atlas of Woodland Ceramics*:* Submitted by Parsons Engineering Science, Inc., Fairfax, Virginia for National Park Service, Washington, D.C.

1998 "Lithic Analysis for Long Valley Project 2163, Morris County, New Jersey": Submitted to Louis Berger & Associates, Inc., East Orange, New Jersey.

1998 "Lithic Resource Assessment for Phase II Excavations at Marshalls Creek, Monroe County, Pennsylvania": Submitted to Cultural Heritage Research Services, Inc., North Wales, Pennsylvania.

1997 "Lithic Analysis of Materials Recovered during Phase III Excavations of the Bennett Site (36 Sq 109), Susquehanna County, Pennsylvania": Submitted to Louis Berger & Associates, Inc., East Orange, New Jersey.

1997 "Petrographic and Hand Sample Analysis of Lithic Materials Recovered from Site 18 PR 119, Sherwood-3 Project, Prince Georges County, Maryland": Submitted to R. Christopher Goodwin & Associates, Frederick, Maryland.

1997 "Geologic Catchment and Lithic Analysis for Phase II of the Iroquois Compressor Project, West Athens Hill, New York": Submitted to Hartgen Archeological Associates, Inc., Troy, New York for Iroquois Gas Company.

1997 "Geologic Reconnaissance in the Lower Devonian Helderberg Group for Phase IB of the Sprint Telecommunications Line Study, New Baltimore Township, New York": Submitted to Hartgen Archeological Associates, Inc., Troy, New York.

1996 "Technical Report for Lums Pond, Delaware Archeological Investigation: A Chemical Characterization of Jasper Artifacts Originating from New Jersey, Pennsylvania and Delaware": Submitted as part of *The Prehistory of the Lums Pond Site, Newcastle County, Delaware*, prepared by Parsons Engineering Science, Inc., Fairfax, Virginia for Delaware Department of Transportation, Newark, Delaware.

1996 "Technical Report for Site PS 56R, Staten Island": Submitted to Historical Perspectives, Inc., Westport, Connecticut.

1996 "Technical Report for Veteran's Administration National Cemetery, Site 731, Town of Stillwater, Saratoga County, New York: Phase II Archeological Investigation": Submitted to Hartgen Archeological Associates, Troy, New York.

1995 "Geological Catchment for Central Hudson Utility Line Project (P and MK Line, Ulster County), Phase IB Report": Submitted to Hartgen Archeological Associates, Inc., Troy, New York for Central Hudson Power and Gas, Albany, New York.

1995 "Geological Catchment for Kingston Business Park, Kingston, New York, Project No. 426, Phase II Report": Submitted to Hartgen Archeological Associates, Inc., Troy, New York for the City of Kingston, New York.

1995 "Lithic Analysis of the Catskill Quarry Collection, Project No. 347, Phase IB Report": Submitted to Hartgen Archeological Associates, Inc., Troy, New York.

1995 "Lithic Analysis and Geologic Catchment for the New Hampshire Wal*Mart RDC Site, Phase II Report": Submitted to Hartgen Archeological Associates, Inc., Troy, New York.

1995 "Lithic Analysis of the Wood's Edge Collection, Phase I Report": Submitted to Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania.

1995 "Lithic Analysis of the Richfield Site, Phase II Collection": Submitted to Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania.

1995 "Geological Catchment for Site C7477.01 Along the Tejas Transmission Line, Northern Tioga County, Pennsylvania, Phase IB Report": Submitted to 3D/ESI, Inc., Cincinnati, Ohio for Tejas Gas Corporation, Houston, Texas.

1994 "Phase III Survey and Testing Along the CNG Natural Gas Pipeline, Kettle Creek Sites (36-Cn-165 and 36-Cn-199), Clinton County, Pennsylvania": Submitted as part of *Archaeological Excavations on Kettle Creek: Investigations at 36CN165 and 36CN199, Clinton County, Pennsylvania,* prepared by Engineering Science, Washington, D.C. for CNG Transmission Corporation, Clarksburg, West Virginia.

1994 "Catchment Geology for Prehistoric Sites Located within the Chilhowee and Glade Springs Quadrangles, Roanoke, Virginia, Phase 2 Report": Submitted to 3D/Environmental Services, Inc., Cincinnati, Ohio for National Park Service, Washington, D.C.

