Technical Report
Phase II National Register Evaluation
Site 36LU301

Bell Bend Nuclear Power Plant

Luzerne County, Pennsylvania

ER 81-0658-079

Redacted Photo

Prepared for:

PPL BBNPP, LLC

Prepared by:

Barbara A. Munford, M.A.

GAI Consultants Inc.
385 East Waterfront Drive
Homestead, Pennsylvania

GAI Project No. C110751.00

December 20, 2011

Note 1: Items in brackets have been redacted per agency request

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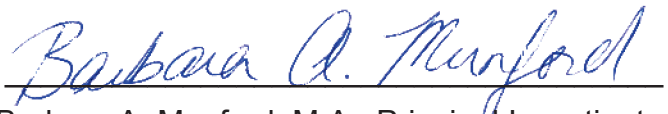

Barbara A. Munford, M.A., Principal Investigator

GAI Consultants Inc.

385 East Waterfront Drive

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Abstract

In June and July, 2011, GAI Consultants, Inc. (GAI) conducted a Phase II National Register Evaluation of Site 36LU301, located within the proposed Bell Bend Nuclear Power Plant (BBNPP) project area, in Luzerne County, Pennsylvania, on behalf of PPL Bell Bend, LLC (PPL). Site 36LU301 represents a multicomponent prehistoric and historic site situated within a cultivated field, on an upland flat north of Walker Run. Proposed project impacts are anticipated to result from use of the northern portion of the site as a temporary construction laydown area. The site was identified during GAI's Second Supplemental Phase I survey of the BBNPP project area in 2010. Based on Phase Ib results and consultation with the Pennsylvania Historic and Museum Commission/Bureau for Historic Preservation (PHMC/BHP) the site was recommended as potentially eligible for listing in the National Register of Historic Places (NRHP) and Phase II investigations were conducted to conclusively evaluate site eligibility.

GAI's Phase II study included a background research review, field investigations, and laboratory analysis. Fieldwork consisted of controlled surface collection, excavation of 84 shovel test pits and ten test units, plowzone stripping, and feature investigations.

Phase II testing produced a very low density, dispersed scatter of 49 prehistoric lithic artifacts and 143 historic artifacts. In addition, 212 possible features (soil anomalies) were identified (all but one exposed on the surface of plowzone-stripped trenches). In accordance with a sampling strategy developed in consultation with PHMC/BHP, GAI investigated 25 percent (*n*=55) of these features. Feature sampling resulted in the identification of ten cultural features (five prehistoric thermal features, two prehistoric/historic postmolds, and three historic features—a refuse pit and two features of undetermined function) as well as 45 non-cultural soil anomalies (predominantly root/rodent disturbance).

The prehistoric lithic assemblage consisted of 2 bifaces, 24 debitage and 23 fire-cracked rocks, and included a single diagnostic Early Woodland Cresap-like projectile point. These artifacts were found overwhelmingly in plow-disturbed contexts, primarily in the western half of the site. Radiocarbon analysis of samples from four of the prehistoric thermal features indicated that two features (Features 150 and 171) date to the Middle Archaic period while two features (Features 153 and 154) date to the Early Woodland period. Excavation of these five prehistoric features yielded no evidence of subsistence remains and produced only three non-diagnostic artifacts. No artifact concentrations or diagnostic artifacts occurred in association with the thermal features. Based on the results of Phase II investigations, the site represents the remains of multiple, small, short term prehistoric occupations dating to the Middle Archaic and Early Woodland periods.

Phase II investigations also defined an historic component at the site, represented by the recovery of 143 historic artifacts and three sampled historic features (Feature 77—a refuse pit, and Features 83 and 85—features of undetermined function). Two thirds of the historic artifacts were found in the refuse pit, with the remainder widely dispersed across the southern portion of the sites. No structural remains or deep shaft features were identified. These materials represent a mid-to-late nineteenth century utilization of the locality (represented exclusively by Features 77) and a twentieth century field scatter associated with the adjacent ca 1880 Michaels Farmstead.

Based on the results of this Phase II study, GAI recommends that the prehistoric component and the historic component at Site 36LU301 are Not Eligible for listing in the National Register. GAI recommends no further investigation of this site.

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Chapter 1. Introduction and Project Overview

Project Summary

GAI Consultants, Inc. (GAI) conducted a Phase II National Register Evaluation of Site 36LU301, located within the proposed Bell Bend Nuclear Power Plant (BBNPP) project area in Luzerne County, Pennsylvania, on behalf of PPL Bell Bend, LLC (PPL) (Figure 1; Photograph 1). The overall BBNPP project area for cultural resources investigations consists of an approximately 1,104-acre (447-hectare) parcel situated west of the North Branch Susquehanna River, adjacent to PPL's existing Susquehanna Steam Electric Station (SSES). PPL proposes construction of a nuclear power generation unit in this locality. Proposed project impacts within Site 36LU301 will result from use of its northern portion for temporary construction laydown.

REDACTED Photograph 1

Photograph 1. Site 36LU301 Overview showing Surface Collection Activities, Facing East

Site 36LU301 was identified during GAI's Second Supplemental Phase Ib investigation of the BBNPP project area, performed in 2010 (Figure 2) (Munford 2010). Based on results of the Phase Ib survey and consultation with the Pennsylvania Historic and Museum Commission/Bureau for Historic Preservation (PHMC/BHP), the site was recommended as potentially eligible for listing on the National Register of Historic Places (NRHP) due to its prehistoric information potential and site avoidance or Phase II investigations were recommended (Appendix A). As PPL concluded that site avoidance was not feasible, a Phase II study was conducted. Phase II fieldwork was performed between June 24 and July 27, 2011.

The purpose of GAI's Phase II study was to investigate this potentially-eligible archaeological site in order to conclusively evaluate the site's NRHP eligibility and to provide recommendations on the need for further archaeological investigations. Phase II investigations were conducted in accordance with GAI's May 13, 2011 Scope of Work, as approved by the PHMC-BHP (May 26, 2011) (Appendix B). Based on interim field results, which documented over 200 possible features (soil anomalies) on the surface of plowzone stripped trenches, and subsequent consultation with Brad Wise (PPL) and Steve McDougal (PHMC-BHP), the work was expanded to include sampling of these possible features. The scope of Supplemental Phase II work was summarized in a July 15, 2011, e-mail to Mr. Wise.

Preliminary results of the Phase II Investigation were provided to PPL in a Phase II Management Summary (Munford 2011). The current report, incorporating and/or summarizing data presented in the previous Phase Ib document and the Phase II Management Summary, presents the methods and results of GAI's Phase II National Register Site Evaluation of Site 36LU301, including recommendations on site eligibility and the need for additional investigations. A BHP Report Summary Form for the project is presented in Appendix C.

REDACTED Figure 1

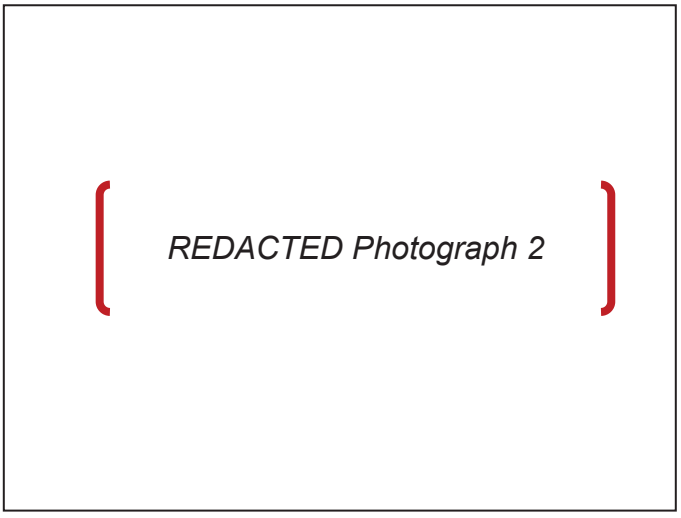
Site 36LU301 Location

Figure 2. Second Supplemental Phase Ib Project Area showing Archaeological Potential, Testing Locations and Identified Sites

11x17

REDACTED Figure 2
Second Supplemental Phase Ib Project Area showing Archaeological Potential, Testing Locations and Identified Sites

Site 36LU301 is situated on a broad upland flat approximately 91 meters (300 feet) north of Walker Run, in the western portion of the BBNPP project area (see Figure 1, Photographs 1 and 2). Based on the results of Phase II investigations, the site measures 140x210 meters (459x689 feet) and occupies the southern portion of a large cultivated field, as well as a small section of an adjacent farmyard, northwest (inside) of a right-angle bend in North Market Street (Figure 3). Due to its irregular boundary the site encompasses approximately 20,175 square meters (217,162 square feet), or approximately 5.0 acres (2.0 hectares). It is bounded, in general, by North Market Street to the east and a fallow field to the west. To its south, a wooded wetland, a pond, and the Michaels Farm (including a house, two garages, and two sheds) separate the cultivated field from North Market Street. The circa 1880 Michaels Farm (155063/GAI-25) was documented during GAI's previous architectural survey (Munford and Tuk 2008; Munford et al. 2010) and was determined by PHMC-BHP as Not Eligible for listing in the NRHP (March 17, 2010 review letter). Ground surface elevation within the site area rises slightly to the north, increasing from 200 meters (655 feet) above mean sea level (amsl) at the south edge to 203 meters (666 feet) amsl along the north edge. An outcrop of calcareous clay shale (claystone), measuring approximately 10x15 meters (33x49 feet), occurs at ground level in the north central portion of the site. The surface of the cultivated field is characterized by a high percentage of cobbles, gravels, and rock fragments.



Photograph 2. Site 36LU301 Overview from Northwest Portion of Field, showing Michael Farmstead in Distance, Facing Southeast

Also Note Area of Grass in Foreground Marking Location of Rock Outcrop

Area of Potential Effect

The Area of Potential Effect (APE) for GAI's Phase II National Register Site Evaluation included an approximately 140 x 225-meter (459 x 738-foot) area centered on the Phase Ib site boundary and encompassing the southern portion of the cultivated field (Lot 41, Section 1) and the western edge of the adjacent farmyard (Lot 41, Section 2) (see Figure 3). As noted above, based on Phase II testing, the site measured 140 x 210 meters (459 x 689 feet).

Figure 3. Site 36LU301 Phase II Testing Locations

11x17

REDACTED Figure 3
Site 36LU301 Phase II Testing Locations

Summary of Results

Previous Phase Ib Survey

Site 36LU301 was identified during GAI's Second Supplemental Phase Ib investigation of the BBNPP project area, conducted in 2010 (Munford 2010). The site consisted of a low-density, dispersed prehistoric lithic scatter measuring 80x200 meters (262x656 feet) (Figure 4). A sparse scatter of historic artifacts was also recovered within the site boundary.

Phase Ib investigations in the site vicinity included a pedestrian ground survey and judgmental shovel testing within the cultivated field, as well as systematic shovel testing of the farmyard south of the field. This work yielded a dispersed low-density surface scatter of 14 prehistoric lithics, as well as 21 historic specimens (see Figure 4). Shovel testing revealed an Ap-B soil horizon sequence throughout the site. [The Ap horizon represents a dark, organic-rich surface horizon that has been disturbed by cultivation. The underlying B horizon is a subsoil horizon that is typically lighter in color (e.g., yellowish-brown) and is characterized by a concentration of clays and iron. The Ap/B horizon interface is distinct and plowscars are often visible at the contact.] All prehistoric lithics were found in plow disturbed contexts, with 13 artifacts recovered from the surface of the cultivated field and one from the Ap horizon in a shovel test.

The sample of 14 prehistoric lithics included 5 bifaces, 7 debitage and 2 cobble tools (hammerstones/pecking stones). Shriver/Helderberg chert was used to manufacture six of the flaked stone artifacts, including three of the five bifaces, with the remainder made from argillite and Onondaga chert. Cobble tools were made exclusively from sandstone. The Phase Ib tool assemblage included one diagnostic specimen—a possible Early/Middle Archaic MacCorkle-like projectile point. Also recovered were one untyped projectile point fragment and three non-diagnostic biface fragments.

The scatter of 21 historic artifacts consisted predominantly of kitchen-related specimens, with a low frequency of architectural debris and activities-related artifacts. These artifacts were concluded to represent a field scatter of nineteenth and twentieth century debris associated with cultivation of this property; they were not considered to constitute an historic period archaeological site.

Based on the results of Phase Ib investigations, GAI concluded that Site 36LU301 had a potential to yield diagnostic artifacts and, possibly, cultural features that could contribute important information on the prehistoric use of the area. Accordingly, GAI recommended that the site was potentially eligible for listing in the NRHP under Criterion D. PHMC-BHP reviewed these results as presented in the Phase Ib Addendum Report (Munford 2010), and in a May 20, 2011 letter (see Appendix A) they concurred with the results and recommended site avoidance or Phase II National Register Evaluation to determine the site's eligibility.

Phase II National Register Evaluation

At the request of PPL, GAI performed a Phase II National Register Evaluation of Site 36LU301 in June and July, 2011. Phase II fieldwork included controlled surface collection of the cultivated field, the excavation of 84 shovel test pits and ten test units, plowzone stripping within seven trenches, and feature sampling. This work produced 49 prehistoric artifacts and 143 historic artifacts and exposed 212 soil stains identified as possible cultural features (all but one located within plowzone stripped trenches). During the course of fieldwork GAI consulted with PHMC/BHP to develop an appropriate sampling strategy for the unexpectedly large number of stains (possible features) exposed during plowzone stripping.

Figure 4. Site 36LU301 showing Phase Ib Testing Locations

11x17

REDACTED Figure 4
Site 36LU301 showing Phase Ib Testing Locations

In accordance with the results of this consultation, GAI defined categories of features and investigated a 25 percent sample of features within each of the categories, resulting in a total of 55 tested features. Based on Phase II results, these 55 features included ten cultural features—five prehistoric thermal features (Features 150, 153, 154, 161, and 171), two prehistoric/historic postmolds (Features 37 and 38), and three historic features (Feature 77, 83 and 85)—as well as 45 non-cultural soil anomalies (primarily root/rodent disturbances).

The small Phase II lithic assemblage consisted of 2 bifaces, 24 debitage and 23 pieces of fire-cracked rock. The single recovered diagnostic artifact was an Early Woodland Cresap-like projectile point. The lithics were found overwhelmingly (84 percent) in plow-disturbed surface or plowzone contexts and occurred in a widely dispersed scatter, primarily in the western half of the site.

The five prehistoric thermal features were all identified on the plowzone stripped B horizon within a single trench (Trench 5). Radiocarbon analysis dated two features (Features 150 and 171) to the Middle Archaic period and two features (Features 153 and 154) to the Early Woodland period; Feature 161 was undated. These features yielded no evidence of prehistoric subsistence remains and produced scant prehistoric artifacts. No concentration of artifacts was observed in the vicinity of the thermal features. The two prehistoric/historic postmolds were located in the southwest portion of the site and as they produced no artifacts and were not associated with any postmold patterning or other prehistoric features, could not be attributed to a specific site occupation.

Based on the results of Phase II testing Site 36LU301 consists of the remains of multiple, small, short-term prehistoric occupations during the Middle Archaic and Early Woodland periods.

Phase II investigations also defined an historic component at the site, as represented by the recovery of 143 historic artifacts and the investigation of three historic features (Features 77, 83 and 85). (An additional five unsampled historic features were identified during plowzone stripping.) The three sampled features included one refuse pit (Feature 77) and two features of undetermined function (Features 83 and 85). All three historic features were situated in the southwest corner of the site and were truncated by plowing. The historic artifact assemblage was composed largely of kitchen-related ceramics and glass, as well as faunal remains (animal bone and teeth). Approximately two thirds of these artifacts were recovered from Feature 77 (refuse pit). The remaining historic artifacts occurred in a low density scatter across the southern portion of the site.

Phase II investigations indicate that the site includes the remains of mid-to-late nineteenth century activities (represented solely by Feature 77/refuse pit) as well as a twentieth century field scatter associated with the adjacent ca 1880 Michaels Farmstead.

Based on the results of Phase II testing GAI recommends that the prehistoric component and historic component of Site 36LU301 are Not Eligible for listing in the National Register. Pending PHMC-BHP review and comment, GAI recommends no further archaeological investigations of the site.

An updated Pennsylvania Archaeological Site Survey (PASS) Form is provided in Appendix D. Phase II prehistoric and historic artifact catalogs are presented in Appendix E.

Curation

Material remains and field records generated by this study will be donated by PPL to the Pennsylvania Historical and Museum Commission for long-term preservation at the State Museum of Pennsylvania.

Regulatory Guidelines

GAI's Phase II National Register Evaluation was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, guidelines developed by the Advisory Council on Historic Preservation, the amended *Procedures for the Protection of Historic and Cultural Properties* as set forth in 36 CFR 800, the Secretary of Interior's *Standards and Guidelines for Archaeology and Historic Preservation*, and *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations* (PHMC-BHP 1991).

Project Staff and Acknowledgements

Benjamin Resnick, M.A., R.P.A. (Group Manager, Cultural Resources) was project manager for GAI's study. Barbara A. Munford, M.A., (Senior Staff Archaeologist) served as project Principal Investigator and authored this report. Lisa Dugas, M.A. (Senior Archaeologist) and Lori Fry M.A. (Senior Staff Archaeologist) contributed to report sections. Qualifications of key project staff are provided in Appendix F.

Terry J. Newell (Senior Archaeologist) supervised Phase II archaeological fieldwork with a crew that included Lisa Dugas, Mark Frank (Archaeologist), Greg Sutton (Archaeologist), Cory Laughlin (Archaeologist), Scott Gajewski (Archaeologist), Marina Davis (Archaeologist), Christine Lasser (Archaeologist), James Brenneman and Matt Wilson.

Colleen Dugan (Archaeologist) performed historic artifact analysis and Marina Davis conducted prehistoric artifact analysis. Lisa Dugas and Amanda Wasliewski (GIS Specialist) prepared figures for the report.

Mr. Brad Wise (PPL) served as PPL's project manager for the Phase II study.

Chapter 2. Site Setting

Physiography

Site 36LU301 is located in the Susquehanna Lowland Section of the Ridge and Valley physiographic province (Sevon 2000) (Figure 5). This section encompasses low to moderately-high linear ridges, linear valleys, and the Susquehanna River Valley. Relief is low to moderate, and the drainage pattern is trellis and angulated. A narrow prong of the Anthracite Valley Section of the Ridge and Valley lies approximately 6 kilometers (4 miles) north of the project area. The Glaciated High Plateau Section of the Appalachian Plateaus Province occurs in the northwestern portion of Luzerne County, approximately 25 kilometers (16 miles) north of the project area. All of Luzerne County has been glaciated. Uplands in the region are covered with the Wisconsin age Olean Till (Sevon and Braun 2000), while the Susquehanna River valley is mapped with stratified drift of Recent to Late Illinoian age.

The North Branch Susquehanna River originates in Otsego Lake near Cooperstown, New York (Kaktins and Delano 1999). From there the river flows in a southerly direction, crossing the Pennsylvania border where it makes a sharp turn to the northwest and flows back into New York. The river re-enters Pennsylvania further west near Sayre, Pennsylvania, and flows southeast to the Wilkes-Barre area. At Wilkes-Barre, the river flow direction is controlled by the intense structural geology folding of the Anthracite Valley Section of the Ridge and Valley Province, which causes the river to make an abrupt 90-degree turn to the southwest and flow through Luzerne County. It continues in a southwesterly direction until its junction with the West Branch Susquehanna River just north of Sunbury, Pennsylvania. From Sunbury, the main branch Susquehanna River generally flows south, eventually entering Maryland and emptying into the Chesapeake Bay. The river has a total length of 715 kilometers (444 miles) and it drains 71,225 square kilometers (27,502 square miles), covering nearly half of the land area of Pennsylvania and portions of New York and Maryland.

In the general site vicinity, the North Branch Susquehanna River flows south to the area of Wapwallopen, where it makes a curve to the southwest. This curve is referred to as Bell Bend. The river continues its southwesterly flow downstream, past Berwick and on to Sunbury. The width of the channel near the study area ranges from 200 to 300 meters (656 to 984 feet). Further downstream near Berwick the channel broadens to 500 meters (1640 feet). Several islands are present in the channel, the most notable being Gould Island near the northern boundary of the overall Bell Bend project area.

Geology

The bedrock in the project vicinity consists of Middle to Upper Devonian shale, claystone, sandstone and limestone (Inners 1978). Site 36LU301 and the majority of the surrounding upland flats are mapped with the Middle Devonian Mahantango Formation of medium-dark to dark-gray silty to very silty claystone. The northernmost edge of this formation is differentiated into the Tully Member of the Mahantango Formation. The Tully Member consists of medium dark-gray, argillaceous, fine grained limestone and calcareous clay shale. North of the site, between Beach Grove Road and the northernmost SSES cooling tower, lies a band of the Middle Devonian Harrell Formation (Inners 1978). The Harrell Formation consists of dark-gray to grayish black clay shale and silty clay shale that forms splintery and platy fragments. The area north of Beach Grove Road is mapped with the Upper Devonian Trimmers Rock Formation. This formation consists of medium gray to medium dark-gray, fine-grained to very fine-grained sandstone, siltstone and shale. The uplands to the north of Beach Grove Road are steep with moderately broad summits and as much as 170 meters (558 feet) relief.

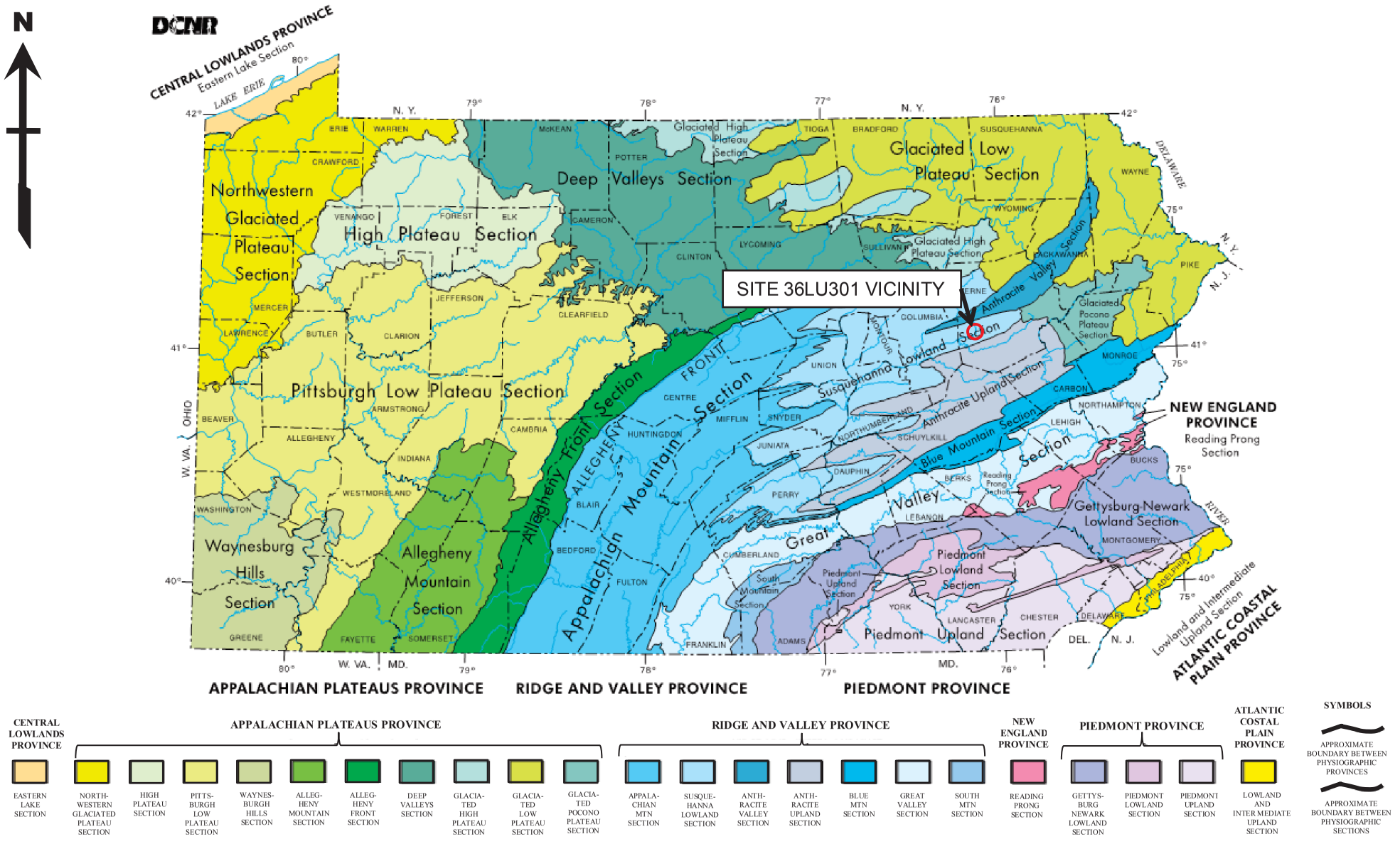


FIGURE 5
SITE VICINITY IN RELATION TO PENNSYLVANIA PHYSIOGRAPHIC PROVINCES

REFERENCE:
COMMONWEALTH OF PENNSYLVANIA,
DCNR, 2000.

LEGEND

SITE 36LU301 VICINITY

gai consultants

BELL BEND NUCLEAR POWER PLANT
PPL BBNPP, LLC.

DRWN: AJW
CHECKED: BAM

DATE: 12/02/2011
APPROVED: BAM

Geomorphology and Drainage

As noted above, all of Luzerne County was glaciated during the Pleistocene. According to maps prepared by Inners (1978), the project area occurs at the boundary of the Woodfordian (Late Wisconsin, circa 12-25 ka) glaciation to the north and east, and older glacial deposits to the west and south. The edge of the Woodfordian End Moraine map unit extends from Beach Haven, along the Susquehanna River, northward to Lee Mountain, beyond the project area. The mapped unit is depicted as a broken boundary with various segments separated by outwash, ground moraine, or kame deposits (Inners 1978). The area of Site 36LU301, located in the westernmost portion of the Bell Bend project occurs in the vicinity of this end moraine map unit. Woodfordian Ground Moraine deposits are mapped on the majority of the uplands to the north of the study area, the uplands in the northern portion of the previously surveyed Bell Bend West Alternative, and the uplands west of the bend in Confers Lane (see Figure 2). Both the end moraine and the ground moraine consist of till--an unsorted mixture of clay, silt, sand, gravel, cobbles and boulders. The remainder of the uplands in the project vicinity west of Route 11 is mapped with the Woodfordian Kame Terrace, and Outwash, Undivided map unit (Inners, 1978). This unit is relatively flat to gently sloping land surfaces and consists of unconsolidated and stratified sand, gravel, and cobbles with some boulders.

Woodfordian outwash and kame deposits are also mapped along the Susquehanna River to the south and west of the end moraine (Inners, 1978). The town of Berwick, located west of the project area, is largely built on Woodfordian outwash deposits. The uplands to the south and west of the end moraine are mapped with discontinuous deposits of Altonian (circa 45-70 ka) and Illinoian (circa 500 ka) glacial deposits.

The Susquehanna River valley floor, east of Route 11, is mapped predominantly with the Holocene Alluvium map unit (Inners, 1978). This unit extends northward (upstream) beyond Gould Island and southward to Berwick. Within the Bell Bend project area, the width of the Holocene Alluvium unit (and the valley floor) ranges from about 400 to 670 meters (1312 to 2198 feet). Further downstream beyond Bell Bend, the unit is very narrow ranging from 60 to 140 meters (197 to 459 feet).

A review of the PHMC-BHP's on-line Cultural Resources Geographical Information System (CRGIS) data base indicates that Site 36LU301 is located within Susquehanna River Basin, Subbasin Number 5 (The Central Susquehanna), Watershed D (Nescopeck Creek). The Central Susquehanna subbasin has a total drainage area of 1,761 square miles that includes the Susquehanna River from the Lackawanna River to the West Branch Susquehanna River, spanning Luzerne, Columbia, and Lackawanna Counties, and reaching portions of Schuylkill, Northumberland, Montour, Lycoming, Sullivan, Wayne, Wyoming and Susquehanna Counties. The Nescopeck Creek watershed has a total drainage area of 261 square miles, with Nescopeck Creek representing the only major stream (http://www.dep.state.pa.us, accessed February 1, 2010).

The area of Site 36LU301 is drained by Walker Run, located 91 meters (300 feet) to its south, which flows southward directly into the Susquehanna River. A large wetland is mapped at a confluence of Walker Run and unnamed tributaries, southeast of the site, opposite North Market Street. A man made pond borders the edge of Walker Run, immediately southwest of the site.

Upland localities east of the site are drained by an unnamed tributary which empties southward into the Susquehanna River. Further to the west, Salem Creek, Glen Brook, and their tributaries drain the uplands between the site area and Berwick. The east bank of the

Susquehanna River, opposite the project area is drained primarily by Wapwallopen, Little Wapwallopen and Nescopeck Creeks, and their tributaries, which empty directly into the river.

Soils

The site vicinity is mapped as the Chenango-Pope-Wyoming soil association (Bush 1981). This soil association is characterized by relatively level to sloping glacial outwash terraces, moderate to very steep hillsides, and relatively level floodplains. Uplands in the general site vicinity (north and west of U.S. Route 11) consist of glacial till and glacial outwash soils (Bush 1981). Glacial till soils, which weathered from sandstone, shale, siltstone and conglomerates, occur on the highest uplands to the north of the site, and on the highest elevation knobs and hillsides to its north and east. Site 36LU301and the majority of surrounding upland settings consist of glacial outwash soils, which formed in thick sediments derived from melting glacial ice. These broad, gently sloping areas represent the highest outwash terraces of the Susquehanna River and are Late Illinoian to Wisconsin in age. The wetlands that have developed on these terraces are also formed in glacial outwash. The site area itself is mapped predominantly as Chenango gravelly loam (ChA), with an area of Braceville gravelly loam (BrA) along its western edge (Figure 6). Soil types in the surrounding localities of glacial outwash include Chenango gravelly loam (ChA, ChB, ChC) and Braceville gravelly loam (BrA, BrB, BrC), as well as Atherton silt loam (At), Rexford loam (RdA, RdB) and Wyoming gravelly loam (WyD, WyF) (see Figure 6). Chenango gravely loam is found across large areas of cultivated fields, such as Site 36LU301; smaller areas of open fields are mapped with Braceville gravelly loam. In the surrounding area, Atherton silt loam and Rexford loam are associated with poorly drained localities while Wyoming gravelly loam occurs on steep hillsides.

Due to its upland setting Site 36LU301 has no potential for deeply buried cultural resources. Cultural resources in this locality are anticipated to be associated with the modern ground surface. Ground surface disturbances in the site area result from prior cultivation and an historic farmstead occupation (along the southern edge).

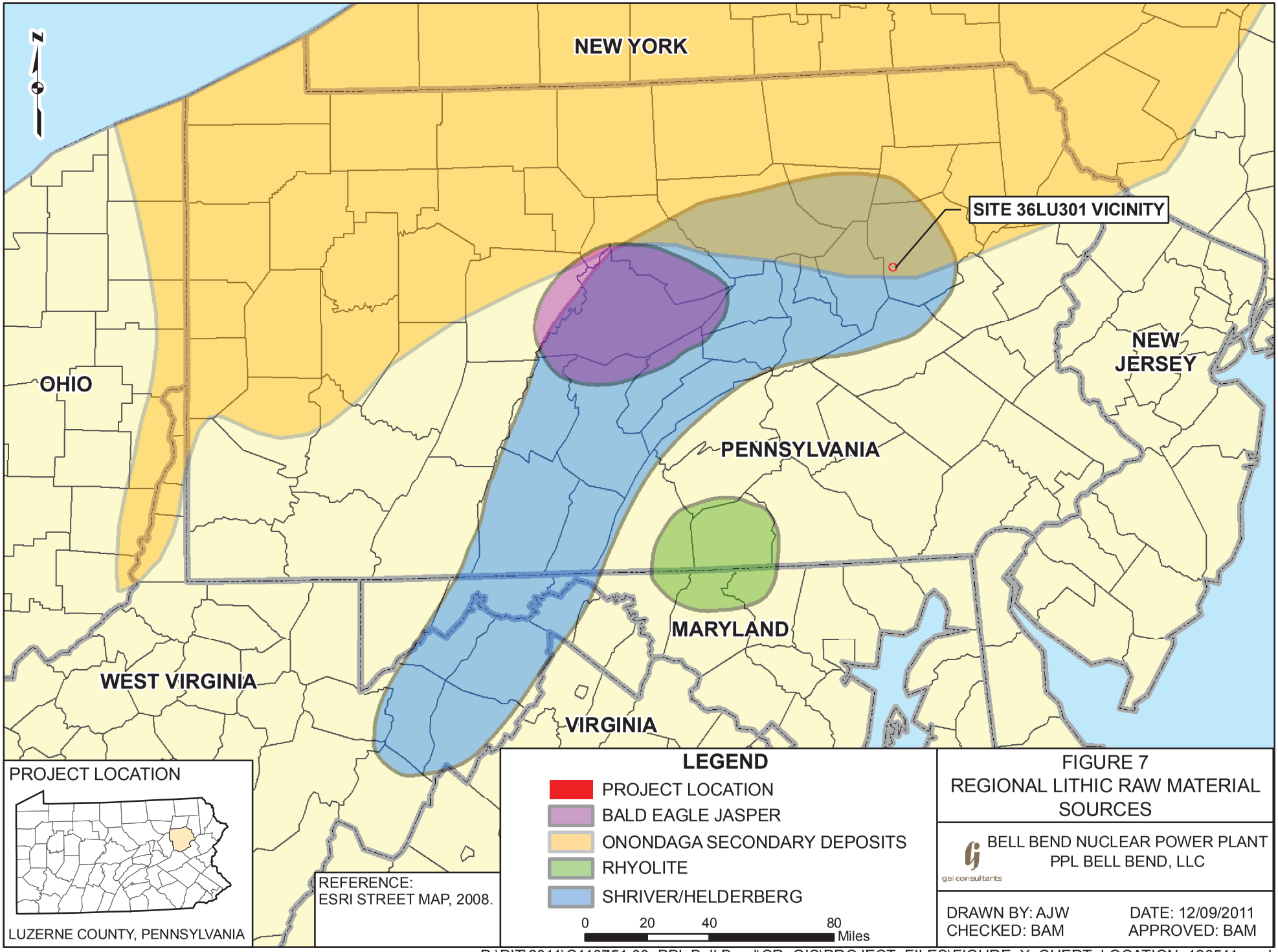
Prehistoric Toolstone Resources

The geologic landscape of the Central West Branch subbasin provided Native Americans with not only livable terraces and highly productive soils, but also with a variety of lithic raw materials for stone tool production, including numerous cherts, jaspers, and quartzites. Among the most widely known lithic raw materials include Bald Eagle jasper, Shriver chert, Onondaga chert, oolitic chert, and Nittany chert (MacDonald 2006). Several other lithic raw materials, including rhyolite (from south-central Pennsylvania), steatite (from the Upper Potomac River), and Flint Ridge chert (from eastern Ohio), were transported into the region within the toolkits of Native Americans and mark the boundaries of trading systems and settlement patterns.

Two varieties of chert that could be attributed to specific geologic sources were deposited as artifacts at the Bell Bend sites (Figure 7). These include Shriver/Helderberg chert and Onondaga chert. Shriver/Helderberg chert is found in outcrops of the Helderberg formation, which extends in a northeast/southwest trending band following the ridgelines, from West Virginia and Virginia, into northeast Pennsylvania. This raw materially is locally available and was the most common material identified during GAI's previous Phase Ib and Phase II investigations of prehistoric sites in the BBNPP project area. Onondaga chert outcrops in New York and also occurs as secondary deposits of cobbles that are transported throughout the river systems from New York and southward. Cobbles of Onondaga chert are available locally from stream beds.

Figure 6. Project Area Soils

REDACTED Figure 6
Project Area Soils


N
NEW YORK
SITE 36LU301 VICINITY
OHIO
NEW JERSEY
PENNSYLVANIA
MARYLAND
WEST VIRGINIA
VIRGINIA
PROJECT LOCATION
LUZERNE COUNTY, PENNSYLVANIA
REFERENCE:
ESRI STREET MAP, 2008.
LEGEND
PROJECT LOCATION
BALD EAGLE JASPER
ONONDAGA SECONDARY DEPOSITS
RHYOLITE
SHRIVER/HELDERBERG
0 20 40 80
Miles
FIGURE 7
REGIONAL LITHIC RAW MATERIAL SOURCES
BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC
gai consultants
DRAWN BY: AJW
CHECKED: BAM
DATE: 12/09/2011
APPROVED: BAM
P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_X_CHERT_LOCATION_120511.mxd

In addition, calcareous clay shale (claystone) occurs on-site as a surface outcrop exposed in the cultivated field within the north-central portion of the site. The rock outcrop has undoubtedly been impacted by plowing and fractured pieces of claystone are ubiquitous across the ground surface in the vicinity of the outcrop. This raw material fractures naturally in a thin platy fashion, resulting in fragments with flake-like characteristics but with edges that are friable and easily broken. Over 200 specimens of claystone were initially collected during Phase II testing, however, following laboratory processing and analysis, all but six of these (exhibiting clear flake morphology) were concluded to be non-cultural and were discarded. As no tools made from claystone were recovered from the site, the use of this raw material as a prehistoric toolstone cannot be conclusively confirmed.

Several other cherts were used in toolstone production but they could not be identified with a specific sourced material type. These unsourced cherts were described primarily by color and include black and dark gray cherts.

In addition to the various cherts, other unsourced toolstone materials found in the prehistoric artifact assemblage include metamorphic rock and sandstone, typically used for cobble tools and/or fire-cracked rock (FCR). Phase II testing (plowzone stripping) exposed a gravel bar, representing a former stream channel, extending in a southwest/northeast band through the northwest quadrant of the site. A portion of a second gravel bar was also documented in the southern portion of the site. Sandstone cobbles found in these stream deposits may have been one source of this raw material; cobbles were also available in glacial till and outwash deposits in the surrounding uplands.

Within the Site 36LU301 Phase Ib and Phase II flaked stone assemblage, Shriver/Helderberg chert was the most common raw material type, followed by Onondaga chert. Sandstone and metamorphic rock were used predominantly for fire-cracked rock and cobble tools. The remaining raw material types occurred in lower frequencies.

Modern and Past Climates

The modern, local climate within the project area is classified as humid continental, with some modifications due to proximity to the Great Lakes and to the Atlantic Ocean (Rossi 1999, Trewartha 1967). An even greater influence is provided by the Ridge and Valley physiography, which has many of the characteristics of a mountain-type climate. These characteristics include localized uplift of moisture-laden air masses producing increased precipitation on the windward side of ridges, and drier conditions on the lee side.

In Luzerne County, Canadian air masses collide with warm airflow originating in the Gulf of Mexico, creating ample precipitation for the region. Summers are typically warm with average temperatures ranging between 80° and 85° Fahrenheit (26° to 29° Celsius). The cold and cloudy winters accumulate approximately 15 inches (38 centimeters) of snowfall in the lower elevations and up to 70 inches (177 centimeters) in higher elevation. In winter, the daytime temperature ranges from 30° to 35° Fahrenheit (1.1° to 1.6° Celsius). Spring and fall are characterized by swift weather pattern changes with fluctuating periods of freeze and thaw during both seasons. The area has a mean annual precipitation of 40.1 inches (102 centimeters). The growing season in Luzerne County averages 120-150 days (USDA, SCS 1981).

Pennsylvania has experienced three main climatic changes over the last 12,000 years (Carr 1998a, Guilday et al. 1964, Guilday et al. 1977, Stingelin 1965). First, at the late Pleistocene/early Holocene transition (circa 11,000 B.P.), a warmer and moister climate (although cooler than present) caused the northward movement of most plant communities

and glacial retreat. Glacial deposits were present throughout the area, as glaciers reached as far south as Picture Rocks, in nearby Lycoming County (USDA, SCS 1986). Between 10,000 and 6000 B.P., climates became warmer and drier with the onset of the Hypsithermal/Altithermal. In the project vicinity, this change likely resulted in the establishment of the modern Mixed Mesophytic forest, including oak, hickory, and chestnut. Finally, after 3000 B.P., human modification of the landscape via fire and agriculture increasingly affected the ecological mosaic, leading to an increase in oak forests along with grasses and sedges (Joyce 1988, Watts 1979).

Paleoenvironment

The project area falls within a basswood-beech-oak-hemlock Mixed Mesophytic forest region (Braun 1950) that became entrenched during the Holocene. Prehistoric faunal assemblages in the Appalachians revealed a rich and diverse fauna for forager exploitation. The white-tailed deer was the most commonly exploited mammal. Other species hunted by prehistoric populations were black bear, bobcat, river otter, raccoon, squirrel, beaver, woodchuck, fox, and rodents. Prehistoric Native Americans also exploited avian and aquatic resources. Except for the extinction of certain large animals (elk, wolf, and cougar) and increases in other species populations, such as white-tailed deer, turkey, and woodchuck, the faunal composition of the area is little changed from early historic times (Shelford 1963).

With easy access to resources in a variety of upland and riverine settings, prehistoric inhabitants extensively utilized this region, which generally has a high potential for prehistoric archaeological sites. However, the pattern of previously recorded sites in the vicinity suggests that there was a preference for the larger drainage valleys along Susquehanna River. Few sites have been recorded in uplands settings similar to that of Site 36LU301.

Chapter 3. Culture History

The purpose of this chapter is to provide a general context for the Phase II investigations of prehistoric Site 36LU301. Both the Native American and Euro-American culture history sections focus on Pennsylvania's Susquehanna Valley region.

Native American Prehistory

Paleoindian (15,000 to 10,000 B.P.)

Humans first entered North America during the Paleoindian period, which dates to before 10,000 B.P. Radiocarbon dates recorded at Meadowcroft Rockshelter in western Pennsylvania have conservatively placed the earliest date of site occupation to approximately14,500 B.P. (Adovasio et al. 1999); occupation of the Shawnee-Minisink Site in eastern Pennsylvania has been placed between 10,000 and 11,000 years ago (McNett 1985). Although the exact date of human entry into the New World remains obscure, it is generally agreed that the arrival was from Asia via Beringia (the area including modern day Northeastern Siberia, the Bering Straits, and Alaska), exposed during Pleistocene glaciations (Neusius and Gross 2007). The paleoclimate to which these populations were adapted was much wetter and cooler than the climate of today. Glaciers covered large portions of North America, terminating in northern Pennsylvania.

Paleoindian populations are viewed as having subsisted as relatively mobile bands of hunters and foragers. They have traditionally been viewed as primarily dependent on the hunting of Pleistocene megafauna such as mastodon, sloth, and giant beaver. Recent evaluations of the evidence for this type of subsistence base have suggested a more generalized hunting and foraging economy where Paleoindians exploited small game and wild plants (e.g., Meltzer 1988). Investigations of the Paleoindian levels at the Shawnee-Minisink Site, in eastern Pennsylvania, suggest that procurement and processing of seeds, berries, and fish reflect seasonally based procurement activities in this locality (McNett 1985; Dent 2002). In this light, more generalized subsistence strategies focusing on a variety of locally available species may have been the best available adaptation.

The majority of Paleoindian sites are interpreted as small, short-term campsites where activities included animal butchering and hide processing, as well as working of wood, bone and antler. Artifact scatters with fluted stone spear points and flake tools used for cutting and scraping mark these sites. The projectile points for this period include forms such as Clovis, Cumberland, and the unfluted Lanceolate Plano cluster (Justice 1987). Dalton cluster points are typical of the Late Paleoindian and some appear to be a technological transition into Early Archaic forms (Justice 1987). Paleoindian tool kits include polyhedral blade cores for producing expedient flake tools, as well as endscrapers, sidescrapers, and gravers. Bipolar reduction techniques may have been employed to allow for exploitation of a wider range of raw materials (Tankersley 1996: 31).

In the glaciated portions of northern Pennsylvania, Paleoindian points and sites typically occur on lowland terraces of small tributaries. Lantz (1984) observed that many Paleoindian sites also occur on glacial features such as glacial kames, terraces, and moraines near springs, wetlands, creeks, and rivers. These areas are considered to be game-attractive settings (Tankersley 1996: 28). In unglaciated regions, Paleoindians sites are located at "more diverse elevations with few areas of concentration" (Lantz 1984).

Researchers suggest that sources of cryptocrystalline raw material were important focus of these groups (Lantz 1984; Tankersley 1996). Studies conducted in the Blue Ridge area of

Virginia (Gardner 1977) indicate that these lithic sources were a primary focus of Paleoindian groups. However, more recent examinations of sites across Virginia (Barber 2003) caution that this is only one of probably multiple factors weighing on the Paleoindian selection process for settlement location. Quarry-related sites in the Ridge and Valley province may occur in association with primary outcrops of these materials, or with cobble beds yielding chert, jasper, and other cryptocrystallines.

Many sites dating to the Paleoindian period have been recorded in the Susquehanna River Valley. However, in Pennsylvania, as in other areas, the majority of these sites are represented by isolated finds, limiting the evidence for subsistence activities of these populations. Prior to GAI's investigations of the Bell Bend project area, only one previously recorded Paleoindian site, consisting of an isolated Paleoindian projectile point, had been documented in Luzerne County. GAI's field investigations of the Bell Bend project area produced two Paleoindian points from prehistoric Site 36LU288, situated on a low terrace/floodplain west of the North Branch Susquehanna River (Munford et al. 2010). In addition, one Paleoindian point was recovered from a disturbed context within an historic period farmstead site (Site 36LU286), located approximately 259 meters (850 feet) east of Site 36LU301, in a similar upland setting above Walker Run. No Paleoindian diagnostic artifacts were recovered from Site 36LU301.

Early Archaic (10,000-8000 B.P.)

The beginning of the Archaic period in eastern North America is generally associated with the onset of the Holocene, which directly followed the end of Pleistocene glaciation. The warmer, drier climate that resulted from the retreat of the Pleistocene glacial ice led to the replacement of a subarctic regime with more heterogeneous flora and fauna (Caldwell 1958). Gradual cultural change occurred as groups began to schedule their activities and specialize in methods of seasonal resource extraction in response to the existence of a more diversified resource base.

Although archaeological research on the Early Archaic period in the region has been limited, it is likely that patterns characterizing the Northeast in general were also typical of central and western Pennsylvania (George 1985). Many archaeologists believe the Early Archaic represents a continuation of the basic Paleoindian subsistence/settlement pattern. This notion is supported by a number of studies in the Mid-Atlantic region that indicate a continuity of lifeways at Paleoindian/Early Archaic sites in Delaware (Custer 1988), the Shenandoah Valley (Gardner 1980), and the Great Valley in Pennsylvania and Maryland (Stewart 1980). Groups remained highly mobile, and Carr (1998b:49, 60) and Stewart and Katzer (1989) suggest that the region sustained a significant population increase during the early Holocene. Territories became somewhat more limited as the spread of deciduous forests led to a greater dispersal of game species (Carbone 1974).

Technologically, the shift in projectile points from the earlier fluted forms to notched and serrated varieties may represent a change from a thrusting to a throwing technique that suggest changes in the hafting of these projectiles to dart or spear shafts. This shift in the design of hunting weaponry may reflect a change in prey species from Pleistocene to Holocene fauna. Projectile point forms typical of this period in the Susquehanna Valley include Palmer, Kessel, Charleston, and Kirk, corner-notched and stemmed points (Custer 1996; Justice 1987). Non-diagnostic tools on Early Archaic sites can include bifaces, and utilized and retouched flakes. Early Archaic sites also witness the first evidence of ground stone technology. Examples include flaked and ground celts and axes along with abraders. Early Archaic trends in lithic raw material use show a continued preference for high quality

materials, such as jaspers and cherts, and the introduction of rhyolite to the tool assemblages (Carr 1998a). Often these materials are considered non-local to the sites and may indicate a wider range of settlement and/or procurement rounds (Carr 1998b).