1994 Contributions to Chapters 2, 6 and 7 (covering regional geology and lithic analysis) submitted as part of *Archaeological Data Recovery for Transcontinental Gas Pipe Line Corporation's 6.79 Mile Leidy Natural Gas Pipeline Expansion, Sandt's Eddy Site (36-Nm-12), Northampton County, Pennsylvania,* prepared by 3D/Environmental Services, Inc., Cincinnati, Ohio for Transcontinental Gas Pipe Line Corporation, Houston, Texas.

1993 "Phase III Survey and Testing Along the CNG Natural Gas Pipeline (TL-400 Extension 1), Beaver, Butler and Armstrong Counties, Pennsylvania": Submitted as part of *Archaeological Data Recovery in the Upper Ohio Valley: Investigations at 36BV292, A Prehistoric Site on Connoquenessing Creek, Beaver County, Pennsylvania,* prepared by Engineering Science, Washington, D.C. for CNG Transmission Corporation, Clarksburg, West Virginia.

1993 "Geological Report for the Chapel Farm Estate Quartz Quarries, Phase II Report": Submitted to City Scape, Inc., Brooklyn, New York for New York City Landmark Division.

1993 "Lithic Analysis of the Minisceongo Site, Site Nos. 177 and 195, Rockland County, New York": Submitted to Hartgen Archeological Associates, Inc., Troy, New York.

1992 "Geological Reconnaissance for the Kerr Estates, Site No. 224, Ulster County, New York": Submitted to Hartgen Archeological Associates, Inc., Troy, New York.

1992 "The Padula Geological Catchment Area and Prehistoric Lithic/Mineral Resource Procurement" and "Analysis of the Prehistoric Lithic Assemblage": Submitted as part of *Archaeological Data Recovery for Transcontinental Gas Pipe Line Corporation's 6.79 Mile Leidy Natural Gas Pipeline Expansion, Padula Site (36-Nm-15), Northhampton County, Pennsylvania,* prepared by 3D/Environmental Services, Inc., Cincinnati, Ohio for Transcontinental Gas Pipe Line Corporation, Houston, Texas.

1992 "Geological Reconnaissance for the Sussex County Sewer Project, Borough of Sussex, Sussex County, New Jersey, Phase IA Report": Submitted to Kittatinny Archaeological Research, Inc., Stroudsburg, Pennsylvania for the County of Sussex, New Jersey.

1990 "Geological Reconnaissance Study of the Sharkey Landfill Superfund Site, Rockaway Neck, Morris County, New Jersey, Phase I Report": Submitted to Joel Grossman & Associates, Inc., New York, for Burns & Roe Industrial Services Co.

OPEN FILE REPORTS

For the Archaeological Facility, State University of New York at Binghamton, on file with the New York State Department of Transportation in Syracuse, New York

1979 Bedrock Geology, Structural History and Stream Patterning in Cayuga Creek, Tioga County, New York, 15 p.

1979 Glacial History of the Manlius-Lafayette-Cicero Swamp Area, East Syracuse, New York, 15 p.

1979 Bedrock Geology and Glacial History of the Lafayette-Cicero Swamp Area, East Syracuse, New York, 16 p.

1979 Bedrock Geology, Physiography [Geomorphology] and Glacial History of the Manlius-Baldwinsville Quadrangle, Onondaga County, New York, 25 p.

1979 Bedrock Geology and Glacial History of the Watkins Glen-Horseheads Area, Cayuga and Schuyler Counties, New York, 37 p.

1978 Bedrock Geology, Structural History and Physiography [Geomorphology] of Broome County, New York: A Summary, 35 p.

Other:

1978 Soil Subdivisions and their Prehistoric Implications, Acadia National Park, Bar Harbor, Maine, 4 p.

MEMBERSHIPS/ASSOCIATIONS

archaeology: Society of American Archaeology, Society for Archaeological Sciences, Society of Pennsylvania Archaeology, Association for the Study of Marble and Other Stones in Antiquity

geology: Geological Society of America, Geological Association of Canada, Geological Association of New Jersey, Mining History Association, Franklin-Ogdensburg Mineralogical Society

APPENDIX H: 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.