Within the limits of the two watersheds in the site vicinity, only six sites with Early Archaic components have been identified. Three of these sites were located on low floodplain or terrace settings near the current study (PHMC/BHP 2010).

GAI's 2008 Phase Ib survey of the Bell Bend project area documented two Early Archaic Isolated Finds (IF 2 and IF 15), consisting of individual diagnostic projectile points, in the upland flats east of Site 36LU301 (Munford et al., 2010). One Kirk corner notched point was recovered from a cultivated field approximately 0.9 kilometers (0.5 miles) to the east, while one Palmer point was found in a cultivated field along the east edge of North Market Street, immediately opposite the site.

Middle Archaic (8000-5000 B.P.)

Like the Early Archaic period, the Middle Archaic is poorly understood in the Ridge and Valley (George 1985; Carr 1998a). Based on an understanding of this period in adjacent regions, however, researchers assume that population densities continued to increase because of the wider availability of food resources. Carr (1998a) notes a "significant increase in population" during the Middle Archaic in the Susquehanna region. A shift occurred toward more logistically organized subsistence/settlement patterns. In the American Midwest, there is evidence to suggest a decline in residential mobility for Middle Archaic populations, at least on a seasonal basis (Brown and Vierra 1983).

Bifurcate point production is the major technological change between the Early and Middle Archaic periods in the Ridge and Valley of Eastern Pennsylvania. Point forms indicative of the Middle Archaic period include Neville/Stanly and LeCroy, with fewer examples of MacCorkle, St. Albans, and Kanawha stemmed points in central Pennsylvania (Kuhn 1985). Rare examples of Morrow Mountain and Guilford type bifaces are found in the region (Cowin 1991:46). The processing of plant foods also grew in importance, and seems to be reflected in the tool assemblage by the introduction of various grinding and pitted stones (Graybill 1995:37). More local lithic resources were exploited and there seems to be an emphasis on more expedient tool production (e.g., bipolar reduction of cobbles) rather than curated tools such as bifaces of select high quality materials (Carr 1998a:88; Custer 1996:151; Graybill 1995:37).

Middle Archaic sites have been identified in a wider variety of settings than the previous Paleoindian and Early Archaic period sites. Cowin (1991:48) characterizes the Middle Archaic settlement system as consisting of base camps positioned on Holocene-age river terraces, smaller resource procurement stations for seasonal plant and animal exploitation in upland settings, and lithic reduction stations near bedrock outcrops of stone exploited for tool manufacture. Custer (1996:154-155) suggests that the base camps are located in areas where multiple resources are readily accessible, not just river terraces, and that procurement sites are positioned to focus exploitation on a single resource. He has revised his previous scenario, which included macro-band and micro-band base camps, and now sees evidence that the larger sites (previously termed "macro-band") are simply a result of more frequent use rather than use by larger groups.

Previous research in Central Susquehanna Watersheds B and D has identified ten sites with Middle Archaic components. Of these sites, three are situated in the vicinity of Site 36LU301 in floodplain or terrace settings (PHMC/BHP 2010).

One Early/Middle Archaic MacCorkle-like point was recovered from the surface of Site 36LU301 during GAI's Second Supplemental Phase Ib survey.

GAI's 2008 Phase Ib survey of the Bell Bend project area recovered two isolated diagnostic Early/Middle Archaic points (one MacCorkle-like point and one Kanawha point), recorded as IFs 3 and 5, from the surface of a cultivated field on an upland flat approximately 0.9 kilometers (0.5 miles) east of the current site (Munford et al., 2010).

In addition, Phase II investigations of Site 36LU301 identified two prehistoric thermal features (hearths) that have been radiocarbon dated to the Middle Archaic period. Radiocarbon analysis of samples from Feature 150 produced a date of 5120+/-40 B.P. (Beta-309435) while Feature 171 samples yielded a date of 7150+/-40 B.P. (Beta-309438).

Late Archaic (5000-3000 B.P.)

The Late Archaic period witnessed major environmental changes, which seem to coincide with cultural changes, including continued population growth, a greater shift to logistically-oriented subsistence/settlement patterns, and the establishment of exchange networks. The appearance of more diverse artifact forms also marks this period. In other areas of eastern North America, the Late Archaic period yields the first evidence of fiber-tempered pottery (Reid 1984; Skibo et al. 1989), burial mounds (Charles and Buikstra 1983), and the use of domesticated plants (Ford 1985; Smith 1987).

Change toward a more logistical settlement pattern is paralleled by an increase in the number and types of sites, at least as seen in the region around Southeastern Pennsylvania (Custer 1983, 1988). Custer (1983) suggests that large base camp sites are found on well-drained land near large drainages or wetlands, while small procurement and extraction stations are found in upland areas.

Within central and eastern Pennsylvania, diagnostic artifacts of the Late Archaic period include Laurentian point types (Kinsey 1972:403-408; Ritchie 1965), such as Otter Creek, Vosburg, and Brewerton, as well as narrow-stemmed Piedmont point types (Kinsey 1972:418-417), including Poplar Island, Lackawaxen, Normanskill, and Lamoka. Subsequent Terminal Archaic projectiles include the Susquehanna and Perkiomen Broadspear, as well as Orient Fishtail points. Custer (1983) suggests that broad blade projectile points found in the neighboring regions may also represent knives. There is also an increase in the use of non-projectile point flaked stone technologies, including expedient flake tool and non-lithic tool types.

Non-diagnostic flaked stone artifacts at Late Archaic sites are dominated by unfinished bifaces and bifacial tools, expedient flake scrapers, drills, perforators, and utilized flakes. Additionally, the variety of groundstone implements in Late Archaic artifact assemblages increases, consisting of adzes, celts, gouges, and axes. The appearance of steatite vessels characterizes the latter part of the Late Archaic. As exchange networks increase in complexity during the Late Archaic, the importance of artifacts of rhyolite, argillite and steatite increased (Custer 1988; Dent 1995:202; Kent et al. 1971; Stewart 1987).

Within the nearby watersheds, Late Archaic components have been identified at 52 previously recorded sites. Of these 52, 13 sites occur near Site 36LU301, all in floodplain or terrace settings (PHMC/BHP 2010).

GAI's 2008 Phase Ib survey of the Bell Bend project area recovered one diagnostic Middle to Late Archaic Piney Island point (IF 4), in a cultivated field on an upland flat 0.9 kilometers (0.5 miles) east of Site 36LU3U01 (Munford et al, 2010). In addition, one Late Archaic Brewerton

eared-notched point (IF 11) was found in a cultivated field bordering the east edge of North Market Street, opposite (northeast of) the site.

Phase Ib and Phase II testing of Site 36LU301 yielded no diagnostic Late Archaic artifacts or features.

Early Woodland (3000-2100 B.P.)

The Woodland period is better known in Pennsylvania than the preceding cultural periods. The major diagnostic traits traditionally cited for the Woodland period include burial ceremonialism, an increased reliance on horticulture, and extensive use of fired clay ceramics. Although the subsistence base was primarily composed of resources collected by the traditional patterns of hunting and gathering that persisted from the Archaic period, horticulture gradually assumed greater importance. This led to a subtle change in settlement patterns toward a more sedentary lifeway. Settlements focused on the most predictable resources and the areas with highest productivity. Semi-sedentary, very large base camps are situated in the floodplains of major drainages.

The emergence of the Adena cultural complex in the central Ohio Valley influenced groups as far east as New York and New Jersey and directly involved populations within the Susquehanna River watershed (Raber 1985). Beginning in the latter portion of the Early Woodland, Native Americans of the Adena and Meadowood cultures built burial mounds and other ceremonial facilities along the Ohio River and mid-Atlantic coast (Adena), as well as along the upper portion of the Susquehanna Valley in New York (Meadowood) (MacDonald 2006).

Early Woodland sites in the greater Susquehanna Valley, including the Memorial Park Site on the West Branch in Lock Haven, reveal evidence of early domestication of squash, chenopod, maygrass, sumpweed, and sunflower (Hart 1995a). Ethnobotanical remains from various Early Woodland sites suggest that, while domesticates were introduced, they were dominated by the use of widely available wild plant foods (Adovasio and Johnson 1981; Ballweber 1989; Ritchie 1980).

Ceramics generally function as cultural markers during the Woodland period. The general trend of Early Woodland pottery in central Pennsylvania and the greater Susquehanna River Valley was toward the production of coarse, crushed rock-tempered, and thick-walled conoidal vessels with cordmarked surface treatment. Marcey Creek, Juniata Thick, and Vinette I wares are characteristic of this region (Custer 1996). Stylistic changes are observable in these wares as Early Woodland potters replaced steatite temper with various forms of grit or crushed rock, including quartz, chert, and other minerals, and flat-bottomed vessels were replaced by conoidal-shaped ones (Custer 1996; MacDonald 2006).

Diagnostic lithic artifacts for the Early Woodland period in the greater Susquehanna Valley region include Cresap stemmed, Adena stemmed, Meadowood points (Ritchie 1980:181), and Robbins stemmed points (Justice 1987). Non-diagnostic stone tool assemblages include drills, perforators, scrapers, and utilized flakes. Additional artifacts associated with the Adena are tubular open-end and blocked-end pipes, copper beads and bracelets, cut mica, and groundstone gorgets and celts. Domestic (both Adena and non-Adena) sites typically yield groundstone tools, such as mortars, pestles, metates, manos, and pitted cobbles, while mortuary sites may contain ground slate objects, such as pendants, gorgets, and effigy pipes, as well as jewelry, projectile points, and blade/biface caches produced from exotic lithic raw materials (MacDonald 2006).

Previous investigations have recorded 31 sites with Early Woodland components in the Central Susquehanna Watersheds B and D (PHMC/BHP 2010). However, only nine recorded sites containing Early Woodland components are located in the vicinity of Site 36LU301. As with the earlier time periods all of these sites were found in floodplain or low terrace settings.

The current study recovered one diagnostic Early Woodland specimen, a Cresap-like point, from Site 36LU301. In addition, based on the results of radiocarbon analysis two prehistoric thermal features (hearths) identified at the site were dated to the Early Woodland period. Feature 153 produced a radiocarbon date of 2780+/-40 B.P. (Beta-309436) and Feature 154 yielded a date of 2760+/-30 B.P. (Beta-309437).

Middle Woodland (2100 B.P.−A.D. 900)

The Middle Woodland period demonstrates a continuation of developments associated with the Late Archaic and Early Woodland periods. The Middle Woodland is characterized by further elaboration in burial ceremonialism, widespread interregional exchange, the increased importance of indigenous cultigens, and perhaps the first use of maize. After the end of Adena-related ceremonialism circa A.D. 250, the Hopewell complex flourished in Ohio and brought cultures in central and western Pennsylvania directly and/or indirectly into its exchange network (Kent et al. 1971). The seasonal hunting and gathering pattern continued, but with a greater emphasis on fishing. Settlement patterns are similar to those described for the Early Woodland. Settlements focused on the most predictable resources and the areas with highest productivity. Semi-sedentary, very large base camps are situated in the floodplains of major drainages.

The diagnostic ceramic types of this period are thick, but more finely grit-tempered wares that exhibit surface finishes of net-marking or cord-marking (e.g., Point Peninsula and Owasco). Associated projectile point forms are a mix of stemmed and notched varieties, including Fox Creek, and Jack's Reef types.

Twenty previously-recorded sites with Middle Woodland components occur in the Central Susquehanna Watersheds B and D. Only four of these previously identified sites are situated near the current study area (PHMC/BHP 2010), all in lowland settings.

Phase Ib and II investigations of Site 36LU301 produced no diagnostic Middle Woodland artifacts or features.

Late Woodland (A.D. 900−1600)

The Late Woodland period in the Upper Susquehanna drainage is characterized by increasing cultural variability and an increase in the use of agriculture to supplement gathered wild food supplies. Although wild food resources remained a major part of the diet during the Late Woodland, data regarding subsistence indicates that maize, domesticated *Chenopodium*, as well as tobacco and sunflower used in the in the Susquehanna basin (Hart 1995b). Wild foods include hickory, chestnut, hazelnut, walnut, butternut, black walnut, acorn, wild rice, and a variety of mammals, fish, and birds. In consort with the change in subsistence pattern, village nucleation and increasing populations marked settlement patterns. There is evidence of large, circular, fortified multi-seasonal villages in floodplain settings. Social organization became more complex during the Late Woodland, and led to the emergence of tribal societies. The presence of palisaded villages suggests that intergroup relations were characterized by violence and competition, as well as intertribal alliances. Treatment of the dead changes, with ossuary burials identified during the Late Woodland.

The Late Woodland period seems to have experienced a more rapid population growth than the preceding periods. The population increase also corresponds with an increasing use of the

Susquehanna drainage and vicinity. Sixty-five sites yielding Late Woodland components were identified within the Central Susquehanna Watersheds B and D. Of the previously identified sites, ten sites near the current study area yielded Late Woodland components (PHMC/BHP 2010).

The Late Woodland in this region can be divided into three sub-phases: Clemson Island (A.D. 750/900-1250), Stewart (A.D. 1250-1350), and McFate-Quiggle (A.D. 1350-1550/1600) (Graybill 1995). Clemson Island occupations show evidence that houses and large storage features were built, suggesting a fairly sedentary, agricultural community (Hart 1995b). Clemson Island pottery shows an increase in finely-made cordmarkings and punctations on vessel exteriors, an increase in decorated lips, and an increase in finely-crushed quartz, chert, or other grit temper. Some evidence of shell temper is observed in later Clemson Island pottery collections (MacDonald 2006). Ground stone tools increase in quantity due to the need for plant-processing equipment (Graybill 1995). Clemson Island stone tool assemblages consist of expedient tools for daily tasks and a decrease in biface production. Projectile points consist mainly of Levanna and Madison triangles and some Jack's Reef corner-notched. Shenks Ferry sites typically yield only triangle points, which generally decrease in size over time (MacDonald 2006).

The Stewart Phase is believed to have developed locally out of the preceding Clemson Island complex. There is strong evidence for interaction with the down river Shenks Ferry populations and the Owasco-Iroquoian populations to the north (Graybill 1995). The Stewart Phase pottery is dominated low-collared forms of rock-tempered Shenks Ferry Incised and Shenks Ferry Cordmarked. Diagnostic projectiles points continue to be varieties of Levanna and Madison triangles.

The McFate-Quiggle Phase shows a continued focus on large fortified villages in the valleys of major drainages. Their ceramics are characterized by high-collared, shell-tempered varieties that exhibit distinctive incised line patterns (Graybill 1995). Again, diagnostic projectile points are primarily varieties of Madison triangular forms.

No Late Woodland diagnostic artifacts were recovered during Phase Ib and Phase II investigations of Site 36LU301.

Protohistoric/Contact (A.D. 1600−1750)

In the Susquehanna River Valley south of the site vicinity, the Susquehanna River divides into its North and West Branches. The region is known for its rich soils, particularly near the mouths of principal tributaries, and former heavy timber coverage. Its mountains were originally a barrier to travel and settlement was initially slow; yet the timber and iron ore extracted from the mountains provided a source for industrial prosperity and growth.

The Andastes or Susquehannocks were known to have occupied the Susquehanna Valley as early as the year 1620. They are believed to have migrated southward from populations living in what is now New York State. Initial occupations appear to be represented by dispersed hamlets in the upper Susquehanna Valley, but later habitation established a series of fortified villages along the Lower Susquehanna River Valley (Custer 1996). Archaeological and ethnohistorical evidence indicates that this new group of people in the Susquehanna Valley brought with them a social organization that was different from the preceding populations. One sign of this is the introduction of Iroquois-style longhouses in the villages. The Susquehannocks became the dominate group in the central Mid-Atlantic region, and a vast array of trade goods has been found at sites during this period. The Susquehannocks occupied the Susquehanna Valley into the middle of the seventeenth century. By the

beginning of the eighteenth century, they had already been removed as the dominate power in the region, and the native populations throughout the Mid-Atlantic were fragmented and dispersed due to increasing European settlement and control.

Initially, after the demise of the Susquehannocks, many different Indian groups migrated to Eastern Pennsylvania due to the more tolerant treatment by William Penn (Custer 1996). However, increasing pressure made those settlements unsustainable, and many groups began to form alliances with the Iroquois Nation, which seemed to have a strong influence on the region. During the last quarter of the seventeenth century and the first half of the eighteenth century, members of the Algonquin (Lenapi and Shawnee), Iroquois (Haudenosaunee), and Siouan (Tutelow and Catawa) tribes lived near the fork of the Susquehanna River. The Algonquins and Siouans, after being conquered by the Haudenosaunee, were absorbed into the Six Nations alliance of tribes. The Oneida Chief Shikellamy, a leader among the Six Nations, established his seat of power near what is now Milton. In 1741, he moved his headquarters to Shamokin, a Lenapi village in Northumberland County at the fork of the Susquehanna. From that location it was possible to travel up the North Branch to Lake Otsego, a short distance from Onondaga, New York, the center of government for the Six Nations. Additionally, the West Branch of the Susquehanna provided access to the upper Ohio Valley, and the Chesapeake Bay could be reached simply by traveling downstream along the main stem of the Susquehanna River. Nevertheless, most of the inhabitants of Shamokin moved westward to the Ohio lands following the death of Shikellamy in 1748 (Godcharles 1944:229-232).

Of the previously recorded archaeological sites in the general vicinity of the current study area just one site contained a Protohistoric/Contact era component (PHMC/BHP 2010). That site, located on the east side of the North Branch Susquehanna River, was identified as a cemetery.

Phase Ib and Phase II investigations of Site 36LU301 produced no diagnostic artifacts or cultural features dating to the Protohistoric/Contact period.

Euroamerican History

The study area is located in Salem Township in western Luzerne County, east of the city of Berwick. The Susquehanna River flows east and south of the study area and forms the southern boundary of Salem Township. This region is predominately rural and agrarian in nature with Wapwallopen, and Beach Haven being the principal areas. While the study area was historically agricultural in nature, it was also impacted by mining of the large anthracite coal field in the Wyoming Valley to the north.

Euroamerican Settlement (1750−1840)

Although William Penn was granted the Charter of Pennsylvania containing the present boundaries of Pennsylvania in 1681, the region remained largely unsettled by English colonists until the latter half of the eighteenth century (Archambault 1924:277). In the 1730s, Conrad Weiser, a noted Pennsylvanian German, travelled throughout the area that would become Luzerne County and noted the presence of Shawnee villages along the banks of the Susquehanna River (Pearce 1866:32). In approximately 1754, hostilities between Britain and France erupted into the Seven Years' War or the French and Indian War. Most of the Shawnee and Lenape who were living in the Susquehanna River drainage allied themselves with the French during the conflict (Pearce 1866:40). After the Treaty of Paris in 1763, hostilities with the French ended. Delaware Chief Teedyuscung and other Native American leaders entered into council, and made peace with the English and settlement of the

Pennsylvania frontier was open to American colonists (Pearce 1866:40-51). Shortly after the arrival of the settlers, Chief Teedyuscun perished in a suspicious fire, which triggered more hostilities of the Native American populations, and attacks were led against settlers throughout the western frontiers of Pennsylvania.

Settlement of the region progressed slowly during the 1770s. In 1774, the region that includes Luzerne, Wyoming, Susquehanna, Bradford, and a portion of Wayne Counties had a population of 1,922 (Pearce 1866:178). In a town meeting held in Wilkes-Barre on August 1, 1775, settlers resolved to join the American colonists in their fight against Britain. Hasty forts were constructed throughout the region (Pearce 1866:121).

In 1786, Luzerne County (encompassing present day Lackawanna, Wyoming, Susquehanna, and Bradford Counties) was created from part of Northumberland County. The county was named in honor Chevalier Caesar Anne de la Luzerne, who served as the French minister to the United States from 1779 to 1783.

In 1780, Sebastian Seybert settled at the mouth of Seybert's Creek a mile west of Beach Haven and operated a gristmill and sawmill, as well as a distillery and clothiery (Bradsby 1893:643-644). In 1788, Mr. Walker constructed a gristmill on a small creek emptying into the Susquehanna a short distance upstream from Beach Haven. Prior to the construction of these mills, settlers in Salem Township shipped their grain via rafts up the Susquehanna to a mill located in Nanticoke.

The early settlers cleared their land, constructed houses, and raised a variety of crops and livestock for personal consumption. These farmers typically relied on storing less perishable items such as wheat, whisky, and salted pork (PHMC/BHP 2005b:15). Extra farm produce was traded locally for other needed goods and services. Their houses and barns were small, one-story, one or two room log structures. By 1840, new buildings (consisting of the two-story, "four-over-four" houses and banked barns) were built in the region (PHMC/BHP 2005b:159-165).

Agricultural development and settlement increased within the region, helped by improved transportation infrastructure, which made it easier to transport goods to more distant markets. The Lehigh-Nescopeck Highway was completed in 1790 to ease the burden of this travel, and allow a more efficient influx of goods in and out of the region. The decade between 1790 and 1800 witnessed a rapid increase in settlement largely due to transportation improvements. The population of Luzerne County rose from 2,000 to almost 13,000 during this decade.

After 1807, construction on the Susquehanna and Tioga Turnpike Road began in Berwick and proceeded north until it reached Elmira, New York in 1825. A ferry was opened to connect Nescopeck with Berwick and Beach Haven to the east. A bridge constructed across the Susquehanna River in 1816 connected Nescopeck to Berwick and also connected the Susquehanna and Lehigh Turnpike to the Tioga and Susquehanna Turnpike, providing easier access to other communities (Bradsby 1893: 612). A stage coach stop was established at Berwick to handle transportation needs of those passing through the area (Nescopeck Centennial Committee 1996: 34). These early roadways contributed to the economic growth and development of the area and, with a short connection from Lehigh to Philadelphia, the route provided the shortest distance from Philadelphia to Elmira, New York.

Construction of the North Branch Canal began in Berwick in 1828. The initial section of the canal extended 55 miles from Northumberland, at the fork of the North and West Branch of the Susquehanna River, to Nanticoke Falls, and was completed in 1831. The canal's primary purpose was to transport the anthracite coal extracted in the Wyoming Valley to the main

Pennsylvania canal system for transportation to other markets (Shank 1991:51). The canal spurred a general economic boom by providing an efficient means of transporting goods in and out of the region.

Economic Development (1840−1900)

Farmers within the study area most likely relied on the North Branch Canal and the Susquehanna and Tioga Turnpike for the transportation of their goods to market until railroad lines were constructed in the area. In 1846 the completion of the Lehigh and Susquehanna Railroad, which connected the anthracite fields of the Wyoming Valley to the Lehigh River, proved to be a quicker and more efficient means of transportation. By 1856, the Lackawanna and Bloomsburg Railroad connected Scranton to Northumberland. Construction of this line began in 1854 and, by 1858, had reached Berwick. While the railroads became the preferred means of transportation for coal, agricultural products, and other supplies, the North Branch of the Pennsylvania Canal continued to be used in a limited capacity.

Following the Civil War, the Pennsylvania Railroad constructed a series of short routes in the region that connected to other anthracite-hauling routes to the northeast. The line that traversed through this area, also known as the North and West Branch Railroad, operated between Catawissa and the rich anthracite region of Wilkes-Barre. In 1873, the Delaware, Lackawanna, and Western Railroad took over the rails of the Lackawanna and Bloomsburg railroad, and added this spur to their larger system (Berwick Bicentennial Committee 1976:4). The Delaware, Lackawanna, and Western Railroad had earlier become the first anthracite region railroad that ran trains directly from the anthracite fields of the Wyoming Valley to New York Harbor. Many of the railroad corporations began purchasing coal land holdings after the Civil War, and by the turn of the nineteenth century railroads controlled 96 percent of the anthracite fields (Duncan and Sams 2002:18). By the 1880s, the more efficient railroad systems in the area had made the North Branch of the Pennsylvania Canal obsolete as a major transportation route.

The local region was located outside of the anthracite fields so farming continued in the rural areas within Luzerne County. The county witnessed a steady increase in the production of corn, sweet potatoes, and honey and beeswax in the latter half of the nineteenth century. Corn production rose from 290,122 bushels in 1849 to 478,648 bushels in 1879. Farmers of Luzerne County continued to grow oats, potatoes, wheat, rye, and buckwheat crops but not to the same extent as corn.

During the same period, the number of working oxen, other cattle, and sheep in Luzerne County steadily decreased. The number of working oxen in the county fell from 2,347 in 1850 to 358. The number of cattle and sheep also declined during the same period while dairy production and butter seemed to fluctuate.

The overall decline in agricultural production in Luzerne County was most likely due to the growing anthracite industry in the region attracting farmers from the fields to the mines or mining towns. In the late 1800s, many county residents became employed in the coal mines, as well as in other burgeoning industry related jobs. There were fewer families making a living farming; however, the project area was still largely rural and farmed in the late nineteenth to mid twentieth century. Local farmers continued to practice a diversified mix of production and sold their produce to markets in mining communities using transportation routes established earlier (PHMC/BHP 2005b:152).

As shown in Figure 8, in 1873 the general site vicinity consisted of scattered residences and farmsteads located in proximity to roads, railroads and waterways (Beers 1873). A residence

identified as “S. Hill” is depicted inside the sharp bend in North Market Street in the location of the current Michaels farmstead and another residence is shown to the northeast, opposite North Market Street, in the location of Site 36LU286 (the Kisner Farmstead), investigated during GAI’s previous Phase II study of the Bell Bend project area. No structures are mapped in the field to the north of the current Michaels Farmstead.

The economic development and population within the study area continued to grow. By 1892, Beach Haven contained a post office, railroad station, two hotels, two general stores, two groceries, a brick yard, a blacksmith, and a shoemaker. The village boasted 300 residents (Bradsby 1893:647).

Economic Development in the Twentieth Century

At the end of the nineteenth century, labor unrest and union activity grew among Luzerne County’s miners. Tension over poor working conditions and pay escalated in the county, and eventually culminated in the Lattimer Massacre in September of 1897; during this tragedy, a Sheriff posse opened fire on miners killing 16 and wounding 38. Then, in 1902, 140,000 United Mine Workers went on strike that was finally settled with President Theodore Roosevelt’s assistance. After the strike, production of anthracite coal increased dramatically. By 1914, 181,000 people were employed in northeastern Pennsylvania’s anthracite mines.

Anthracite coal was commonly used in industrial production, such as steel mills, rather than home use. Two world wars created heavy demand for anthracite coal. The industrial demands created by World War I spurred a boom in anthracite production in 1917, with a national output of 99.7 million tons. After the war, production rapidly declined (Luzerne County 2006). The industrial needs of World War II created another demand for anthracite coal, and in 1944 63.7 million tons of anthracite coal was used. However, after the war, the use and mining of anthracite coal again sharply declined.

On January 22, 1959, tragedy struck the anthracite mining community. The Knox Mine Disaster occurred near the small town of Port Griffith, between Scranton and Wilkes-Barre. The company’s mines under the Susquehanna River collapsed, sending 10.37 billion gallons of water into mines. Other mines were shut down as mining companies feared that a similar accident might occur at their mines. This tragedy essentially ended the underground anthracite mining in the area, costing the county 7,500 jobs (Luzerne County 2006).

Hurricane Agnes struck the region in 1972. The storm dropped 18 inches of rain on an already saturated Luzerne County. The Susquehanna River rose 40.9 feet in some areas, and as the flood subsided 25,000 homes had been nearly destroyed and six people had lost their lives. The total cost of the estimated damage was set at $1 billion (Luzerne County 2006).

In 1975, Pennsylvania Power and Light Company purchased property for the Susquehanna electric steam plant. The construction of the nuclear power plant resulted in the relocation of families within the current APE. Most of these families relocated to nearby Berwick in Columbia County (Berwick Bicentennial Committee 1976:6).

The area in the immediate vicinity of Site 36LU301 remained largely agricultural through the twentieth century. Aerial photography of the area from 1939 (Figure 9) shows the Michaels Farmstead (residence and outbuildings) and indicates the presence of large cultivated fields to the north of the farmstead in the area of the Site 36LU301. No structures are depicted within the cultivated field. Aerial photographs dating to 1959 and 1969 show no changes in land use within the site area.

Figure 8. Site 36LU301 Vicinity in 1873

REDACTED Figure 8
Site 36LU301 Vicinity in 1873

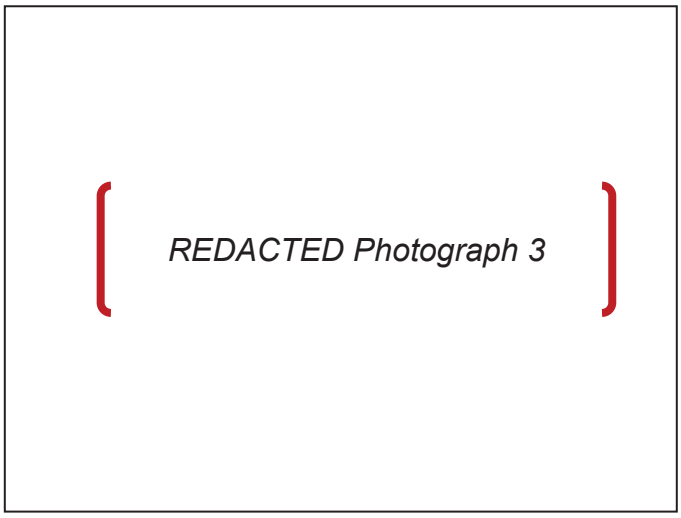
Figure 9. Site 36LU301 Vicinity in 1939

REDACTED Figure 9
Site 36LU301 Vicinity in 1939

Chapter 4. Phase Ib Summary

Phase Ib Methods and Results

Site 36LU301 was identified in May 2010, during GAI's Second Supplemental Phase Ib survey of the Bell Bend project area (Munford 2010). The site was encountered in the southern portion of a large cultivated field (Lot 41, Section 1) and the adjacent farmyard (Lot 41, Section 2) at the western edge of the study area (see Figure 4). Field investigations included pedestrian ground survey and judgmental shovel testing in the cultivated field and systematic shovel testing in the farmyard. Because cultural resources in this upland setting were anticipated to be near surface in nature, shovel tests were excavated to a maximum depth of 50 cm below ground surface. GAI conducted pedestrian survey of the field along transects spaced at 5-meter (16-foot) intervals (Photograph 3). Observed surface artifacts were marked with pin flags. Due to the dispersed nature of the artifact scatter, surface artifacts were plotted on a site map and recorded individually, rather than being collected within a surface collection block (as proposed in the scope of work). Twelve judgmental shovel tests were excavated in dispersed localities within the field to document stratigraphy and the depth of cultural deposits, with four of these (STPs 3, 10, 11, and 12) occurring within the site boundary (see Figure 4). All four of these shovel tests were negative. The farmyard south of the field was subject to systematic shovel testing along transects spaced at 15-meter (49-foot) intervals (see Figure 4). Of the 21 systematic shovel tests excavated in the farmyard, only one STP (STP A2) produced a prehistoric artifact; one additional STP (STP E1) contained an historic specimen.



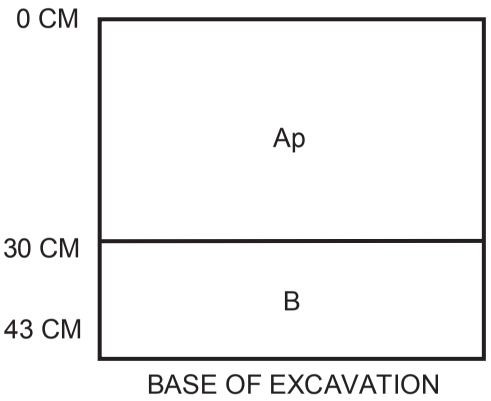
Photograph 3. Site 36LU301: Pedestrian Ground Survey of Cultivated Field (Lot 41, Section 1), Facing South

Phase Ib investigations yielded a dispersed low-density surface scatter of 14 prehistoric lithics, as well as a scatter of 21 historic specimens, across the southern end of the field. Systematic shovel testing within the farmyard yielded one additional prehistoric artifact from a single positive STP (STP A-2, A horizon), located at the northwestern edge of the yard (see Figure 4). Radial shovel tests excavated around this initial findspot produced no additional artifacts. Based on the results of Phase Ib survey, the site had dimensions of 80 x 200 meters (262x656 feet).

Shovel testing revealed an Ap-B soil horizon sequence within the cultivated field (Lot 41, Section 1). As described for STP 10 the profile consisted of a 30-cm-thick dark yellowish-brown silt loam plowzone above a brownish-yellow silty clay B horizon (Figure 10). Shovel testing in the farmyard (Lot 41, Section 2) exposed an A-B soil horizon sequence. The profile of STP A-2 included a 30-cm-thick brown silt loam A horizon and a yellowish-brown clay loam B horizon (see Figure 10).

SITE 36LU301

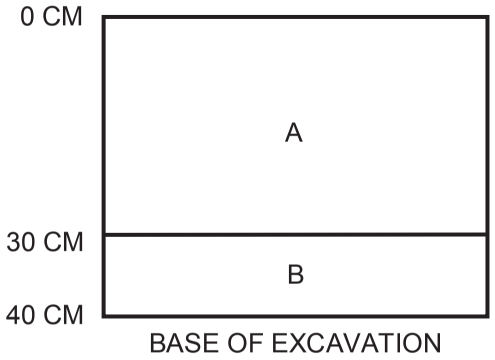
STP J-10



Ap – DARK YELLOWISH BROWN (10YR 4/4) SILT LOAM

B – YELLOWISH BROWN (10YR 5/6) SILTY CLAY

STP A-2



A –BROWN (10YR 4/3) SILT LOAM

B – YELLOWISH BROWN (10YR 5/6) CLAY LOAM

FIGURE 10
SITE 36LU301: REPRESENTATIVE PHASE Ib STP PROFILES
(STPs J-10 AND A-2)

SCALE

1 INCH = 25 CM

gai consultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRWN: LMD DATE: 12/9/2011
CHECKED: BAM APPROVED:BAM

All but one of the prehistoric artifacts were found on the surface of the cultivated field; the single prehistoric lithic recovered during shovel testing occurred in an A horizon. No cultural features were identified.

Phase Ib Artifact Analysis

Phase Ib investigations of Site 36LU301 yielded 14 prehistoric lithic artifacts and 21 historic artifacts. The prehistoric lithic artifacts consisted of 5 bifaces, 7 debitage and 2 cobble tools (hammerstones/pecking stones). The very high tool to debitage ratio exhibited by the assemblage (1:1) suggested that lithic reduction activities were not the primary activity at the site. Lithic analysis identified four raw material types in the assemblage, including locally-available Onondaga chert and Shriver/Helderberg chert, as well as argillite and sandstone (Table 1). Sandstone was used exclusively for the two cobble tools. Among the flaked stone assemblage, Shriver/Helderberg chert was the most common raw material, accounting for six artifacts, including three of the five bifaces.

Table 1. Site 36LU301: Phase Ib, Crosstabulation of Artifact Type by Lithic Raw Material

Lithic Raw Material	Biface	Cobble Tool	Debitage	Total	%
Argillite	1		3	4	28.6%
Onondaga chert	1		1	2	14.3%
Sandstone		2		2	14.3%
Shriver/Helderberg chert	3		3	6	42.9%
TOTAL	**5**	**2**	**7**	**14**	**100.0%**

An analysis of cortical surfaces indicated that Shriver/Helderberg artifacts included one specimen with block cortex and one specimen with cobble cortex. This suggests both primary and secondary sources for this raw material. One argillite debitage also retained cortex, which was indeterminate as to type.

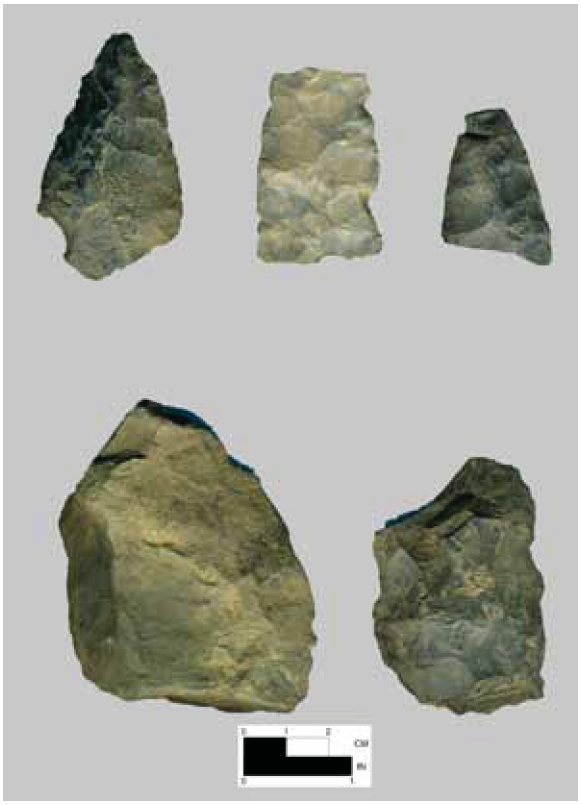
The sample of five bifaces included two projectile points, one late-stage biface, one middle-stage biface and one early stage specimen (Table 2, Photograph 4). Both projectile points (FS 2 and 18) are made from Shriver/Helderberg chert. FS 2 represents a possible Early/Middle Archaic MacCorkle-like specimen; due to a broken basal lobe, this point cannot be conclusively identified as to type. FS 10 is an untyped medial fragment of a projectile point. This broken specimen exhibits a diagonal snap at its proximal end and a possible impact snap with a hinge fracture at its distal end.

Table 2. Site 36LU301: Phase Ib, Summary of Lithic Tools

FS#	Soil Horizon	Wt (g)	Lithic Raw Material	Artifact Type	Cortex	Condition	L (mm)	W (mm)	Th (mm)	Comments*
2	surface	16.21	Shriver/Helderberg	Projectile Point	Absent	broken	58.4	35.5	7.9	Possible EA/MA MacCorkle-like
10	surface	7.31	Shriver/Helderberg	Projectile Point	Absent	medial		25	7.8	Untyped
18	surface	10.56	Onondaga	Late-Stage Biface	Absent	medial		29.3	6	
4	surface	37.2	Shriver/Helderberg	Middle-Stage Biface	Absent	broken		42.2	13.4	
8	surface	117.14	Argillite	Early-Stage Biface	Absent	broken		60.3	19.7	Utilized
6	surface	670.13	Sandstone	Hammerstone		whole	89.5	83	67.7	Utilized
7	surface	617.29	Sandstone	Hammerstone		whole	85.7	84.8	61.3	Utilized

*EA=Early Archaic; MA=Middle Archaic

The remaining three bifaces (one early-stage biface, one middle-stage biface and one late-stage biface) are non-diagnostic tool fragments made from Shriver/Helderberg chert, Onondaga chert and argillite. The single early-stage biface (FS 8) exhibits usewear along one flaked margin, suggesting that after being broken early in the manufacturing process it was used for various cutting or scraping tasks.



Photograph 4. Site 36LU301: Phase Ib Bifaces

Top—Possible Early/Middle Archaic MacCorkle-like Projectile Point (FS 2), Late Stage Biface (FS 18), Untyped Projectile Point (FS 10); Bottom—Early Stage Biface (FS 8), Middle Stage Biface (FS 4)

The two cobble tools (FS 6 and FS 7) are both hammerstones/pecking stones made from sandstone cobbles (see Table 2, Photograph 5). These cobble tools were both recovered from the northwest corner of the site, approximately 40 meters (131 feet) apart. Such tools could have been used for a variety of percussive tasks, such as flaked stone tool manufacture, initial shaping of ground stone tools, or food processing.

Photograph 5. Site 36LU301: Hammerstones (FS 6 and FS 7)

Flake type analysis of the debitage sample identified two biface reduction flakes, two decortication flakes and three flake fragments. Although results may be skewed by the small sample size, based on this flake type distribution, prehistoric occupants likely conducted limited early and late stage lithic reduction at Site 36LU301.

A low-density dispersed scatter of 21 historic artifacts was also recovered within the boundaries of prehistoric Site 36LU301; additional historic artifacts were found in the field outside the site boundaries. The sample of 21 historic artifacts consists predominantly of kitchen-related specimens (86 percent) with a low frequency of architectural debris and activities-related artifacts (Table 3). These artifacts include 14 historic ceramics (9 redware, 4 whiteware and 1 ironstone), 4 bottle/container glass fragments, 1 brick, 1 window glass and 1 toy car. The assemblage includes eight temporally diagnostic specimens (olive bottle glass, plain whiteware, spongeware whiteware, and plain ironstone). Of these, only one spongeware whiteware sherd (1830-1871) dates to the mid- to late-nineteenth century; date ranges for the remaining temporally diagnostic artifacts extend to the present.

No structural remains were identified within the site boundary during fieldwork and historic map review revealed no structures within area of the cultivated field, north of the Michaels Farm. Based on Phase Ib results, this sample of historic artifacts was concluded to represent field scatter associated with cultivation of this property; they do not constitute an historic period archaeological site.

Table 3 Site 36LU301: Phase Ib Historic Artifact Pattern Analysis

Class	Sub-Class	Ware Type/Object	Total	%
Activities	**Toys**	**Car**	**1**	**4.76%**
Architecture	Brick, Block	brick fragment	1	4.76%
	Window Glass	window glass	1	4.76%
		Architecture Total	**2**	**9.52%**
Kitchen	Bottles/Jars	wine bottle	3	14.29%
		container glass	1	4.76%
	Ceramics	ironstone, plain	1	4.76%
		redware	9	42.85%
		whiteware, plain	3	14.29%
		whiteware, spongeware	1	4.76%
		Kitchen Total	**18**	**85.71%**
		TOTAL	**21**	**100.00%**

Based on the results of Phase Ib investigations, GAI concluded that Site 36LU301 had a potential to yield diagnostic prehistoric artifacts and cultural features that could contribute important information on the prehistoric use of this upland setting. GAI recommended that Site 36LU301 was potentially eligible for listing in the NRHP and recommended either site avoidance by proposed construction or Phase II testing to evaluate its NRHP eligibility. PHMC-BHP reviewed these results as presented in GAI's Second Supplemental Phase Ib Addendum Report (Munford 2010) and concurred with the recommendations in a May 20, 2011 review letter (see Appendix A).

Chapter 5. Phase II Research Design

Because site avoidance through project design was not feasible, PPL requested that GAI conduct a Phase II National Register Site Evaluation of Site 36LU301 to evaluate its eligibility for listing in the NRHP. Specific objectives of the study included the following:

(1) Determine the horizontal and vertical limits of the site in the APE;

(2) Interpret the site's cultural affiliations, functions and significance;

(3) Evaluate site integrity;

(4) Conclusively determine the site's eligibility for listing on the NRHP;

(5) Define the need for further archaeological work.

The *National Register Bulletin No. 15-How to Apply the National Register of Criteria for Evaluation* (NPS 1997) provides standards that a site must meet to be considered eligible to the NRHP. The researcher must first be able to establish an historic context for the site, relating it to a specific cultural group or particular time period, and secondly, document that the site retains integrity.

To establish the historic context of a site, archaeologists must determine the period of occupation or cultural affiliation, typically accomplished via analysis of diagnostic artifacts (e.g., projectile points, bottle glass manufacturing method, ceramic type and decoration method), or by the identification of features which may provide a means to date the site occupation (e.g., large sample of diagnostic historic period artifacts or radiocarbon dating of charcoal from prehistoric hearths). For historic sites, context can be established by means of historic map research and chain-of-title and deed research. If the age of a site cannot be established, the site cannot be placed within a broad historic context and likely will not be eligible to the NRHP.

If the site provides data regarding its period of occupation, it must also be shown to be significant under one of the four National Register Criteria: A) association with historic events; B) association with historic individuals; C) distinctive design/construction; or D) information potential. Archaeological sites generally cannot be linked to historic events (Criterion A) or historic individuals (Criterion B), nor can they be evaluated based on their distinctive design/construction (Criterion C). Thus, most historic and prehistoric sites are evaluated for NRHP eligibility under Criterion D, the potential to contribute important information on the prehistory or history of the region. Site 36LU301 was evaluated for its NRHP eligibility under Criterion D.

An archaeological site must also retain integrity to qualify as NRHP-eligible. For archaeological sites, integrity is a quality that typically reflects whether or not the site's physical components have been disturbed since their original deposition. If the disturbance has been substantial, resulting in a significant loss of integrity, the site is likely to be not eligible to the NRHP. However, if a site was not disturbed, or only minimally disturbed to the extent that the disturbance has not affected the qualities that render it NRHP eligible, then the site can still be considered eligible to the National Register.

Chapter 6. Phase II Methods

Field Methods

At the request of PPL, GAI performed a Phase II National Register site evaluation of Site 36LU301. Phase II investigations were conducted in accordance with GAI's Phase II Scope of Work (May 13, 2011) as approved by the PHMC-BHP (May 26, 2011) (see Appendix A). The study included field excavations and laboratory analysis. Phase II fieldwork was conducted between June 24 and July 27, 2011.

Prior to the start of Phase II investigations, the previously cultivated field within the site area was plowed and disked and was rain washed in order to provide good ground surface visibility. Following site preparation, GAI surveyors established a grid across the site using a total station [electric theodolite (transit) with integrated electronic distance meter]. The grid was referenced in space using GPS points (to sub meter accuracy). The survey grid covered an area measuring 140x220 meters (459x722 feet) (see Figure 3). A site datum was established and designated with arbitrary north and east coordinates. Stakes were placed at 20-meter (65.6-foot) intervals along north/south and east/west baselines at the edges of the site and throughout the portion of the site in the cultivated field. Ground surface elevations were recorded at these stakes. Subsequent excavations were designated by their coordinates within this grid system.

Phase II fieldwork included controlled surface collection (CSC) followed by judgmental and close-interval shovel testing, test unit excavation, plowzone stripping (mechanical trenches), and feature sampling. Due to the need for mechanical plowzone stripping, the Luzerne Conservation District required preparation and implementation of an Erosion and Sedimentation Control (E&S) Plan for the site (Appendix G). In accordance with this plan, GAI installed silt fencing along the southern and western edges of the cultivated field before the start of plowzone stripping and removed this fencing following the completion of fieldwork.

Surface Collection

Phase II fieldwork began with a controlled surface collection (CSC) of the plowed and disked field. The site was gridded into 5x5-meter (16.4x16.4 foot) surface collection blocks (see Figure 3). GAI archaeologists examined the ground surface within each block and observed artifacts were collected, bagged, and provenienced according to the southwest corner grid coordinates of the collection block. A total of 1,009 surface collection blocks were examined during the CSC, for a total of 25,225 square meters (271,520 square feet). Surface collection results were plotted on a site map, documented on standard GAI Surface Collection Forms, and used to guide the placement of subsequent shovel tests and test units.

Shovel Testing

GAI excavated 84 shovel test pits (STPs) within the site area during the Phase II study. Based, in part, on the results of the surface collection, 64 judgmental shovel test pits (STPs) were excavated in select localities within the cultivated field to further investigate areas of surface artifact recovery, document soil stratigraphy, and assess the presence of subplowzone cultural deposits (see Figure 3). Radial shovel tests were excavated at 5-meter (16-foot) intervals around initial positive findspots in an area outside of the recent plowing and disking at the northern edge of the site, where surface visibility was poor.

Close-interval (5-meter/16-foot) shovel testing was conducted in a small portion of the farmyard south of the field from which prehistoric artifacts were recovered during Phase Ib shovel testing. Twenty STPs were excavated in this lawn area (also used as a field access

road) bounded by North Market Street to the south, the field to the north and west, and a line of evergreen trees to the east (see Figure 3).

Shovel tests measured 50x50-cm (1.6x1.6-feet) and were hand-excavated by natural stratigraphy to a depth of approximately 40 to 50 cm (1.3 to 1.6 feet) below ground surface. Shovel test results were recorded on standard GAI Shovel Test Forms. STPs were backfilled upon completion.

Test Unit Excavation

GAI excavated ten 1x1-meter (3.3x3.3-foot) test units (TUs 1-10) in select areas of the site to sample areas of relatively higher artifact density or possible activity areas, to assess the presence of cultural features, and to evaluate the vertical extent of cultural deposits. Test units were hand-excavated in 10-cm (0.3-foot) levels within natural strata, to a depth of at least 10 cm (0.3 feet) into the subsoil and 10 cm (0.3 feet) below the deepest recovered artifact. Nine of the test units (TUs 1-8 and 10) were excavated in the northwest quadrant of the site and one (TU 9) was placed in the southwest quadrant (see Figure 3). Test units were backfilled upon completion.

TU 1 (N592 E418) and TU 5 (N585 E416) were excavated in the location of two contiguous positive surface collections blocks (yielding one flake and one FCR), in the western portion of the site's northwest quadrant. TU 2 (N603 E426), TU 4 (N608 E426), and TU 7 (N598 E423) were located in the central portion of the northwest quadrant, in the vicinity of positive STP J29, which produced one flake. TU 6 (N602 E444) sampled two contiguous positive surface collection blocks (yielding one flake each), in the western portion of the northwest quadrant. TU 3 (N612 E445), TU 8 (N610 E443), and TU 10 (N617 E445) were located north of TU 6, between positive STPs J29 (*n*=1 flake) and J32 (*n*=2 flakes).

TU 9 (N540 E445) was positioned in the site's lower density southwest quadrant, in the vicinity of a positive surface collection block which produced one FCR.

Plowzone Stripping

Following the completion of hand excavations, GAI conducted mechanical stripping of the plowzone to investigate the presence of cultural features at the top of the subsoil. Seven trenches (Trenches 1-7) were excavated using a rubber-tired backhoe and/or a trackhoe, both with flat-bladed buckets. Due to the near absence of recovered artifacts from the site's eastern portion, these parallel, north/south-oriented trenches were all located in the western half of the site. The trenches measured 2-meters (6.6-feet) wide and varied in length from 95 to 130 meters (312 to 427 feet). Under the guidance of a GAI archaeologist, within each trench the plowzone was removed in increments, to expose the top of the B horizon. Excavated soils were deposited in piles along one side of each trench. GAI archaeologists then hand shovel-scraped the floor of the trench to expose soil anomalies or artifact concentrations representing possible cultural features. Each trench was mapped and photographed. Identified features were documented and sampled (as described below).

Trenches were mechanically backfilled upon completion of investigations. GAI excavated 1,600 square meters (17,222 square feet) during plowzone stripping, representing approximately 7.9 percent of the total site (measuring 20,175 square meters/217,162 square feet).

The trenches extended northward from the south edge of the cultivated field through the site area. Six of the parallel trenches (Trenches 1-6) were placed at 10-meter (33-foot) intervals between E405 and E455; Trench 7 was positioned 25 meters further east at E480. Trenches 1 through 5 extended from between the N505 and N530 gridlines to approximately the

northern edge of the site, ending at the N630 to N640 gridlines. Trenches 1 and 2 measured 110 meters (361 feet) in length while Trenches 3, 4 and 5 were 130 meters (427 feet) long. Trenches 6 and 7 (95 meters/312 feet in length) were both terminated at N600 in order to avoid the rock outcrop (claystone) located in the north-central portion of the site.

Feature Sampling

GAI's initial Phase II Scope of Work assumed investigation of up to five prehistoric features. Following the identification of a large number of possible cultural features during initial plowzone stripping, GAI notified Mr. Brad Wise (PPL) of these unanticipated discoveries. At the request of PPL, GAI consulted with Steve McDougal (PHMC-BHP) to develop an appropriate approach for investigation of these features. In a July 12, 2011 phone conference, Mr. McDougal recommended investigation of a 25 percent sample of various feature types exposed during plowzone stripping. In accordance with PHMC-BHP's recommendations, and subsequent to PPL's approval of supplemental Phase II work, feature sampling was conducted at Site 36LU301.

GAI identified 211 possible cultural features on the surface of the plowzone stripped trenches. [One additional feature (non-cultural Feature 1) was previously exposed and excavated in TU 6 and was not included in sampling process.] GAI grouped these 211 possible cultural features into categories based on initial plan view observations of feature size and morphology. Seven feature categories were defined: small circular/oval stains (Type A); medium circular/oval stains (Type B); large circular stains (Type C); large oval/elongate stains (Type D); oxidized stains (Type OX); irregular stains (Type I); and large, likely historic/modern stains (Type H). Clearly non-cultural anomalies (e.g., obvious root disturbances) and recent agricultural-related anomalies (e.g., multiple, overlapping lines of small circular to rectangular stains) were excluded from investigation. GAI investigated a 25 percent sample of features in each of the seven categories. During Phase II fieldwork, GAI investigated 54 possible cultural features exposed during plowzone stripping, plus one additional feature (Feature 1) identified during test unit excavation, for a total of 55 features.

All 212 possible cultural features were troweled clean, plotted on project maps, photographed, and recorded on a Feature Log. Each sampled feature was bisected along its long axis and the first half of the feature was removed in 10-cm (0.3-foot) arbitrary levels within natural stratigraphy, if present. The feature fill was screened through 0.6-cm (0.25-in) wire mesh and recovered artifacts were bagged according to their provenience. The feature profile was recorded with a measured drawing and photographs. If the results of the bisection confirmed that the feature was non-cultural, investigations were terminated at this stage. If the feature was concluded to be potentially cultural the second half of the feature was excavated as above and flotation samples were collected from the feature fill. The base of the excavated feature was photographed. Sampled features were documented with standardized GAI Feature forms.

Analytical Methods

This section reviews the methods employed during analysis of prehistoric and historic artifacts recovered during GAI's investigations of Site 36LU301. Brief overviews of analytical methods are presented for prehistoric lithics, historic/modern artifacts, and flotation/ethnobotanical remains. Detailed descriptions of prehistoric lithic analysis and historic artifact analysis are provided in Appendices H and I.

Laboratory Processing

Cultural materials collected during field investigations were transported to GAI's Archaeological Laboratory in Homestead, Pennsylvania, for processing and analysis. These materials were processed in accordance with the *Curation Guidelines* of the Pennsylvania Historical and Museum Commission (2005a). Following completion of this project and approval of technical reporting, project materials will be donated to the PHMC-BHP for permanent curation at the State Museum of Pennsylvania.

The initial processing stage consisted of checking artifact bags against the field-generated Field Specimen Log to confirm that all collected materials were present. Artifacts were temporarily placed in numerical order according to Field Specimen Number (FS#), providing a basis for processing, analysis, and curation. Artifacts were then cleaned, generally with water and a soft brush. Metal artifacts and perishable items were cleaned by dry-brushing. Non-cultural materials (i.e., pebbles) included in the artifact samples were recorded and discarded during this stage of processing or in later stages, as they were recognized. Cultural materials were placed on artifact-drying racks to air dry.

When dry, the artifacts within each provenience were sorted into basic artifact classes (i.e., lithics, glass, ceramic) and were re-bagged accordingly in clean, perforated, 4-mil polyethylene bags. Bags were labeled with provenience information using a permanent ink marker. An acid-free paper tag with complete provenience information was also placed inside each artifact bag.

Specimens large enough in size were then labeled with the site number and the appropriate field specimen number (FS#). Labels were written in permanent ink and coated with PVA. After washing and labeling, artifacts were subject to the appropriate laboratory analysis.

Methods of Prehistoric Lithic Analysis

The analytical approach for stone tools and debris employed here can be described as techno-morphological; that is, lithic artifact classes and types were based on key morphological attributes, which are linked to or indicative of particular stone tool production (reduction) strategies (see Appendix H).

Following initial artifact processing, GAI's Lithic Analyst divided lithic artifacts from each provenience into general classes (i.e., debitage, bifaces, fire-cracked rock) and then subdivided them into specific artifact types (i.e., early-stage biface, late-stage biface, projectile point) for that particular class. Artifacts were then examined and appropriate attributes were recorded. The surfaces and edges of artifacts were examined with the unaided eye and with a 10x hand lens, where appropriate, to discern evidence of retouch and/or utilization.

Lithic raw material type was recorded for all artifacts. These lithic raw material types were defined on the basis of macroscopic characteristics, including color, texture, hardness, and inclusions (Luedtke 1992). Where possible using conservative standards and based on the above macroscopic criteria, lithic raw material types were attributed to known geological sources based on published sources (e.g., Stewart 1984) and by reference to GAI's lithic reference collection.

All lithic tools were examined at a detailed analysis level that recorded temporal/stylistic, functional, and technological variables as well as lithic raw material type. These variables included artifact class, artifact type, condition of specimen, presence/type of cortex, weight, and metric dimensions (when complete). Further artifact-specific observations (e.g., heat damage, refit, unique characteristics) were noted where appropriate. Diagnostic projectile points, important in assessing the age of prehistoric components represented at the sites,

were identified though a comparison with standard typologies established for Pennsylvania and the eastern United States (Custer 2001; Fogelman 1988; Dent 1995; Justice 1987; Broyles 1971; Ritchie 1961). Additional variables of point type and temporal affiliation were recorded for diagnostic points.

Lithic debitage was classified using a typology designed to detect differences in lithic reduction practices and early vs. late-stage reduction (e.g., decortication flake, bipolar reduction flake, early reduction flake, biface thinning flake). Other attributes recorded for debitage included raw material, presence and type of cortex (as indicators of primary or secondary geologic source), weight and size grade.

Information recorded during lithic analysis was entered on analysis sheets as a series of codes, unique to each variable. The codes were then entered into Access, a relational database. For the purposes of data analysis and manipulation, this database was subsequently converted to the Excel computer program for data manipulation and table generation.

Methods of Historic/Modern Artifact Analysis

Historic/modern artifacts recovered during Phase II investigations were subjected to identification and analysis using GAI's Historic Coding scheme (see Appendix I). This multivariate classification system codes for significant attributes of various artifact classes. Artifact analysis was focused on the creation of an inventory of artifact classes and types to examine issues of chronology and function for each site containing historic/modern components. A variety of analytical techniques was employed to synthesize artifact data including standard classification typologies developed by South (1977).

Once washed, artifacts were sorted into major material classes including ceramics, glass, and metal. The materials were then subjected to a preliminary analysis, which included a basic description of artifacts by material class, functional group, and relevant attributes. Included among the recorded attributes, where applicable, are type, beginning and end dates of production, form, motif/decoration, color, manufacturing technique, functional group, base, finish, embossment, maker's mark/manufacturer, material, bore diameter, and pattern class and subclass (South 1977:95-96). Artifact dating was based on the identification of maker's marks, diagnostic-manufacturing methods, such as bottle mold seams, bottle pontil marks, ceramic bodies and glazes, and known dates of production.

Coded data, using unique codes for each artifact description, were entered into the Access database. This database was subsequently converted into the Excel computer program for purposes of data manipulation and table generation.

Historic ceramic analysis focused on identifying ware and type categories, decorative attributes, and maker's marks, in order to interpret site chronology. Whenever possible, each provenience was assigned dates based on a Mean Ceramic Dates (MCD) and Terminus Post Quem (TPQ) date. Attributes recorded during the ceramic analysis include count, ware, type, form, motif, colors, percent complete, and functional group for each artifact or group of artifacts. Maker's marks were described in detail and dated, when possible.

Glass artifacts, much like ceramics, were tabulated according to major groups (e.g., bottle glass, window glass, lamp glass, tableware, tumblers) and then separated into functional categories whenever possible. Dating information was based on the identification of diagnostic technological attributes (e.g., mold seams and evidence of snap-case manufacture) in addition to identifiable bottle embossments. Attributes recorded for glass artifacts include manufacturing technique, decoration, finish type, base type, color, and functional group. The

beginning and end dates for datable attributes were determined. As with ceramics sample, maker's marks and embossments were described and dated, when possible.

Other historic/modern artifact classes include architectural debris (e.g., bricks, nails, window glass, etc.), clothing (type and materials identified when possible) and miscellaneous small finds. Where appropriate, attributes such as character, wear, decoration, and material were recorded for these artifacts.

Methods of Flotation Processing

Soil flotation samples were collected from feature fill during excavation in order to recover small specimens that would normally pass through 6-mm (0.25-inch) hardware cloth.

Select flotation samples of feature fill were processed at GAI's Archaeological Laboratory using an *R. J. Dausman Flot-Tech* flotation machine. The Dausman flotation machine is a self-contained, multi-modal system that uses a closed-loop water recirculation system. It allows the user to manually adjust water circulation and flow rates to assist in the separation of light and heavy fractions of flotation samples. This method produces clean, sediment-free, light and heavy fraction feature fill samples. Once processed, the materials were allowed to air dry before being re-bagged according to heavy or light fraction type into clean, 4-mil polyethylene bags. As with artifact processing, these bags were clearly labeled with provenience information using a permanent ink marker and an acid-free tag with complete provenience information placed inside each bag.

Following flotation processing, GAI technicians examined heavy fractions of each sample to collect cultural materials. To insure standardization during flotation sample "picking," each heavy fraction sample was examined for 20 minutes to separate out other cultural materials. Cultural materials identified in the samples were subjected to historic or prehistoric analysis as described above.

Chapter 7. Phase II Results

Phase II testing at Site 36LU301 consisted of controlled surface collection of 1,009 5x5-meter (16.4x16.4-foot) blocks, the excavation of 84 shovel tests and 10 test units, mechanical plowzone stripping (1,600 square meters/17,222 square feet), and sampling of 55 features. This work produced 49 prehistoric artifacts and 143 historic specimens (Tables 4 and 5). In addition, investigation of 55 features (a 25 percent sample of the 212 possible features identified) documented ten cultural features (five prehistoric thermal features, two prehistoric/historic postmolds, one historic trash pit and two historic features of indeterminate function) and 45 non-cultural anomalies.

The meager prehistoric lithic assemblage consisted of 2 bifaces, 24 debitage and 23 pieces of FCR (Table 6). These artifacts included a single diagnostic specimen—an Early Woodland Cresap-like projectile point. The prehistoric lithics occurred in an extremely low density, widely dispersed scatter, across the approximately 5.0-acre (2.0-hectare) site, with approximately 90 percent found in the site's western half. These artifacts were recovered overwhelmingly (83.7 percent, *n*=41) from plow disturbed contexts (surface and Ap horizon) (see Table 6). Seven lithics were recovered from feature fill (including three from prehistoric features, and four from non-cultural or historic features), while a single artifact was found on the plowzone-stripped B horizon surface in Trench 3.

The sample of 143 Phase II historic artifacts consisted largely of ceramics, glass and faunal remains. Approximately two thirds of these artifacts were recovered from the feature fill in a single historic trash pit (Feature 77). The remaining historic artifacts were found in plow disturbed contexts, primarily in a low density scatter across the southeast and eastern portion of the site.

Table 4. Site 36LU301 Phase II: Stratigraphic Distribution of Prehistoric Artifacts by Testing Method

Soil Horizon	Surface Collection	STP	TU	Plowzone Stripping	Feature Sampling	Total	%
Surface	20	--	--	--	--	20	40.8%
Ap	--	7	14	--	--	21	42.9%
B		--	--	1	--	1	2.0%
Feature Fill	--	--	--	--	7	7	14.3%
Total	**20**	**7**	**14**	**--**	**7**	**49**	**100.0%**
%	40.8%	14.3%	28.6%	2.0%	14.3%	100.0%	

Table 5. Site 36LU301 Phase II: Stratigraphic Distribution of Historic Artifacts by Testing Method

Soil Horizon	Surface Collection	STP	TU	Plowzone Stripping	Feature Sampling	Total	%
Surface	17	--	2	--	--	19	13.29%
Ap	--	28	1	--	--	29	20.28%
Feature Fill	--	--	--	--	93	93	65.03%
Disturbed	--	--	--	2	--	2	1.40%
Total	**17**	**28**	**3**	**2**	**93**	**143**	**100.0%**
%	11.89%	19.58%	2.10%	1.40%	65.03%	100.0%	

Table 6. Site 36LU301 Phase II: Stratigraphic Distribution of Prehistoric Artifacts by Artifact Class

Soil Horizon	Biface	Debitage	Fire-Cracked Rock	Total	%
Surface	2	11	7	20	40.8%
Ap	0	6	15	21	42.9%
B	0	1	0	1	2.0%
Feature Fill	0	6	1	7	14.3%
TOTAL	**2**	**24**	**23**	**49**	100.00%

Soils and Geomorphology

As discussed above (Site Setting) Site 36LU301 is located in a glaciated upland flat above Walker Run. The site area is mapped primarily as Chenango gravelly loam (ChA), with an area of Braceville gravelly loam (BrA) along its western edge. Topography across the site is relatively level, with gentle rise of approximately 3 meters (10 feet) towards the northwest. Elevations range from a low of 656 feet at its southern edge to 666 at the northwest corner.

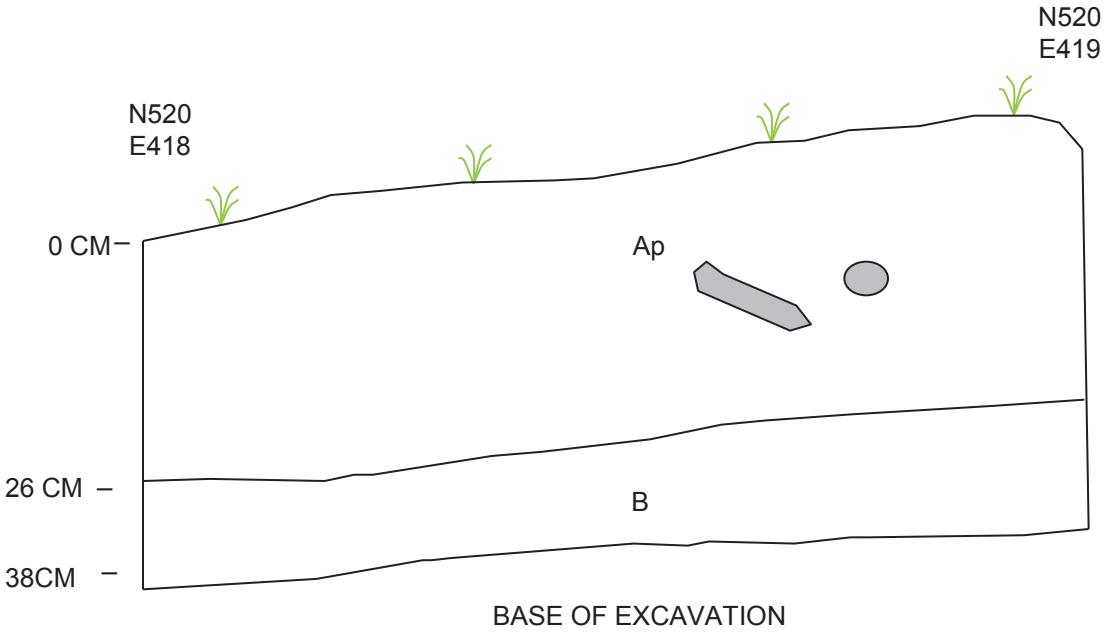
Cobbles, gravels, and channers are common throughout the site area, both on the surface and in the exposed soil profile. An outcrop of claystone is located in the north-central portion of the site and platy fragments of this material occur throughout the site, especially in the western portion in proximity to the outcrop. Phase II plowzone stripping revealed portions of two gravel bars within the site, representing former braided stream channels (see Figure 3). One gravel bar was located in the higher-elevation, northwest quadrant of the site; as defined in Trenches 1 through 5, this gravel bar had a northeast/southwest orientation and widened toward the northeast, expanding from less than 5 meters (16.4 feet) wide in Trench 1 to over 25 meters (82 feet) wide in Trench 5. A portion of a second gravel bar, measuring 25 meters (82 feet) in width, was observed in the southern portion of the site in Trench 7; this gravel bar was not encountered in the trenches directly to its east. However, the southern ends of Trenches 2 and 3, excavated further to the west, both contained a relatively high percentage of cobbles, possibly representing the edges or upper contact of such a gravel bar.

The area of Site 36LU301 has been plowed and Phase II excavations exposed a simple Ap-B horizon across the site. [The only exception to this soil profile occurred in shovel tests at the western edge of the farmyard, which revealed disturbed soils associated with a drainage ditch and use as a field access road.] Typical stratigraphic profiles at the site, exemplified by the profiles of TU 1, 9 and 10 are provided in Figures 11, 12 and 13.

TU 1, located in the site's northwest quadrant, exposed an Ap-B soil horizon sequence including an approximately 30-cm (11.8-in) thick dark grayish-brown silt loam Ap horizon with only 10 percent cobbles and gravels, above a yellowish-brown sandy silt loam B horizon (see Figure 11, Photograph 6). TUs 5, 6 and 7 revealed soil profiles similar to that of TU 1 (i.e., containing a low percentage of cobbles and gravels).

Photograph 6. Site 36LU301: TU 1 West Wall Profile, Facing West

36LU301
TEST UNIT 1
WEST WALL PROFILE



Ap – DARK GRAYISH BROWN (10YR 4/2) SILT LOAM WITH 10 % COBBLES AND GRAVEL

B –YELLOWISH BROWN (10YR 5/4) SANDY SILT LOAM

LEGEND

– GROUND SURFACE

– ROCK

SCALE

0 CM 20 CM 40 CM

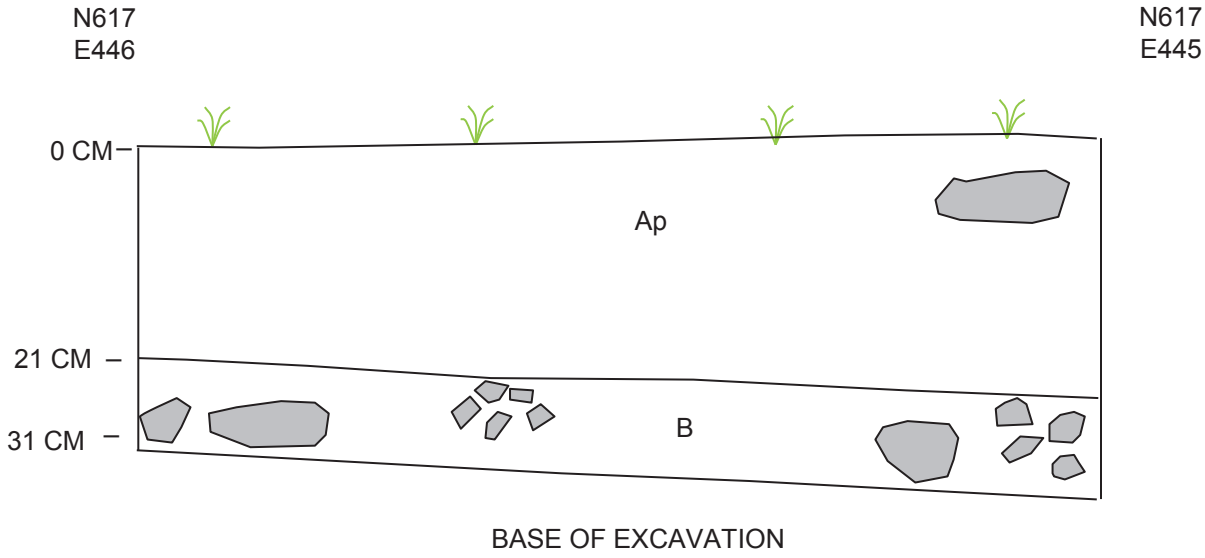
FIGURE 11
SITE 36LU301: TEST UNIT 1
WEST WALL PROFILE

gai consultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC.

DRAWN: LMD DATE: 12/09/11
CHECKED: APPROVED: BAM

36LU301
TEST UNIT 10
SOUTH WALL PROFILE



BASE OF EXCAVATION

Ap – DARK GRAYISH BROWN (10YR 4/2) SANDY SILT LOAM WITH 10 % CHANNERS AND 10% COBBLES AND GRAVEL

B –YELLOWISH BROWN (10YR 5/4) GRAVELLY SANDY LOAM WITH 40% CHANNERS AND 20% COBBLES AND GRAVEL

LEGEND

– GROUND SURFACE

– ROCK

SCALE

0 CM 20 CM 40 CM

FIGURE 12
SITE 36LU301: TEST UNIT 10
SOUTH WALL PROFILE

gai consultants

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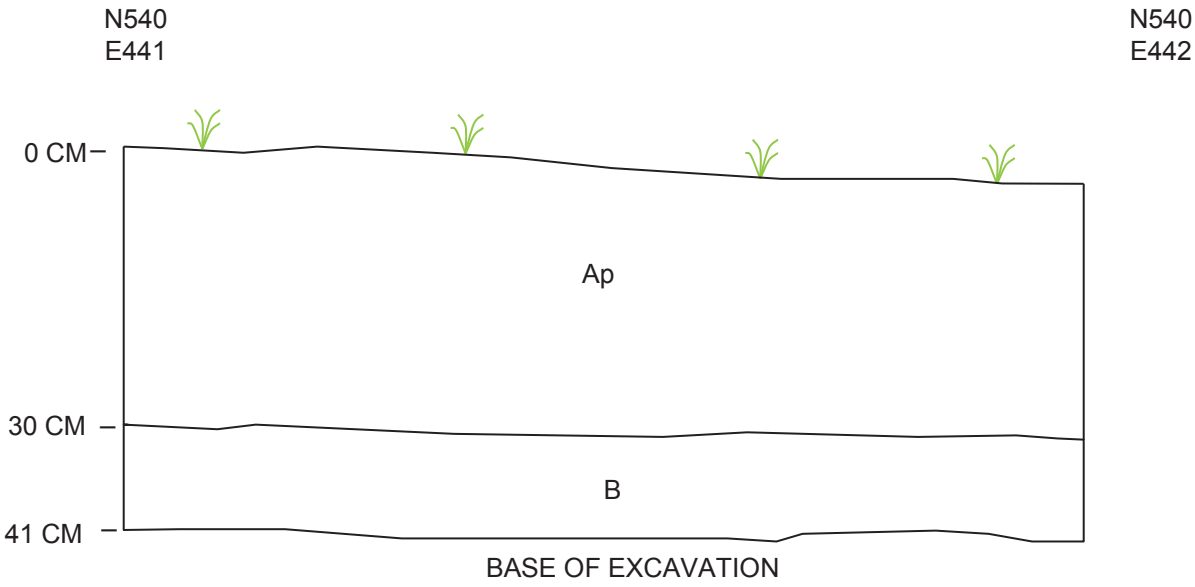
PPL BELL BEND, LLC.

DRAWN: LMD DATE: 12/09/11
CHECKED: APPROVED: BAM

36LU301
TEST UNIT 9
SOUTH WALL PROFILE



Ap – DARK YELLOWISH BROWN (10YR 4/4) SANDY LOAM

B – YELLOWISH BROWN (10YR 5/4) SANDY LOAM WITH <5% COBBLES AND GRAVEL

LEGEND

– GROUND SURFACE

SCALE

0 CM 20 CM 40 CM

FIGURE 13
SITE 36LU301: TEST UNIT 9
SOUTH WALL PROFILE

gai consultants

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TU 10, also situated in the northwest portion of the site approximately 36 meters (118 feet) northeast of TU 1, exposed an Ap-B soil horizon sequence with high percentage of cobbles, gravels, and channers (see Figure 12, Photograph 7). The Ap horizon in this locality consisted of a 22 to 26-cm (8.7 to 10.2-in)-thick dark grayish-brown sandy silt loam with 10 percent cobbles, gravels and channers. It superimposed a yellowish-brown gravelly sandy loam B horizon with approximately 40 percent channers and 20 percent cobbles and gravels. TUs 2, 3, 4, and 8, located to the south and west of TU 10, also contained a high percentage of cobbles and gravels (Photograph 8). The test units exhibiting a high percentage of cobbles and gravels occurred in the area of the gravel bar exposed by subsequent plowzone stripping.

Photograph 7. Site 36LU301: TU 10 West Wall Profile showing Cobbles and Gravels, Facing West

Photograph 8. Site 36LU301: TU 4 Plan View Top of B Horizon showing Cobbles and Gravels, Facing North

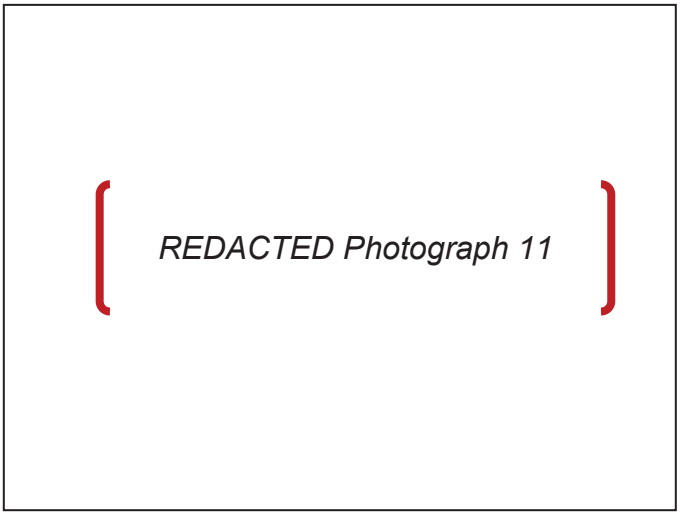
TU 9, situated in the southwest portion of the site, revealed a 26 to 28-cm (10.2 to 11-in) thick dark yellowish-brown sandy loam Ap horizon above a yellowish-brown sandy loam B horizon with less than 5 percent cobbles and gravels (see Figure 13, Photograph 9)

Photograph 9. Site 36LU301: TU 9 South Profile, Facing South

Surface Collection

Controlled surface collection (CSC) of 1,009 5x5-meter (16.4x16.4-foot) blocks across the cultivated field within the site area produced just 20 prehistoric lithic artifacts from 19 positive blocks and 17 historic/modern artifacts from 17 blocks (see Figure 3, see Tables 4 and 5, Photographs 10 and 11). The prehistoric artifacts included 2 projectile points, 11 debitage and 7 fire-cracked-rocks (FCR). The single diagnostic prehistoric artifact recovered represented an Early Woodland Cresap-like projectile point that was point provenienced (N575.3 E419.3) within Block N575 E415 near the site's western edge. One untyped projectile point fragment (possibly representing a stemmed specimen) was point provenienced (N575.45 E457.0) within Block N575 E455, in the west central portion of the site.

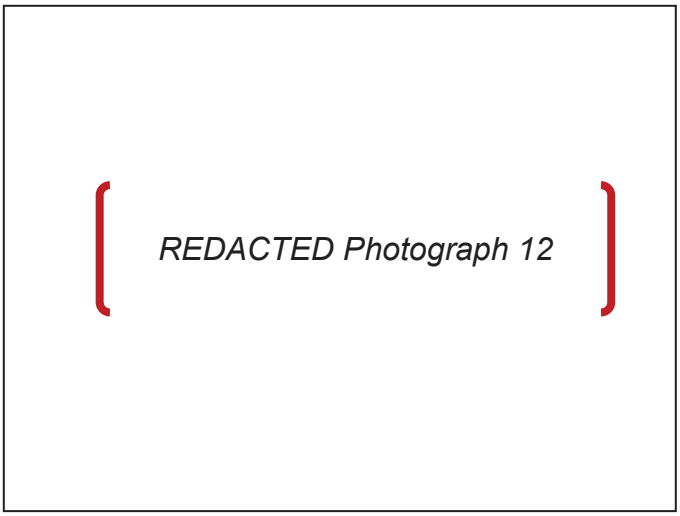
Photograph 10. Site 36LU301: View of Controlled Surface Collection, Facing West



Photograph 11. Site 36LU301: View of Controlled Surface Collection, Facing East

Prehistoric artifact density was extremely low, with 18 of the blocks producing just one artifact each and one positive block yielding two artifacts. Half (*n*=10) of the artifacts recovered during controlled surface collection, including both projectile points, were found in the northwestern quadrant of the site (north of the N570 gridline and west of the E490 gridline). This is also the only area of the site containing contiguous positive surface collection blocks. Of the remaining artifacts, seven were found in the southern portion of the site while only two were recovered from its eastern portion. This surface artifact distribution differs from the results of Phase Ib survey of the site, which recovered artifacts in a scatter across the southeast and eastern portions of the field.

As noted previously, an outcrop of calcareous clay shale (claystone) was documented within the northern portion of the site and a high percentage of this rock, as well as sandstone cobbles and gravels, occurs naturally within the site area (Photograph 12). Based on surface collection observations, the percentage of claystone rock fragments was highest in the northwest quadrant of the site, in proximity to the outcrop, and in the southwest quadrant.



Photograph 12. Site 36LU301: View of Controlled Surface Collection with Rock Outcrop (Marked by Grass) in Foreground and Michaels Farmstead in Distance, Facing Southeast

The 17 historic/modern specimens recovered during controlled surface collection consisted of kitchen-related glass and ceramics as well as architectural specimens (i.e., brick fragments and window glass) (see Table 5). Unlike the distribution of Phase II lithics, approximately two thirds (65 percent) of the historic/modern artifacts were recovered from the southwest quadrant of the site, seven artifacts were found in the site's eastern portion and one was found in the northwest quadrant.

Shovel Testing

GAI excavated 84 STPs within the site during the Phase II study. Of these, 64 judgmental shovel tests (STPs J1-J64) were excavated in the cultivated field (see Figure 3, Photographs 13 and 14). Judgmental STPs were located in the vicinity of positive surface collection blocks primarily in the site's northwest and southwest quadrants. Three judgmental STPs were placed in the extremely low-density eastern section of the site. A row of STPs was also excavated immediately outside the western edge of the plowed and disked field in order to confirm the site's western boundary. Seventeen STPs were located just beyond the northern edge of the plowed and disked field to further investigate an initial findspot and to define the site's northern boundary. STPs excavated in the cultivated field exposed an Ap-B soil horizon sequence, as described above.

Photograph 13. Site 36LU301: Judgmental Shovel Testing in Cultivated Field, Facing Southwest

Photograph 14. Site 36LU301: Judgmental Shovel Testing in Cultivated Field, Facing Northwest

An additional 20 close-interval STPs were excavated in a small section of farmyard south of the field to further investigate an area of Phase Ib prehistoric artifact recovery (see Figure 3, Photograph 15). Shovel tests excavated at the western edge of the farmyard exposed disturbed soils associated with a drainage ditch and use as a field access road. The remainder of STPs in the farmyard exposed an Ap-B soil horizon.

Photograph 15. Site 36LU301: Close Interval Shovel Testing in Farmyard, Facing South

Shovel testing yielded seven prehistoric artifacts and 28 historic specimens, all from plowzone contexts. The seven prehistoric lithics were recovered from six positive STPs, including four (STP J26, J29, J32 and J41) in the northwest portion of the site and two in the farmyard (STP X9 and X10) (see Figure 3). These lithics all consisted of debitage; no diagnostic artifacts were found.

The 28 historic artifacts occurred in ten positive shovel tests. The majority (*n*=16) of these artifacts were found STPs located in the farmyard, and all but one of the remaining artifacts were recovered from the southern edge of the field (see Figure 3). STP J43, located in the northwest corner of the site, yielded a single historic artifact.

Test Units

Ten 1x1-meter (3.3x3.3-foot) test units (TUs 1-10) were excavated within the site during Phase II investigations (see Figure 3, Photograph 16).

Photograph 16. Site 36LU301: View of TU 1 Excavation, Facing West

Test unit excavation produced only 14 prehistoric lithic artifacts and three historic specimens (Table 7). The test unit prehistoric assemblage consisted entirely of fire-cracked rock (FCR); no flaked stone artifacts were recovered from the test units. These 14 FCR were recovered

from two test units—TU 1 (*n*=10) and TU 7 (*n*=4). Both of these test units were situated in the northwest quadrant of the site, approximately 7 meters (23 feet) apart (see Figure 3). The three historic artifacts were found in surface/plowzone contexts in TU 4 (1 whiteware sherd and 1 window glass) and TU 10 (1 redware sherd), also located in the site's northwest corner.

Table 7. Site 36LU301 Phase II: Test Unit Summary

TU	Location	Soil Stratigraphy (Depth=cm below ground surface)	Prehistoric Artifact Total	Historic Artifact Total	Comments
1	N 592 E 418	Ap=0-30 cm; B=30-40 cm	10	0	Few cobbles, No features, Plowscars at Ap/B interface
2	N 603 E 426	Ap=0-32 cm; B=32-42 cm	0	0	Cobbles, No features
3	N 612 E 445	Ap=0-29 cm; B=29-39 cm	0	0	Cobbles, No features
4	N 608 E 426	Ap=0-19 cm; B=19-29 cm	0	2	Cobbles, No features
5	N 585 E 416	Ap=0-34 cm; B=34-44 cm	0	0	Few Cobbles, No features
6	N 602 E 444	Ap=0-33 cm; B=33-43 cm	0	0	Feature 1(Non cultural), Few cobbles, Plowscars at Ap/B interface
7	N 598 E 423	Ap=0-24 cm; B=24-34 cm	4	0	Few cobbles, No features
8	N 610 E 443	Ap=0-30 cm; B=30-40 cm	0	0	Cobbles, No features
9	N 540 E 442	Ap=0-35 cm; B=35-45 cm	0	0	Few cobbles, No features, Plowscars at Ap/B interface
10	N 617 E 445	Ap=0-29 cm; B=29-39 cm	0	1	Cobbles, No features
		TOTAL	**14***	**3**	

*All FCR

As described above (Soils and Geomorphology), test units were excavated to a depth of between 29 and 45 cm (0.9 and 1.5 feet) below surface and exposed an Ap-B soil horizon sequence throughout the site (see Table 7). Representative profiles of this sequence as exposed in TUs 1, 9 and 10 are illustrated in Figures 11, 12 and 13 and Photographs 17 through 20. The dark brown to dark-grayish-brown sandy loam Ap horizon ranged from 19 to 35 cm (0.6 to 1.1 feet) in thickness and superimposed a yellowish-brown sandy loam to gravelly sandy loam B horizon. Five of the test units (TUs 2, 3, 4, 8 and 10) located in the northwest quadrant of the site contained a high percentage of channers (thin, flat rock fragments), gravels and cobbles, with the percentage of rock generally increasing from 5 to 10 percent at the top of the Ap horizon to as much as 40 to 50 percent in the subsoil (see Photographs 17 and 18). In the remaining units (e.g., TUs 1, 5, 6, and 7 in the northwest quadrant and TU 9 in the southeast quadrant) the percentage of channers, gravels and cobbles was significantly lower (see Photographs 9, 19 and 20). Prehistoric artifacts (FCR) were recovered exclusively from the plowzone (Ap horizon) (see Table 7).

Photograph 17. Site 36LU301: TU 10 South Wall Profile showing Cobbles and Gravels, Facing South

Photograph 18. Site 36LU301: TU 3 North Wall Profile showing Cobbles and Gravels, Facing North

Photograph 19. Site 36LU301: TU 5 South Wall Profile, Facing South

No diagnostic artifacts and no cultural features were identified during test unit excavation. One soil anomaly (Feature 1), consisting of an area of reddened soil with charcoal flecking, was encountered in the southeast corner of TU 6 near the top of the B horizon. The exposed portion of the feature had an irregular shape and a maximum depth of 22 cm (8.6 in) (see

Photograph 20). In profile, it was observed to dip downward from the Ap/B horizon contact into the subsoil. Based on sampling of this anomaly, it was concluded to represent a non-cultural tree/root burn.

Photograph 20. Site 36LU301: TU 6 East Wall Profile showing Excavated Feature 1 (Non Cultural Tree Burn), Facing East

Plowzone Stripping

Plowzone stripping was conducted within seven parallel trenches (Trenches 1-7), located in the western portion of the site and comprising a total surface area of 1,600 square meters (17,222 square feet) (see Figure 3, Photograph 21). Hand shovel scraping of the B horizon surface exposed 211 soil stains that were identified as possible cultural features (Photographs 22 through 26). Figures 14 through 20 present plan views of Trenches 1-7, illustrating these possible cultural features. Subsequent feature sampling documented ten cultural features (five prehistoric features, two prehistoric/historic features and three historic features) (see Feature Overview below). A nonsystematic collection of observed artifacts recovered a single piece of debitage from the B horizon surface near southern end of Trench 3.

Photograph 21. Site 36LU301: Overview of Plowzone Stripping, Trenches 3, 4, and 5, Facing Northeast

GAI also observed numerous clearly non-cultural stains (e.g., root or rodent disturbance) that were not designated as features; these stains were typically characterized by loose, mottled fill, irregular shapes, and/or light “halos”. In addition, plowzone stripping exposed a large number of long, parallel, overlapping lines of very small circular to rectangular stains that

were interpreted as agricultural-related stains see (see Photographs 25 and 26). Cross-sectioning of a sample of these small (approximately 5-cm/2.0-in diameter) stains revealed a depth of approximately 1 to 2 cm (0.4 to 0.8 in) below the stripped B horizon surface; these stains may be associated with staking or planting of crops (see Photograph 26).

Photograph 22. Site 36LU301: Trench 3, B Horizon Surface, showing Possible Cultural Features Marked by Pin Flags, Facing North

Photograph 23. Site 36LU301: Trench 2, B Horizon Surface, showing Possible Cultural Features Marked by Pin Flags, Facing North

Photograph 24. Site 36LU301: Trench 4, B Horizon Surface, showing Possible Cultural Features Marked by Pin Flags, Facing North

Photograph 25. Site 36LU301: Trench 1, B Horizon Surface, showing Possible Cultural Features Marked with Pin Flags, Facing North.

Note Parallel Lines of Small, Shallow Circular Stains (Likely Agricultural-Related Stains)

Photograph 26. Site 36LU301: Trench 2, B Horizon Surface, showing Possible Cultural Features Marked with Pin Flags and Parallel Lines of Small Likely Agricultural-Related Stains, Facing North.

Note Cross-sectioning of Sample of Likely Agricultural-Related Stains

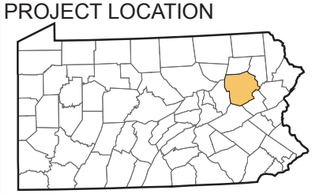
In addition to soil anomalies and possible features, plowzone stripping exposed a dense band of gravels and cobbles in the northwest portion of the site (north of the N590 gridline), in Trenches 1 through 5 (see Figure 3, Photograph 27).

Photograph 27. Site 36LU301: Trench 2 showing Band of Cobbles and Gravels (Gravel Bar) on B Horizon Surface, Facing North

This gravel bar was oriented southwest/northeast and expanded in width towards the northeast, increasing from less than 5 meters (16.4 feet) wide in Trench 1 to over 25 meters (82 feet) wide in Trench 5. A second gravel bar was also exposed in Trench 7, in the southern portion of the site. This area of gravels and cobbles was approximately 25 meters (82 feet) wide and was not observed in the other trenches in this portion of the site. The southern ends of Trenches 2 and 3 both contained a relatively high percentage of gravels in the B horizon which may represent the edge or the upper contact of a gravel bar. These gravel bars likely represent the remains of former braided stream channels.