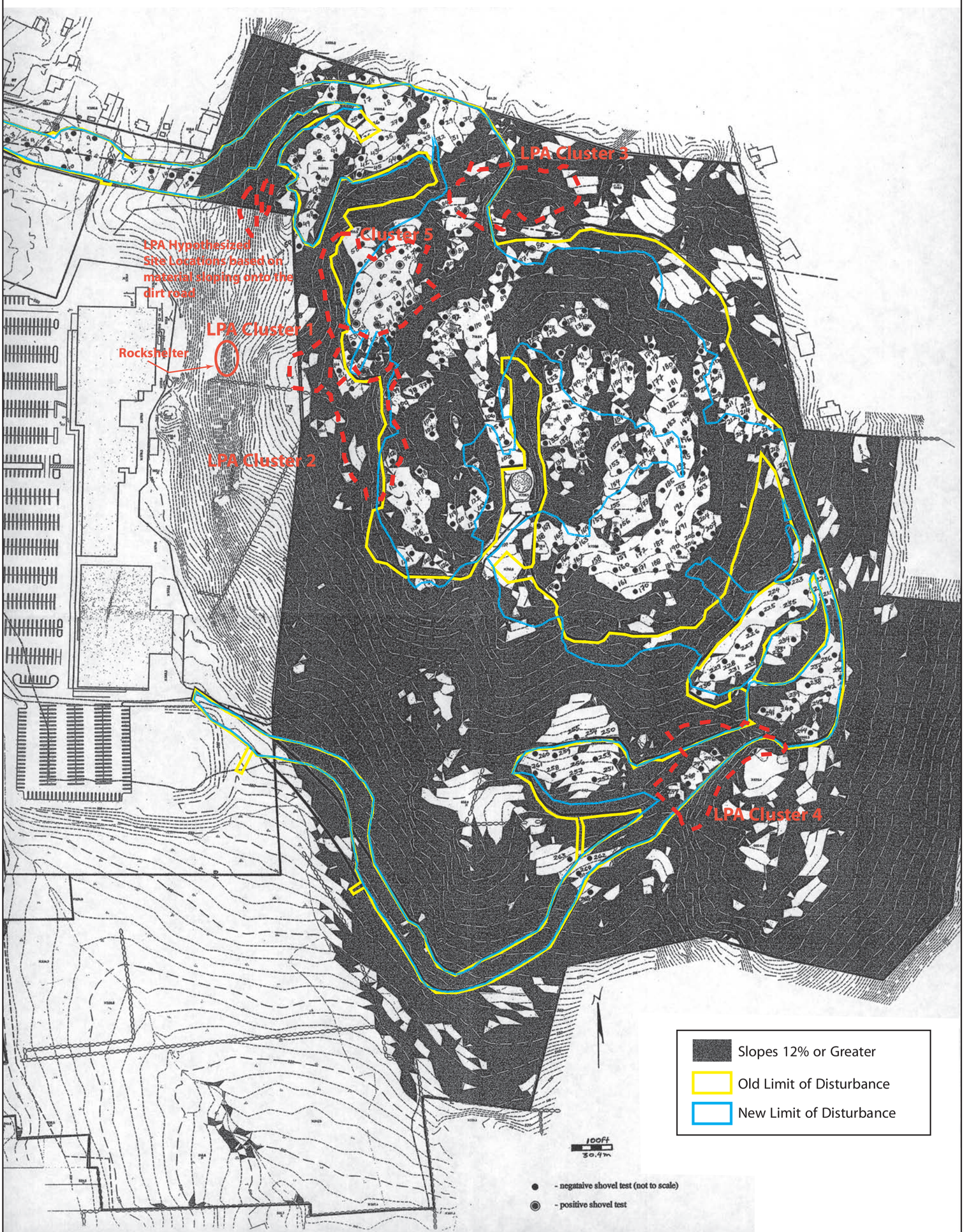
2004 *Phase IA Cultural Resources Survey Site Assessment Phase, Proposed Hillcrest Commons Development, Town of Carmel and Kent, Putnam County, New York*. Prepared by Columbia Heritage, Newburgh, New York for Tim Miller and Associates, Cold Spring, New York. Columbia Heritage Report CA487A-1-11-04.

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.



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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

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