N530, E405
N535
N540
N545
SOUTH END OF TRENCH
E407
MATCH LINE 1
FEATURE 2
(A)
N550
N555
N560
N565
MATCH LINE 1
FEATURE 3
(A)
FEATURE 4
(A)
FEATURE 5
(B)
FEATURE 6
(A)
FEATURE 7
(B)
FEATURE 8
(B)
FEATURE 9
(B)
MATCH LINE 2
N570
N575
N580
N585
MATCH LINE 2
FEATURE 10
(A)
FEATURE 11
(A)
FEATURE 12
(C)
FEATURE 13
(A)
MATCH LINE 3

PROJECT LOCATION



LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 14a
SITE 36LU301: TRENCH 1, PLAN VIEW
SHEET 1 OF 2

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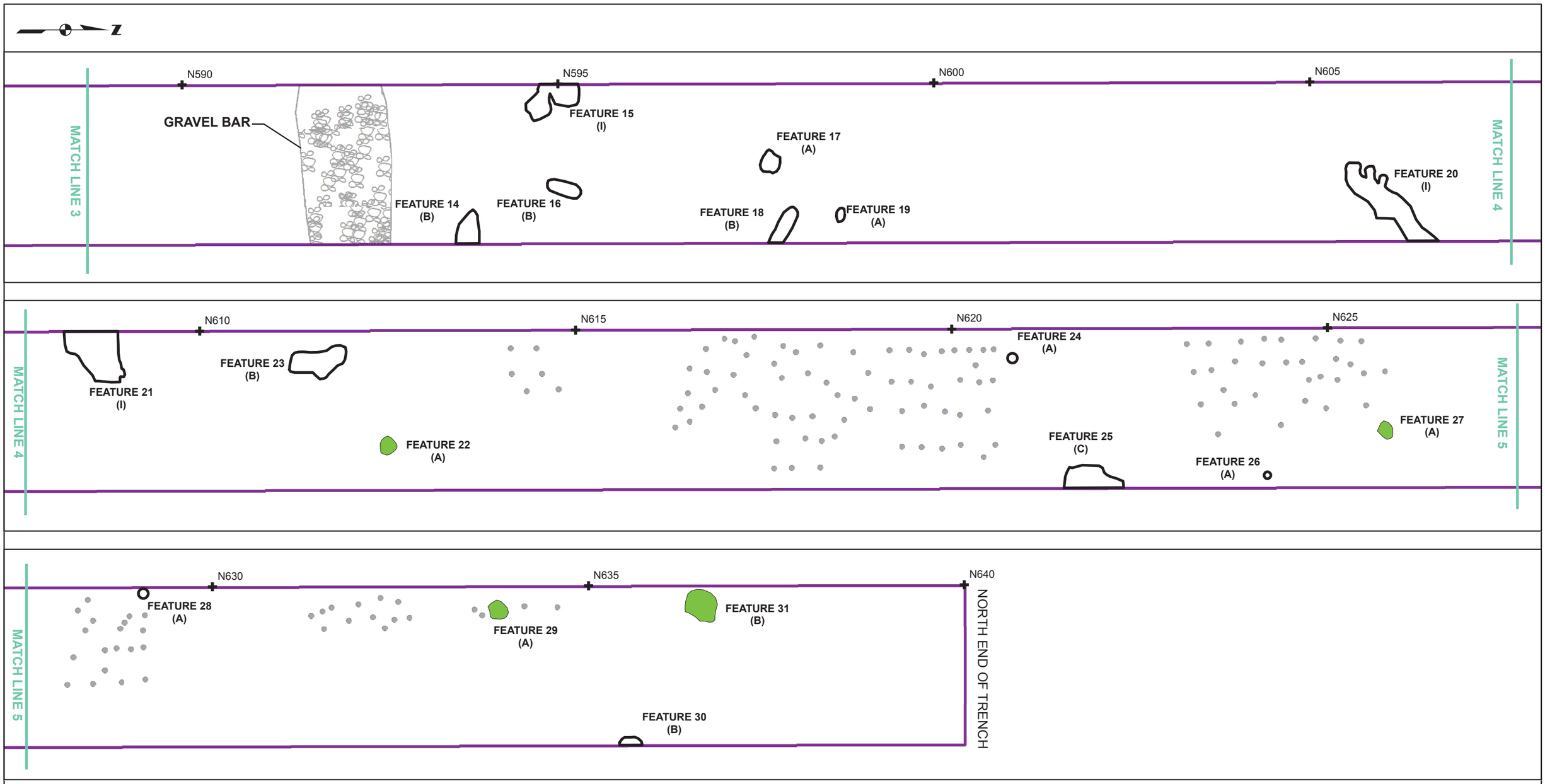
BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

CHECKED: LMD APPROVED: BAM

P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_14_TRENCH_1a_120111.mxd



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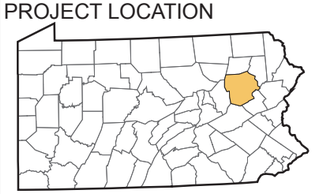

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
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- SAMPLED HISTORIC FEATURE
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- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

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Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 14b
SITE 36LU301: TRENCH 1, PLAN VIEW
SHEET 2 OF 2

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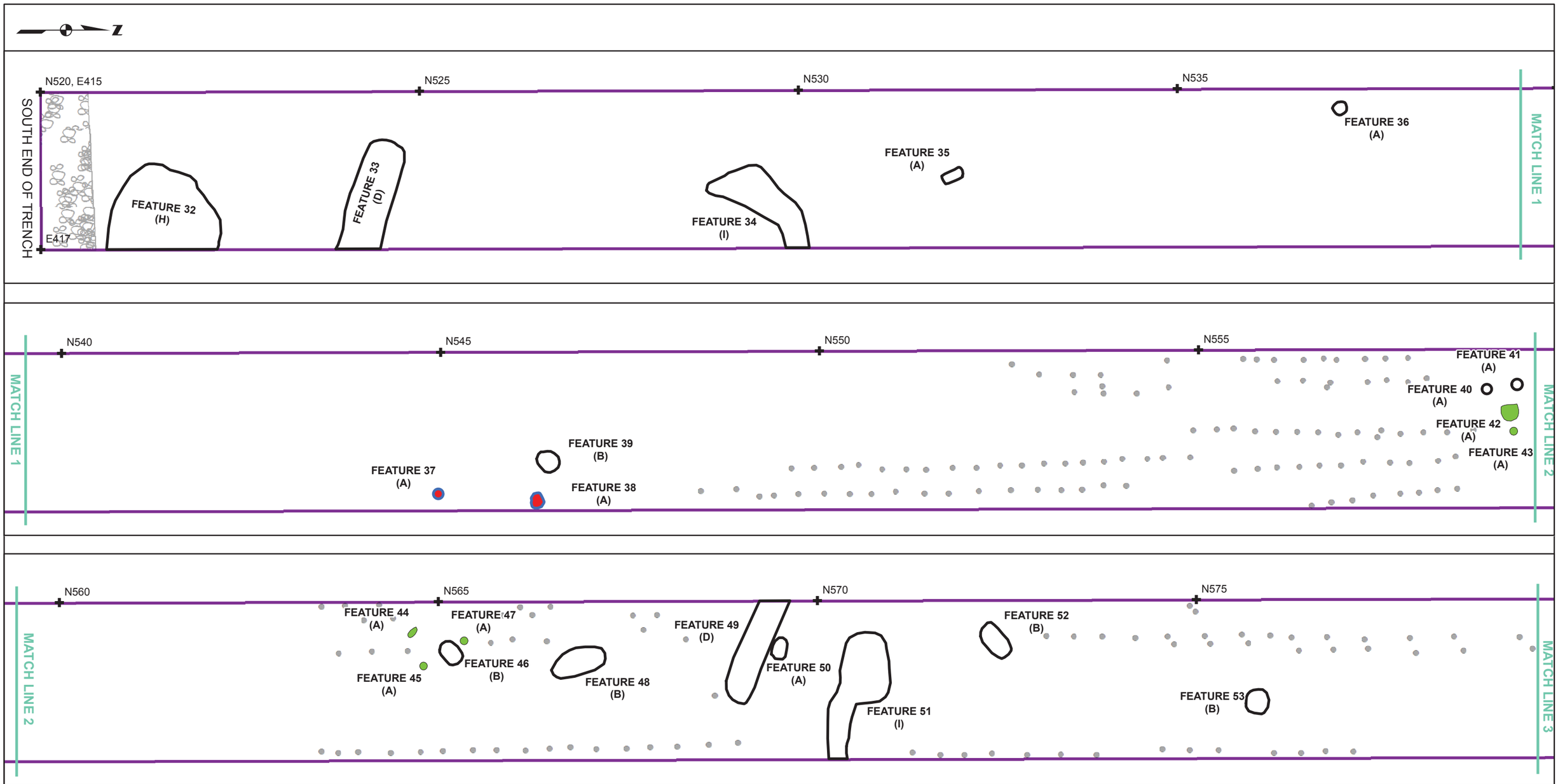
P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_14_TRENCH_1b_120111.mxd



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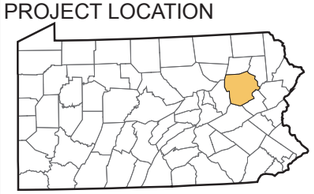

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

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- NON SAMPLED FEATURE
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- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

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Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 15a
SITE 36LU301: TRENCH 2, PLAN VIEW
SHEET 1 OF 2

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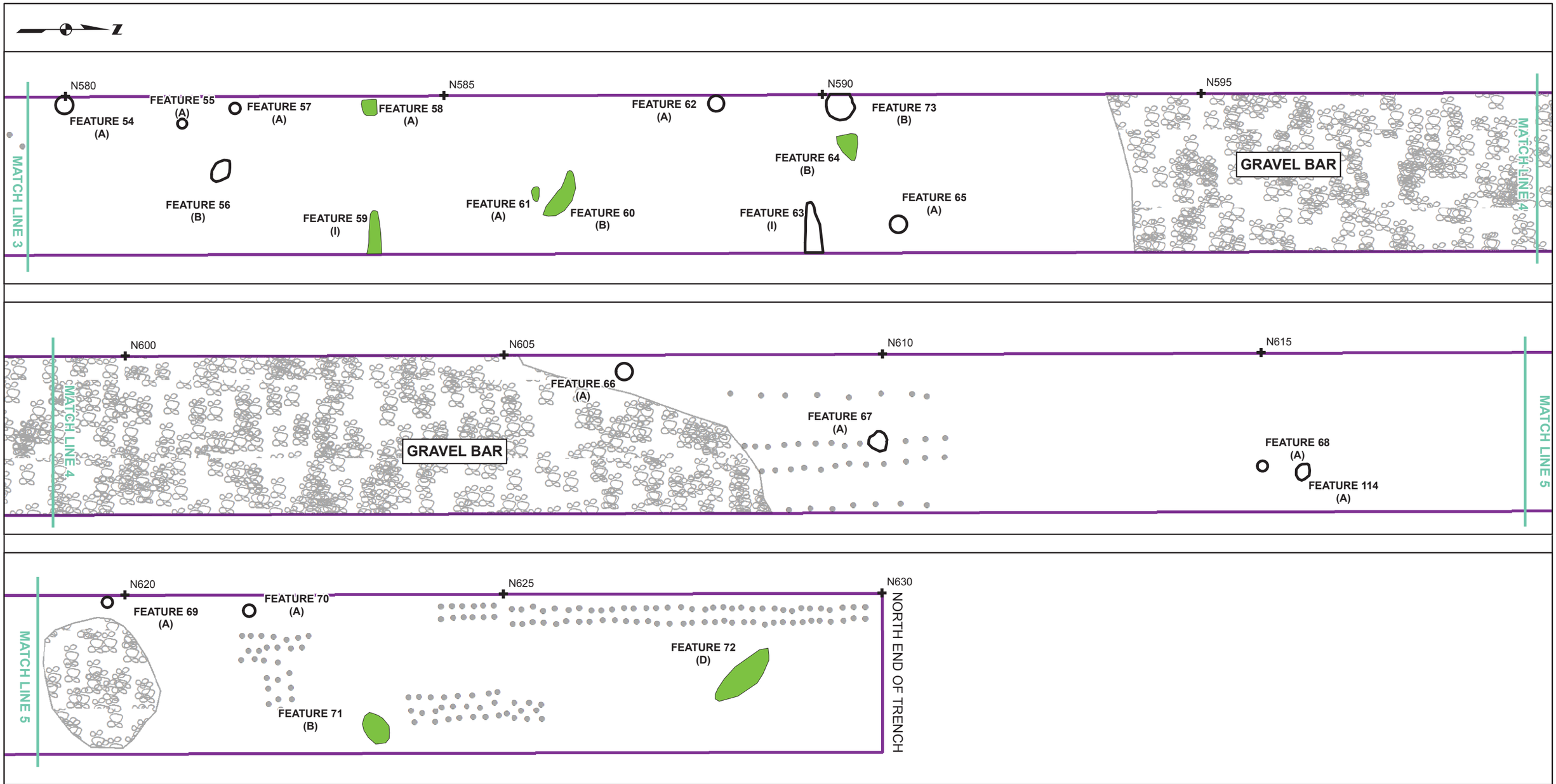
P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_15_TRENCH_2a_120111.mxd



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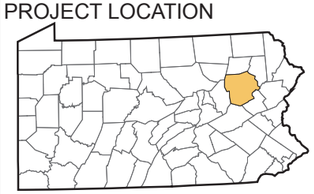

LUZERNE COUNTY, PENNSYLVANIA

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- SAMPLED NON-CULTURAL FEATURE
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- TRENCH
- COBBLES / GRAVELS

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Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 15b
SITE 36LU301: TRENCH 2, PLAN VIEW
SHEET 2 OF 2

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BELL BEND NUCLEAR POWER PLANT
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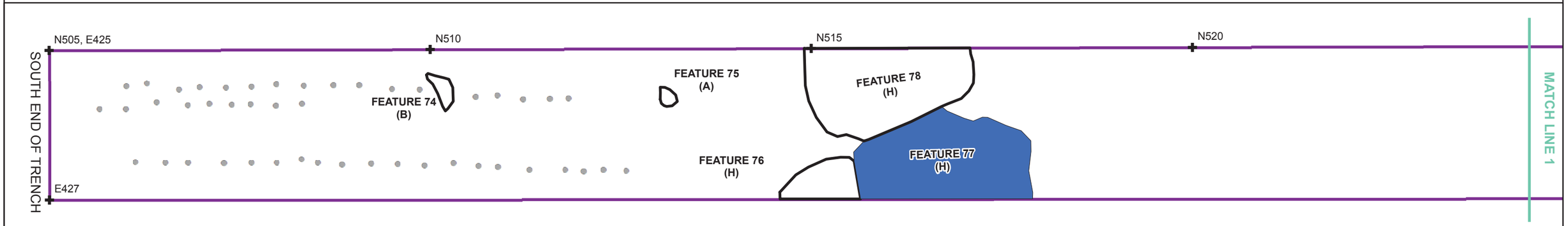
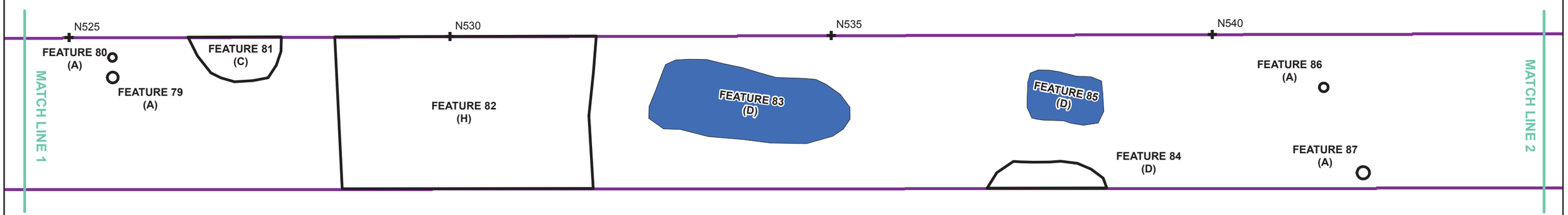
P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_15_TRENCH_2b_120111.mxd





PROJECT LOCATION

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
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- SAMPLED HISTORIC FEATURE
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Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 16a
SITE 36LU301: TRENCH 3, PLAN VIEW
SHEET 1 OF 3

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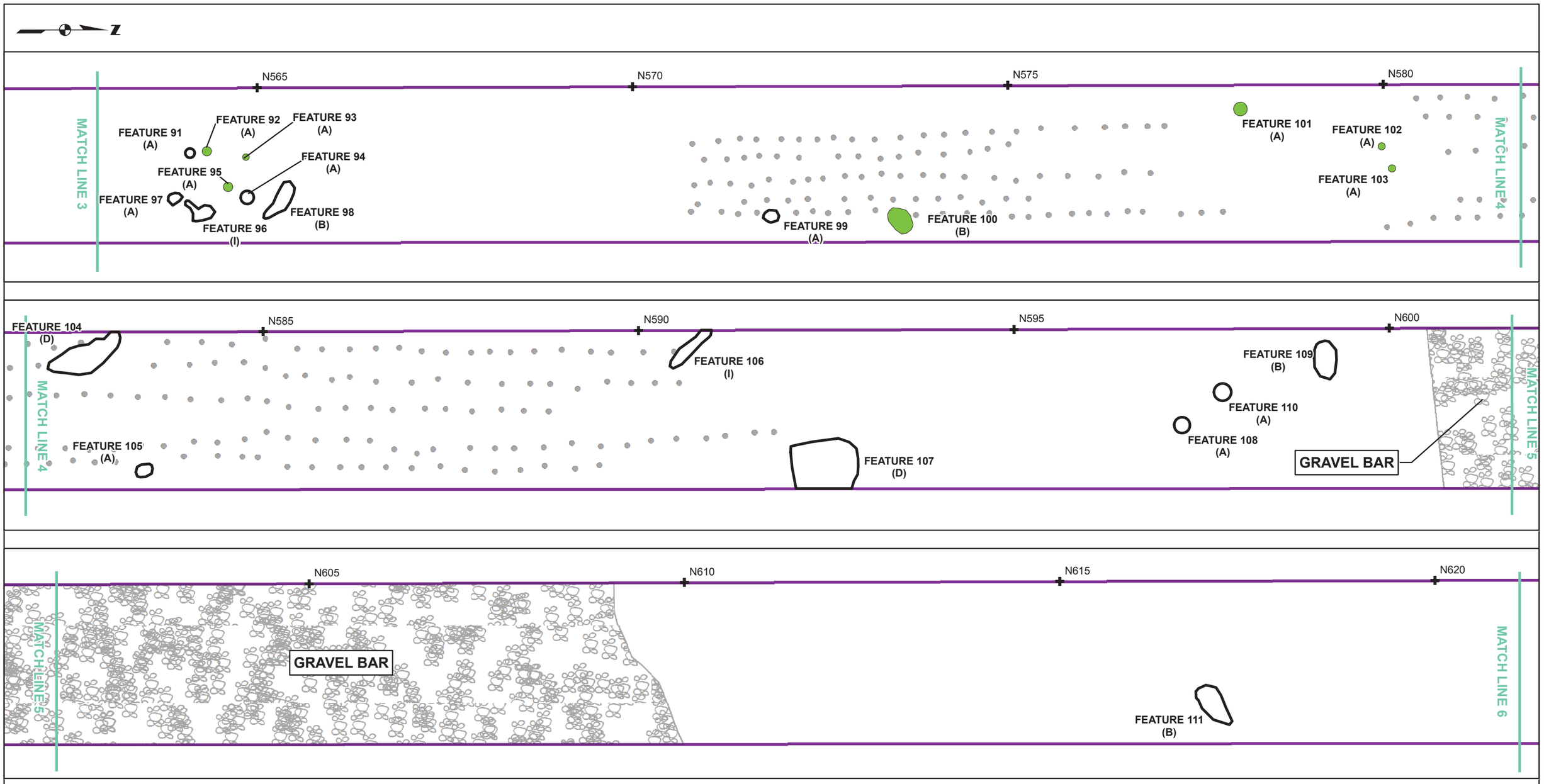
BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

CHECKED: BAM APPROVED: BAM

P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_16_TRENCH_3a_120111.mxd



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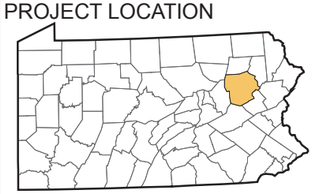

LUZERNE COUNTY, PENNSYLVANIA

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- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

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Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 16b
SITE 36LU301: TRENCH 3, PLAN VIEW
SHEET 2 OF 3

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BELL BEND NUCLEAR POWER PLANT
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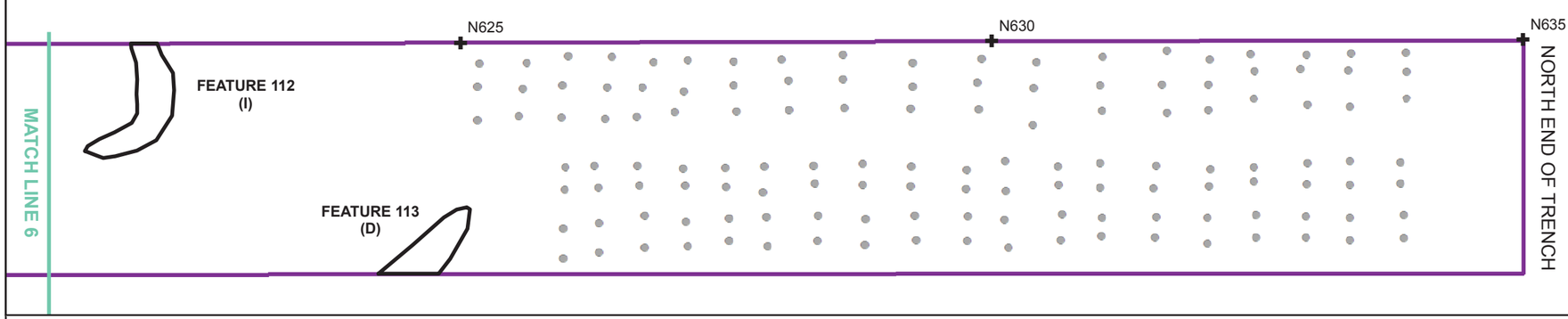

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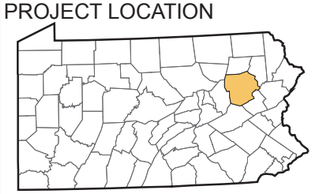

LUZERNE COUNTY, PENNSYLVANIA

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- POSSIBLE AGRICULTURAL SOIL ANOMALY
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- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
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Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 16c
SITE 36LU301: TRENCH 3, PLAN VIEW
SHEET 3 OF 3

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BELL BEND NUCLEAR POWER PLANT
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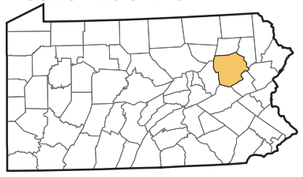

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 17a
SITE 36LU301: TRENCH 4, PLAN VIEW
SHEET 1 OF 3

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BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

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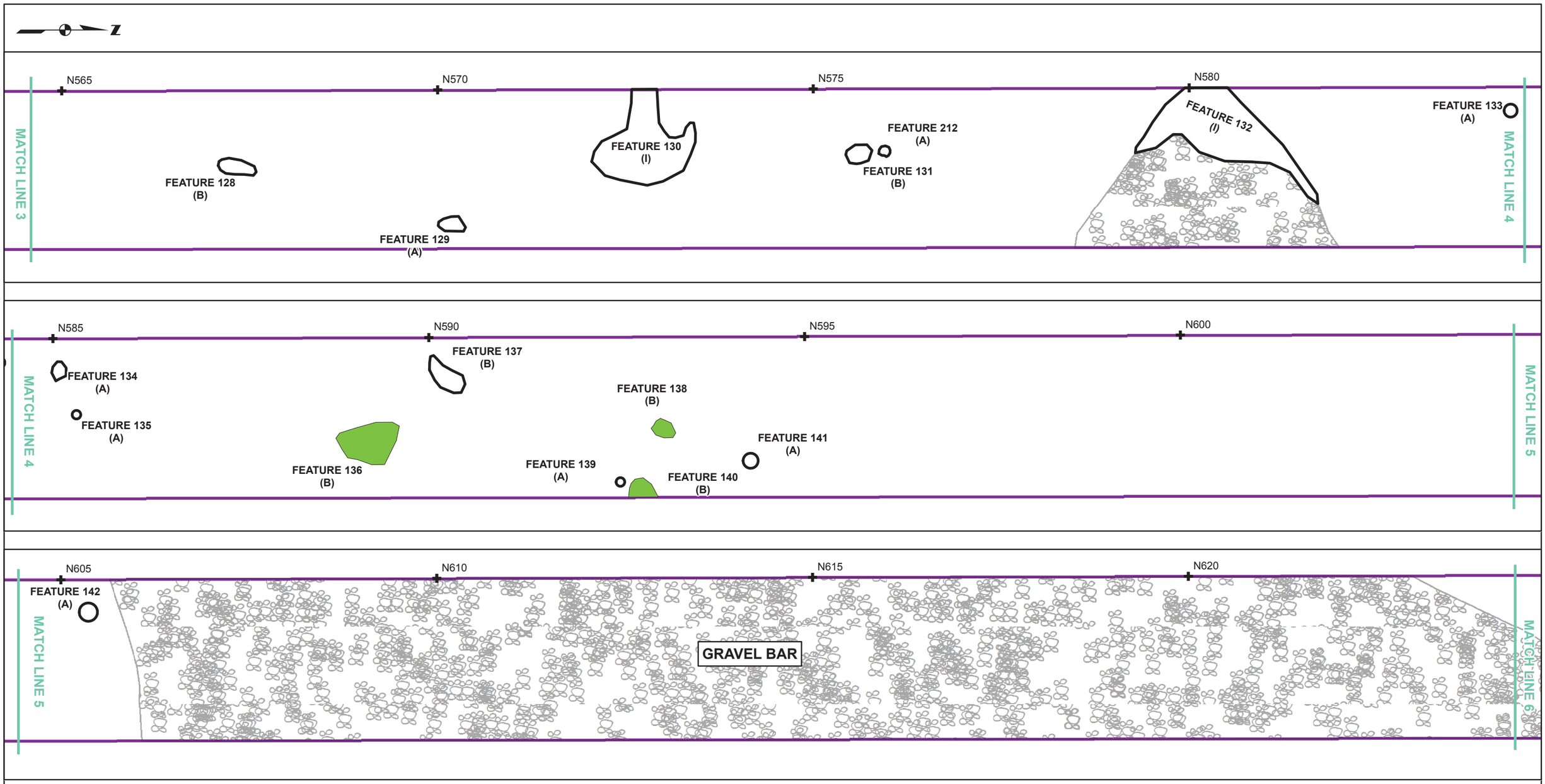

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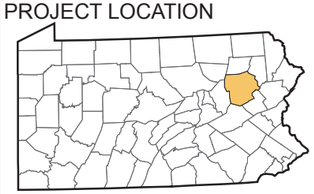

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

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Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 17b
SITE 36LU301: TRENCH 4, PLAN VIEW
SHEET 2 OF 3

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BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

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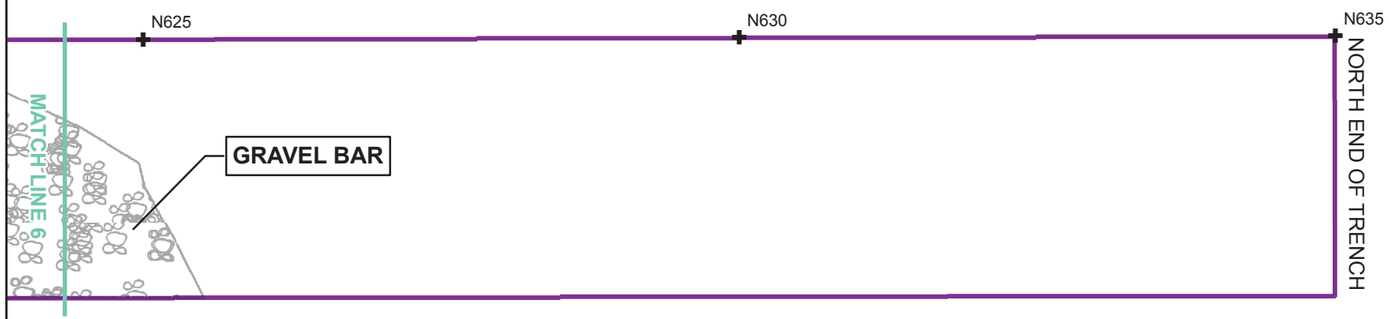
P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_17_TRENCH_4b_120111.mxd



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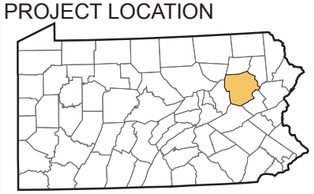

LUZERNE COUNTY, PENNSYLVANIA

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Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 17c
SITE 36LU301: TRENCH 4, PLAN VIEW
SHEET 3 OF 3

gai consultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

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N505, E445

N510

N515

N520

FEATURE 144
(B)

SOUTH END OF TRENCH

E447

FEATURE 143
(B)

MATCH LINE 1

N525

N530

N535

N540

MATCH LINE 1

FEATURE 147
(A)

FEATURE 150
(OX)

FEATURE 148
(A)

FEATURE 149
(A)

FEATURE 146
(I)

FEATURE 145
(A)

MATCH LINE 2

N545

N550

N555

N560

MATCH LINE 2

FEATURE 151
(A)

FEATURE 154
(B)

FEATURE 156
(A)

FEATURE 152
(A)

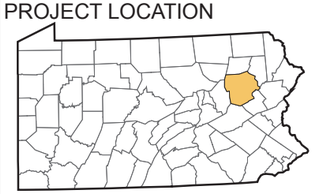
FEATURE 153
(OX)

FEATURE 211
(A)

FEATURE 155
(A)

MATCH LINE 3

PROJECT LOCATION



LUZERNE COUNTY, PENNSYLVANIA

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- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
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Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 18a
SITE 36LU301: TRENCH 5, PLAN VIEW
SHEET 1 OF 3

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BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

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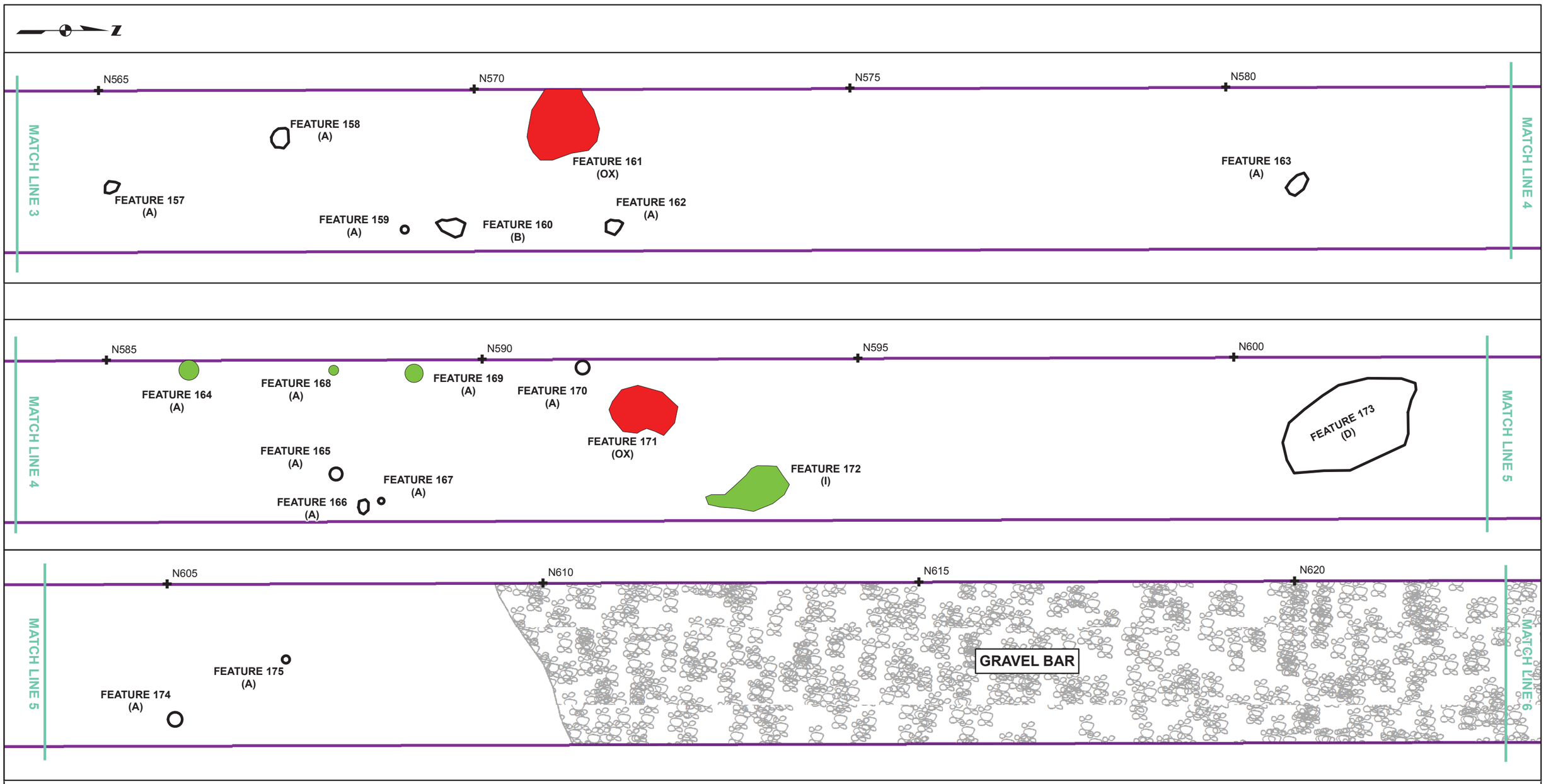

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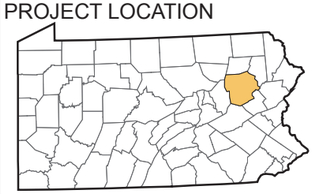

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 18b
SITE 36LU301: TRENCH 5, PLAN VIEW
SHEET 2 OF 3

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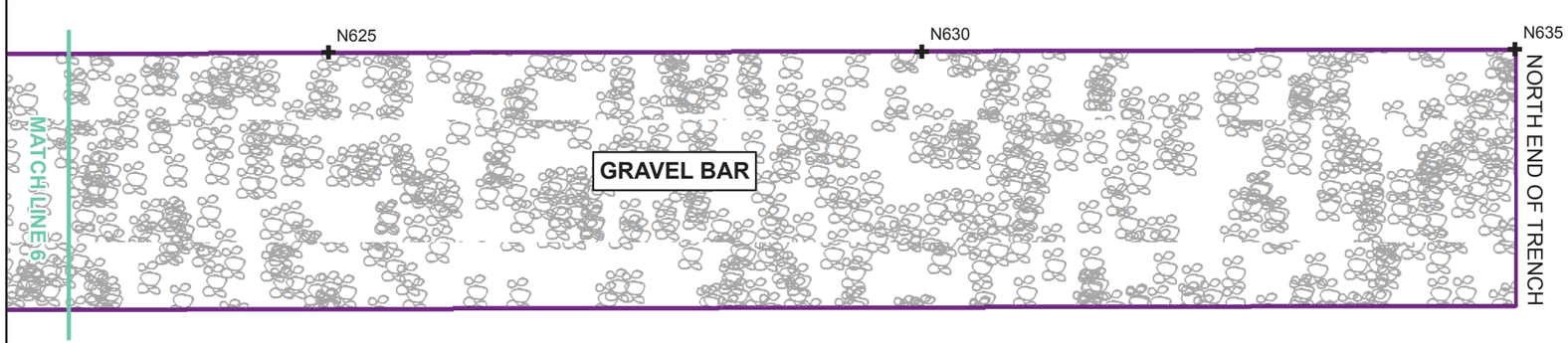
BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

CHECKED: LMD APPROVED: BAM

P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_18_TRENCH_5b_120111.mxd



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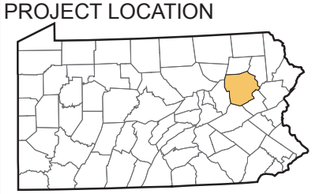

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 18c
SITE 36LU301: TRENCH 5, PLAN VIEW
SHEET 3 OF 3

gaiconsultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

CHECKED: LMD APPROVED: BAM

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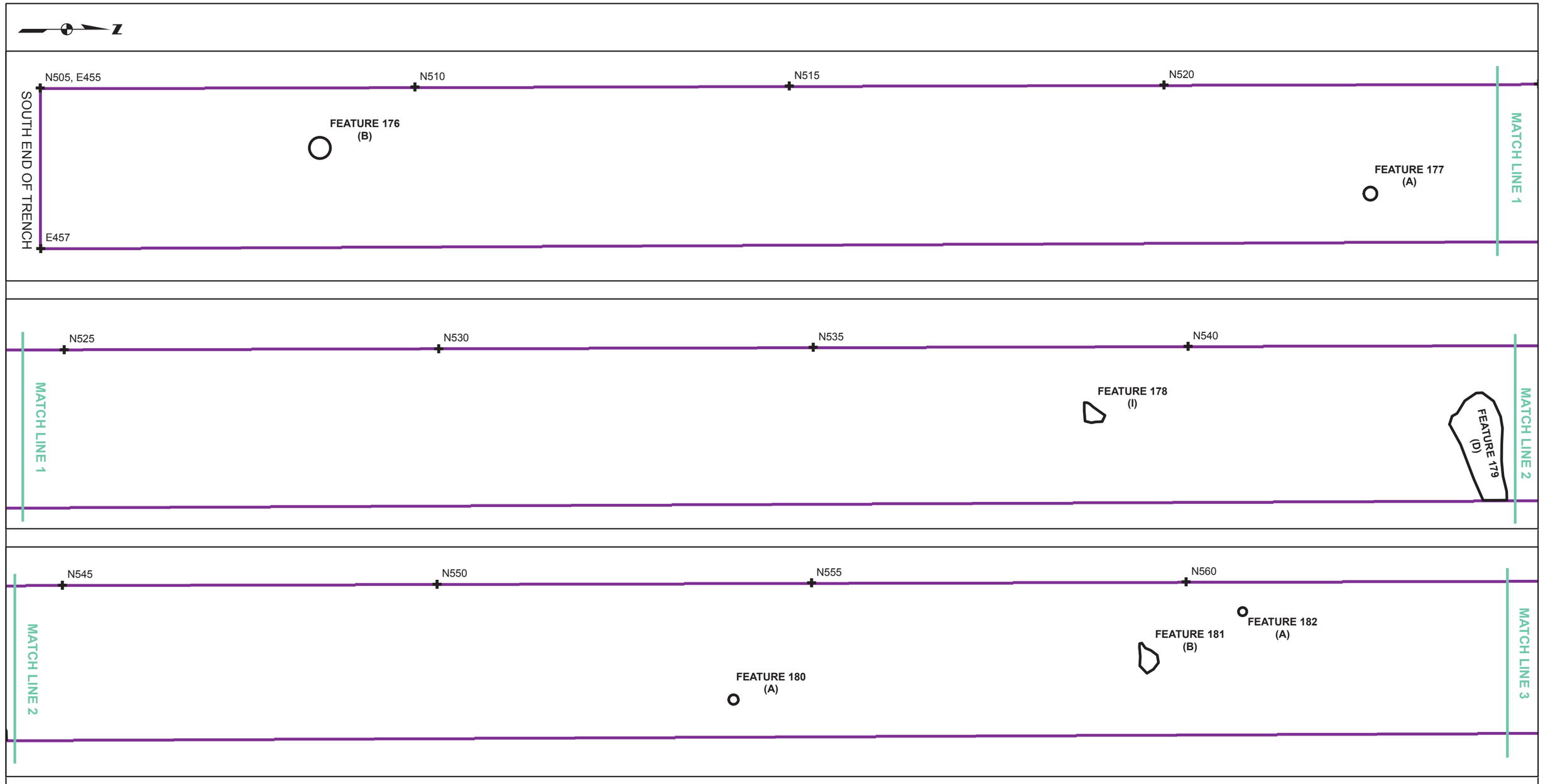

PROJECT LOCATION

LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 19a
SITE 36LU301: TRENCH 6, PLAN VIEW
SHEET 1 OF 2

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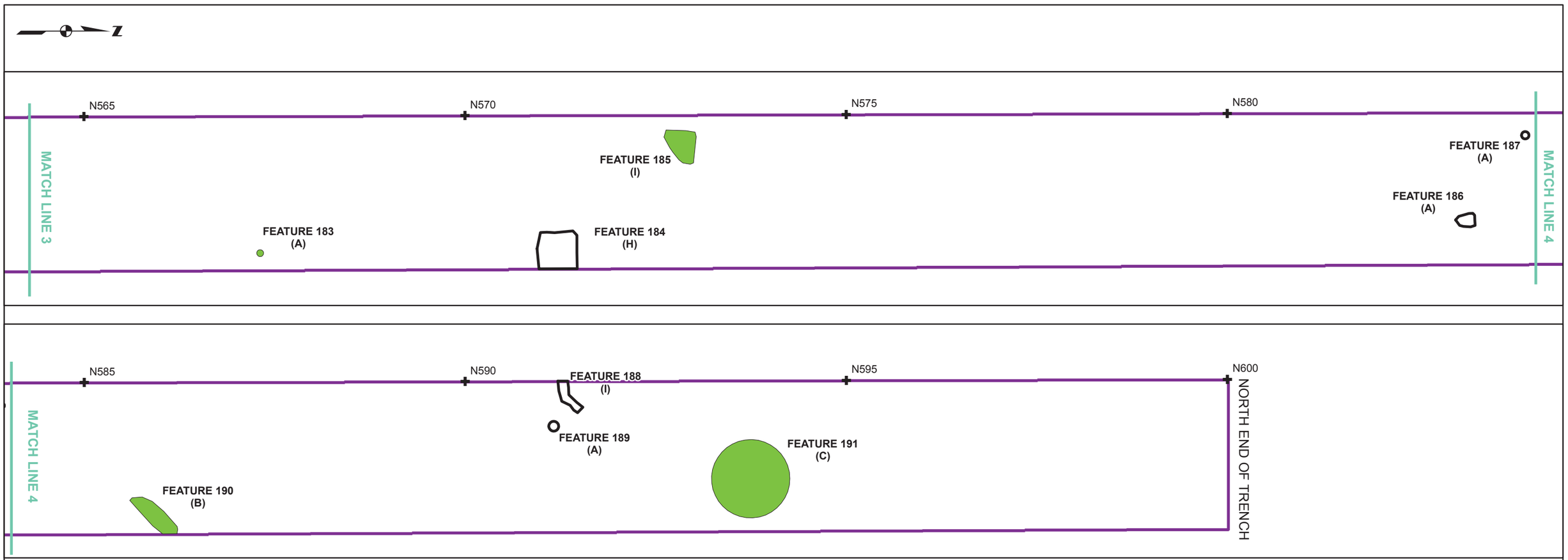
BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

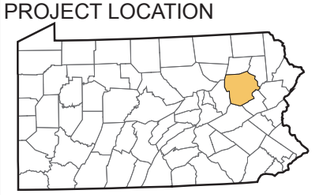
DRAWN BY: AJW DATE: 12/02/2011

CHECKED: LMD APPROVED: BAM

P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_19_TRENCH_6a_120111.mxd



PROJECT LOCATION



LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 19b
SITE 36LU301: TRENCH 6, PLAN VIEW
SHEET 2 OF 2

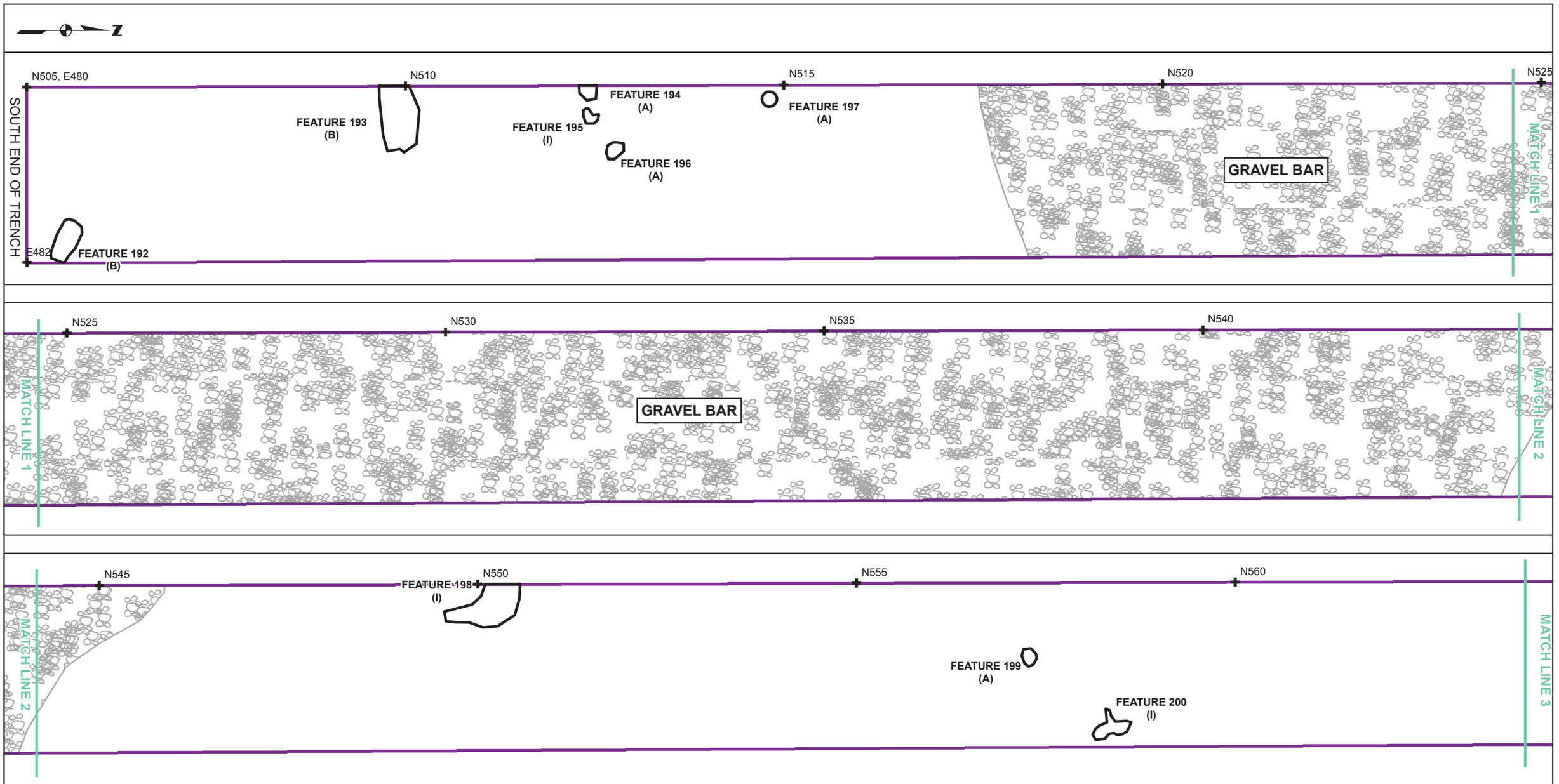
gaiconsultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

CHECKED: LMD APPROVED: BAM

P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_19_TRENCH_6b_120111.mxd



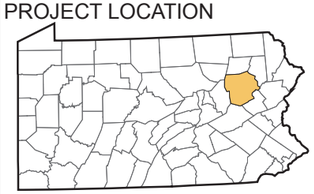
LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

PROJECT LOCATION



LUZERNE COUNTY, PENNSYLVANIA

FIGURE 20a
SITE 36LU301: TRENCH 7, PLAN VIEW
SHEET 1 OF 2

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BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

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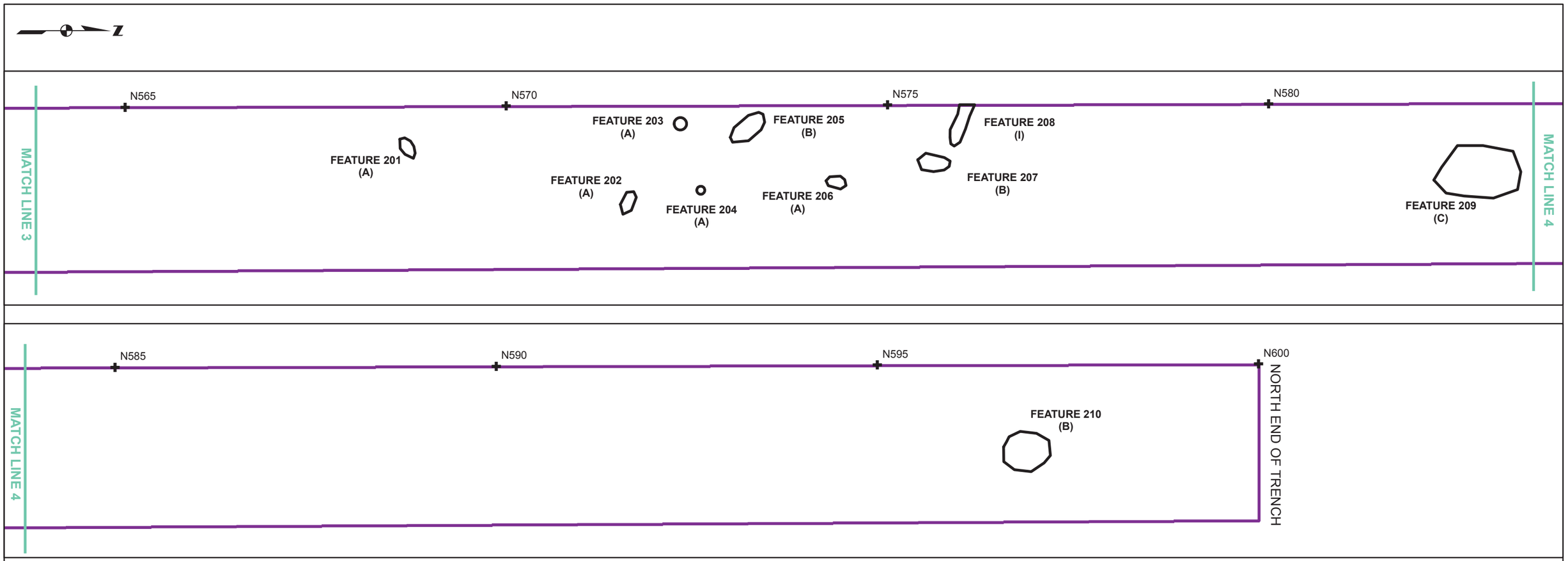
P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_20_TRENCH_7a_120111.mxd



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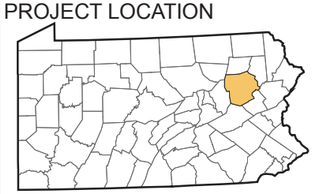


LUZERNE COUNTY, PENNSYLVANIA

LEGEND

- GRID COORDINATE
- POSSIBLE AGRICULTURAL SOIL ANOMALY
- NON SAMPLED FEATURE
- SAMPLED HISTORIC FEATURE
- SAMPLED PREHISTORIC FEATURE
- SAMPLED NON-CULTURAL FEATURE
- SAMPLED PREHISTORIC/HISTORIC FEATURE
- TRENCH
- COBBLES / GRAVELS

FEATURE TYPE	FEATURE TYPE CODE
Small Circular/Oval	A
Medium Circular/Oval	B
Large Circular	C
Large Oval/Elongate	D
Oxidized Stain	OX
Irregular	I
Large, Likely Historic/Modern	H

0 0.25 0.5 1 1.5 2 Meters

FIGURE 20b
SITE 36LU301: TRENCH 7, PLAN VIEW
SHEET 2 OF 2

gaiconsultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC

DRAWN BY: AJW DATE: 12/02/2011

CHECKED: LMD APPROVED: BAM

P:\PIT\2011\C110751.00_PPL Bell Bend\CR_GIS\PROJECT_FILES\FIGURE_20_TRENCH_7b_120111.mxd

Feature Overview

As noted above, plowzone stripping activities exposed 211 possible cultural features on the B horizon surface of Trenches 1 through 7; one additional feature was encountered during previous test unit excavation. As requested by PHMC-BHP, GAI investigated a 25 percent sample of these features, resulting in the testing of 55 features during the Phase II study (54 features in trenches and one in TU 6).

Table 8 presents a summary of identified feature types and the sampling strategy. As described above, features exposed during plowzone stripping were grouped into the following seven categories: small circular/oval stains (Type A); medium circular/oval stains (Type B); large circular stains (Type C); large oval/elongate stains (Type D); oxidized stains (Type OX); irregular stains (Type I); and large, likely historic/modern features (Type H). The total number of features in each category varied from 4 to 114, with small circular/oval stains (Type A) accounting for over half (*n*=114; 55 percent) of the identified features. Likewise, the number of sampled features in each category ranged from 30 (small circular/oval stains) to one (large circular stains and likely modern/historic stains). A 100 percent sample of oxidized stains was investigated due to their low frequency (only four features) and their high potential to represent prehistoric hearth features.

Table 8. Site 36LU301 Phase II: Feature Types and Sampling Strategy

Feature Type	Feature Type Code	Feature Description	Total Features Exposed	Total Features Investigated (~25% sample)
Small Circular/Oval	A	<25 cm diameter dark stain	114	30
Medium Circular/Oval	B	25-80 cm diameter dark stain	46	11
Large Circular	C	>80 cm diameter dark stain	5	1
Large Oval/Elongate	D	>80 cm length dark stain	13	3
Oxidized Stain	OX	Reddened (Oxidized) stain with charcoal flecking, circular to ovoid, 40-95 cm maximum dimension	4	4*
Irregular	I	Dark stain with variety of irregular shapes	23	4
Likely Historic/Modern	H	1-3+ meter dark stain, distinct boundaries, some right angle corners, historic artifacts	6	1
		Total	**211**	**54****

*excavated 100 percent of Oxidized Stains

**One additional feature (Feature 1) was investigated in TU 6 prior to plowzone stripping

As presented in Table 9, possible cultural features were exposed in all seven trenches, with totals ranging from 16 to 43 features per trench. Trenches 2 and 3 contained the largest number of identified features (43 and 40 features, respectively).

Table 9. Site 36LU301 Phase II: Summary of Identified Features by Trench

Feature Type	Feature Type Code	Trench 1	Trench 2	Trench 3	Trench 4	Trench 5	Trench 6	Trench 7	Total
Small Circular/Oval	A	15	25	21	14	23	7	9	114
Medium Circular/Oval	B	10	10	5	9	4	3	5	46
Large Circular	C	2	0	1	0	0	1	1	5
Large Oval/Elongate	D	0	3	6	2	1	1	0	13
Oxidized Stain	OX	0	0	0	0	4	0	0	4
Irregular	I	3	4	3	4	2	3	4	23
Likely Historic/ Modern	H	0	1	4	0	0	1	0	6
Total		**30**	**43**	**40**	**29**	**34**	**16**	**19**	**211***

*One additional feature (Feature 1) was investigated in TU 6 prior to plowzone stripping

Table 10 provides a summary of all 212 possible features identified at the site, including feature type code, location, and dimensions. These features are mapped on Figures 14 through 20.

Based on the results of the Phase II investigation, the 55 sampled features included ten cultural features. These consisted of five prehistoric thermal features (Features 150, 153, 154, 161 and 171) all identified in Trench 5, two prehistoric or historic postmolds (Features 37 and 38) located in Trench 2, and three historic features (Feature 77, an historic trash pit, and Features 83 and 85, historic features of indeterminate function) all exposed in Trench 3. The remaining 45 features were concluded to represent non-cultural soil anomalies, primarily reflecting extensive bioturbation activity (e.g., root and/or rodent disturbances) within the cultivated field.

Table 11 presents a summary of the 55 features sampled during Phase II investigations. The ten possible cultural features noted above are illustrated on Figure 3 and on the appropriate trench plan views (see Figures 14 through 20) and are also documented with individual plan views and profiles (see feature descriptions below).

Table 10. Site 36LU301 Phase II: Summary of Identified Features

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique*	Dimensions	Artifacts	Comments**
1	--	--	602.30	445.00	NC	Bioturbation (Tree burn)	Excavated	65x35x22		Exposed in TU 6
2	A	1	541.57	406.62	NC	Bioturbation (root)	Bisected	27x26x22	2 debitage	
3	A	1	549.55	406.45	Undetermined	--	NS	17x22		
4	A	1	555.05	406.45	Undetermined	--	NS	25x25		
5	B	1	559.05	406.85	Undetermined	--	NS	32x40		extends W wall
6	A	1	560.80	405.05	Undetermined	--	NS	13x15		extends E. wall
7	B	1	561.50	405.10	Undetermined	--	NS	20x40		extends E. wall
8	B	1	564.70	405.45	Undetermined	--	NS	20x55		
9	B	1	564.75	406.35	Undetermined	--	NS	25x35		
10	A	1	571.50	405.73	NC	Bioturbation (root)	Excavated	18x22x38		
11	A	1	577.20	406.23	Undetermined	--	NS	20x35		
12	C	1	577.80	406.83	Undetermined	--	NS	40x52		extends W. wall
13	A	1	579.00	405.20	Undetermined	--	NS	10x15		
14	B	1	598.83	406.83	Undetermined	--	NS	30x35		extends W. wall
15	I	1	595.00	405.10	Undetermined	--	NS	45x70		extends E. wall
16	B	1	595.08	406.30	Undetermined	--	NS	17x45		
17	A	1	597.83	406.00	Undetermined	--	NS	25x25		
18	B	1	598.00	406.80	Undetermined	--	NS	20x50		extends W. Wall
19	A	1	598.75	406.68	Undetermined	--	NS	10x15		
20	I	1	606.15	406.85	Undetermined	--	NS	40x140		extends E. wall
21	I	1	606.85	405.28	Undetermined	--	NS	65x70		extends E. wall
22	A	1	612.44	406.20	NC	Bioturbation (root)	Bisected	20x21x26		
23	B	1	611.60	405.40	Undetermined	--	NS	35x80		
24	A	1	620.80	405.43	Undetermined	--	NS	10x12		
25	C	1	621.90	406.90	Undetermined	--	NS	30x80		extends E. wall
26	A	1	624.20	406.85	Undetermined	--	NS	9x9		
27	A	1	625.65	405.23	NC	Bioturbation (root)	Bisected	20x22x29		
28	A	1	629.08	405.08	Undetermined	--	NS	12x12		
29	A	1	633.50	405.55	NC	Bioturbation (root)	Bisected	15x21x12		
30	B	1	635.35	406.95	Undetermined	--	NS	10x30		extends E. wall
31	B	1	636.05	405.55	NC	Bioturbation (rodent)	Bisected	45x80x20		

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
32	H	2	521.10	416.70	Undetermined	--	NS	110x145		extends E. wall
33	D	2	524.35	416.40	Undetermined	--	NS	57x125		extends E. wall
34	I	2	529.50	416.35	Undetermined	--	NS	35x150		extends E. wall
35	A	2	532.00	416.10	Undetermined	--	NS	12x30		
36	A	2	537.15	415.25	Undetermined	--	NS	17x17x27		
37	A	2	544.90	416.80	P/H	Possible Postmold	Excavated	20x18x16		Tapered profile, rounded base
38	A	2	546.25	416.90	P/H	Possible Postmold	Excavated	21x20x28		Tapered profile, slightly pointed base
39	B	2	546.40	416.40	Undetermined	--	NS	30x30		
40	A	2	558.80	415.50	Undetermined	--	NS	10x10		
41	A	2	559.20	415.45	Undetermined	--	NS	12x15		
42	A	2	559.15	415.80	NC	Bioturbation (root/rodent)	Bisected	20x20x28		adjacent to Fea 43
43	A	2	559.15	416.05	NC	Bioturbation	Bisected	12x9x12		adjacent to Fea 42
44	A	2	564.55	415.50	NC	Bioturbation (root/rodent)	Bisected	17x9x4		
45	A	2	546.69	416.02	NC	Bioturbation	Bisected	13X8X2		very shallow
46	B	2	565.15	415.65	Undetermined	--	NS	23x32		
47	A	2	565.20	415.57	NC	Bioturbation (root/rodent)	Bisected	9x9x7		
48	B	2	566.85	415.75	Undetermined	--	NS	35x75		
49	D	2	569.20	415.55	Undetermined	--	NS	36x137		extends W. wall
50	A	2	569.50	415.60	Undetermined	--	NS	20x27		
51	I	2	570.55	416.05	Undetermined	--	NS	65x177		extends E. wall
52	B	2	572.35	415.25	Undetermined	--	NS	28x47		
53	B	2	575.80	416.30	Undetermined	--	NS	28x30		
54	A	2	580.00	415.10	Undetermined	--	NS	17x23		
55	A	2	581.55	415.35	Undetermined	--	NS	12x12		
56	B	2	582.05	415.95	Undetermined	--	NS	22x33		
57	A	2	582.25	415.15	Undetermined	--	NS	13x15		
58	A	2	584.00	415.15	NC	Bioturbation (root/rodent)	Excavated	24x28x15		
59	I	2	584.30	416.70	NC	Root burn	Bisected	13x55x29		
60	B	2	586.55	416.40	NC	Bioturbation (root/rodent)	Bisected	24x40x22		
61	A	2	586.20	416.25	NC	Bioturbation (root/rodent)	Bisected	18x22x29		poss extension of Fea 60
62	A	2	588.60	415.10	Undetermined	--	NS	20x20		
63	I	2	589.85	416.75	Undetermined	--	NS	25x40		

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
64	B	2	590.35	415.65	NC	Bioturbation (rodent)	Bisected	35x25x5		triangular/circular; loose recent fill
65	A	2	591.00	416.65	Undetermined	--	NS	18x20		poss STP J26
66	A	2	606.60	415.20	Undetermined	--	NS	17x22		
67	A	2	609.90	416.10	Undetermined	--	NS	25x25		
68	A	2	615.00	416.43	Undetermined	--	NS	13x13		
69	A	2	619.80	415.10	Undetermined	--	NS	13x13		
70	A	2	621.65	415.20	Undetermined	--	NS	15x15		
71	B	2	623.30	416.70	NC	Bioturbation	Bisected	20x30x20		
72	D	2	628.15	416.10	NC	Bioturbation (root)	Bisected	25x70x9		oval w/ C14 and gray halo
73	B	2	590.23	415.15	Undetermined	--	NS	30x35		poss STP J19
74	B	3	510.20	425.55	Undetermined	--	NS	20x55		
75	A	3	513.10	425.67	Undetermined	--	NS	25x25		
76	H	3	515.15	426.80	Undetermined/ H	--	NS	50x100		Dark stain with rock; adjacent to Fea 77; extends E. wall
77	H	3	517.05	426.50	H	Shallow Historic Refuse Pit	Bisected	95x214x26	92 Historic (faunal, glass, ceramic, metal)	Near Fea 76 and 78
78	H	3	516.00	425.50	Undetermined/ H	--	NS	120x220		Oval to rectangular dark stain; adjacent to Fea 77; extends W. wall
79	A	3	525.55	425.55	Undetermined	--	NS	10x18		
80	A	3	525.55	425.30	Undetermined	--	NS	10x10		
81	C	3	527.20	425.25	Undetermined	--	NS	60x120		
82	H	3	530.00	426.00	Undetermined/ H	--	NS	200x330		Rock filled stain with sharp parallel edges; bisects trench; includes channers, broken cobbles and burned wood plank
83	D	3	534.20	425.65	H	Large, shallow basin; undetermined function; historic	Excavated	220x90x10	1 window glass; 2 debitage	1 glass from base; south of Fea 85
84	D	3	537.80	426.85	Undetermined	--	NS	35x155		
85	D	3	538.00	425.65	H	Shallow basin; undetermined function; historic	Excavated	100x62x13		North of Fea 83
86	A	3	541.45	425.70	Undetermined	--	NS	10x10		

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
87	A	3	541.95	426.80	Undetermined	--	NS	15x15		
88	A	3	548.55	425.45	Undetermined	--	NS	20x20		
89	A	3	549.30	426.55	Undetermined	--	NS	13x13		
90	A	3	560.00	426.70	Undetermined	--	NS	20x20		
91	A	3	564.10	425.85	Undetermined	--	NS	12x15		
92	A	3	564.52	425.77	NC	Bioturbation	Bisected	14x14x39		C14, gray halo w/ depth; loose fill
93	A	3	565.00	425.85	NC	Bioturbation	Bisected	11x11x26		loose recent fill
94	A	3	564.85	426.40	Undetermined	--	NS	10x20		
95	A	3	564.75	426.29	NC	Bioturbation (rodent)	Bisected	14x15x12		
96	I	3	564.25	426.65	Undetermined	--	NS	25x40		
97	A	3	563.90	426.45	Undetermined	--	NS	15x18		
98	B	3	565.30	426.45	Undetermined	--	NS	20x56		
99	A	3	571.80	426.65	Undetermined	--	NS	18x20		
100	B	3	573.72	426.62	NC	Bioturbation (rodent)	Bisected	27x34x18		
101	A	3	578.15	425.30	NC	Bioturbation (rodent)	Bisected	12X12X16		
102	A	3	480.05	425.85	NC	Bioturbation	Bisected	8x9x1		
103	A	3	480.15	426.09	NC	Bioturbation	Bisected	10x11x2		
104	D	3	582.65	425.35	Undetermined	--	NS	40x95		
105	A	3	583.40	426.75	Undetermined	--	NS	15x20		
106	I	3	590.67	425.22	Undetermined	--	NS	15x60		
107	D	3	592.40	426.70	Undetermined	--	NS	65x85		
108	A	3	597.25	426.20	Undetermined	--	NS	20x25		
109	B	3	599.15	425.40	Undetermined	--	NS	33x48		
110	A	3	597.80	425.80	Undetermined	--	NS	20x25		
111	B	3	617.00	426.55	Undetermined	--	NS	30x50		
112	I	3	621.70	425.60	Undetermined	--	NS	35x100		
113	D	3	624.15	426.75	Undetermined	--	NS	35x85		
114	A	2	615.53	416.50	Undetermined	--	NS	17x20		Numbered out of sequence
115	B	4	508.35	436.10	Undetermined	--	NS	42x70		
116	A	4	511.20	435.90	Undetermined	--	NS	18x25		
117	D	4	513.10	436.60	Undetermined	--	NS	25x87		
118	B	4	522.40	436.15	Undetermined	--	NS	15x78		

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
119	D	4	524.57	436.00	Undetermined	--	NS	18x85		
120	I	4	539.15	435.35	Undetermined	--	NS	30x60		
121	A	4	542.60	435.67	Undetermined	--	NS	20x23		
122	B	4	549.55	443.58	NC	Bioturbation (tree root)	Bisected	33x40x58+		tap root continues below 58cm
123	A	4	560.40	435.55	Undetermined	--	NS	8x9		
124	A	4	561.10	436.77	Undetermined	--	NS	14x16		
125	I	4	561.90	435.35	Undetermined	--	NS	40x45		
126	A	4	562.80	436.35	Undetermined	--	NS	14x15		
127	A	4	563.33	435.98	Undetermined	--	NS	18x18		
128	B	4	567.35	436.00	Undetermined	--	NS	20x50		
129	A	4	570.20	436.70	Undetermined	--	NS	18x35		
130	I	4	572.75	435.75	Undetermined	--	NS	120x140		
131	B	4	575.63	435.82	Undetermined	--	NS	25x37		
132	I	4	580.45	435.45	Undetermined	--	NS	90x250		
133	A	4	584.30	435.33	Undetermined	--	NS	12x12		
134	A	4	585.10	435.92	Undetermined	--	NS	20x20		
135	A	4	585.32	435.95	Undetermined	--	NS	10x13		
136	B	4	589.00	436.64	NC	Root burn	Bisected	48x24x10		semi-circular w/ some oxidation and C14
137	B	4	590.25	435.25	Undetermined	--	NS	25x58		
138	B	4	593.00	436.25	NC	Root burn	Bisected	33x26x32+		ovoid w/ oxidation and C14 flecks; ass w/ Fea 140
139	A	4	592.05	436.80	Undetermined	--	NS	13x13		
140	B	4	592.50	437.00	NC	Root burn	Bisected	40x21x20		
141	A	4	594.30	436.55	Undetermined	--	NS	18x20		
142	A	4	605.40	435.40	Undetermined	--	NS	22x22		
143	B	5	518.25	445.78	Undetermined	--	NS	20x25		
144	B	5	524.30	445.20	Undetermined	--	NS	21x45		
145	A	5	536.57	446.10	Undetermined	--	NS	12x14		
146	I	5	537.89	446.36	NC	Tree/Root burn	Bisected	121x65x30		
147	A	5	539.62	445.28	Undetermined	--	NS	18x25		
148	A	5	541.80	445.70	NC	Bioturbation (root/rodent)	Bisected	8x9x16		angles to N, very narrow, faint
149	A	5	542.10	446.06	NC	Bioturbation (root)	Bisected	18x17x29		Corona at base

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
150	OX	5	543.33	445.99	P	Oxidized stain/thermal feature	Excavated	55x56x9	0	Dated 5120+/- 40 B.P. (MA); shallow basin-shaped profile, C14 flecks
151	A	5	545.27	445.25	NC	Bioturbation (root)	Bisected	17x17x27		Corona at base
152	A	5	554.09	446.19	NC	Bioturbation (root)	Bisected	16x11x28		corona visible, angled
153	OX	5	555.99	446.63	P	Oxidized stain/thermal feature	Excavated	38x70x5	1 debitage	Dated 2780+/-40 B.P. (EW); shallow basin-shaped profile; C14 flecks
154	B	5	556.50	445.24	P	Dark stain/thermal feature	Excavated	62x35x6.5	0	Dated 2760+/-30 B.P. (EW); shallow basin-shaped profile,C14 flecks
155	A	5	557.00	446.81	NC	Bioturbation (root)	Excavated	8x7x11		C14 flecks, base appears slightly tapered
156	A	5	558.18	445.33	NC	Bioturbation (root burn)	Bisected	12x14x12.5		C14 flecks, corona visible
157	A	5	565.15	446.20	Undetermined	--	NS	13x17		
158	A	5	567.40	445.60	Undetermined	--	NS	20x25		
159	A	5	569.10	446.70	Undetermined	--	NS	12x12		
160	B	5	569.73	446.70	Undetermined	--	NS	22x35		
161	OX	5	571.20	445.40	P	Oxidized stain/thermal feature	Excavated	95x78x29.5	0	not dated; basin, bright red center w/ dark red,C14 flecks/base
162	A	5	571.85	446.70	Undetermined	--	NS	20x25		
163	A	5	580.95	445.23	Undetermined	--	NS	20x30		
164	A	5	586.15	445.00	NC	Bioturbation (tree/rodent)	Bisected	20x18x25		widens w/ depth, extends W wall
165	A	5	588.05	446.42	Undetermined	--	NS	15x15		
166	A	5	588.40	446.83	Undetermined	--	NS	14x20		
167	A	5	588.65	446.75	Undetermined	--	NS	8x10		
168	A	5	588.05	445.20	NC	Bioturbation	Bisected	12x11x8		
169	A	5	589.10	454.20	NC	Bioturbation	Bisected	23x20x10		
170	A	5	591.35	445.12	Undetermined	--	NS	16x20		
171	OX	5	592.16	445.67	P	Oxidized stain/thermal feature	Excavated	52x90x26	1 debitage, I FCR	Dated 7150+/-30 B.P. (MA); basin shaped
172	I	5	593.52	446.61	NC	Root Burn	Bisected	102x62x31		mottled, root-like extensions, lenses of fill
173	D	5	606.60	445.80	Undetermined	--	NS	105x170		
174	A	5	605.20	446.65	Undetermined	--	NS	20x20		

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
175	A	5	606.60	446.93	Undetermined	--	NS	8x12		
176	B	6	508.70	455.75	Undetermined	--	NS	25x27		
177	A	6	522.75	456.40	Undetermined	--	NS	18x18		
178	I	6	538.75	455.90	Undetermined	--	NS	20x33		
179	D	6	543.90	456.30	Undetermined	--	NS	65x135		
180	A	6	553.95	456.50	Undetermined	--	NS	17x17		
181	B	6	559.50	456.05	Undetermined	--	NS	24x38		
182	A	6	560.78	456.40	Undetermined	--	NS	10x10		
183	A	6	567.16	456.69	NC	Bioturbation	Bisected	8x16x10		right-angle turn with depth
184	H	6	571.20	456.75	Undetermined	--	NS	50x52		
185	I	6	572.74	455.56	NC	Bioturbation (rodent)	Bisected	40x46x24		splits into two parts w/ depth
186	A	6	583.12	456.40	Undetermined	--	NS	18x25		
187	A	6	583.90	455.30	Undetermined	--	NS	10x12		
188	I	6	591.30	455.20	Undetermined	--	NS	10x45		
189	A	6	591.14	455.58	Undetermined	--	NS	10x15		
190	B	6	585.83	455.81	NC	Bioturbation (rodent/root)	Bisected	35x46x35		extends E wall of trench, fresh rodent dist, irregular base
191	C	6	593.95	456.35	NC	Root burn	Bisected	80x70x23		circular, gravels/cobbles, C14 flecks
192	B	7	505.52	481.72	Undetermined	--	NS	27x50		
193	B	7	509.95	480.30	Undetermined	--	NS	47x90		
194	A	7	512.45	480.05	Undetermined	--	NS	15x20		
195	I	7	512.45	480.35	Undetermined	--	NS	12x20		
196	A	7	512.78	480.72	Undetermined	--	NS	17x26		
197	A	7	514.85	480.15	Undetermined	--	NS	15x15		
198	I	7	550.25	480.25	Undetermined	--	NS	47x90		
199	A	7	557.27	480.87	Undetermined	--	NS	18x23		
200	I	7	558.35	481.75	Undetermined	--	NS	15x52		
201	A	7	568.65	480.50	Undetermined	--	NS	13x27		
202	A	7	571.08	481.17	Undetermined	--	NS	17x33		
203	A	7	572.25	480.20	Undetermined	--	NS	15x15		
204	A	7	572.55	480.05	Undetermined	--	NS	10x12		
205	B	7	573.20	480.23	Undetermined	--	NS	27x45		

Fea #	Fea Type Code	Trench	North	East	Cultural Status*	Description (Sampled Features)	Sampling Technique+	Dimensions	Artifacts	Comments**
206	A	7	574.35	480.80	Undetermined	--	NS	18x27		
207	B	7	575.10	480.73	Undetermined	--	NS	23x40		
208	I	7	575.95	480.20	Undetermined	--	NS	18x45		
209	C	7	582.85	480.85	Undetermined	--	NS	60x110		
210	B	7	596.80	456.10	Undetermined	--	NS	50x65		
211	A	5	550.1	446.25	Undetermined	--	NS	8x8		Numbered out of sequence
212	A	4	575.95	435.77	Undetermined	--	NS	13x17		Numbered out of sequence
Total	**212**									

*H=Historic, P=Prehistoric, NC=Noncultural; +NS=Not Sampled;** MA=Middle Archaic; EW=Early Woodland

Table 11. Site 36LU301 Phase II: Summary of Sampled Features

Fea #	Fea Code	Trench	North	East	Cultural Status*	Description	Sampling Technique	Dimensions LxWxD (cm)	Artifacts P/H*	Comments
Prehistoric Thermal Features (n=5)										
150	OX	5	543.33	445.99	P	Oxidized stain with charcoal flecking; shallow basin-shaped profile	Excavated	55x56x9	--	Dated 5120+/- 40 B.P. (MA); shallow basin, C14 flecks,
153	OX	5	555.99	446.63	P	Oxidized stain with charcoal flecking; shallow basin-shaped profile	Excavated	38x70x5	1 P (debitage)	Dated 2780+/-40 B.P. (EW); shallow basin, C14 flecks,
154	B	5	556.50	445.24	P	Dark stain with charcoal flecking; shallow basin-shaped profile	Excavated	62x35x6.5	--	Dated 2760+/-30 B.P. (EW); shallow basin,C14 flecks t
161	OX	5	571.20	445.40	P	Oxidized stain with charcoal flecking; basin-shaped profile	Excavated	95x78x29.5	--	Undated; basin, bright red center w/ dark red outer,C14 flecks
171	OX	5	592.16	445.67	P	Oxidized stain with charcoal flecking; basin-shaped profile	Excavated	52x90x26	2 P (1 debitage, 1 FCR)	Dated 7150+/-30 B.P. (MA); basin shaped
Prehistoric/Historic Postmolds (n=2)										
38	A	2	546.25	416.90	P / H	Possible Postmold	Excavated	21x20x28	--	Tapered profile, rounded base
37	A	2	544.90	416.80	P/ H	Possible Postmold	Excavated	20x18x16	--	Tapered profile, slightly pointed base
Historic Features (n=3)										
77	H	3	517.05	426.87	H	Shallow Historic Refuse Pit	Bisected	95x214x26	92 H (faunal, glass, ceramic, metal)	Adjacent to Fea 76 and 78, pocket knife on surface
83	D	3	534.20	425.65	H	Large shallow basin; Undetermined function; historic	Excavated	220x90x10	1 H (window glass); 2 P (debitage)	1 glass from disturbed soils; south of Fea 85 and north of Fea 82
85	D	3	538.00	425.50	H	Shallow basin; Undetermined function; historic	Excavated	100x62x13	--	North of Fea 83 and Fea 82
Noncultural (n=45)										
1**	--	--	602.3	445.0	NC	Bioturbation (Tree burn)	Excavated	65x35x22	--	Exposed in TU 6
2	A	1	541.57	406.62	NC	Bioturbation (root)	Bisected	27x26x22	2 P (debitage)	
10	A	1	571.50	405.73	NC	Bioturbation (root)	Excavated	18x22x38	--	
22	A	1	612.44	406.20	NC	Bioturbation (root)	Bisected	20x21x26	--	
27	A	1	625.65	405.23	NC	Bioturbation (root)	Bisected	20x22x29	--	
29	A	1	633.50	405.55	NC	Bioturbation (root)	Bisected	15x21x12	--	
42	A	2	559.15	415.80	NC	Bioturbation (root/rodent)	Bisected	20x20x28	--	adjacent to Fea 43

Fea #	Fea Code	Trench	North	East	Cultural Status*	Description	Sampling Technique	Dimensions LxWxD (cm)	Artifacts P/H*	Comments
43	A	2	559.15	416.05	NC	Bioturbation	Bisected	12x9x12	--	adjacent to Fea 42
44	A	2	564.55	415.50	NC	Bioturbation (root/rodent)	Bisected	17x9x4	--	
45	A	2	546.69	416.02	NC	Bioturbation	Bisected	13X8X2	--	very shallow
47	A	2	565.20	415.57	NC	Bioturbation (root/rodent)	Bisected	9x9x7	--	
58	A	2	584.00	415.15	NC	Bioturbation (root/rodent)	Excavated	24x28x15	--	
61	A	2	586.20	416.25	NC	Bioturbation (root/rodent)	Bisected	18x22x29	--	poss extension of Fea 60; C14
92	A	3	564.52	425.77	NC	Bioturbation	Bisected	14x14x39	--	C14, gray halo w/ depth; loose fill
93	A	3	565.00	425.85	NC	Bioturbation	Bisected	11x11x26	--	loose recent fill
95	A	3	564.75	426.29	NC	Bioturbation (rodent)	Bisected	14x15x12	--	
101	A	3	578.15	425.30	NC	Bioturbation (rodent)	Bisected	12X12X16	--	
102	A	3	480.05	425.85	NC	Bioturbation	Bisected	8x9x1	--	
103	A	3	480.15	426.09	NC	Bioturbation	Bisected	10x11x2	--	
148	A	5	541.80	445.70	NC	Bioturbation (root/rodent)	Bisected	8x9x16	--	angles to N, very narrow/faint
149	A	5	542.10	446.06	NC	Bioturbation (root)	Bisected	18x17x29	--	Corona at base
151	A	5	545.27	445.25	NC	Bioturbation (root)	Bisected	17x17x27	--	Corona at base
152	A	5	554.09	446.19	NC	Bioturbation (root burn)	Bisected	16x11x28	--	corona visible, angled
155	A	5	557.00	446.81	NC	Bioturbation (root)	Excavated	8x7x11	--	C14 flecks
156	A	5	558.18	445.33	NC	Bioturbation (root burn)	Bisected	12x14x12.5	--	C14 flecks, corona visible
164	A	5	586.15	445.00	NC	Bioturbation (tree/rodent)	Bisected	20x18x25	--	widens w/ depth, extends into W trench wall
168	A	5	588.05	445.20	NC	Bioturbation	Bisected	12x11x8	--	
169	A	5	589.10	4454.20	NC	Bioturbation	Bisected	23x20x10	--	
183	A	6	567.16	456.69	NC	Bioturbation	Bisected	8x16x10	--	right-angle turn with depth
31	B	1	636.05	405.55	NC	Bioturbation (rodent)	Bisected	45x80x20	--	
60	B	2	586.55	416.40	NC	Bioturbation (root/rodent)	Bisected	24x40x22	--	loose recent fill
64	B	2	590.35	415.65	NC	Bioturbation (rodent)	Bisected	35x25x5	--	triangular/circular plan view; loose recent fill
71	B	2	623.30	416.70	NC	Bioturbation	Bisected	20x30x20	--	
100	B	3	573.72	426.62	NC	Bioturbation (rodent)	Bisected	27x34x18	--	
122	B	4	549.55	443.58	NC	Bioturbation (tree root)	Bisected	33x40x58+	--	tap root continues below 58cm

Fea #	Fea Code	Trench	North	East	Cultural Status*	Description	Sampling Technique	Dimensions LxWxD (cm)	Artifacts P/H*	Comments
136	B	4	589.00	436.64	NC	Root burn	Bisected	48x24x10	--	semi-circular w/ some oxidation and C14
138	B	4	593.00	436.25	NC	Root burn	Bisected	33x26x32+	--	ovoid w/ oxidation and C14 flecks; ass w/ Fea 140
140	B	4	592.50	437.00	NC	Root burn	Bisected	40x21x20	--	
190	B	6	585.83	455.81	NC	Bioturbation (rodent/root)	Bisected	35x46x35	--	extends into E trench wall, fresh rodent dist, irregular base
191	C	6	593.95	456.35	NC	Root burn	Bisected	80x70x23	--	circular, gravels/cobbles, C14 flecks
72	D	2	628.15	416.10	NC	Bioturbation (root)	Bisected	25x70x9	--	oval w/ C14 and gray halo
59	I	2	584.30	416.70	NC	Root burn	Bisected	13x55x29	--	
146	I	5	537.89	446.36	NC	Tree/Root burn	Bisected	121x65x30	--	
172	I	5	593.52	446.61	NC	Root burn	Bisected	102x62x31	--	mottled, root-like extensions, lenses of fill
185	I	6	572.74	455.56	NC	Bioturbation (rodent)	Bisected	40x46x24	--	splits into two parts w/ depth
TOTAL	**55**									

*H=Historic, P=Prehistoric, NC=Noncultural; **MA=Middle Archaic, EW=Early Woodland

Prehistoric Thermal Features

Five thermal-related features were identified on the surface of the B horizon in Trench 5 during plowzone stripping (see Figure 3, see Table 11). These features included all four oxidized stains (Features 150, 153, 161 and 171—Type OX) observed during fieldwork as well as one medium circular/oval stain (Feature 154—Type B) (see Figures 18a and 81b, Photographs 28-39). The four oxidized stains were characterized by circular to oval areas of reddened soil and charcoal flecking**;** Feature 154 contained charcoal flecking but no evidence of oxidation. In plan view the features had maximum dimensions of between 56 and 95 cm (22 and 37 in). The upper portion of each of these features had been truncated by plowing and by plowzone stripping.

Feature excavations exposed basin-shaped profiles with maximum depths ranging from 5 to 29.5 cm (2 to 12 in). Excavation of Feature 153 produced one debitage, while Feature 171 yielded one debitage and one piece of FCR. No cultural materials were recovered from the three remaining thermal features. These features are described below.

Feature 150

Feature 150 was a prehistoric thermal-related feature identified in the southwest portion of the site at N543.33 E445.99 during plowzone stripping activities (see Figure 3, see Figure 18a). It was exposed on the stripped B horizon surface in Trench 5, at approximately 30 cm below ground surface, and was one of four features categorized as oxidized stains (Type OX). In plan view, the feature consisted of a circular reddened stain measuring 55x56 cm (21.6x22.0 in), with a darker, charcoal flecked central zone (Figure 21, see Photograph 28).

Photograph 28. Site 36LU301: Feature 150, Plan View on B Horizon Surface (Trench 5), Facing West

It had a shallow, basin shaped profile extending to a maximum depth of 9 cm below the surface of the B horizon (Figure 22, see Photographs 29 and 30). The feature fill consisted of a yellowish-red (5YR 5/8) sandy silt loam with a 1-cm-(0.4-in) thick lens of dark reddish-brown (5 YR 3/2) sandy silt loam in the center.

Photograph 29. Site 36LU301: Feature 150, Profile, Facing Northwest

Photograph 30. Site 36LU301: Feature 150, Plan View of Excavated Feature, Facing Northwest

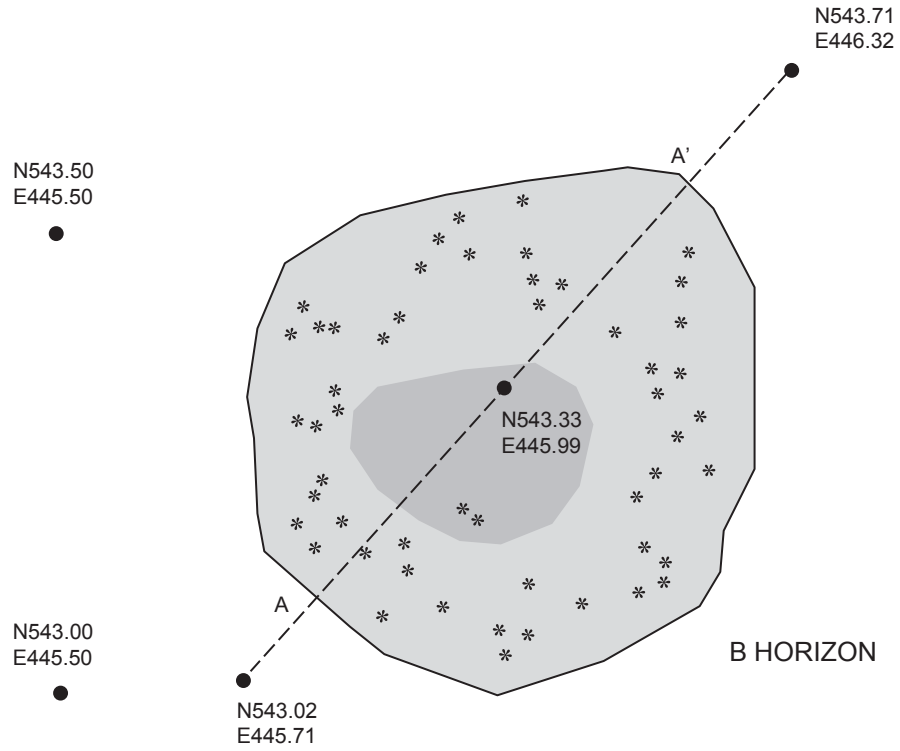
Feature 150 was mapped and photographed in plan view. It was then bisected along a northeast/southwest axis and the southeast half of the feature was excavated. Flotation samples were collected and the remaining soil was screened through 0.6-cm (0.25-in) mesh. Following recordation of the feature profile the northwest half of the feature was excavated and screened. Excavation of Feature 150 yielded no cultural materials.

Flotation samples collected from the feature fill (approximately 6 liters) were processed at GAI's Archaeology Laboratory and the carbonized specimens recovered from the heavy and light fractions were submitted to Justine McKnight for archaeobotanical analysis (Appendix J). Archaeobotanical analysis of these samples identified wood charcoal (pine) as well as non-carbonized (modern) seeds including pigweed, carpetweed and grass. The non-carbonized seeds are considered intrusive modern specimens representing contamination from factors such as bioturbation (i.e., root or rodent disturbances), fluvial action or aeolian forces. No carbonized plant food remains were identified in the samples.

Wood charcoal identified in the flotation sample was subsequently submitted to Beta Analytic for a radiocarbon assay (Appendix K). AMS counting analysis provided a radiocarbon age for Feature 150 of 5120+/-40 B.P. (Beta-309435), with a calibration intercept date of BC 3960 and with a 2 sigma calibrated range of BC 3980 to 3890 and BC 3880 to 3800. This indicates occupation/use of the site and formation of Feature 150 during the late Middle Archaic period.

Based on the results of Phase II investigations, Feature 150 was interpreted as the truncated remains of a basin-shaped hearth that was utilized by the site's prehistoric inhabitants during the Middle Archaic period. The absence of subsistence remains in the feature fill suggests that this hearth may have been used primarily for heat rather than for cooking.

SITE 36LU301
FEATURE 150
PLAN VIEW



:FEATURE 150 – YELLOWISH RED (5YR 5/8) SANDY SILT LOAM

:FEATURE150 – DARK REDDISH BROWN (5YR 3/2) SANDY SILT LOAM WITH CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

* :CHARCOAL FLECKING

SCALE

0 CM 20CM 40CM

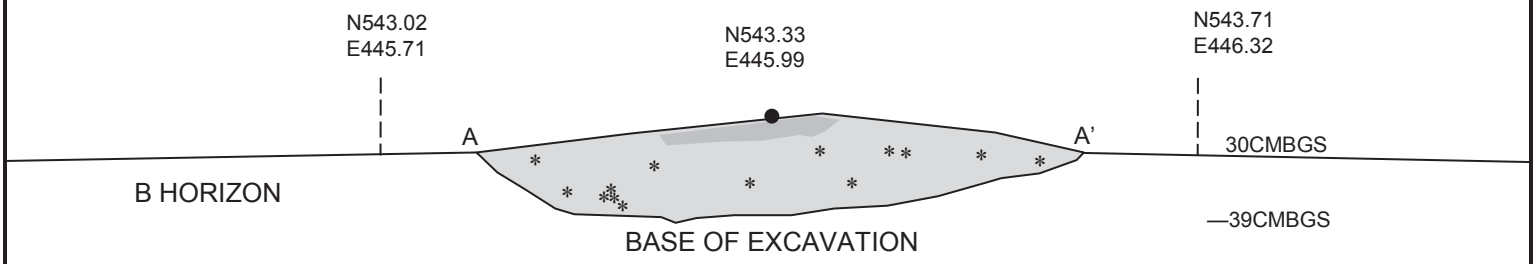
FIGURE 21
SITE 36LU301: FEATURE 150
PLAN VIEW

gai consultants

BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC.

DRWN: LMD DATE: 11/29/11
CHECKED: APPROVED: BAM

SITE 36LU301
FEATURE 150
NORTHWEST PROFILE



:FEATURE 150 – YELLOWISH RED (5YR 5/8) SANDY SILT LOAM

:FEATURE150 – DARK REDDISH BROWN (5YR 3/2) SANDY SILT LOAM WITH CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

* : CHARCOAL

SCALE

0 CM 20 CM 40 CM

FIGURE 22
SITE 36LU301: FEATURE 150
NORTHWEST PROFILE

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Feature 153

Like Feature 150, Feature 153 was a prehistoric thermal feature (Type OX) exposed during mechanical stripping of the plowzone in Trench 5, in the southwest portion of the site (see Figure 3). This feature was located at N555.99 E446.63, 12 meters (39 feet) north of Feature 150 and just one meter (3.3 feet) east of Feature 154 (see Figure 18a). Feature 153 was identified on the scraped B horizon surface, approximately 30 cm (12 in) below ground surface; the upper portion of the feature has been truncated by plowing. The feature appeared in plan view as an ovoid oxidized stain with dimensions of 38x70 cm (15x28 in) (Figure 23, Photograph 31). A lighter area was observed in its north-central portion and a scatter of charcoal flecking occurred at its south edge. In profile, the feature was basin-shaped with a maximum depth of 5 cm (2 in) below the stripped B horizon surface (Figure 24, Photographs 32 and 33). The feature fill consisted of a dark reddish gray (5YR 4/2) silt loam with mottles of yellowish-red (5YR 5/6) silt loam and with charcoal flecking. The area of yellowish-red silt loam, noted in the north-central portion, extended to the base of the feature.

Photograph 31. Site 36LU301: Feature 153, Plan View on B Horizon Surface (Trench 5), Facing North

Photograph 32. Site 36LU301: Feature 153, Profile, Facing Southeast

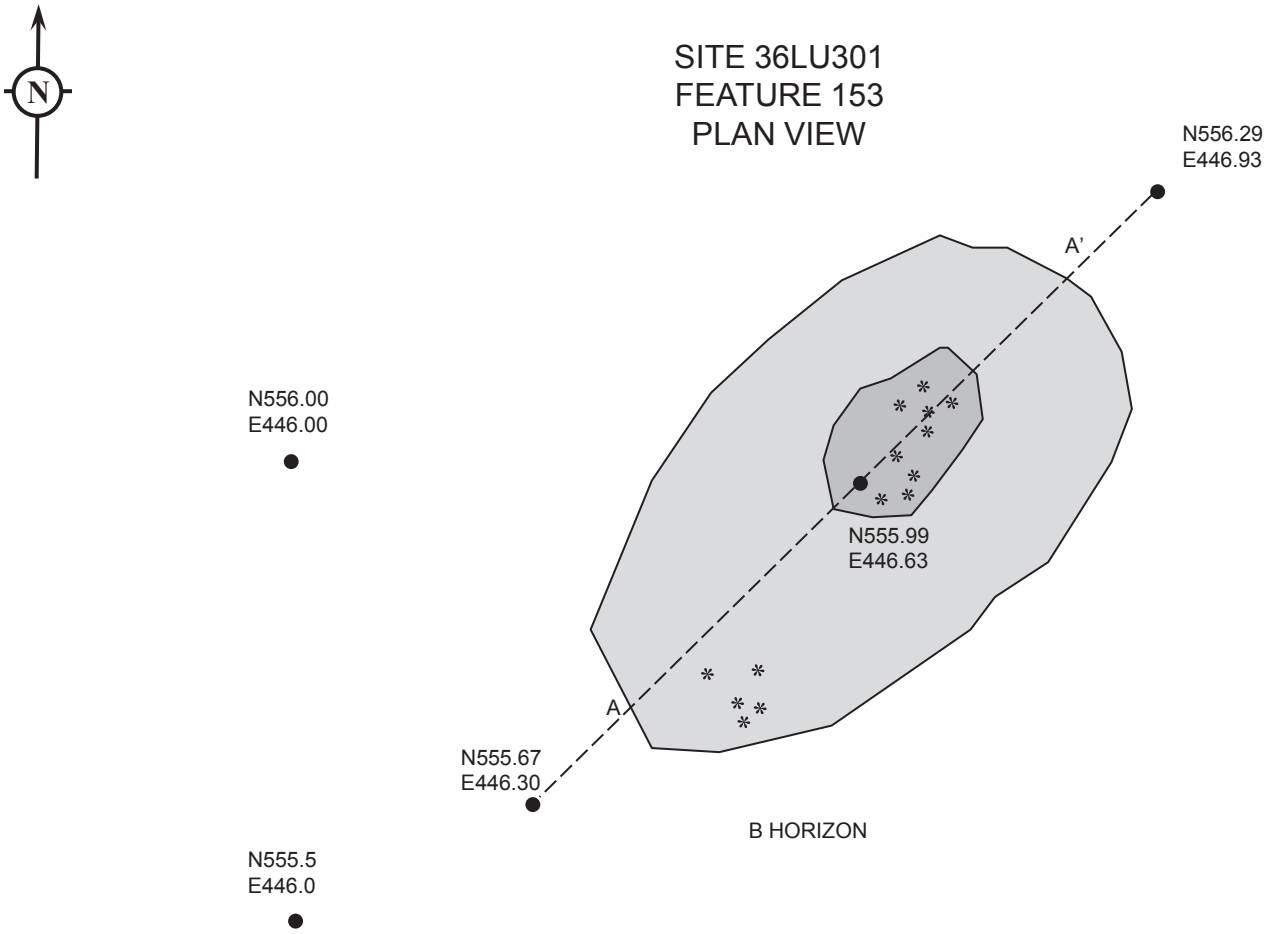
Photograph 33. Site 36LU301: Feature 153, Plan View of Excavated Feature, Facing Southeast

Feature 153 was bisected on a northeast/southwest axis and was excavated and documented as described above for Feature 150. One piece of lithic debitage (a biface reduction flake made from dark gray chert) was recovered from the feature fill.

Flotation samples (5 liters) collected from the feature fill were processed at GAI's Archaeology Laboratory and the carbonized specimens recovered from the heavy and light fractions were submitted to Justine McKnight for archaeobotanical analysis (see Appendix J). Similar to Feature 150 results, archaeobotanical analysis of Feature 153 identified wood charcoal (pine) and noncarbonized (modern) seeds representing pigweed and carpetweed. Analysis identified no carbonized plant food remains in these samples.

A sample of charcoal from the flotation samples was submitted to Beta Analytic for a radiocarbon assay (see Appendix K). AMS counting analysis provided a radiocarbon age for Feature 153 of 2780+/-40 B.P. (Beta-309436), with a calibration intercept date of BC 920 and with a 2 sigma range of BC 1010 to 830. Based on these results Feature 153 dates to the Early Woodland period.

The results of Phase II investigations indicate that Feature 153 represents the truncated remains of a shallow, basin-shaped hearth, utilized by the site's Early Woodland inhabitants for heat, and possibly for cooking. As noted above for Feature 150, the lack of subsistence remains suggests that food processing was not a primary function of Feature 153.



:FEATURE153 – DARK REDDISH GRAY (5YR 4/2) SILT LOAM MOTTLED WITH YELLOWISH RED (5YR 5/6) SILT LOAM WITH CHARCOAL FLECKING

:FEATURE 153 – YELLOWISH RED (5YR 5/8) SANDY SILT LOAM

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

* :CHARCOAL FLECKING

SCALE

0 CM 20CM 40 CM

FIGURE 23
SITE 36LU301: FEATURE 153
PLAN VIEW

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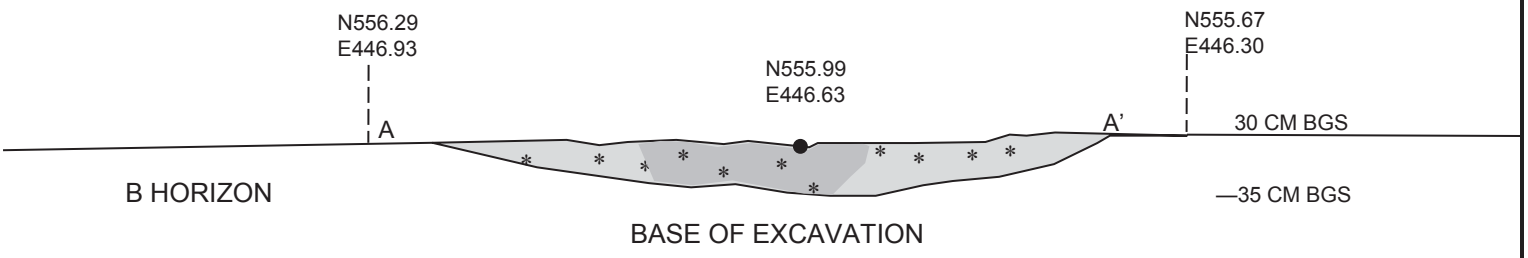
SITE 36LU301
FEATURE 153
SOUTHEAST PROFILE



:FEATURE153 – DARK REDDISH GRAY (5YR 4/2) SANDY SILT LOAM MOTTLED WITH YELLOWISH RED (5YR 5/6) SANDY LOAM WITH CHARCOAL FLECKING

:FEATURE 153 – YELLOWISH RED (5YR 5/8) SANDY SILT LOAM

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

* : CHARCOAL

SCALE

0 CM 20 CM 40 CM

FIGURE 24
SITE 36LU301: FEATURE 153
SOUTHEAST PROFILE

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PPL BELL BEND, LLC.

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Feature 154

Feature 154 was a prehistoric thermal feature (Type B) located on the stripped B horizon surface in Trench 5, just one meter (3.3 feet) west of Feature 153 (see Figure 3, see Figure 18a). In plan view this feature was observed as a dark, charcoal flecked, ovoid stain with dimensions of 35x62 cm (13.7x24.4 in) (Figure 25, Photograph 34). No evidence of oxidization was observed in this locality. Feature 154 had a shallow, slightly basin shaped profile extending a maximum of 6.5 cm (2.6 in) below the B horizon surface (Figure 26, Photograph 35 and 36). The feature fill was composed of a dark brown (7.5 YR 3/2) silt loam with charcoal flecking.

Photograph 34. Site 36LU301: Feature 154, Plan View on B Horizon Surface (Trench 5), Facing West

Photograph 35. Site 36LU301: Feature 154, Profile, Facing West

Feature 154 was bisected along its north/south axis and was documented and excavated as described above. Excavation of Feature 154 produced no artifacts.

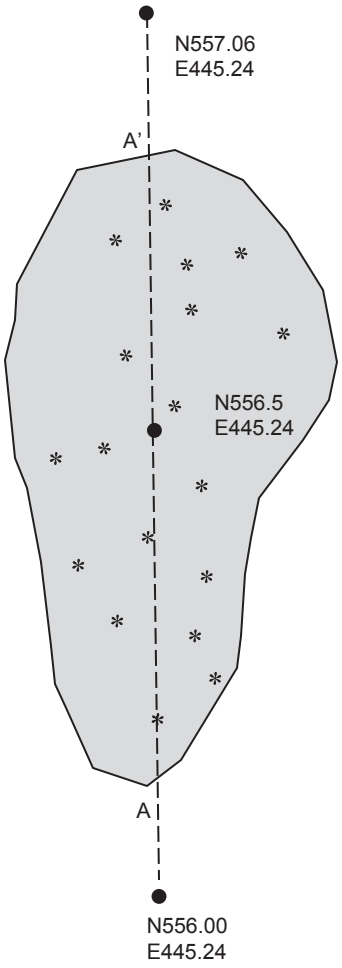
Photograph 36. Site 36LU301: Feature 154, Plan View of Excavated Feature, Facing North

Flotation samples collected from the feature were processed at GAI's Archaeology Laboratory and the recovered carbonized specimens (heavy and light fractions) were submitted to Justine McKnight for archaeobotanical analysis (see Appendix J). Archaeobotanical analysis identified wood charcoal including pine and hickory, along with non-carbonized (modern) seeds of copperleaves, pigweed and grass. No carbonized subsistence remains were observed in the samples.

Following archaeobotanical analysis, a charcoal sample from the feature was submitted to Beta Analytic for a radiocarbon assay (see Appendix K). AMS counting analysis provided a radiocarbon age for Feature 154 of 2760+/-30 B.P. (Beta-309437), with a calibration intercept date of BC 900 and with a 2 sigma range of BC 980 to 830. This analysis indicates an Early Woodland age for Feature 154, with a date very similar to nearby Feature 153.

Based on the results of Phase II investigations Feature 154 is interpreted as the truncated remains of a shallow, basin-shaped hearth that was utilized by the site's prehistoric Early Woodland inhabitants. Based on the absence of plant food remains in the sample of feature fill this hearth may have served primarily as a heat source, rather than for cooking.

SITE 36LU301
FEATURE 154
PLAN VIEW



B HORIZON

:FEATURE154 – DARK BROWN(75YR 3/2) SILT LOAM WITH CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

* :CHARCOAL FLECKING

SCALE

0 CM 20 CM 40 CM

FIGURE 25
SITE 36LU301: FEATURE 154
PLAN VIEW

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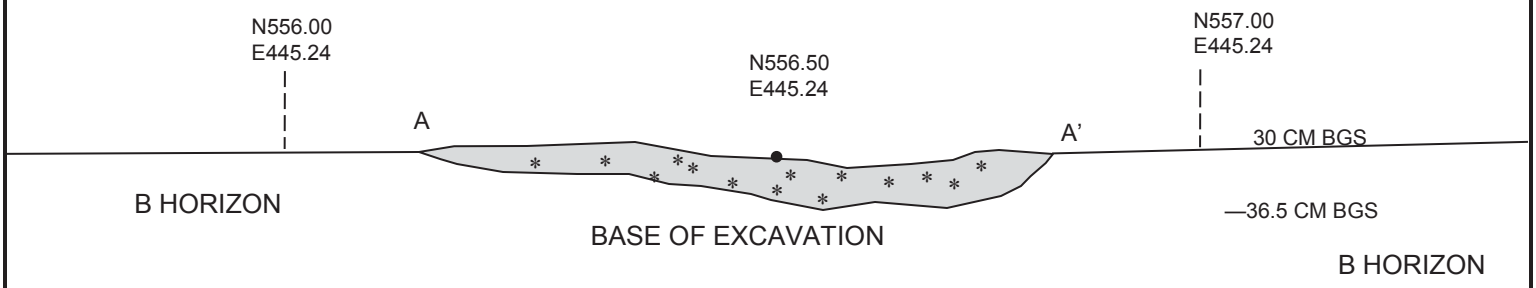
SITE 36LU301
FEATURE 154
WEST PROFILE



:FEATURE154 – DARK BROWN(75YR 3/2) SILT LOAM WITH CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

* : CHARCOAL

SCALE

0 CM 20 CM 40 CM

FIGURE 26
SITE 36LU301: FEATURE 154
WEST PROFILE

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Feature 161

Feature 161 was a prehistoric thermal feature (Type OX) exposed in the west central portion of the site, during mechanical plowzone stripping within Trench 5 (see Figure 3, see Figure 18a). It had a center point of N571.20 E445.40 and was situated approximately 15 meters (49 feet) north of Features 153 and 154 and 22 meters (72 feet) south of Feature 171. The feature was identified on the stripped B horizon surface at a depth of approximately 30 cm below ground surface. The upper portion of the feature had been truncated by previous plowing. In plan view, Feature 161 consisted of an ovoid oxidized stain measuring 78x95 cm (30.7x37.4 in), with a bright red central area and light charcoal flecking throughout (Figure 27, Photograph 37). Bioturbation (root/rodent disturbance) was observed within the feature fill and on thestripped surface of the B horizon immediately to its east. Feature excvation revealed a basin-shaped profile that extended to a maximum depth of 29.5 cm (11.6 in) below the B horizon surface (Figure 28, Photographs 38 and 39).

Photograph 37. Site 36LU301: Feature 161, Plan View on B Horizon Surface (Trench 5), Facing North

Photograph 38. Site 36LU301: Feature 161, Profile, Facing West

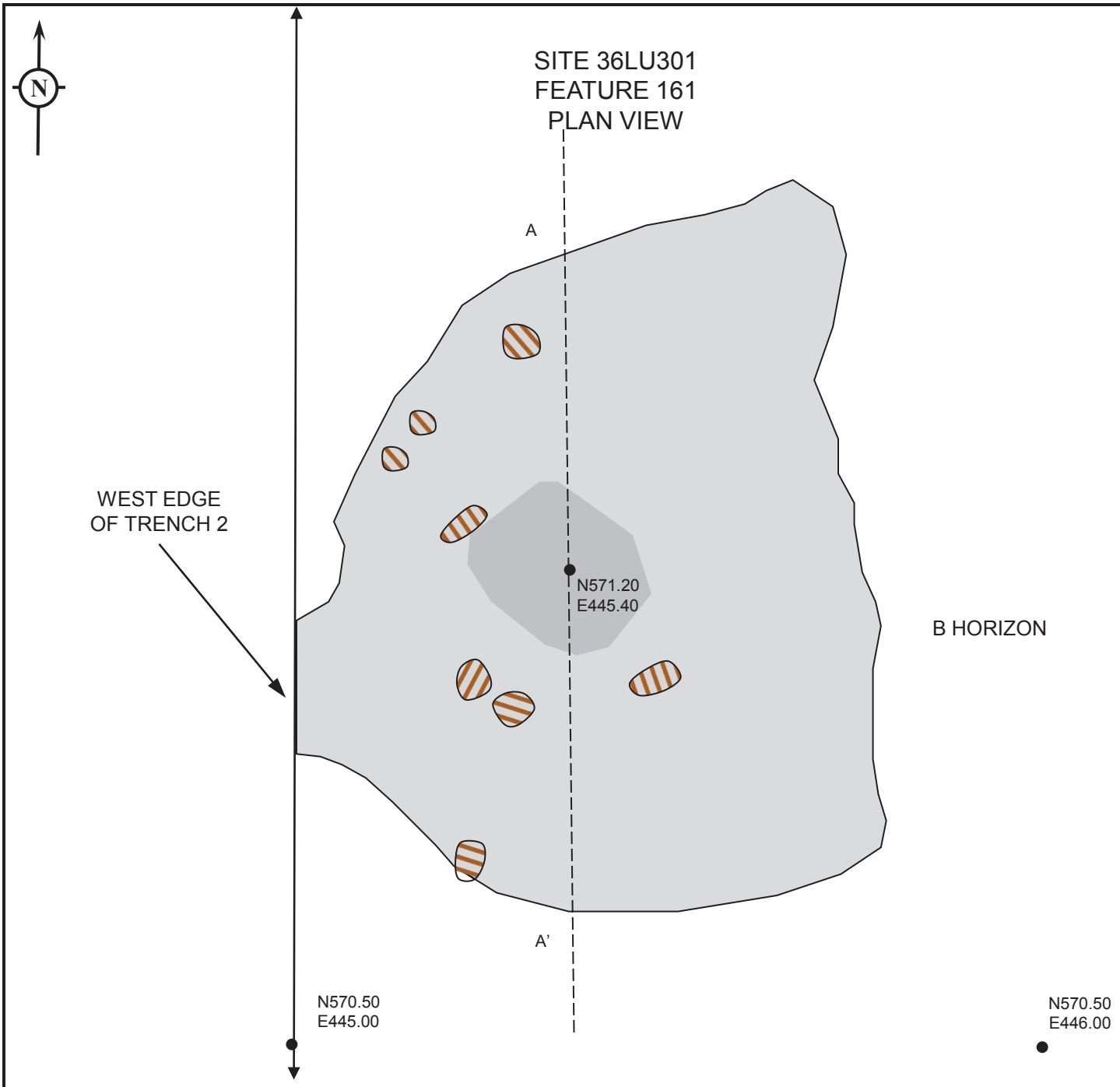
Photograph 39. Site 36LU301: Feature 161, Plan View of Excavated Feature, Facing South

This feature was bisected along its north/south axis and the east half was excavated as a single level. Flotation samples (7.5 liters) were collected from the east half and the remaining feature matrix was screened through 0.6-cm (0.25-in) mesh. The feature profile was recorded and the west half of the feature was removed in three 10-cm (4-in) levels. The feature fill included an approximately 8-cm- (3-in) thick central zone of red (10R 5/6) sandy silt loam surrounded by a yellowish-red (5YR 4/6) sandy silt loam. An approximately 1-cm- (0.4-in) thick layer of light charcoal flecking was observed at the base of the feature. An area of bioturbation extended through the southern portion of the feature profile. Excavation of Feature 161 yielded no artifacts.

Flotation samples were processed at GAI's Archaeology Laboratory and were submitted to Justine McKnight for archaeobotanical analysis (see Appendix J). Archaeobotanical analysis identified an extremely small amount of plant remains in the sample, including wood charcoal (white oak and unidentifiable wood) and non-carbonized (modern) seeds consisting of copperleaves, pigweed, carpetweed, purselane, sheep sorrel and grass. No carbonized remains of plant food were identified.

Because the extremely small amount of charcoal contained in the flotation samples was not adequate for AMS counting, materials from this feature were not submitted for radiocarbon dating.

Based on the results of Phase II investigations Feature 161 appears to represent the truncated remains of a prehistoric hearth, likely used primarily for heat. The extremely low quantity of charred plant material identified in the feature fill indicates that cooking was not a major function. Due to the absence of diagnostic cultural materials and the lack of sufficient recovered charcoal for AMS radiocarbon dating, the age of Feature 161 is indeterminate.



:FEATURE161– YELLOWISH BROWN (10YR 5/6) SANDY SILT LOAM

:FEATURE 161 – YELLOWISH RED (5YR4/6) SANDY SILT LOAM

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

*: CHARCOAL

: BIOTURBATION

SCALE

0 CM 20CM 40CM

FIGURE 27
SITE 36LU301: FEATURE 161
PLAN VIEW

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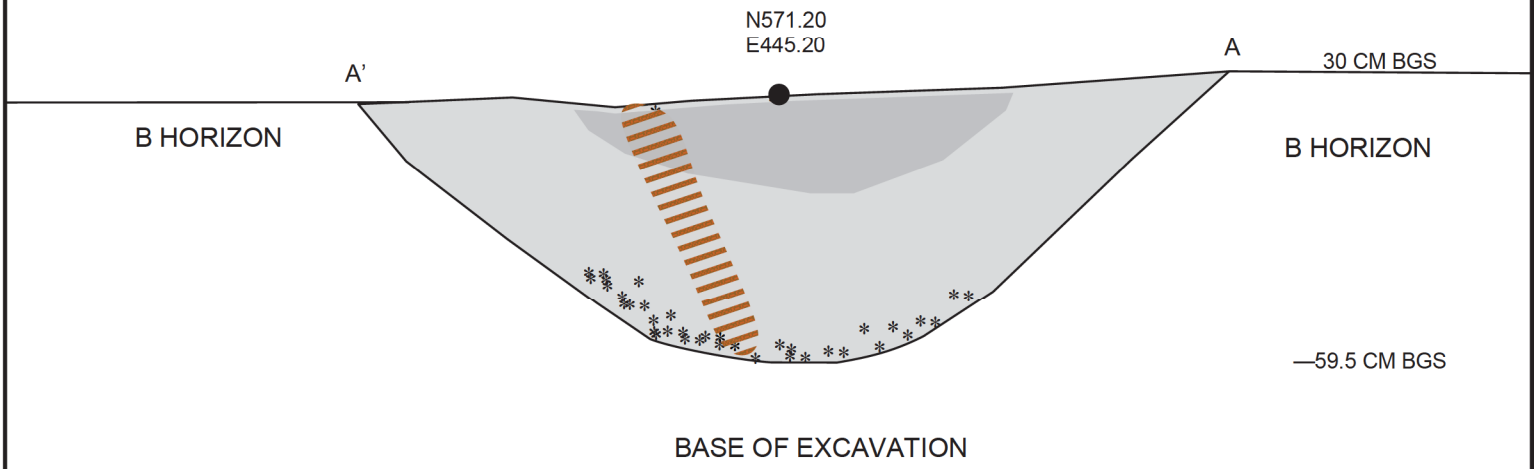
SITE 36LU301
FEATURE 161
WEST PROFILE



:FEATURE161– YELLOWISH BROWN (10YR 5/6) SANDY SILT LOAM

:FEATURE 161 – YELLOWISH RED (5YR4/6) SANDY SILT LOAM

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

*: CHARCOAL

: BIOTURBATION

SCALE

0 CM 20 CM 40 CM

FIGURE 28
SITE 36LU301: FEATURE 161
WEST PROFILE

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Feature 171

Feature 171, a prehistoric thermal feature (Type OX), was identified in the northwest portion of the site during plowzone stripping of Trench 5 (see Figure 3, see Figure 18b). It was the northernmost of the five thermal features exposed in Trench 5 and was located at N592.16 E445.67, approximately 22 meters (72 feet) north of Feature 161. Feature 171 was identified on the stripped surface of the B horizon approximately 25 cm below ground surface; the upper portion of the feature had been truncated by plowing. As defined in plan view, Feature 171 was a generally ovoid oxidized stain with dimensions of 52x90cm (20.5x35.4 in) (Figure 29, Photograph 40). The feature had a basin shaped profile with a maximum depth of 26 cm (10.2 in) below the stripped B horizon surface (Figure 30, Photographs 41 and 42). The feature fill was a yellowish-red (5YR 5/8) sandy silt loam mottled with grayish-brown (10YR 5/2) and brownish-yellow (10YR 6/6) and with slight charcoal flecking.

Photograph 40. Site 36LU301: Feature 171, Plan View on B Horizon Surface (Trench 5), Facing West

Photograph 41. Site 36LU301: Feature 171, Profile, Facing West

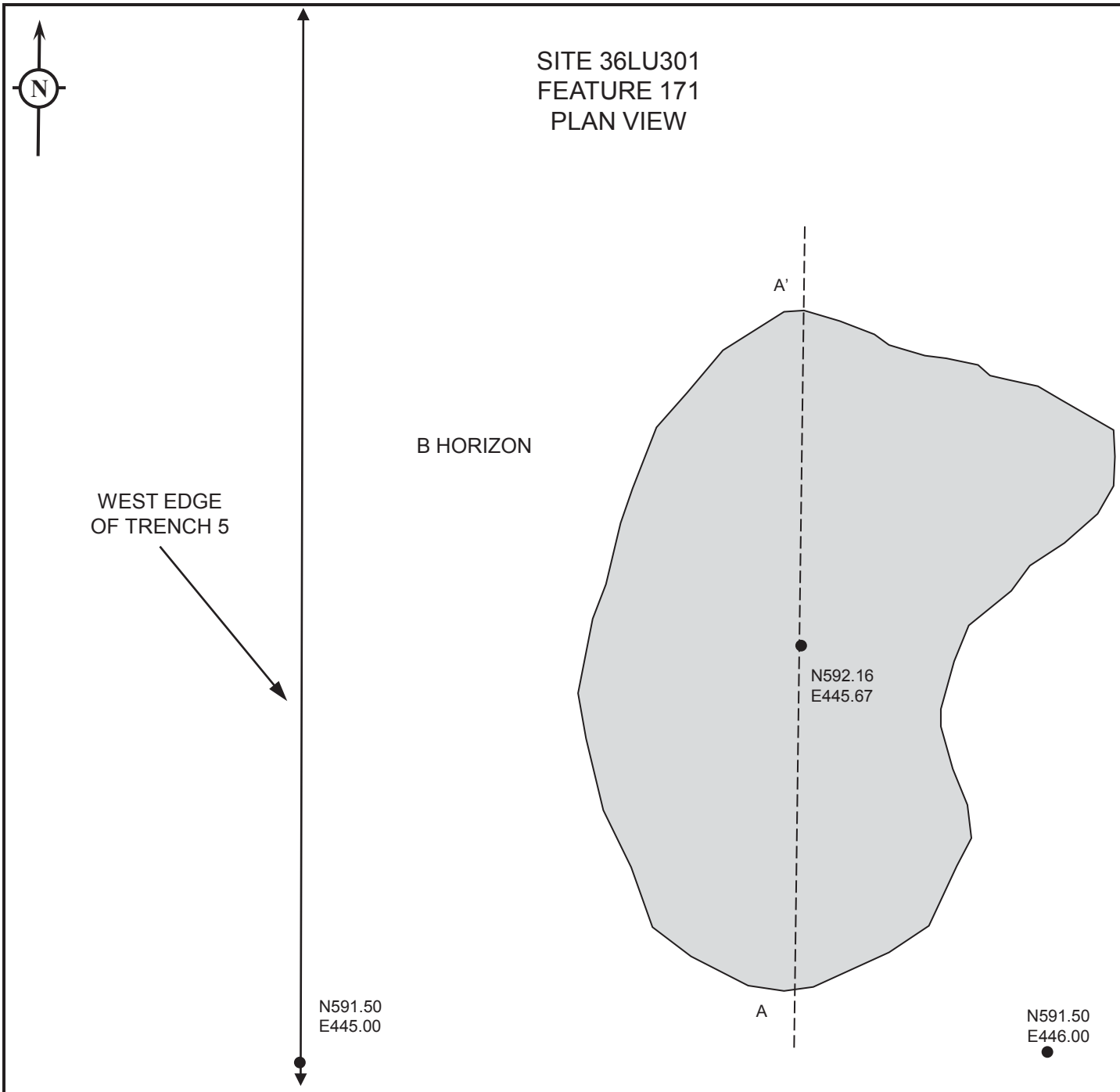
Feature 171 was bisected along its north/south axis and the east half was removed in three 10-cm arbitrary levels and all fill from this half was screened through 0.6-cm (0.25-in) mesh. The feature profile was recorded and the west half was also excavated in 10-cm levels. Flotation samples were collected from each level in the west half and the remaining feature fill was screened. One piece of debitage (a biface reduction flake made from dark gray chert) and one fire-cracked rock were recovered from the feature fill.

Photograph 42. Site 36LU301: Feature 171, Plan View of Excavated Feature, Facing West

Flotation samples were processed at GAI's Archaeology Laboratory and recovered carbonized specimens (heavy and light fractions) were submitted to Justine McKnight for archaeobotanical analysis (see Appendix J). Archaeobotanical analysis identified a low quantity of wood charcoal representing pine and chestnut, as well as non-carbonized (modern) seeds including copperleaves, carpetweed, purselane, sheep sorrel, knotweed/dock and grass. As with analysis of the samples from the other thermal features, no carbonized plant food remains were identified.

Following completion of archaeobotanical analysis, charcoal samples were submitted to Beta Analytic for a radiocarbon assay (see Appendix K). AMS counting analysis provided a radiocarbon age for Feature 171 of 7150+/-30 B.P. (Beta-309438), with a calibration intercept date of BC 6020, and with a 2 sigma range of BC 6060 to 5990. Radiocarbon analysis indicates that Feature 171 dates to the Middle Archaic period.

Based on the results of Phase II investigations Feature 171 is interpreted as the truncated remains of a basin-shaped hearth that was utilized by the site's Middle Archaic inhabitants for heat. Although the feature may have also been used for cooking, the absence of subsistence remains in the feature fill suggests that this was not a major function.



:FEATURE171– YELLOWISH RED (5YR 5/8) SANDY SILT LOAM MOTTLED WITH GRAYISH BROWN (10YR 5/2) AND BROWNISH YELLOW (10YR 6/6) SANDY SILT LOAM WITH SLIGHT CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

SCALE

0 CM 20CM 40CM

FIGURE 29
SITE 36LU301: FEATURE 171
PLAN VIEW

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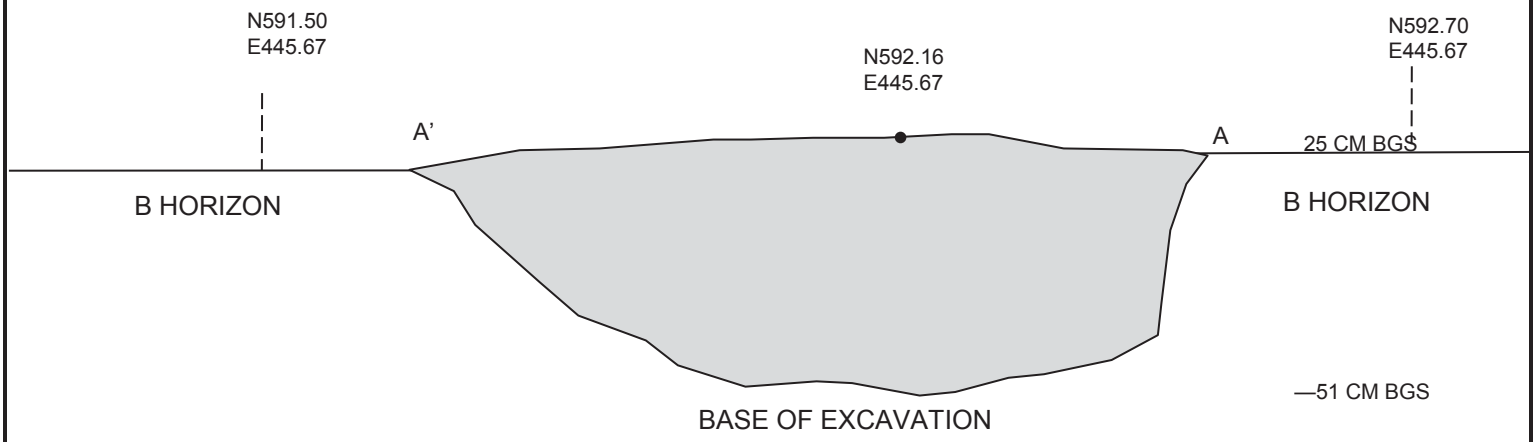
SITE 36LU301
FEATURE 171
WEST PROFILE



:FEATURE 171– YELLOWISH RED (5YR 5/8) SANDY SILT LOAM MOTTLED WITH GRAYISH BROWN (10YR 5/2) AND BROWNISH YELLOW (10YR 6/6) SANDY SILT LOAM WITH SLIGHT CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

SCALE

0 CM 20 CM 40 CM

FIGURE 30
SITE 36LU301: FEATURE 171
NORTH PROFILE

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Summary of Prehistoric Thermal Features

The five thermal features identified within the site during Phase II feature sampling represent the remains of burning events which resulted in reddened (oxidized) soils and/or concentrations of charcoal flecking in these localities. These features are very similar in size, morphology, and in the near-absence of artifacts or cultural remains. In addition, all five features were identified in a single 2-meter (6.5-foot) wide trench, extending in a north/south orientation across the site's upland landform in the western portion of the site (perpendicular to the location of Walker Run, situated south of the site). Their size and morphology suggest that they represent the remains of prehistoric hearth features, whose upper portion has been truncated by previous plowing. Three of the feature remnants (Features 150, 153 and 154) were just 5 to 9 cm (1.9 to 3.5 in) thick, while the other two (Features 161 and 171) had maximum depths of 26 to 29.5 cm (10.2 to 11.6 in). Excavation of these features revealed clear boundaries and a smooth, basin shaped profile. No evidence of an irregular base, as would be expected of a natural tree/root burn, was observed.

Based on radiocarbon analysis, two of the features (Features 150 and 171) date to the Middle Archaic period and two features (Features 153 and 154) date to the Early Woodland period; the remaining feature (Feature 161) yielded insufficient material for radiocarbon analysis and its date is unknown. Due to their close spatial proximity and their overlapping radiocarbon dates, it is possible that Features 153 and 154 represent a single prehistoric occupation.

Archaeobotanical analysis identified no evidence of charred subsistence remains in samples from any of the features; plant remains consisted of low quantities of wood charcoal (primarily pine) and numerous non-carbonized modern weed seeds. Two features (Features 153 and 171) yielded only one to two prehistoric artifacts each while the other three features produced no artifacts. No diagnostic lithic artifacts were recovered from the feature fill or surrounding vicinity. Additionally, no ceramics were found in association with the Early Woodland features (or from the site as a whole).

These features represent multiple prehistoric occupations of the site during the Middle Archaic and Early Woodland periods. However, due to the near dearth of artifacts or subsistence remains from the feature fill, as well as the overall the lack of associated artifacts in the surrounding portions of the site, these features provide little information on the nature of the site's prehistoric occupations.

Prehistoric/Historic Postmolds

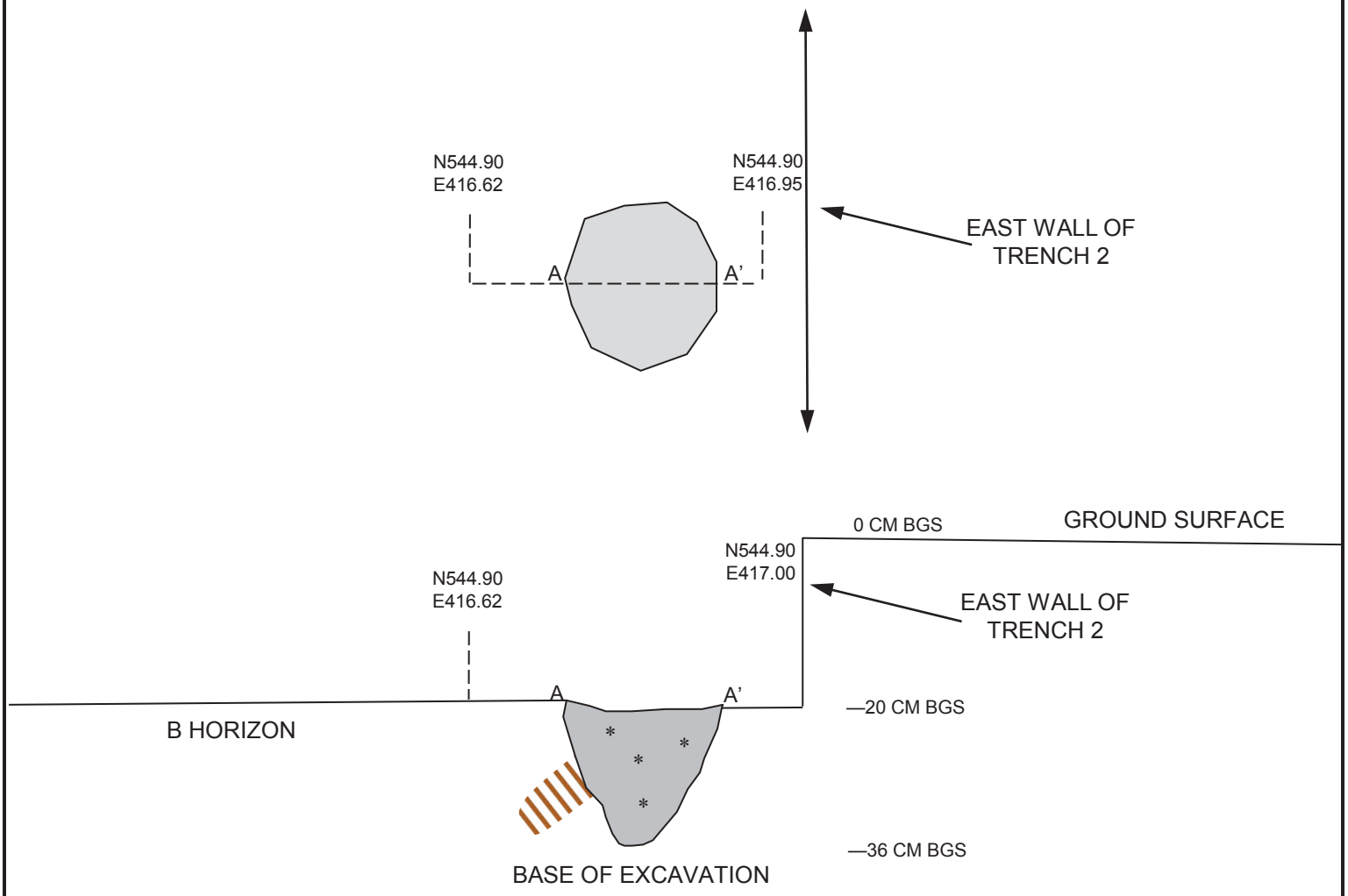
Two possible postmolds (Features 37 and 38) were identified during mechanical stripping of the plowzone in Trench 2, in the southwest portion of the site (see Figure 3, see Figure 15a, see Table 11). Both of these features were categorized as small circular/oval stains (Type A). The size and morphology of Features 37 and 38 suggest that they may represent the truncated remains of prehistoric postmolds. However, as these features produced no artifacts, do not appear to be part of a larger postmold pattern, and are not associated with other prehistoric features their prehistoric origin cannot be conclusively determined. It is also possible that these features may represent small historic period postmolds.

Feature 37

Feature 37 (Type A) was located in the southern section of Trench 2 at N544.90 E416.80 (see Figure 15a). It was exposed on the stripped surface of the B horizon at approximately 20 cm (7.9-in) below ground surface; its upper portion had been truncated by plowing. The feature was defined in plan view as a dark circular stain measuring 18x20 cm (7.1x7.9 in) (Figure 31). It was bisected along its east/west axis, exposing a straight, tapered profile with a rounded base and a maximum depth of 16 cm below the B horizon surface (see Figure 31, Photograph 43). The feature fill consisted of dark brown (10YR 3/3) sandy silt loam with mottles of yellowish-brown (10YR 5/6) and charcoal flecking. Excavation of the feature fill produced no artifacts. Feature 37 represents a possible prehistoric postmold or a small historic period postmold.

Photograph 43. Site 36LU301: Feature 37, Profile on B Horizon Surface (Trench 2), Facing North

SITE 36LU301
FEATURE 37 PLAN VIEW AND
NORTH PROFILE



:FEATURE 37- DARK BROWN (10YR 3/3) SANDY SILT LOAM WITH FEW MOTTLES OF YELLOWISH BROWN (10YR 5/6) SANDY SILT LOAM AND CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SANDY SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

*: CHARCOAL

: BIOTURBATION

SCALE

0 CM 20CM 40CM

FIGURE 31
SITE 36LU301: FEATURE 37
PLAN VIEW AND NORTH PROFILE

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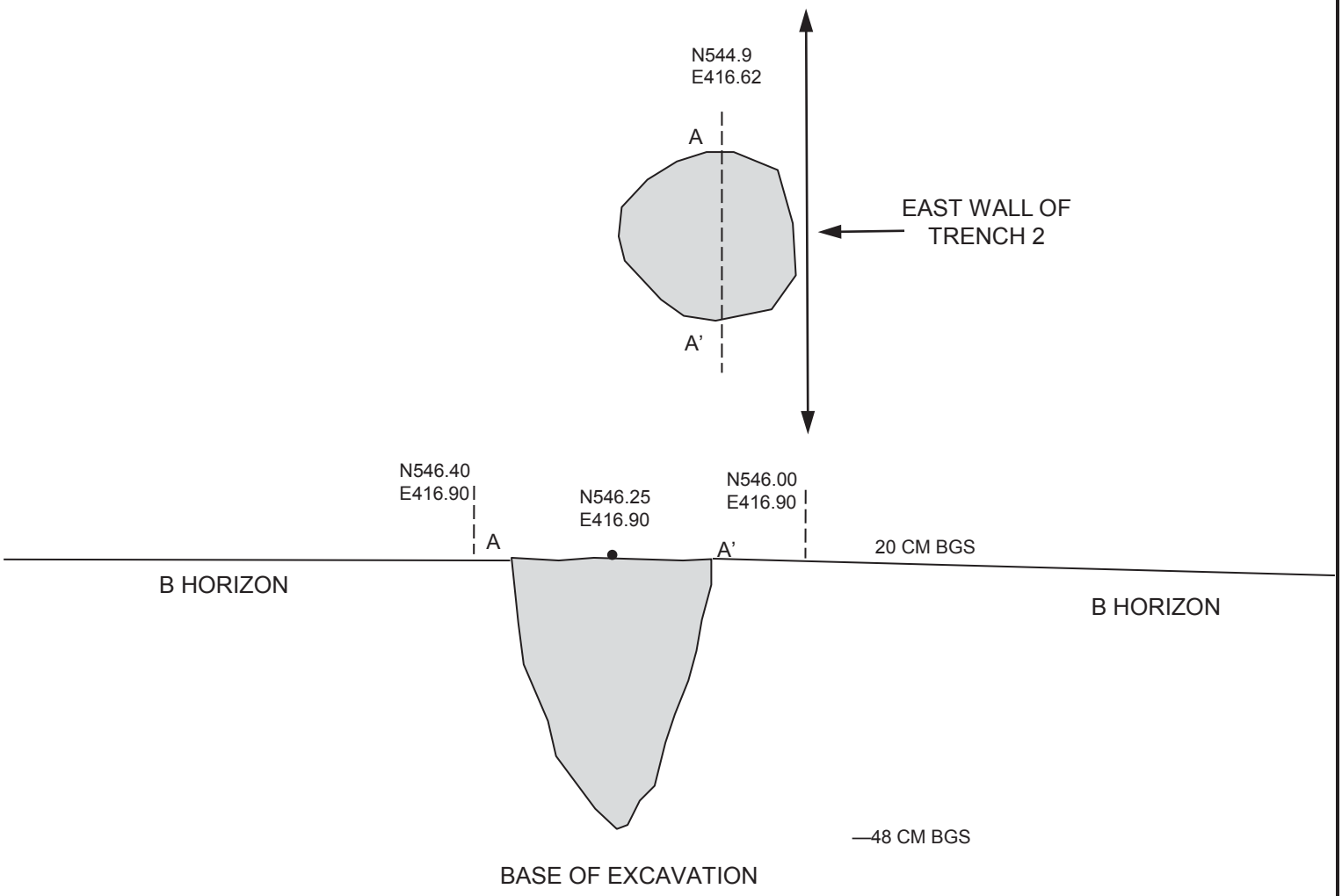
Feature 38

Feature 38 (Type A) was also located on the stripped B horizon surface in Trench 2, approximately 1.3 meters (4.3 feet) north of Feature 37 (see Figure 15a). It had a center point of N546.25 E416.90 and was observed at approximately 20 cm (7.9 in) below ground surface. This feature consisted of a dark circular stain with dimensions of 20x21 cm (7.9x8.3 in) (Figure 32). It had a straight, tapered profile with a slightly pointed base that extended to a depth of 28 cm below the stripped B horizon surface (see Figure 32, Photograph 44). The feature fill consisted of a brown (10YR 4/3) sandy loam. No artifacts were recovered from Feature 38. This feature is interpreted as the truncated remains of a prehistoric postmold or, as noted above, a small historic period postmold.

Photograph 44. Site 36LU301: Feature 38, Profile on B Horizon Surface (Trench 2), Facing East

SITE 36LU301
FEATURE 38 PLAN VIEW AND
EAST PROFILE



:FEATURE 37- DARK BROWN (10YR 3/3) SANDY SILT LOAM WITH CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SANDY SILT LOAM

NOTE:
A – A': BISECTION LINE

LEGEND

*: CHARCOAL

SCALE

0 CM 20CM 40CM

FIGURE 32
SITE 36LU301: FEATURE 38
PLAN VIEW AND EAST PROFILE

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Historic Features

Plowzone stripping exposed six large soil anomalies (Type H) that were considered likely to represent historic features (Features 32, 76, 77, 78, 82 and 184) (see Table 10). These features consisted of large dark stains with sharp boundaries and either a rectangular/oval shape or straight edges. Historic artifacts (i.e., pocket knife, ceramics, bone, charred wood) or rock fragments were observed on the exposed surface of these features. These historic features were concentrated in the southwest corner of the site, with five of the six features located south of the N532 gridline in Trench 3 (n=4) and Trench 2 (n=1) (see Figure 15a and Figure 16a); one Type H feature (Feature 184) was mapped approximately 50 meters (164 feet) further northeast in Trench 6 (N571 gridline) (see Figure 19b). One of the six historic (Type H) features (Feature 77) was sampled during Phase II investigations and was concluded to represent an historic trash pit (see Table 11). In addition, based on the results of feature sampling, two additional large oval stains (Feature 83 and 85) categorized as Type D features, and situated immediately north of the historic features in Trench 3, were concluded to represent possible historic features (see Table 11, see Figure 16a). The three sampled features concluded to be historic in origin (Features 77, 83 and 85) are described below.

Feature 77

Feature 77 was identified on the surface of the B horizon near the southern end of Trench 3 at N517.05 E426.50 in the vicinity of three other likely historic features (Features 76, 78 and 82) (see Figure 16a). Feature 76 and 78, consisting of dark oval to rectangular stains, abutted Feature 77 to the south and west, respectively (Photograph 45). Feature 82, a 3.5-meter (11.5-foot)-wide dark, rock-filled stain with charred wood that bisected Trench 3, was located 10 meters (33 feet) to the north (see Photograph 45). Note that Features 76, 78 and 82 were not sampled during Phase II fieldwork.

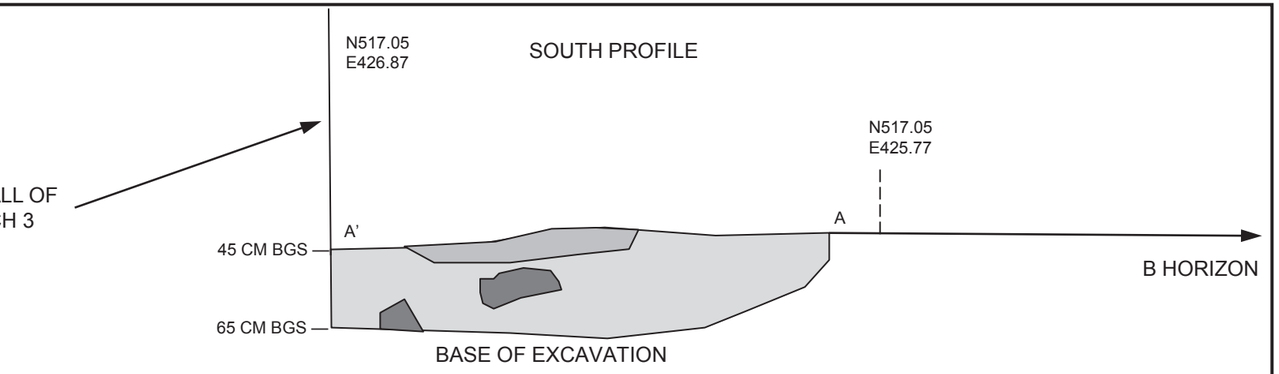
Photograph 45. Site 36LU301: Overview of Trench 3 showing Features 76, 77, and 78 in Foreground and Feature 82 (rock-filled stain) in Distance; Facing North.

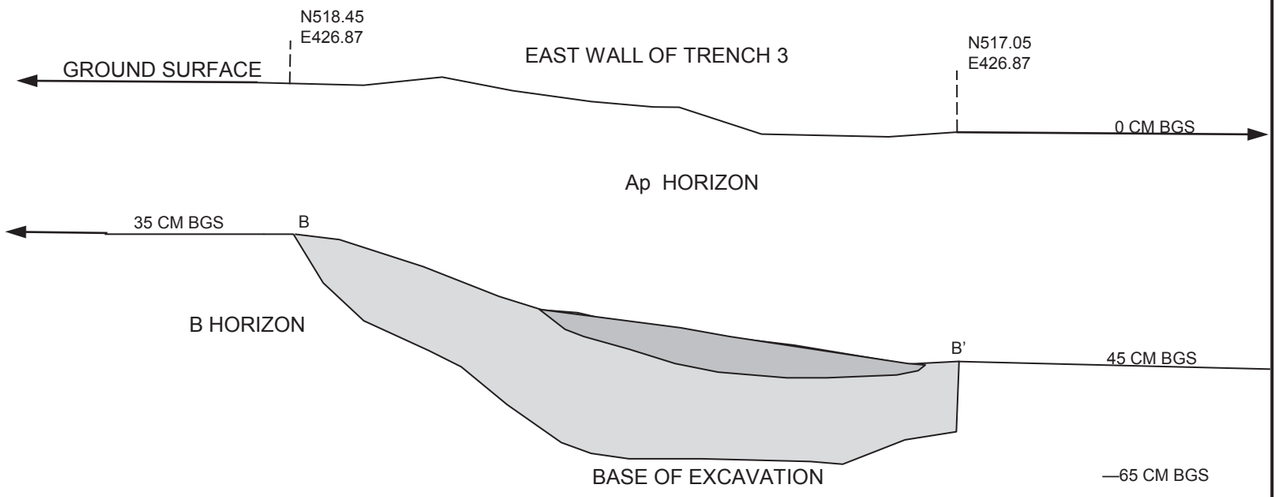
In plan view, Feature 77 appeared as a large, dark-gray to dark-grayish-brown, sub rectangular stain with exposed dimensions of 95x214 cm (3.2x7.0 feet); the feature extended beyond the east wall of the trench and was not fully uncovered during Phase II excavations (Figure 33, Photograph 46). The upper portion of this feature was truncated by plowing. A pocket knife and historic ceramics were observed on the surface of the feature. Feature 77 was bisected along its east/west axis and excavation of the north half of the feature revealed a basin-shaped profile with a maximum depth of 26 cm (10 in) (see Figure 33, Photograph 47).

SITE 36LU301
FEATURE 77
PLAN VIEW

NOTE:
A – A': BISECTION LINE
B – B': WALL PROFILE BISECTION

SOUTH PROFILE





:FEATURE 171 – VERY DARK GRAY (10YR 3/1) SILT LOAM MOTTLED WITH BROWNISH YELLOW (10YR 6/6) SILT LOAM AND GRAY (10YR 6/1) ASH

:FEATURE 171 – GRAYISH BROWN (10YR 5/2) SILT LOAM MOTTLED WITH VERY DARK GRAYISH BROWN (10YR 3/2) SILT LOAM

: FEATURES 78 AND 76 – VERY DARK GRAY (10YR 3/1) SILT LOAM MOTTLED WITH BROWNISH YELLOW (10YR 6/6) SILT LOAM

Ap HORIZON: DARK GRAYISH BROWN (10YR 4/2) SANDY SILT LOAM

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

LEGEND

* : CHARCOAL
: ROCK
: POCKET KNIFE
: WHITEWARE

SCALE
0 CM 35CM 60CM

FIGURE 33
SITE 36LU301: FEATURE 77
PLAN VIEW AND PROFILE

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Photograph 46. Site 36LU301: Feature 77, Plan View on B Horizon Surface (Trench 3), showing Feature 77 at East Edge (to right), Feature 76 to the South (near right) and Feature 78 to the West (left), Facing North

Photograph 47. Site 36LU301: Feature 77, Profile in East Wall of Trench 3, Facing East

Ninety-two historic artifacts were recovered during excavation of Feature 77 (Table 12). Over half of these specimens (58 percent, *n*=54) were animal bone and teeth. The animal bone represented the remains of a yearling, white-tailed deer. Evidence of butchering was observed on the distal end of one radius. Additionally, several bones appeared to be blackened from burning and one calcined bone was noted. The sample of faunal remains also included a single rib from a medium sized mammal (i.e., raccoon). The remaining artifacts consisted largely of kitchen-related redware sherds (*n*=26), along with one stoneware sherd, one bone-handled pocket knife, one wrought nail, two fragments of thin, tinted window glass and seven indeterminate metal fragments.

Table 12. Site 36LU301: Feature 77 Pattern Analysis, Historic Artifacts

Class	SubClass	Ware Type/Object	Count	%
Architecture	Nails, Spikes, Etc.	nail, wrought	1	1.09%
	Window Glass	window glass	2	2.17%
		Architecture Total	**3**	**3.26%**
Faunal	Bone	bone	49	53.26%
		teeth	5	5.43%
		Faunal Total	**54**	**58.70%**
Kitchen	Ceramics	redware, brown glaze	18	19.57%
		redware, clear lead glaze	8	8.70%
		whiteware, plain	1	1.09%
		Kitchen Total	**27**	**29.35%**
Personal	**Personal-Other**	**pocket knife**	**1**	**1.09%**
Unidentifiable	**Indeterminate**	**indeterminate metal**	**7**	**7.61%**
		TOTAL	**92**	**100.00%**

Based on Phase II analysis, Feature 77 represents the remains of a shallow refuse pit. The presence of redware sherds, a wrought nail, and thin window glass suggest an early to mid nineteenth century age for this feature. As the adjacent Michael's residence dates to circa 1880, this feature may be associated with an earlier activity or use of the field that predates construction of this residence. The 1873 map of the area (see Figure 8) depicts no structures in this locality and no structural remains were identified within the site during Phase II investigations. This data suggests that Feature 77 and the earlier historic activities may have been limited in time and scale and/or that any associated structures, if present, were abandoned prior to 1873.

Feature 83

Feature 83 (Type D) was a large, mottled, oval stain located on the surface of the stripped B horizon near the southern end of Trench 3 at N534.20 E425.65, approximately 50 cm (20 in) north of historic Feature 82, the rock filled stain noted above (see Figure 16a, Photograph 48). Feature 83 had dimensions of 220x90 cm (87x35 in) and sharp boundaries (Figure 34, Photograph 49). It was bisected along its north/south axis and the east half was excavated and screened through 0.6-cm (0.25-in) mesh. Following recordation of the feature profile, the west half was excavated. In profile the feature was very shallow, with a maximum depth of 10 cm and a slightly undulating base (see Figure 34, Photograph 50). The feature fill consisted of a compact yellowish-brown (10YR 5/4) sandy loam mottled with subsoil (10YR 5/8 yellowish-brown sandy loam). An area of bioturbation (root or rodent disturbance) was observed in the northern portion of the feature. One piece of window glass was recovered from this area of disturbed soils. Two prehistoric flakes (both identified as flake fragments made from Shriver Helderberg Chert) were recovered during screening of the feature fill.

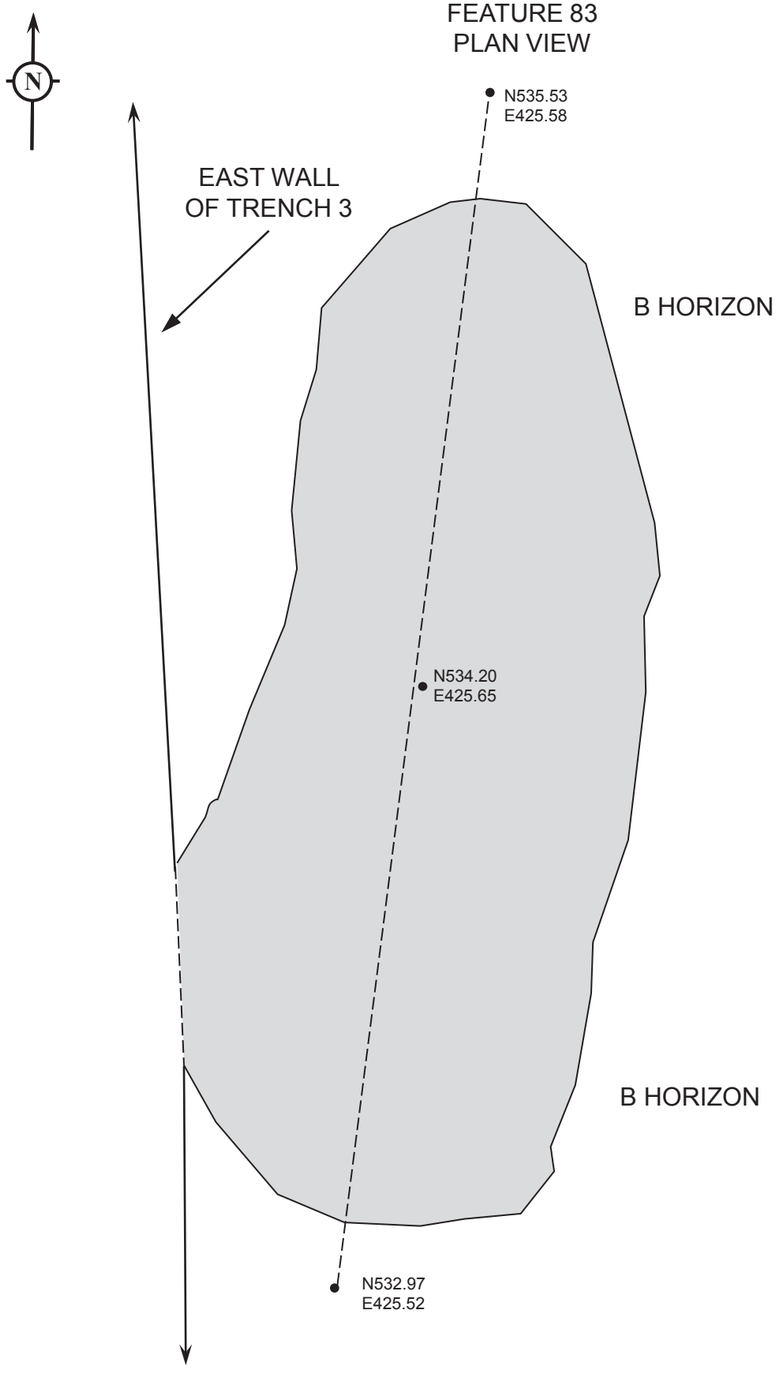
This feature was truncated by plowing activities and disturbed by rodent activity. Due to the shallow depth of the feature remnant and paucity of artifacts, feature function could not be determined.

Photograph 48. Site 36LU301: Overview of Trench 3 showing Feature 82 (rock-filled stain) with Features 83 and 85 in Distance (Feature 81 in left foreground), Facing North

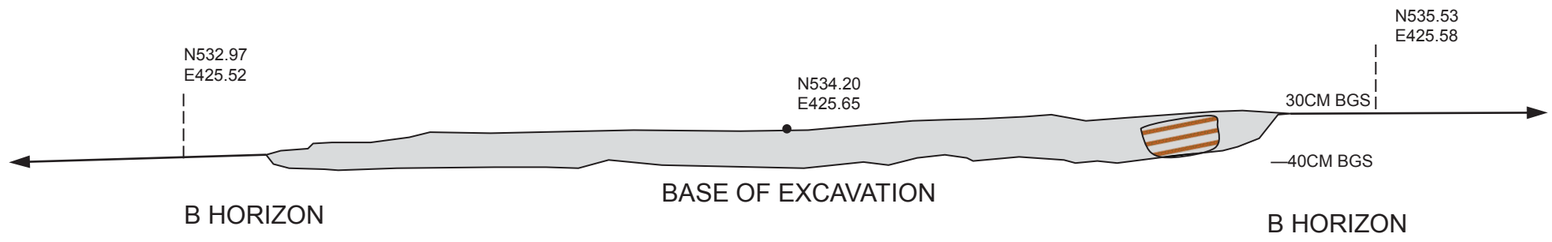
Photograph 49. Site 36LU301: Feature 83, Plan View on B Horizon Surface (Trench 3), Facing North

Photograph 50. Site 36LU301: Feature 83, Profile, Facing West

SITE 36LU301
FEATURE 83
PLAN VIEW



SITE 36LU301
FEATURE 83
WEST WALL PROFILE



:FEATURE 83 – YELLOWISH BROWN (10YR 5/4) SANDY LOAM MOTTLED WITH YELLOWISH BROWN (10YR 5/8) SANDY LOAM

B HORIZON: YELLOWISH BROWN (10YR 5/8) SANDY LOAM

LEGEND

: BIOTURBATION

SCALE

0 CM 35CM 60CM

FIGURE 34
SITE 36LU301: FEATURE 83
PLAN VIEW AND WEST PROFILE

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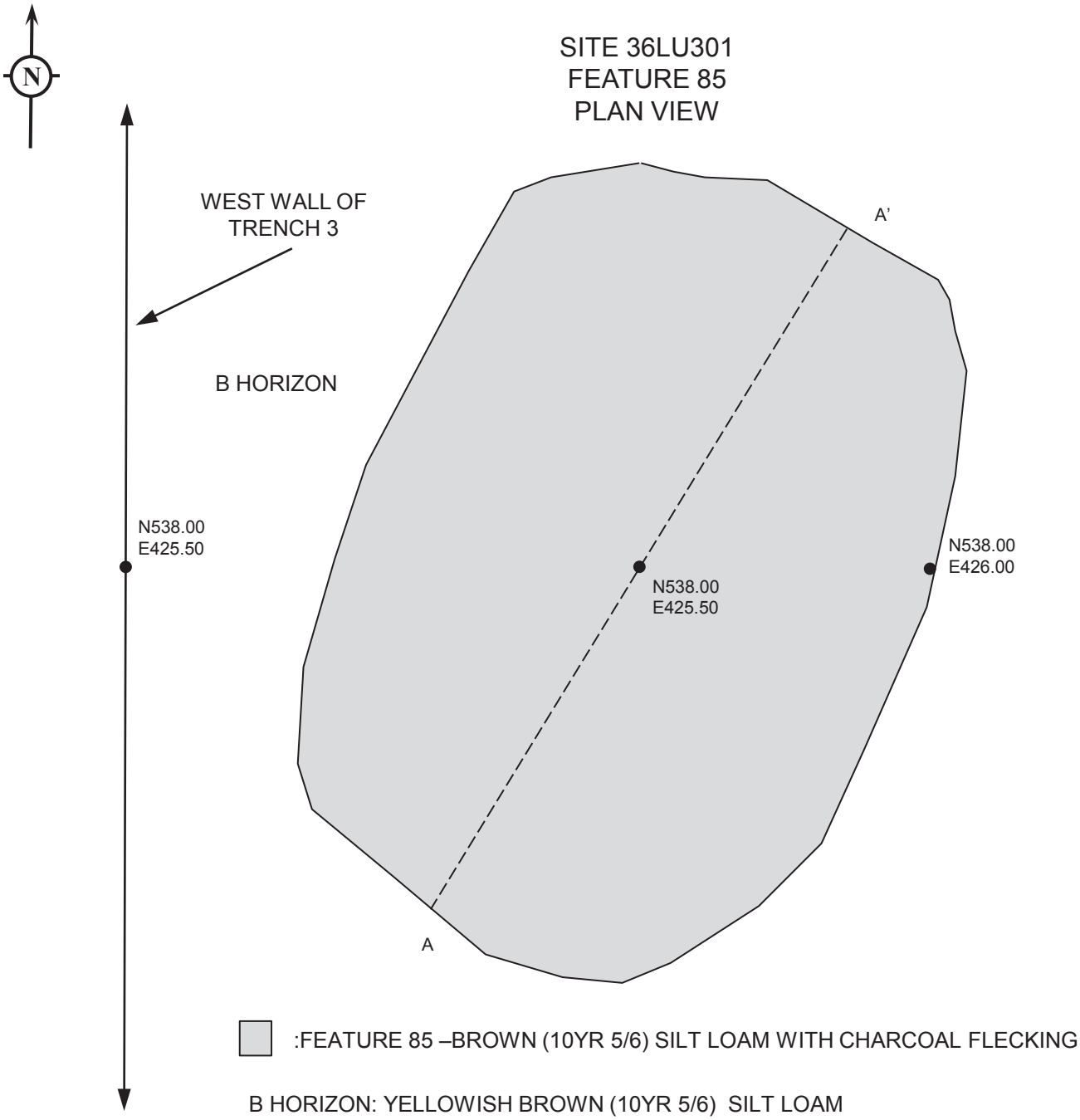
Feature 85

Feature 85 (Type D) was a large stain identified on the stripped B horizon surface near the southern end of Trench 3 at N538.00 E425.65 (see Figure 16a). It was situated approximately 3 meters (9.8 feet) north of Feature 83 (described above). In plan view Feature 85 had a sub rectangular shape with clear boundaries and dimensions of 100x62 cm (39x24 in) (Figure 35, Photograph 51). The feature was bisected along its north/south axis and the east half was excavated and screened. The profile was then recorded and the west half of the feature was excavated. Feature excavation revealed a shallow basin shaped profile, extending a maximum of 13 cm (5 in) (Figure 36, Photograph 52). The feature fill consisted of a brown (10YR 5/3 silt loam). No artifacts were recovered from this feature.

The upper portion of Feature 85 was truncated by plowing activities. Only the shallow base of the feature remained and no artifacts were recovered from the feature fill. As a result, the function of this historic feature could not be determined.

Photograph 51. Site 36LU301: Feature 85, Plan View on B Horizon Surface (Trench 3), Facing North

Photograph 52. Site 36LU301: Feature 85, Profile, Facing West



NOTE:
A – A': BISECTION LINE

SCALE

0 CM 20CM 40CM

FIGURE 35
SITE 36LU301: FEATURE 85
PLAN VIEW

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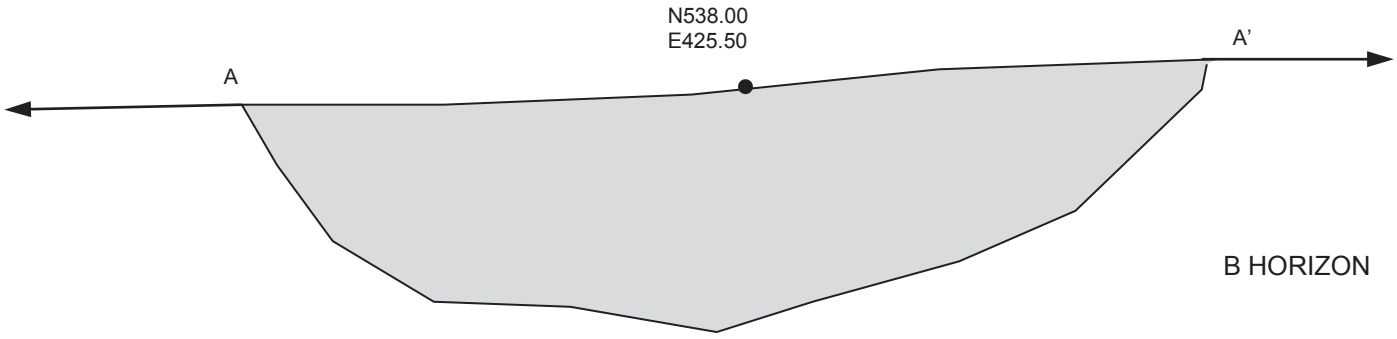
SITE 36LU301
FEATURE 85
WEST WALL PROFILE



BASE OF EXCAVATION

:FEATURE 85 –BROWN (10YR 5/6) SILT LOAM WITH CHARCOAL FLECKING

B HORIZON: YELLOWISH BROWN (10YR 5/6) SILT LOAM

NOTE:
A – A': BISECTION LINE

SCALE

0 CM 20CM 40CM

FIGURE 36
SITE 36LU301: FEATURE 85
WEST WALL PROFILE

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Non Cultural Features/Anomalies

Based on the results of feature excavations, 45 (82 percent) of the 55 possible cultural features sampled during Phase II fieldwork were concluded to represent non-cultural anomalies. As described in Table 11, the majority (*n*=27) of these anomalies were categorized as small circular/oval stains (Type A), with a lower frequency of medium circular/oval stains (Type B), irregular stains (Type I), large circular stains (Type C), and large oval/elongate stains (Type D). Phase II investigations indicated that these stains primarily represented bioturbation (i.e. root and/or rodent disturbances) and areas of tree or root burns within the cultivated field.

Each of these features was mapped and photographed in plan view and was documented on a standard GAI feature form. The feature was bisected and the fill from one half was removed and screened through 0.6-cm (0.25-in) mesh. The feature profile was then recorded and photographed. If the results of feature bisection clearly established that the feature was non-cultural, feature investigation was halted at this stage and the second half of the feature was not removed. If the feature's cultural status could not be determined (or if it was considered to be cultural), the feature was fully excavated and the second half of the feature fill was removed and screened.

Artifacts were recovered from only two of the 47 non-cultural features (see Table 11). Feature 2 (a root disturbance located in Trench 1) produced two lithic debitage, No artifacts were recovered from the remaining non-cultural features.

Table 11 includes a summary of the features that were investigated during Phase II fieldwork and determined to represent non-cultural soil anomalies. A representative sample of select non-cultural features is presented in the following photographs (Photographs 53 through 63).

Photograph 53. Site 36LU301: Representative Non Cultural Feature—Type A, Profile of Feature 2 (Root Disturbance) in Trench 1, showing Root Casts and Mixed Soils, Facing North

Photograph 54. Site 36LU301: Representative Non Cultural Feature—Type A, Profile of Feature 27 (Root Disturbance) in Trench 1, showing Root Casts and Mixed Soils, Facing North

Photograph 55. Site 36LU301: Representative Non Cultural Feature—Type A, Profile of Feature 29 (Root Disturbance) in Trench 1 showing Root Casts and Mixed Soils, Facing South

Photograph 56. Site 36LU301: Representative Non Cultural Feature—Type A, Profile of Feature 151 (Bioturbation) in Trench 5, showing Root Cast, Mixed Soils and Stain Angling to East, Facing West

Photograph 57. Site 36LU301: Representative Non Cultural Feature—Type B, Profile of Feature 71 (Bioturbation) in Trench 2, showing Mixed Soils and Stain Angling to West, Facing Southeast

Photograph 58. Site 36LU301: Representative Non Cultural Feature—Type B, Profile of Feature 31 (Bioturbation) in Trench 1, showing Rodent Disturbance, Facing Northwest

Photograph 59. Site 36LU301: Representative Non Cultural Feature—Type C, Profile of Feature 191 (Root Burn) in Trench 6, showing Gravelly Soils, Area of Dark Stain, and Irregular Shape, Facing North

Photograph 60. Site 36LU301: Representative Non Cultural Feature—Type D, Profile of Feature 72 (Bioturbation/Root) in Trench 2, showing Root Casts, Mixed Soils and Irregular Base, Facing Northeast

Photograph 61. Site 36LU301: Representative Non Cultural Feature—Type I, Profile of Feature 146 (Tree/Root Burn) in Trench 5, showing Dark Irregular Stain with Root Casts, Mixed Soils and Burned Wood, Facing Southeast

Photograph 62. Site 36LU301: Representative Non Cultural Feature—Type I, Plan View of Feature 172 (Root Burn) in Trench 5, showing Irregular Mottled Stain, Facing North

Photograph 63. Site 36LU301: Representative Non Cultural Feature—Type I, Profile of Feature 59 (Root Burn) in Trench 2, showing Burned Root Casts and Mixed Soils, Facing North

Chapter 8. Phase II Artifact Analysis

Phase II testing of Site 36LU301 produced 49 prehistoric lithics and 143 historic artifacts. Results of prehistoric and historic artifact analysis are described in the following sections.

Prehistoric Artifact Analysis

The meager sample of 49 prehistoric lithic artifacts recovered during Phase II investigations consisted of 2 bifaces (both projectile points), 24 debitage and 23 pieces of FCR (Table 13). As described above, these prehistoric artifacts were found in a very low density, dispersed scatter, largely within the western portion of the site. They were recovered overwhelmingly (83.4 percent; *n*=41) from the plow disturbed surface and the Ap horizon (see Table 4). The single diagnostic prehistoric artifact (an Early Woodland Cresap point) in the assemblage was found on the plowed surface. Of the remaining artifacts, seven lithics were associated with feature fill (with four of these representing a disturbed context) while one was collected from the surface of the B horizon.

Table 13. Site 36LU301: Summary of Count, Weight and Mean Weight by Artifact Class

Artifact Class	Count	Weight	Mean Weight
Biface	2	14.43	7.22
Debitage	24	213.23	8.88
Fire Cracked Rock	23	3600.7	156.55
TOTAL	**49**	**3828.36**	**78.13**

Lithic Raw Material Types

Lithic analysis identified eight raw material types within the assemblage (Table 14). These include four varieties of chert, along with argillite, claystone, metamorphic rock, and sandstone. Locally-available Shriver/Helderberg chert accounted for one third (*n*=8) of the flaked stone artifacts (including both bifaces) and for 16 percent of the total lithic assemblage. The remaining flaked stone artifacts were manufactured from claystone, Onondaga chert, and metamorphic rock, with one to two specimens each made from black chert, dark-gray chert, and argillite. Metamorphic rock and sandstone were the most common raw materials used for fire-cracked rock.

Table 14. Site 36LU301 Phase II: Crosstabulation of Artifact Class by Lithic Raw Material

Material Type	Biface	Debitage	Fire Cracked Rock	Total	%
Argillite		1		1	2.0%
Black Chert		2		2	4.1%
Dark Gray Chert		2		2	4.1%
Claystone		5	1	6	12.2%
Metamorphic		4	13	17	34.7%
Onondaga Chert		4		4	8.2%
Sandstone			9	9	18.4%
Shriver/Helderberg Chert	2	6		8	16.3%
TOTAL	**2**	**24**	**23**	**49**	100.0%

As described above (Prehistoric Toolstone Sources) two of the raw material types identified in the assemblage (Shriver/Helderberg chert and Onondaga chert) can be associated with known geological sources (see Figure 7). Shriver/Helderberg chert is available from local outcrops of the Helderberg formation, which extends from West Virginia and Virginia through Pennsylvania. Onondaga chert occurs in primary sources in New York as well as in secondary cobble deposits in stream beds within the immediate project vicinity and in the surrounding region. This distribution of lithic raw material suggests a reliance on locally-available toolstone.

Remnant cortex was recorded on approximately one third (31 percent, n=8) of the small flaked stone assemblage (Table 15). Of this total, 23 percent (n=6) represented cobble cortex, either from nodules or loose pieces within alluvial contexts. One specimen exhibited block cortex, probably from a bedrock outcrop or naturally eroded block, and one specimen retained cortex that was indeterminate as to type. This distribution indicates that both primary and secondary sources of lithic raw material were exploited by the site's prehistoric inhabitants.

Table 15. Site 36LU301: Phase II Crosstabulation of Cortex Type by Lithic Raw Material

Lithic Raw Material	Absent	Block	Cobble	Indeterminate	Total	%
Argillite	1				1	3.8%
Black Chert	1	1			2	7.7%
Claystone	2		2	1	5	19.2%
Dark Gray Chert	2				2	7.7%
Metamorphic	2		2		4	15.4%
Onondaga Chert	2		2		4	15.4%
Shriver/Helderberg Chert	8				8	30.8%
TOTAL	**18**	**1**	**6**	**1**	**26**	**100.0%**
%	69.2%	3.8%	23.1%	3.8%	100.0%	

Bifaces

Two bifaces, both projectile points, were recovered during Phase II testing (Table 16 and Photograph 64). These points are the only tools in the Phase II assemblage; no unfinished bifaces were recovered. One specimen (FS 216) is a diagnostic Early Woodland Cresap-like project point (FS 216) made from Shriver/Helderberg Chert. One corner of its base is broken. The other point (FS 217) is an untyped medial projectile point fragment (FS 217), also manufactured from Shriver/Helderberg Chert. Its base and tip have snapped, but based on its remaining distal portion this point appears to represent a broken stemmed specimen. These two points both were found on the surface of the cultivated field, in the northwest portion of the site, approximately 38 meters (124.7 feet) apart.

Table 16. Site 36LU301 Phase II Tool Summary

FS	N	E	Soil Horiz	Wt (g)	Lithic Raw Matl	Artifact Type	Cortex	Condition	L (mm)	W (mm)	Th (mm)	Comments
216	575.3	419.3	Surface	9.92	Shriver/Helderberg	Projectile Point	Absent	whole	52.9	22.8	8.0	EW Cresap-like
217	575.45	457.0	Surface	4.51	Shriver/Helderberg	Projectile Point	Absent	medial		26.7	6.7	untyped; pos. stemmed

*EW=Early Woodland

Photograph 64. Site 36LU301: Early Woodland Cresap Projectile Point (FS 216) and Untyped Projectile Point (FS 217)

Debitage

Phase II testing produced 24 pieces of debitage, representing approximately half (48.9 percent) of the total lithic assemblage and 92 percent of the flaked stone artifacts (see Table 14). The debitage assemblage included 8 biface reduction flakes, 5 decortication flakes, 1 early reduction flake and 10 flake fragments (Table 17).

As presented in Table 17, approximately 70 percent (*n*=17) of the debitage was recovered from plow disturbed surface or Ap horizon contexts. The remaining debitage was found in feature fill (25 percent) or on the surface of the plowzone stripped B horizon. The lithic debitage recovered from feature fill included four flakes in disturbed feature contexts (two flakes found in non-cultural Feature 2 and two flakes from historic Feature 83) and two flakes from prehistoric thermal features (Features 153 and 171).

Table 17. Site 36LU301 Phase II: Crosstabulation of Flake Type by Soil Horizon

Soil Horizon	Biface Reduction	Decortication Flakes	Early Reduction	Flake Fragments	Total	%
Surface	1	3	1	6	11	45.8%
A/Ap	3	1		2	6	25.0%
B		1			1	4.2%
Feature Fill	4			2	6	25.0%
TOTAL	**8**	**5**	**1**	**10**	**24**	**100.0%**
%	33.3%	20.8%	4.2%	41.7%	100.0%	

Seven lithic raw material types were identified in the small debitage sample (Table 18). Shriver/Helderberg, the material used for both recovered projectile points, is the most common raw material, accounting for 25 percent (*n*=6) of the flakes. Slightly fewer flakes (21 percent, *n*=5) were manufactured from claystone, while four flakes each were made from

Onondaga Chert and metamorphic rock. The remaining raw materials represent one to two specimens each.

Table 18. Site 36LU301 Phase II: Crosstabulation of Flake Type by Lithic Raw Material

Lithic Raw Material	Biface Reduction	Decortication Flakes	Early Reduction	Flake Fragments	Total	%
Argillite	1				1	4.2%
Black Chert		1		1	2	8.3%
Claystone	1	1	1	2	5	20.8%
Dark gray chert	2				2	8.3%
Metamorphic	1	2		1	4	16.7%
Onondaga Chert	1	1		2	4	16.7%
Shriver/Helderberg Chert	2			4	6	25.0%
TOTAL	**8**	**5**	**1**	**10**	**24**	**100.0%**
%	33.3%	20.8%	4.2%	41.7%	100.0%	

The analysis of debitage recorded flake type for each specimen. Decortication and early reduction flake types are characteristic of early stages of lithic reduction. Biface reduction flakes represent middle to late-stage reduction, usually associated with the manufacture of bifacial tools or the refurbishing of projectile points. Flake fragments are not diagnostic of specific stages of lithic reduction.

Of the 24 flakes in the debitage sample, one third (33.3 percent, n=8) are classified as biface reduction flakes. Flake types representative of early stage lithic reduction (decortication and early reduction flakes) constitute 25 percent (n=6) of the sample. The majority (42 percent, *n*=10) of the recovered debitage consists of non-diagnostic flake fragments. Although results may be skewed by the small sample size, this analysis suggests that later stage lithic reduction activities appear to have been more common at the site than initial lithic reduction activities.

As noted previously, along with the prehistoric lithic artifacts reported here, more than 200 additional specimens of claystone were collected during initial surface collection activities. Subsequent to laboratory processing and analysis it was concluded that these specimens were likely non-cultural. An outcrop of calcareous clay shale (claystone) occurs within the northern portion of the site and fractured pieces of this material were ubiquitous throughout the site. Although it is possible that this immediately-available claystone was used prehistorically for stone tool manufacture, no tools of this material were identified during Phase Ib or Phase II investigations. The breakage patterns observed in these specimens likely reflect plowing or other nondeliberate activity (e.g., vehicle impacts). While the few specimens of claystone (*n*=5) included in the prehistoric lithic assemblage exhibit good flake morphology, there is a possibility that these specimens may represent non-cultural breakage.

Historic Artifact Analysis

A total of 143 historic artifacts were collected within the boundary of Site 36LU301 during Phase II investigations. Approximately two-thirds (64 percent, *n*=92) of these artifacts were recovered from a single historic refuse pit (Feature 77), located in the cultivated field in the southwest corner of the site (see Figure 3; see Table 5). Nearly all of the remaining historic specimens (34 percent, *n*=48) occurred in plow disturbed contexts, in a low density scatter found largely in the southern portion of the site. One historic artifact was recovered from

Feature 83, an historic feature of undetermined function, while two were found in disturbed contexts.

The historic artifact assemblage was composed predominantly of kitchen-related ceramics and glass (47.5 percent), and faunal remains (37.7 percent) (Table 19). Low frequencies of architectural debris, activities-related specimens, personal items and unidentifiable materials were also recovered.

Table 19. Site 36LU301 Phase II: Pattern Analysis, Historic Artifacts

Class	Sub-Class	Ware Type/Object	Count	%
Activities	**Farming**	**braided wire**	**2**	**1.40%**
Architecture	Brick, Block	brick	2	1.40%
	Nails and Spikes	nail, indeterminate	1	0.70%
		nail, wrought	1	0.70%
	Window Glass	window glass	6	4.20%
		Architecture Total	**10**	**6.99%**
Faunal	Bone	bone	49	34.27%
		teeth	5	3.50%
		Faunal Total	**54**	**37.76%**
Kitchen	Bottles/Jars	bottle glass	10	7.0%
		Container glass	3	2.1%
	Ceramics	redware	45	31.49%
		Stoneware, olive glaze	1	0.70%
		whiteware, plain	5	3.50%
		whiteware, hand painted	1	0.7%
		whiteware, transfer print	1	0.7%
	Kitchen Related-Other	canning jar lid liner	2	1.40%
		Kitchen Total	**68**	**47.55%**
Personal	**Personal-Other**	**pocket knife**	**1**	**0.70%**
Unidentifiable	Indeterminate	indeterminate metal	7	4.90%
		indeterminate pewter	1	0.70%
		Unidentifiable Total	**8**	**5.59%**
		TOTAL	**143**	**100.00%**

The sample of kitchen ceramics (n=53) consisted largely of redware, with a lower frequency of plain and transfer print whiteware. Kitchen glass included clear bottle glass (*n*=12), aqua bottle glass (*n*=1), and canning jar lid liners (*n*=2).

The faunal assemblage (*n*=54) was composed of animal bone and teeth. These faunal remains were all recovered from Feature 77 (historic refuse pit). As noted above they consist of the remains of white-tailed deer along with one rib fragment from a medium sized mammal (i.e. raccoon). Butchering was noted on one deer bone and several bones appeared to be blackened from burning. One calcined bone was also observed.

The low quantity of architectural debris (*n*=10) included window glass, brick fragments and nails (wrought and indeterminate). Activities-related items consisted of braided wire (*n*=2), while the single personal item was a bone-handled pocket knife.

The 92 historic artifacts recovered from Feature 77 included redware, a wrought nail, thin tinted window glass, and a relatively large quantity (*n*=54) of faunal remains (animal bone and teeth). Based on the presence of diagnostic specimens this feature appears to date to the early to mid nineteenth century.

The remaining low-density dispersed scatter of historic artifacts included clearly twentieth century materials and likely reflects field scatter associated with use of this property over approximately the last 175 years.

The Phase II historic artifact assemblage represents two historic era periods of use: one dating to the early-to-mid nineteenth century and one dating to ca 1880 to present. Wrought nails, redware and very thin window glass are associated with the early historic period use of the site. This period is represented by a refuse pit (Feature 77); no other feature was identified in association with this early to mid-nineteenth century use of the property. The later historic-era usage of the site area is likely associated with the adjacent residence (Michaels Farmstead) constructed in ca 1880. Artifacts associated with this component include machine-made bottle glass, canning jar lid liners, and braided wire. No features sampled during Phase II investigations could be attributed to this more recent component.

Chapter 9. Site Synthesis

Summary of Phase Ib and II Results

GAI's Phase Ib and Phase II studies of Site 36LU301 yielded 227 artifacts (63 prehistoric lithic and 164 historic specimens) and identified 10 cultural features, including five prehistoric thermal features, two prehistoric/historic postmolds, and three historic features (one refuse pit and two features of undetermined function). The combined results of these two studies are summarized below.

Prehistoric Component

The combined Phase Ib/II prehistoric artifact assemblage consisted of 63 prehistoric lithics (14 from the Phase Ib survey and 49 from Phase II testing). These artifacts included 7 bifaces, 2 cobble tools, 31 debitage and 23 pieces of FCR (Table 20). This small assemblage represented a very low density, widely dispersed artifact scatter extending across the 5.0-acre (2.0-hectare) site. These artifacts were recovered overwhelmingly (87 percent) from plow disturbed contexts (surface of cultivated field and Ap horizon) (see Table 20). The remaining lithics were found in feature fill (*n*=7; including four lithics in disturbed contexts in non-cultural or historic features) and on the surface of the B horizon (*n*=1). Importantly, all of the tools (seven bifaces and two cobble tools) were surface finds.

Table 20. Site 36LU301: Phase Ib and II, Crosstabulation of Prehistoric Artifact Class by Soil Horizon

Soil Horizon	Biface	Debitage	Cobble Tool	Fire Cracked Rock	Count	%
Surface	7	17	2	7	33	52.4%
Ap	--	7	--	15	22	34.9%
B	--	1	--	--	1	1.6%
Feat 2 (non-cultural)		2			2	3.2%
Feat 83 (historic)		2			2	3.2%
Feat 153 (prehistoric)		1			1	1.6%
Feat 171 (prehistoric)		1		1	2	3.2%
TOTAL	**7**	**31**	**2**	**23**	**63**	**100.0%**

Lithic analysis identified eight raw material types in the Phase Ib/II lithic assemblage (Table 21). Locally available Shriver/Helderberg Chert was the most common raw material in the sample of flaked stone artifacts, accounting for 14 (37 percent) of these artifacts, including five of the seven bifaces. The remaining flaked stone artifacts consisted of lower frequencies of Onondaga Chert (also locally available), claystone, argillite, metamorphic rock, and other unsourced cherts. The two cobble tools were both made from sandstone, while metamorphic rock and sandstone were used for FCR. This data suggests a reliance on locally available raw materials for toolstone. Remnant cortex observed on a small sample (*n*=11) of artifacts suggest that prehistoric occupants obtained Shriver/Helderberg chert from both local primary and secondary sources while Onondaga Chert and the other raw materials were likely collected from secondary cobble sources.

Table 21. Site 36LU301: Phase Ib and II, Crosstabulation of Artifact Class by Lithic Raw Material Type

Lithic Raw Material	Biface	Debitage	Cobble Tool	Fire Cracked Rock	Count	%
Argillite	1	4			5	7.9%
Black Chert		2			2	3.2%
Claystone		5		1	6	9.5%
Dark Gray Chert		2			2	3.2%
Metamorphic		4		13	17	27.0%
Onondaga Chert	1	5			6	9.5%
Sandstone			2	9	11	17.5%
Shriver/Helderberg Chert	5	9			14	22.2%
TOTAL	**7**	**31**	**2**	**23**	**63**	**100.0%**
%	11.1%	49.2%	3.2%	36.5%	100.0%	

As shown in Table 22, the Phase Ib/II lithic tool assemblage was limited to bifaces and cobble tools. No cores, unifaces, or utilized flakes were recovered from the site. The sample of seven bifaces consisted predominantly of projectile points (*n*=4) along with single examples of early stage, middle stage and late-stage bifaces. Two diagnostic points were recovered—an Early/Middle Archaic MacCorkle-like point and an Early Woodland Cresap-like point. All four of the projectile points exhibited breakage, with two representing medial fragments and two (the diagnostic specimens) characterized by broken bases. The medial point fragments likely represent tools that were broken during use and were discarded. The more complete diagnostic specimens, which could have been refurbished, may have either been inadvertently lost or discarded. One early-stage biface exhibited usewear along one flaked margin suggesting that after being broken during manufacture, it was used for various cutting and/or scraping tasks.

Table 22. Site 36LU301: Phase Ib and II, Lithic Tool Summary

FS #	N	E	Soil Hz	Weight	Material Type	Type	Cortex	Cond	L	W	T	Comments
Bifaces												
2			Surface	16.21	Shriver/Helderberg	Projectile Point	Absent	broken	58.4	35.5	7.9	MacCorkle-like; broken lobe
216	575.3	419.3	Surface	9.92	Shriver/Helderberg	Projectile Point	Absent	whole	52.9	22.8	8.0	Cresap-like; broken corner
217	575.45	457.0	Surface	4.51	Shriver/Helderberg	Projectile Point	Absent	medial		26.7	6.7	untyped; pos. stemmed
10			Surface	7.31	Shriver/Helderberg	Projectile Point	Absent	medial		25.0	7.8	untyped
8			Surface	117.14	Argillite	Early-Stage Biface	Absent	broken		60.3	19.7	utilization on flaked margin
4			Surface	37.20	Shriver/Helderberg	Middle-Stage Biface	Absent	broken		42.2	13.4	
18			Surface	10.56	Onondaga	Late-Stage Biface	Absent	medial		29.3	6.0	
Cobble Tools												
6			Surface	670.13	Sandstone	Hammerstone		whole	89.5	83.0	67.7	
7			Surface	617.29	Sandstone	Hammerstone		whole	85.7	84.8	61.3	

As noted for the flaked stone assemblage as a whole, Shriver/Helderberg Chert appears to have been the preferred toolstone for biface manufacture throughout the site's multiple periods of prehistoric occupation. It was used to manufacture all four of the projectile points in the assemblage, including both diagnostic specimens.

The hammerstones/pecking stones recovered from the site evidence battering or pecking damage and were likely used for percussive tasks such as stone tool manufacture or food processing.

Of the 31 flakes in the small Phase Ib/II debitage sample, 32 percent (*n*=10) were classified as biface reduction flakes and 26 percent (*n*=8) represented flake types characteristic of early stage lithic reduction (decortication and early reduction flakes). The majority of the debitage (41.9 percent) consisted of non-diagnostic flake fragments. This flake type distribution indicates that limited late stage lithic reduction and early stage lithic reduction activities occurred at the site.

Figure 37 illustrates the distribution of Phase Ib and II prehistoric tools and cultural features at Site 36LU301. The five prehistoric thermal features—consisting of two Middle Archaic hearths, two Early Woodland hearths and one undated feature—were identified in a north/south line extending through the site's west-central section, on the slightly higher elevation portion of the landform. The two Early Woodland features (Feature 153—2780+/-40 B.P. and Feature 154—2760+/-30 B.P.) were located just one meter (3.3 feet) apart, near the N555 gridline. Based on their proximity and overlapping radiocarbon dates, these features may represent a single Early Woodland occupation. The two Middle Archaic features (Feature 150—5120+/-40 B.P. and Feature 171—7150+/-30 B.P.) were situated approximately 50 meters (164 feet) apart and represent the southernmost and northernmost of the identified prehistoric thermal features. Their radiocarbon dates and location within the site suggest that they represent separate prehistoric occupations associated with the Middle Archaic period (Feature 171) and late Middle Archaic period (Feature 150).

The upper portion of each of these features was truncated by plowing. The remnant portion of three of the features (Features 150, 153 and 154) were less than 9 cm (3.5 in) thick while two features (Features 161 and 171) had depths of 26 to 29 cm (10.2 to 11.4 in).

Two possible prehistoric or historic postmolds were also documented in the southwest portion of the site. However, due to their lack of associated prehistoric cultural materials (i.e., diagnostic artifacts or other clearly prehistoric features) the age of these postmolds cannot be conclusively determined and they do not contribute to an interpretation of the site's prehistoric occupation.

As noted previously, the overall prehistoric lithic artifact assemblage represented a very low density, widely dispersed scatter, with no artifact concentration, and, in fact, a near absence of artifacts, in the vicinity of the prehistoric features. As illustrated on Figure 37, the distribution of tools is also widely dispersed, with six tools recovered from the west half of the site (west of the N500 gridline) and three found in the east half. No spatial association is observed between the temporally diagnostic projectile points and the prehistoric features of the same general time period. The single Early/Middle Archaic projectile point was recovered from the south-central portion of the site, approximately 60 meters (197 feet) east of Middle Archaic Feature 150. Similarly, the single Early Woodland point was located near the west edge of the site, approximately 35 meters (115 feet) northwest of Early Woodland Features 153 and 154.

Figure 37. Site 36LU301: Distribution of Phase Ib and II Lithic Tools and Cultural Features

11x17

REDACTED Figure 37
Site 36LU301: Distribution of Phase Ib and II Lithic Tools and Cultural Features

In all, prehistoric artifact recovery at the site is surprisingly dispersed and low density, given the presence of the identified prehistoric hearth features. The low quantity of lithic debitage and the absence of cores suggest that although limited early and late lithic reduction occurred, these activities were not a primary focus of the site's prehistoric inhabitants. The absence of subsistence remains in the thermal features indicates that these features may have been used primarily for heat, rather than for cooking. The lack of prehistoric ceramics in association with the Early Woodland hearth features likewise suggests that food processing was not a major activity. The restricted range and quantity of recovered artifact types suggests that the site consists of the remains of multiple small, short term prehistoric occupations during the Middle Archaic, late Middle Archaic, and Early Woodland periods, perhaps representing small camps or procurement stations for the exploitation of upland plant or animal resources.

Historic Component

Phase Ib and II investigations recovered 164 artifacts from Site 36LU301 (21 artifacts from Phase Ib survey and 143 from Phase II testing). These artifacts consisted largely of kitchen-related ceramics and glass, and faunal remains (animal bone and teeth); minimal architectural debris, activities-related items and personal items were also recovered. In addition, Phase II fieldwork sampled three historic features and identified and mapped five more likely historic features which were not investigated during this study. The three sampled features included one historic refuse pit (Feature 77) and two features of undetermined function (Features 83 and 85). All of these features were truncated by plowing. Historic features were concentrated in the southwest corner of the site. Two thirds (*n*=92) of the historic artifacts (including all 54 faunal specimens—almost exclusively deer) were recovered from Feature 77. The remaining artifacts occurred in plow-disturbed contexts in a dispersed, low density across the southern portion of the site.

Artifact analysis indicated that Feature 77 likely represents an early-to-mid nineteenth century use of the locality; no other features or artifacts associated with this time period were identified. The remaining low density, dispersed scatter of historic artifacts included clearly twentieth century materials and likely represents field scatter associated with the use of this property and the adjacent ca 1880 farmstead (Michaels Farmstead).

Prehistoric Settlement Pattern Analysis

In order to assist in the evaluation of Site 36LU301, a comparison with nearby prehistoric sites was undertaken, using data available through the PHMC-BHP's on-line Cultural Resources Geographic Information System (CRGIS). This on-line database lists 144 prehistoric sites within the surrounding Central Susquehanna River Watersheds B and D, with 107 having datable components. Using CRGIS, the number of recorded prehistoric sites and areas of professional archaeological survey was examined for a roughly 5-mile (8.0-kilometer) radius around Site 36LU301. This data was grouped into three categories based on basic landform regions—lowlands, uplands, and transitional. The lowlands include the Susquehanna floodplain and the first terrace. The uplands consist of elevated broad areas consisting of flat land and rolling hills. Finally, the transitional area includes the tributary valleys of the Susquehanna and rugged slopes and undulating hills positioned between the lowlands and the uplands.

Within the 5-mile (8.0-kilometer) radius research area, archaeological surveys have taken place in nearly equal portions of lowlands (approximately 532 ha [1,315 ac]) and uplands (566 ha [1,399 ac]), with the transitional areas being subjected to substantially more survey (1,275 ha [3,150 ac]). Within the professionally-surveyed portions of these three landform

categories, an overwhelming majority of sites (*n*=20) are recorded in lowland settings, while only two prehistoric sites are recorded in uplands and one prehistoric site is recorded in the transitional area. Twelve additional prehistoric sites have been recorded in the lowlands by informant interview or avocational survey. Site 36LU301 is one of the two professionally recorded sites within the uplands within this study area. The other site is Site 36LU282, a small, undated prehistoric lithic scatter identified during GAI's previous Phase Ib survey of the Bell Bend project area (Munford et al., 2010). This site is situated in a cultivated field on an upland flat east of North Market Street, just 152 meters (500 feet) northeast of Site 36LU301. Phase Ib survey recovered only two non-diagnostic lithics (one biface and one debitage) from this locality (Table 23).

Table 23. Previously Recorded Upland Sites in Vicinity of Site 36LU301

Site #	Temporal Period	Setting	# Lithics	Ceramics	Features	Distance from Site 36LU301
36LU178	Late Archaic / Late Woodland	Mid to Upper Slope	Unrecorded	Owasco Series	None	12 miles
36LU189	Middle Archaic / Late Woodland	Mid to Upper Slope	<25	Owasco Series	None	12 miles
36LU282	Undated	Upland Flat	2	None	None	500 feet

Little is known about prehistoric land use in upland settings near the Bell Bend project area. The results of GAI's previous studies of the Bell Bend project area (Munford et al. 2010, Munford 2010) supply the only information on prehistoric upland land use within the 5-mile (8.0-kilometer) radius of the current study area. Based on GAIs Phase Ib survey results, it appears that pre-European Native American groups minimally used these upland settings, as represented by occasional isolated finds and low-density lithic scatter sites (Site 36LU282 and Site 36LU301). Isolated finds of diagnostic projectile points represent use of these upland settings during the Early Archaic through Late Archaic periods; non-diagnostic prehistoric artifacts were also documented as Isolated Finds. A high number of prehistoric sites are recorded along the floodplain of the Susquehanna, including Site 36LU288, investigated during GAI's previous Phase II investigations of the Bell Bend project area (Munford et al., 2010). With the exception of one cemetery and two longer-term camps (all three in the lowlands), the recorded prehistoric sites in the vicinity of Site 36LU301 are generally multi-component short-term camps representing locales that were repeatedly reused over hundreds or even thousands of years. However, no distinct settlement pattern is apparent based on chronology.

Due to the scarcity of previously recorded upland sites within a 5-mile (8.0-kilometer radius) of the study area, in order to gain additional information about prehistoric land use in upland settings, GAI expanded the radius of the background research search. CRGIS review identified two sites (36LU178 and 36LU189) in upland locales approximately 19 kilometers (12 miles) southeast of the study area, near Hazleton City (see Table 23). These two sites both occur in mid and upper slope settings. Site 36LU178 consists of a low-density Late Archaic and Late Woodland artifact scatter that yielded two Late Archaic projectile points, one Late Woodland projectile point and Owasco Series ceramics. The total artifact count from the site is unrecorded. Site 36LU189 is recorded as a low-density (less than 25 artifacts) site with Middle Archaic and Late Woodland diagnostic artifacts including a Middle Archaic projectile point and Owasco Series ceramics.

Based on the results of GAI's Phase Ib and II studies, Site 36LU301 consists of a low-density lithic scatter (*n*=63 lithic artifacts) as well as five prehistoric thermal features and two possible

prehistoric/historic post molds. Diagnostic artifacts recovered from Site 36LU301 consist of one Early/Middle Archaic MacCorkle-like point and one Early Woodland Cresap-like point. In addition four of the five thermal features produced radiocarbon dates—two dating to the Middle Archaic period and two to the Early Woodland period.

None of the other three previously recorded upland sites in the vicinity of Site 36LU301 indicated the presence of cultural features. The flaked stone artifact counts for these three sites ranged from two to 25 artifacts each. These sites produced diagnostic artifacts from multiple periods, including Middle Archaic, Late Archaic, Middle Woodland, and Late Woodland.

Site 36LU301, as a multi-component, low-density artifact scatter, is consistent with the few other previously recorded upland sites in the general project vicinity in terms of its low artifact density and multicomponent nature. It differs from these recorded upland sites in the identification of prehistoric hearth features. However, based on the results of Phase II testing, these features were truncated, lacked evidence of subsistence remains, and yielded scant prehistoric artifacts from the feature fill (two features contained one to two lithics and three features were sterile) or from the surrounding site area. Accordingly, while they represent an unusual find at upland prehistoric sites in the vicinity, these features do not provide significant data regarding the site's prehistoric occupations or the activities, subsistence practices and life-ways of the prehistoric inhabitants.

Chapter 10. Summary and Recommendations

GAI Consultants, Inc. (GAI) conducted Phase II National Register Evaluations of Site 36LU301 at the Bell Bend Nuclear Power Plant (BBNPP), Luzerne County, Pennsylvania on behalf of PPL Bell Bend, LLC (PPL). Phase II fieldwork was performed between June 24 and July 27, 2011, and included a controlled surface collection, shovel testing, test unit excavations, plowzone stripping, and feature sampling.

Based on the results of this work, Site 36LU301 consists of a very low density, multicomponent prehistoric and historic site representing the remains of small, short-term Middle Archaic and Early Woodland prehistoric occupations and early-to-mid nineteenth century through twentieth century historic utilization, on an upland flat north of Walker Run. The site measured 140x210 meters (459x689 feet) and occurred almost exclusively within a cultivated field. Phase II testing yielded a meager prehistoric assemblage of 49 prehistoric lithic artifacts (2 bifaces, 24 debitage and 23 pieces of fire-cracked rock) as well as 143 historic artifacts. The Phase II prehistoric assemblage included a single diagnostic specimen—an Early Woodland Cresap-like projectile point, found on the surface of the cultivated field. The prehistoric lithics were found in a sparse, widely dispersed scatter, primarily in the western half of the field and were recovered overwhelmingly (84 percent) from plow-disturbed contexts. Nearly half of the prehistoric assemblage consisted of fire-cracked rock, with the flaked stone artifacts limited to two bifaces (both projectile points) and debitage.

In addition to these artifacts, Phase II plowzone stripping exposed an unanticipated 211 possible features (soil anomalies) on the B horizon surface within seven trenches; one additional possible feature was encountered in a test unit, for a total of 212 features. In accordance with procedures developed in consultation with PHMC-BHP, GAI investigated a 25 percent sample (*n*=55) of these features; the remaining features were documented with photographs and maps. Based on the results of Phase II investigations, these 55 sampled features included ten cultural features consisting of five prehistoric thermal features, two prehistoric or historic postmolds, and three historic features (one refuse pit and two features of undetermined function). The remaining 45 sampled features were concluded to represent non-cultural anomalies, primarily reflecting extensive bioturbation (i.e., root and rodent disturbance) within the cultivated field.

The five prehistoric thermal features (Features 150, 153, 154, 161 and 171), all identified in Trench 5 and extending in a north/south band through the site, were found on the B horizon surface at a depth of approximately 30 cm below surface; these features were truncated by plowing. Based on the results of radiocarbon analysis, two features (Features 150 and 171) were dated to the Middle Archaic period and two (Features 153 and 154) were dated to the Early Woodland period. Feature 161 was undated. The five features contained no evidence of subsistence remains. Prehistoric artifacts were also nearly entirely lacking from these features—Feature 153 yielded a single piece of debitage and Feature 171 produced one debitage and one piece of fire-cracked rock, while the remaining three features yielded no prehistoric artifacts. Additionally, no artifact concentrations occurred in the vicinity of these features and the recovered diagnostic artifacts (one Early Woodland point from the Phase II study and one Early/Middle Archaic point from the Phase Ib survey) were not found in association with the features of similar age.

The two prehistoric/historic postmolds yielded no artifacts and were not associated with other prehistoric features or larger postmold patterns. Accordingly, they cannot be attributed to a specific site occupation.

Based on the results of this Phase II study, Site 36LU301 is concluded to have poor integrity. This is demonstrated by the recovery of both Early/Middle Archaic and Early Woodland points, as well as the bulk of non-diagnostic prehistoric lithics, from plow-disturbed surface/plowzone contexts. Poor integrity is likewise indicated by the truncation of the prehistoric thermal features, leaving feature remnants that produced no evidence of subsistence remains and yielded scant (*n*=3) prehistoric artifacts.

Despite the identification of five prehistoric thermal features, based on the paucity of artifacts recovered from the site, the mixed multicomponent nature of these artifacts, and the lack of subsistence remains and near absence of cultural materials associated with the prehistoric features, GAI recommends that the site does not have a potential to contribute important information on the prehistoric occupation of this upland setting.

Based on the above evaluation, GAI recommends that the Site 36LU301 prehistoric component is Not Eligible for listing in the National Register under Criterion D. No further investigations of this site are recommended.

In addition to the prehistoric materials described above, Phase II investigations of Site 36LU301 recovered 143 historic artifacts (largely kitchen-related ceramics and glass and faunal remains) and investigated three historic features (Features 77, 83 and 85). Approximately two thirds of the historic artifacts were found in Feature 77, a shallow historic refuse pit located in the southwest corner of the cultivated field. The remaining historic artifacts were found largely in plow-disturbed contexts within the southern portion of the site. Features 83 and 85 represent the truncated remains of shallow historic features of undetermined function; Feature 83 yielded a single historic artifact and two prehistoric lithic debitage. All three sampled features, as well as five additional unsampled historic features identified on the plowzone-stripped B horizon surface, were located primarily in the site's southwest quadrant and were truncated by plowing.

Artifact analysis indicated that Feature 77 likely represents an early-to-mid nineteenth century use of this locality; no other features or artifacts associated with this time period were identified. The remaining low density, dispersed scatter of historic artifacts included clearly twentieth century materials and likely represents field scatter associated with the use of this property and the adjacent ca 1880 farmstead (Michaels Farmstead), located southeast of the site. Cartographic research documented no structures in the vicinity of the identified historic features or within the surrounding property prior to the construction of the ca 1880 residence.

Due to the lack of observed deep shaft features or structural remains, the shallow, truncated nature of the identified features, and the dearth of artifacts from two of the three sampled features, the site has a low potential to address questions associated with intrasite patterning, architecture, or other broader research questions related to its early-to-mid nineteenth century through twentieth century utilization.

Accordingly, GAI recommends that the Site 36LU301 historic component is Not Eligible for listing in the National Register under Criterion D. No further investigations of this site are recommended.

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Appendix A

Project Correspondence

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

20 May 2011

Rocco R. Sgarro
PPL Bell Bend, LLC
38 Bomboy Lane, Suite 2
Berwick, PA 18603

Re: ER# 81-0658-079-CC
Addendum Report, Second Supplemental Phase Ib Cultural Resource Investigation, Power Block Relocation, Bell Bend Nuclear Power Plant, Salem Township, Luzerne County, Pennsylvania

Dear Mr. Sgarro:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

This report meets our standards and specifications as outlined in *Guidelines for Archaeological Investigations in Pennsylvania* (BHP 2008) and the Secretary of the Interior's Guidelines for Archaeological Documentation. This report documents two previously unrecorded archaeological sites with the project area. These sites include **GAI Site 12 (36Lu301)** and **GAI Site 13 (36Lu302)**.

We agree that **36Lu301** is potentially eligible for inclusion on the National Register of Historic Places. If this site cannot be avoided by project activities, then a Phase II investigation is necessary to formally determine site eligibility.

We agree that **36Lu302** is not eligible for inclusion on the National Register. In our opinion, no further archaeological work is necessary at this site.

Please send four additional copies of the final report (three bound and one unbound) for our files and distribution to the repositories.

If you need further information in this matter please consult Steven McDougal at (717) 772-0923.

Sincerely,

Andrea T. MacDonald for

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

cc: B. Munford, GAI Consultants, 385 E. Waterfront Dr., Homestead, PA
S. Imboden, NRC, Mailstop T-6D38M
J. Davis, NRC, Mailstop O-11F1

DCM/srm

From: McDougal, Steven [mailto:smcdougal@state.pa.us]
Sent: Thursday, May 26, 2011 9:33 AM
To: Barbara Munford
Cc: Benjamin Resnick
Subject: RE: Bell Bend Site 36LU301 ER# 81-0658-079

Barb,

The scope of work for 36Lu301 is consistent with the BHP *Guidelines for Archaeological Investigations in Pennsylvania* (2008). Let me know if you would like a site meeting towards the end of field work and I'll work it into my schedule. We look forward to reviewing the report for this project when it is complete.

Steve

Steven McDougal
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
(717) 772-0923

-----Original Message-----
From: Barbara Munford [mailto:b.munford@gaiconsultants.com]
Sent: Wednesday, May 25, 2011 1:09 PM
To: McDougal, Steven
Cc: Benjamin Resnick
Subject: Bell Bend Site 36LU301 ER# 81-0658-079

Steve-

As discussed this morning, attached for your review is GAI's scope of work for Phase II investigations of Site 36LU301 located in the Bell Bend project area, Luzerne County (ER# 81-0658-079). We currently anticipate beginning fieldwork at this site in June.

Please let me know if you have any questions or comments regarding the proposed scope.

Have a good Memorial Day weekend!
Barb

Barbara A. Munford, M.A.
Senior Project Archaeologist

GAI Consultants, Inc.
385 East Waterfront Drive
Homestead, PA 15120-5005
412.476.2000 ext. 1203 | F 412.476.2020 | gaiconsultants.com

Appendix B

Phase II Workplan

May 13, 2011

Mr. Bradley Wise
Environmental Permitting Supervisor
PPL Bell Bend
2 North 9th Street
Genpl-4
Allentown, PA 18181

Re: Scope of Work
Phase II National Register Evaluation of Archaeological Site 36LU301
Bell Bend Nuclear Power Plant
Luzerne County, Pennsylvania
ER 81-0658-079

Dear Mr.Wise:

GAI Consultants, Inc. (GAI) is pleased to submit this scope of work to PPL Nuclear Development, LLC (PPL) to conduct a Phase II National Register Evaluation of archaeological Site 36LU301 at the Bell Bend Nuclear Power Plant (BBNPP), Luzerne County, Pennsylvania. Site 36LU301 lies within the Area of Potential Effect (APE) of the proposed BBNPP project area located adjacent to the existing PPL Corporation's Susquehanna Steam Electric Station (SSES), west of the North Branch Susquehanna River and northeast of the town of Berwick. GAI identified this site during a Second Supplemental Phase Ib survey of the proposed project area in 2010 (Munford 2010). The goal of GAI's Phase II archaeological study is to evaluate the eligibility of Site 36LU301 for listing in the National Register of Historic Places (NRHP).

GAI's Phase II investigation will include background research, preparation and implementation of an Erosion and Sedimentation Control Plan, archaeological fieldwork, laboratory analysis, management summary and technical report preparation, and curation activities. This work will be conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, guidelines developed by the Advisory Council on Historic Preservation, the amended *Procedures for the Protection of Historic and Cultural Properties* as set forth in 36 CFR 800, the Secretary of Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the *Guidelines for Archeological Investigations in Pennsylvania* [Pennsylvania Historical and Museum Commission/Bureau for Historic Preservation (PHMC/BHP) 2008]. These proposed project tasks are described below.

Workplan

Task 1: Project Management/Section 106 Coordination/Meetings

At various points in the proposed project, GAI will assist PPL in consulting and coordinating with the PHMC/BHP. This is expected to include phone calls and preparation of memos involving discussions of project methods and results, drafting letters, and attendance at up to one (1) meeting either on-site or in Harrisburg, Pennsylvania. This task also includes preparation of a site-specific Health and Safety Plan (HASP).

Task 2: Background Research

GAI will conduct background research to enhance the existing prehistoric context developed for the BBNPP project area in order to support the NRHP evaluation of Site 36LU301. This work will include a review of cultural resource investigations and previously recorded archaeological sites in similar upland

settings within the project vicinity. Data will be gathered from on-line sources (e.g., PHMC/BHP's on-line Cultural Resources Geographic Information System (CRGIS) database) as well as from local repositories.

Task 3: Erosion and Sedimentation Control Plan

Based on previous Phase II investigations within the BBNPP project area, it is anticipated that the Luzerne County Conservation District will require an Erosion and Sedimentation Control (ESC) Plan to address the effects of plowzone stripping activities proposed as part of the Phase II archaeological fieldwork at Site 36LU301. GAI will prepare this ESC Plan in consultation with the Luzerne County Conservation District and the Salem Township Zoning Office. It is assumed that the ESC Plan will be an on-site plan only and that no conservation district submittal and review will be necessary. The ESC Plan will be submitted to PPL and a copy will be kept on-site during the course of Phase II fieldwork.

As required by previous ESC Plans for Phase II investigations in the BBNPP project area, it is expected that this plan will require the installation of silt fencing at Site 36LU301. This task assumes the installation and removal of up to 360 meters (approximately 1,200 feet) of silt fencing. Silt fencing will be installed prior to the start of plowzone stripping activities and will be removed at the completion of fieldwork. This activity will be conducted by GAI archaeological field personnel.

Task 4: Archaeological Fieldwork

Site 36LU301 lies almost entirely within a previously cultivated field northeast of a bend in North Market Street and north of Walker Run; a small portion of the site's southern edge extends into a farmyard. Phase II field investigations will include surface collection, shovel testing, test unit excavation, plowzone stripping, and feature excavation.

Prior to the start of Phase II fieldwork PPL will conduct plowing and disking of the site area within the cultivated field to produce adequate visibility for subsequent surface collection.

Following site preparation by plowing and disking, GAI surveyors will establish a grid over the site using a total station. The grid will be tied into a permanent datum. Phase II excavations will be designated by coordinates within this grid. Where possible, Phase Ib shovel tests will be relocated and plotted according to the Phase II grid system.

Phase II fieldwork will begin with a controlled surface collection of the recently plowed and disked site area to refine site boundaries and delineate within-site artifact concentrations. This task is performed in accordance with state guidelines (PHMC/BHP 2008) that require at least two surface collections of potentially eligible sites (including the Phase I surface collection). The site will be gridded into 5-meter (16-foot) collection blocks and artifacts observed on the surface will be collected and provenienced by block. Diagnostic artifacts will be point provenienced, as appropriate. Based on the results of surface collection, judgmental STPs will be excavated to sample artifact concentrations or locations of possible cultural features within the site area.

Due to low ground surface visibility within the portion of the site situated in the farmyard, close-interval shovel testing of this locality will be required. GAI will excavate close-interval shovel test pits at 5-meter (16-foot) intervals within transects spaced 5-meters (16-feet) apart. STPs will measure approximately 50x50 cm (1.6 x1.6-feet) in diameter and will be hand-excavated by natural strata into the subsoil.

Based on the results of surface collection and shovel testing, GAI will excavate test units in areas of higher artifact density, unusual stratigraphy or potential cultural features within the site. Test unit excavations will serve to define site stratigraphy, sample artifact concentrations and/or activity areas, determine the potential for subsurface features, and assess the integrity of archaeological remains. Test units will measure 1x1-meters (3x3-feet). They will be hand-excavated in 10-cm (0.3-foot) levels according to natural stratigraphy and will extend into subsoil. At the completion of each test unit, measured profiles will be drawn and photographs taken of at least one wall of each unit.

Due to the site's upland setting, cultural resources will be near-surface in nature and excavations are anticipated to extend to a maximum depth of 50 cm (1.6 feet).

For both STPs and test units, excavated soils will be screened through 6-mm (0.25-inch) hardware cloth for systematic artifact recovery. Recovered artifacts will be bagged and labeled with appropriate provenience information. GAI archaeologists will record results of individual STPs and test units on standardized field forms, including depths of soil horizons, soil texture and Munsell color, and artifact recovery. Testing locations will be plotted on project maps and documented with photographs.

Following test unit excavations, mechanical removal of plowzone strips will be conducted in portions of the site to expose cultural features at the plowzone/subsoil interface. A backhoe with a flat blade will be used to remove the plowzone in approximately 2-meter (6.5-foot)-wide strips to the top of the B horizon. This activity will be monitored by GAI personnel. Plowzone strips will be plotted on project maps and documented with photographs. Hand shovel-scraping of these strips will be conducted to define and delineate features.

Potential cultural features identified during testing will be troweled clean, cross-sectioned, and documented in plan view and profile with measured drawings and photographs. As appropriate, a portion of the feature fill will be collected as a flotation sample and the remaining feature fill will be screened through 6-mm (0.25-inch) hardware cloth. Artifacts and samples collected from the feature fill will be bagged and labeled with appropriate provenience information. The feature will be recorded on a standardized GAI Feature Form and plotted on project maps. Features are assumed to have a maximum dimension of 60 cm (2 feet) and a maximum depth of 50 cm (2.5 feet).

Excavations (e.g. STPs, TUs, plowzone strips) will be backfilled upon completion, either by hand or mechanically. GAI will coordinate plans for plowing/disking activities with PPL.

For purposes of this proposal GAI estimates the following field effort at Site 36LU301:

- controlled surface collection of approximately 4.0 acres;
- excavation of up to 70 STPs (50 judgmental STPs and 20 close-interval STPS);
- excavation of ten (10) test units [1x1-meter (3x3-foot)];
- identification and sampling of up to five (5) features,
- plowzone stripping/hand shovel scraping of approximately 1,600 m^2,
- installation and removal of silt fencing (approximately 360 linear meters/1200 linear feet);
- mapping;
- backfilling.

Task 5: Laboratory Analysis

Subsequent to Phase II fieldwork, GAI will conduct laboratory analysis of recovered artifacts to characterize age, type, and function of recovered archaeological remains. Artifacts recovered during Phase II testing will be transported to GAI's archaeological laboratory in Homestead, Pennsylvania, and will be processed according to the *Revised Curation Guidelines* (PHMC/BHP 2006). These materials will be washed, sorted, and labeled with the site number. Prehistoric artifacts will be divided into general classes (i.e., debitage, bifaces, unifaces, cores) and then subdivided into specific artifact types (i.e., early-stage biface, late-stage biface, projectile point). Lithic raw material type will be recorded for artifacts and appropriate attributes will be documented. Historic artifacts will be separated into various material groups, including ceramics, glass, metal, faunal, etc. These artifacts will be cataloged according to established typologies using the class-type-variety method. If possible, historic proveniences will be assigned date ranges, based on the presence of diagnostic artifacts (e.g., bottle technological attributes, ceramic types). Soil flotation samples collected from feature fill will be processed to recover small specimens such as seeds, nuts or small bones. Select samples will be analyzed to identify archaeobotanical materials. The final artifact repository for these materials will be determined in consultation with PPL and the PHMC/BHP.

For the purpose of this proposal, GAI assumes the recovery of a total of up to 800 artifacts and the processing of up to 5 flotation samples.

Task 6: Phase II Report Preparation

As preparation of the Phase II Technical Report is anticipated to be deferred until 2012, GAI will produce a brief Management Summary in order to provide PPL with timely Phase II evaluations and recommendations. This document will be prepared following the completion of fieldwork and laboratory analysis. It will summarize preliminary Phase II results and will present an evaluation of the NRHP eligibility of Site 36LU301 and the need, if any, for further work.

GAI will prepare a Phase II Technical Report on the National Register Evaluation of Site 36LU301. The report will include methods and results of background research, prehistoric context, archaeological fieldwork, and laboratory analysis. It will provide recommendations regarding the NRHP eligibility of this site and, if necessary, the need for additional archaeological investigations (i.e., Phase III Data Recovery Investigations). Report appendices will include an updated Pennsylvania Archaeological Site Form and catalogs of recovered artifacts.

The Phase II field investigation, artifact analysis, and Phase II report preparation will be conducted in accordance with National Register criteria and guidelines contained in *National Register Bulletin 15—How to Apply the National Register Criteria for Evaluation* (National Park Service 1998) and *National Register Bulletin 21—Defining Boundaries for National Register Properties* (National Park Service 1992).

GAI assumes the completion of the following project deliverables:

- Five (5) hardcopies and electronic copy of Management Summary for client review;
- Five (5) hardcopies and electronic copy of Draft Report for client review;
- Five (5) hardcopies of Final Report, as well as disc with PDF and MS Word files, within two (2) weeks of receipt of comments on Draft Report;

Task 7: Curation

This task assumes that a Deed of Gift form will be signed by PPL, allowing material remains and field records generated by this Phase II investigation to be to be donated to the State Museum of Pennsylvania for curation. Artifacts, samples, and project documentation (including original field forms, laboratory forms, photographs, and artifact catalogs) will be processed and boxed for storage in accordance with the *Revised Curation Guidelines* (PHMC/BHP 2006).

Cost Proposal and Schedule

GAI can conduct Phase II National Register Evaluations of Site 36LU301 as delineated above, for a not-to-exceed cost of $XXXXXX. Based on the assumptions stated in the workplan, it is anticipated that fieldwork will extend for a period of approximately four (4) calendar weeks. Laboratory work will take approximately two (2) calendar weeks. GAI will submit a Management Summary within four (4) weeks following the completion of fieldwork. Phase II Technical Report preparation will take approximately six (6) calendar weeks. Based on information provided by PPL GAI anticipates submittal of a Preliminary Draft Phase II Technical Report in the first quarter of 2012.

Costs are based on the workplan described above as well as the following assumptions:

- One mobilization/demobilization for all fieldwork;
- Field crew consisting of Senior Archaeologist (field director), 1 Senior Technician (crew chief), and 5 technicians;
- 8-hour work day;
- 10-day work sessions, as appropriate;

- Fieldwork includes mapping, surface collection, plowzone stripping/hand shovel scraping, excavation (STPs, test units and features) and travel;
- Excavation of up to 70 STPs and up to 10 test units;
- STP and test unit excavations will extend to a maximum depth of 50 cm (1.6 feet);
- Identification of up to 5 features; features are assumed to have maximum dimensions of 60 cm (2 feet) and a maximum depth of 50 cm (1.6 feet);
- Site area within the previously-cultivated field will be plowed and disked by PPL prior to start of Phase II fieldwork;
- Cost assumes no crop damages will be incurred and no crop removal will be required;
- Costs for preparation and implementation of Erosion and Sedimentation Control (ESC) Plan associated with mechanical soil removal are included in this cost;
- Curation rates of $350 per box (as per PHMC/BHP requirements);
- No extreme weather conditions or winter fieldwork (e.g., frozen ground or flooding);
- No more than one (1) day of down time due to inclement weather;
- Submittal of a brief Phase II Management Summary;
- Submittal of a Phase II Technical Report including one round of report revisions;

If you have any questions, please do not hesitate to contact me at (412) 476-2000 x1200 (b.resnick@gaiconsultants.com) or Barbara Munford at (412) 476-2000 x1203 (b.munford@gaiconsultants.com). We look forward to working with you and continuing to provide PPL with cultural resources services for the Bell Bend project.

Sincerely,
GAI Consultants, Inc.

Ben Resnick, M.A., RPA
Group Manager
Cultural Resources Group

Barbara A. Munford, M.A.
Senior Project Archaeologist
Cultural Resources Group

/bam

References

Munford, Barbara
2010 *Addendum Report, Second Supplemental Phase Ib Cultural Resources Investigation Power Block Relocation, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania*. Prepared by GAI Consultants, Inc. for AREVA NP Inc. and UniStar Nuclear Development, LLC.

National Park Service
1998 *National Register Bulletin 15 – How to Apply the National Register Criteria for Evaluation*. Department of the Interior, National Park Service, Washington, D.C.

1992 *National Register Bulletin 21 – Defining Boundaries for National Register Properties.* Department of the Interior, National Park Service, Washington, D.C.

Pennsylvania Historical and Museum Commission/Bureau for Historic Preservation
2006 *Revised Curation Guidelines*. Harrisburg, Pennsylvania.

2008 *Guidelines for Archaeological Investigations in Pennsylvania*. Harrisburg, Pennsylvania.

Appendix C

BHP Report Summary Form

Pennsylvania Historical & Museum Commission
Bureau for Historic Preservation • State Historic Preservation Office

Archaeological Report Summary Form

ER# _____

DATE 12/20/2011

PROJECT CHECKLIST: Please fill out a copy of this checklist and include it with your initial report submission,(including with management summaries or draft reports). This form may be downloaded and expanded as needed, but please do not eliminate any fields.

1. **Report Title** Technical Report, Phase II Natio nal Register Evaluation, Site 36LU301, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, ER 81-0658-079, Prepared for PPL BBNPP, LLC, by GAI Consultants, Inc. Homestead, Pennsylvania.
2. **PI** Barbara A. Munford (☒ MA, ☐ PhD) **/Firm** or Institution GAI Consultants, Inc.
3. **Report Date** (Month/Day/Year) December 12, 2011
4. **Number of Pages** ~180 + appendices
5. **Agency Name** NRC Federal ☒ State ☐
6. **Project Area County/Municipality** (list all)

County	Municipality
Luzerne	Salem Township

7. **Project Area Drainage(s)**, (list all)

Sub-basin	Watershed
Central Susquehanna (Number 5)	Nescopeck Creek (D)

8. **Project Area Physiographic Zone(s)** (list All) (Use DCNR Map 13 compiled by W.D. Sevon, Fourth Edition, 2000.)

Physiographic Zone
Ridge and Valley Province, Susquehanna Lowlands Section

Archaeological Report Summary Form

ER# _____

DATE 12/20/2011

9. **Report Type** (some reports are combinations, check as many as apply to this report)

- ☐ Phase IA/Sensitivity Study
- ☐ Phase I
- ☒ Phase II
- ☐ Phase III
- ☐ Historic Structures
- ☐ Geomorphology
- ☐ Determination of Effects
- ☐ Other _____

10. **Total Project Area** 2.0 hectares

11. **Low Probability/Disturbed Areas** 0 hectares = 0 % of project area

12. **Phase I Methods used for total project** (check as many as apply)

☒ shovel tests, ☒ controlled test units/deep tests,
☒ surface survey, ☐ informant interview, ☒ other: Feature Sampling

13. **Total Number of Sites** Encountered/Phase I _____

Total Sites Tested/Phase II one (1)

Total Sites Excavated/Phase III _____

14. Updated PASS Information:

Please complete an updated PASS form **for each site** reported by this report. Updated forms need only include the new information and the site number and name.

15. PASS Site Specific Information:

In addition, the following pages must also be completed **for each site**. Complete only the portions that pertain to the current report. If the report is a stand-alone Phase II, you do not need to fill in the Phase I methods, since they should have been included in the summary form for the previous report.

15. PASS Site Specific Information

Please complete the following **for each site** reported by this report.

PASS NUMBER 36LU301

A. Phase I Methods (how the site was located - check as many as apply)

☒ shovel tests, ☐ controlled test units/deep tests,
☒ surface survey, ☐ informant interview, ☐ other:

B. Phase II Methods

☒ controlled surface collection
☒ controlled excavation w. screening of plowzone, > 5 units
☒ mechanical stripping of plowzone (7.9 %)
☐ deep excavation units
☐ remote sensing
☒ other Feature Sampling; Shovel Testing

square meters of site tested: surface collection of entire site (20,175 square meters) and surrounding field (total of 25,225 square meters); subsurface testing of 1628 square meters
% of site area tested: surface collection 100%, subsurface testing ~8%

C. Phase III Methods

☐ controlled surface collection
☐ controlled excavation w. screening of plowzone, > 5 units
☐ mechanical stripping of plowzone _____%
☐ deep excavation
☐ block excavations
☐ remote sensing
☐ environmental reconstruction (soils, floral, pollen)
☐ dietary reconstruction (floral, faunal)
☐ intensive lithic analysis (functional)
☐ intensive lithic analysis (technological)
☐ raw material sourcing
☐ ceramic analysis (seriation)
☐ ceramic analysis (functional)
☐ blood residue
☐ other _____

square meters of site tested: _____ sq. m
% of site area tested: _____ %

Recommendations (normally completed only after Phase II)**:**

-- NR Eligibility recommendation
☐ eligible, ☒ ineligible, ☐ undetermined

-- reasons for determination (check as many as apply; expand as needed)

☐ eligible: Criterion A. Explain _____
☐ eligible: Criterion B. Explain _____
☐ eligible: Criterion C. Explain _____
☐ eligible: Criterion D:
- ☐ settlement patterning (intersite patterning)
- ☐ intrasite artifact patterning
- ☐ features
- ☐ radiocarbon dating
- ☐ organic preservation
- ☐ evidence of culture change through time
  - ☐ stratified ☐ temporally discrete clusters
- ☐ burials/human remains
- ☐ technological
- ☐ economics
- ☐ ethnicity
- ☐ dietary
- ☐ other(specify): _____

☒ ineligible
- ☐ disturbed
- ☐ ephemeral occupation
- ☐ redundant information
- ☐ undatable
- ☒ other (specify): Artifacts occur in a mixed, mulitcomponent, plow-disturbed context; extremely low artifact density (63 lithics from combined Phase Ib/II investigations within a 5-acre (2-hectare) site area; five prehistoric thermal features were identified, including two radiocarbon dated to the Middle Archaic and two dated to the Early Woodland period (one feature was undated); however these thermal features were truncated by plowing, lacked evidence of subsistence remains, and produced almost no prehistoric artifacts (total of 3 nondiagnostic artifacts from five features)

E. Artifacts/Collections

☒ will be donated to the State Museum of Pennsylvania
- ☐ gift agreement from private owner enclosed

- or -

☐ transfer of responsibility from State Agency enclosed
☐ election of repository from Federal Agency enclosed
☒ artifacts washed/marked/cataloged following State Museum guidelines
-- collection will be submitted by _____(date)

☐ will be donated to other approved repository **(this option must be negotiated with the BHP and State Museum or stated as stipulation in MOA)**
☐ curation agreement enclosed
☐ artifacts washed/marked/cataloged following host guidelines
-- collection will be submitted by _____(date)

☐ will be retained by land owner (☐ whole or ☐ partial collection)
☐ expanded documentation enclosed for items retained
☐ proof enclosed that owner was notified of the option to donate the collection to the State Museum and chose to retain the collection:
☐ letter from owner indicating desire to retain collection

- or -

☐ agency or representative discussed donation option with owner on _____(date)

- and -

☐ copy of letter and certified letter receipt indicating that the owner was offered this option in writing.

Appendix D

Updated Pennsylvania Archaeological Site Survey (PASS) Form

REDACTED Appendix D
in its entirety

Appendix E
Artifact Catalogs

BBNPP Site 36LU301 Phase II Lithic Artifact Catalog

Fs	N	E	Stp	Tu	Trench	Fea	Strat	Soil Hz	Lev	Elev	Count	Weight	Material Type	Class	Type	Cortex	Cond	L	W	Th	Point Type
43	525	425					Surface	Surface			2	1158.2	Sandstone	Fire Cracked Rock	Fire Cracked Rock						
48	530	405					Surface	Surface			1	625.16	Sandstone	Fire Cracked Rock	Fire Cracked Rock						
51	535	450					Surface	Surface			1	40.94	Metamorphic	Fire Cracked Rock	Fire Cracked Rock						
57	560	465					Surface	Surface			1	115.95	Sandstone	Fire Cracked Rock	Fire Cracked Rock						
69	510	530	X10				I	Ap		0-30	1	1.08	Onondaga	Debitage	Decortication Flakes	Cobble					
70	520	530	X09				I	Ap		0-28	1	0.08	Onondaga	Debitage	Biface Reduction	Absent					
75	580	400					Surface	Surface			1	1.58	Calcareous clay shale (claystone)	Debitage	Biface Reduction	Indeterminate					
78	615	400					Surface	Surface			1	4.3	Calcareous clay shale (claystone)	Debitage	Flake Fragments	Absent					
87	585	415					Surface	Surface			1	246.59	Metamorphic	Fire Cracked Rock	Fire Cracked Rock						
88	590	415					Surface	Surface			1	25.88	Metamorphic	Debitage	Decortication Flakes	Cobble					
91	625	415					Surface	Surface			1	3.24	Metamorphic	Debitage	Flake Fragments	Absent					
109	515	435					Surface	Surface			1	3.18	Black Chert	Debitage	Decortication Flakes	Block					
120	600	440					Surface	Surface			1	3.1	Calcareous clay shale (claystone)	Debitage	Decortication Flakes	Cobble					
126	600	445					Surface	Surface			1	3.03	Calcareous clay shale (claystone)	Debitage	Early Reduction	Cobble					
149	535	480					Surface	Surface			1	34.28	Metamorphic	Fire Cracked Rock	Fire Cracked Rock						
152	630	480					Surface	Surface			1	3.37	Calcareous clay shale (claystone)	Debitage	Flake Fragments	Absent					
166	520	510					Surface	Surface			1	1.92	Onondaga	Debitage	Flake Fragments	Absent					
173	595	550					Surface	Surface			1	11.87	Shriver/Helderberg	Debitage	Flake Fragments	Absent					
174	610	600					Surface	Surface			1	0.1	Black Chert	Debitage	Flake Fragments	Absent					
176	529	418		1			I	Ap	3	34-39 cm	2	270.32	Metamorphic	Fire Cracked Rock	Fire Cracked Rock						
187	592	417	J26				I	Ap		0-35 cm	1	0.82	Shriver/Helderberg	Debitage	Flake Fragments	Absent					
189	607	427	J29				I	Ap		0-30 cm	1	3.12	Argillite	Debitage	Biface Reduction	Absent					
191	617	457	J32				I	Ap		0-20 cm	1	9.06	Metamorphic	Debitage	Biface Reduction	Absent					
191	617	457	J32				I	Ap		0-20 cm	1	358.54	Calcareous clay shale (claystone)	Fire Cracked Rock	Fire Cracked Rock						
194	650	477	J41				I	Ap			1	0.91	Onondaga	Debitage	Flake Fragments	Cobble					
199	592	418		1			I	Ap	2	24-34 cm	8	263.08	Metamorphic	Fire Cracked Rock	Fire Cracked Rock						
212	598	423		7			I	Ap	2		4	463.44	Sandstone	Fire Cracked Rock	Fire Cracked Rock						
216	575.30	419.30					Surface	Surface			1	9.92	Shriver/Helderberg	Biface	Projectile Points	Absent	whole	52.9	22.8	8	Cresap-like
217	575.45	457.00					Surface	Surface			1	4.51	Shriver/Helderberg	Biface	Projectile Points	Absent	medial		26.7	6.7	untyped
222	518.20	425.80			3		II	B			1	131.37	Metamorphic	Debitage	Decortication Flakes	Cobble					
228	541.57	406.62			1	2 S1/2		F-2			2	0.6	Shriver/Helderberg	Debitage	Biface Reduction	Absent					
235	534.2	425.65		0	3	83 W1/2		F-83			1	0.32	Shriver/Helderberg	Debitage	Flake Fragments	Absent					
236	534.2	425.65		0	3	83 E1/2		F-83			1	4.21	Shriver/Helderberg	Debitage	Flake Fragments	Absent					
238	592.16	445.67		0	5	171 E1/2		F-171		0-10	1	24.2	Sandstone	Fire Cracked Rock	Fire Cracked Rock						
244	555.99	446.63		0	5	153 NW1/2		F-153		0-5	1	0.05	Dark gray chert	Debitage	Biface Reduction	Absent					
249	592.16	445.67		0	5	171 W1/2		F-171		10-20	1	0.04	Dark gray chert	Debitage	Biface Reduction	Absent					
										TOTAL	49										

BBNPP Site 36LU301 Phase II Historic Artifact Catalog

Fs	N	E	Stp	Tu	Trench	Fea	F-Lev	Strat	Elev	Class	Sub-Class	Count	Material	Object	Color	Form	Part	Beg	End	Reference
36	500	485						Surf		Architecture	Brick, Block	1	brick	brick						
37	500	495						Surf		Kitchen	Ceramics	1	ceramic	whiteware, handpainted, ind motif	red	hollowware	rim	1840	1860	Lofstrum et al 1982; Majewski & O'Brien 1984
41	520	475						Surf		Kitchen	Kitchen-Other	1	glass	canning jar lid liner	white opaque	lid	body	1896	1950	Toulouse 1971
45	525	440						Surf		Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk	ind form	chip			
52	540	425						Surf		Kitchen	Ceramics	1	ceramic	redware, paste		ind form	body			
59	570	570						Surf		Kitchen	Bottles/Jars	1	glass	bottle glass	aqua, lt	bottle	body			
60	585	600						Surf		Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk int & ext	ind form	body			
63	590	585						Surf		Kitchen	Ceramics	1	ceramic	whiteware, plain		ind form	body	1830	2011	Price 1979; Noel Hume 1980
64	615	590						Surf		Kitchen	Ceramics	1	ceramic	whiteware, transfer print, ind motif	red	flatware	rim	1828	1850	Majewski & O'Brien 1984
67	520	525	X16					I	0-32	Architecture	Nails,Spikes,Etc.	1	metal	nail, indeterminate						
67	520	525	X16					I	0-32	Kitchen	Bottles/Jars	1	glass	container glass; machine made; "O made in USA"	clear	ind form	body	1903	2011	Diess 1981
67	520	525	X16					I	0-32	Kitchen	Bottles/Jars	1	glass	container glass	clear	ind form	body			
68	515	530	X15					I	0-35	Kitchen	Bottles/Jars	1	glass	bottle glass	clear	ind form	body			
69	510	530	X10					I	0-30	Kitchen	Bottles/Jars	1	glass	container glass, embossed	clear	ind form	body			
69	510	530	X10					I	0-30	Kitchen	Bottles/Jars	1	glass	bottle glass	clear	ind form	body			
69	510	530	X10					I	0-30	Kitchen	Ceramics	1	ceramic	whiteware, plain		ind form	body	1830	2011	Price 1979; Noel Hume 1980
70	520	530	X09					I	0-28	Kitchen	Bottles/Jars	1	glass	bottle glass	clear	ind form	body			
71	510	533.5	X12					I	0-38	Kitchen	Bottles/Jars	2	glass	bottle glass	clear	ind form	chip			
72	515	525	X05					I	0-30	Activities	Farming	2	metal	braided wire						
72	515	525	X05					I	0-30	Kitchen	Bottles/Jars	2	glass	bottle glass	clear	ind form	body			
72	515	525	X05					I	0-30	Kitchen	Kitchen-Other	1	glass	canning jar lid liner	white opaque	lid	rim	1896	1950	Toulouse 1971
74	510	540	X06					I	0-32	Kitchen	Bottles/Jars	1	glass	bottle glass, machine made	clear	container	rim	1903	2011	Diess 1981
77	600	400						Surf		Kitchen	Bottles/Jars	1	glass	bottle glass, pressed	clear	hollowware	body	1820	Ca 1950	Schroy 2001
83	520	410						Surf		Kitchen	Ceramics	1	ceramic	redware, paste		ind form	body			
92	515	420						Surf		Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk int & ext	ind form	body			
99	530	425						Surf		Architecture	Window Glass	1	glass	window glass	clear					

Fs	N	E	Stp	Tu	Trench	Fea	F-Lev	Strat	Elev	Class	Sub-Class	Count	Material	Object	Color	Form	Part	Beg	End	Reference
117	510	440						Surf		Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk int & ext	ind form	body			
161	520	500						Surf		Architecture	Brick, Block	1	brick	brick						
162	525	500						Surf		Kitchen	Ceramics	1	ceramic	Stoneware	olive	hollowware	body			
172	580	535						Surf		Kitchen	Ceramics	1	ceramic	whiteware, plain		ind form	body	1830	2011	Price 1979; Noel Hume 1980
179	515	435	J15					I	0-29 cm	Architecture	Window Glass	1	glass	window glass	clear					
179	515	435	J15					I	0-29 cm	Kitchen	Ceramics	1	ceramic	redware, brown glaze	unglazed ext; brown, dk int	hollowware	body			
179	515	435	J15					I	0-29 cm	Kitchen	Ceramics	2	ceramic	redware, paste		ind form	body			
179	515	435	J15					I	0-29 cm	Kitchen	Ceramics	2	ceramic	redware, brown glaze	brown, dk	ind form	chip			
179	515	435	J15					I	0-29 cm	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk int & ext	ind form	body			
179	515	435	J15					I	0-29 cm	Kitchen	Ceramics	2	ceramic	redware, brown glaze	brown, dk int & ext	hollowware	rim			
179	515	435	J15					I	0-29 cm	Unidentifiable	Indeterminate	1	pewter	pewter	gray, dk					
180	515	505	J16					I	0-28 cm	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk	ind form	chip			
195	582	410	J43					I	0-35 cm	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk/ black	ind form	chip			
207	608	426		4				I		Architecture	Window Glass	1	glass	window glass	tinted					
207	608	426		4				I		Kitchen	Ceramics	1	ceramic	whiteware, plain		ind form	body	1830	2011	Price 1979; Noel Hume 1980
214	617	445		10				I		Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk	ind form	chip			
218	520	415			2			fill		Kitchen	Ceramics	1	ceramic	redware, brown glaze	unglazed ext; brown, lt int	hollowware	base			
221					3			back dirt		Kitchen	Ceramics	1	ceramic	redware, brown glaze	unglazed ext; brown, dk int	hollowware	base			
223	517.70	426.75			3	77				Personal	Personal-Other	1	metal, bone	pocket knife						
231	517.05	426.84		0	3	77 N1/2	1		0-3	Faunal	Bone	1	bone	teeth						
231	517.05	426.84		0	3	77 N1/2	1		0-3	Faunal	Bone	4	bone	bone						
231	517.05	426.84		0	3	77 N1/2	1		0-3	Kitchen	Ceramics	2	ceramic	redware, clear lead glaze	clear glaze int; unglazed ext	hollowware	body			
231	517.05	426.84		0	3	77 N1/2	1		0-3	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, med int; unglazed ext	hollowware	body			
231	517.05	426.84		0	3	77 N1/2	1		0-3	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk int & ext	hollowware	body			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Architecture	Window Glass	2	glass	window glass	tinted					
232	517.05	426.87		0	3	77 N1/2	2		3-13	Faunal	Bone	2	bone	teeth						
232	517.05	426.87		0	3	77 N1/2	2		3-13	Faunal	Bone	15	bone	bone						

Fs	N	E	Stp	Tu	Trench	Fea	F-Lev	Strat	Elev	Class	Sub-Class	Count	Material	Object	Color	Form	Part	Beg	End	Reference
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	2	ceramic	redware, brown glaze, rolled rim	brown, lt int; unglazed ext	hollowware	rim			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	3	ceramic	redware, brown glaze, straight rim	brown, lt int; unglazed ext	hollowware	body			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	2	ceramic	redware, brown glaze	brown, med int; unglazed ext	hollowware	body			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	1	ceramic	whiteware, plain		ind form	rim	1830	2011	Price 1979; Noel Hume 1980
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk int & ext	hollowware	rim			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, dk	ind form	chip			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	1	ceramic	redware, brown glaze	brown, med int; unglazed ext	hollowware	rim			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Kitchen	Ceramics	6	ceramic	redware, clear lead glaze	clear glaze int; unglazed ext	hollowware	body			
232	517.05	426.87		0	3	77 N1/2	2		3-13	Unidentifiable	Indeterminate	4	metal	indeterminate metal						
233	517.05	426.87		0	3	77 N1/2	3		13-23	Architecture	Nails,Spikes,Etc.	1	metal	nail, wrought, rosehead						
233	517.05	426.87		0	3	77 N1/2	3		13-23	Faunal	Bone	30	bone	bone						
233	517.05	426.87		0	3	77 N1/2	3		13-23	Faunal	Bone	2	bone	teeth						
233	517.05	426.87		0	3	77 N1/2	3		13-23	Kitchen	Ceramics	2	ceramic	redware, brown glaze	brown, med int & ext	hollowware	body			
233	517.05	426.87		0	3	77 N1/2	3		13-23	Kitchen	Ceramics	4	ceramic	redware, brown glaze	brown, lt int; unglazed ext	hollowware	body			
233	517.05	426.87		0	3	77 N1/2	3		13-23	Unidentifiable	Indeterminate	3	metal	indeterminate metal						
236	534.2	425.65		0	3	83 E1/2				Architecture	Window Glass	1	glass	window glass, thin	tinted					

Appendix F

Qualifications of Key Personnel

Barbara A. Munford

Principal Investigator

Education

M.A., Anthropology, 1982, George Washington University

B.A., Anthropology, 1977, American University

Affiliation

West Virginia Archaeology Society

Eastern States Archaeological Federation

Relevant Training/Courses

2010 Project Management Short Course

2010 Advanced Project Management Training Program

Areas of Specialization

Prehistory of the eastern and southwestern United States; lithic analysis; collections management; field and laboratory methods.

Professional Experience

Principal Investigator

2011

- Third Supplemental Phase I Cultural Resources Investigation, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for AREVA NP Inc. and UniStar Nuclear Energy, LLC
- Phase II National Register Evaluation of Site 36LU301, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for PPL Bell Bend, LLC.
- Report Author. Phase I Cultural Resources Investigation, Tall Trees Project, Upshur County, West Virginia, for Chesapeake Midstream Services, LLC.
- Report Co-Author. Phase I Cultural Resources Investigation, TL-571 Replacement Project, Lewis County, West Virginia, for Dominion Transmission, Inc.

2010

- Intensive Phase I Cultural Resources Investigation, SR 0056, Section 453, South Brush Valley Bridge Replacement, Brush Valley Township, Indiana County, Pennsylvania, for Pennsylvania Department of Transportation, Engineering District 10-0.
- Phase Ib Cultural Resources Investigation, REMP Garden and Fiber Optic Communications, Cable Relocation Area, Calvert Cliffs Nuclear Power Plant, Calvert County, Maryland, for Constellation Generation Group
- Bell Bend Alternative Sites Research, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for UniStar Nuclear Energy, LLC.
- Phase I Cultural Resource Investigations and Phase II National Register Site Evaluations, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for Unistar Nuclear Energy, LLC.
- Second Supplemental Phase Ib Cultural Resources Investigation and COLA Environmental Report Revisions, Power Block Relocation, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for AREVA NP Inc.

2009

- Phase II National Register Site Evaluations (Five Archaeological Sites), Nine Mile Point Nuclear Station, Proposed Unit 3 (NMP Unit 3), Oswego County, New York, for UniStar Nuclear Energy, LLC.
- Co-Principal Investigator. Phase II National Register Sites Evaluations (Seven Archaeological Sites), Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for UniStar Nuclear Energy, LLC.
- Phase I Cultural Resources Investigations and Phase II National Register Site Evaluations, Calvert Cliffs Nuclear Power Plant, Calvert County, Maryland, for UniStar Nuclear Development, LLC.
- Co-Principal Investigator and Report Co-Author. Phase Ib Archaeological Survey, Rural Valley Pipeline Project, Armstrong, Westmoreland, Elk, and McKean Counties, Pennsylvania, for Dominion Transmission, Inc.
- Third Supplemental Phase I Cultural Resources Survey, Franklin 20-inch Storage Pipeline Project, Wayne and Summit Counties, Ohio, for Dominion East Ohio Gas.
- Second Supplemental Phase I Cultural Resources Survey, Franklin 20-inch Storage Pipeline Project, Wayne and Summit Counties, Ohio, for Dominion East Ohio Gas.
- Co- Principal Investigator. Data Recovery Plan: Site 18Cv474, Calvert Cliffs Nuclear Power Plant, Calvert County, Maryland, for UniStar Nuclear Development, LLC.
- Phase II National Register Site Evaluations, TL-585/H-162 Pipeline Replacement Project, Kanawha and Clay Counties, West Virginia, for Dominion Transmission, Inc.

2008

- Phase Ib Cultural Resources Investigations, TL-585/H-162 Pipeline Replacement Project, Kanawha and Clay Counties, West Virginia, for Dominion Transmission, Inc.
- Phase Ia Cultural Resources Investigations, TL-585/H-162 Pipeline Replacement Project, Kanawha and Clay Counties, West Virginia, for Dominion Transmission, Inc.
- Supplemental Phase Ib Cultural Resources Investigation, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for AREVA NP Inc. and UniStar Nuclear Development, LLC.
- Phase Ib Cultural Resources Investigation, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania, for AREVA NP Inc. and UniStar Nuclear Development, LLC.
- Phase I Cultural Resources Investigations and Phase II National Register Site Evaluations, Calvert Cliffs Nuclear Power Plant, Calvert County, Maryland, for UniStar Nuclear Development, LLC.
- Phase I Cultural Resources Survey, Limestone Compressor Station and Pipeline Project, Clarion County, Pennsylvania, for Equitable Gas.
- Phase IA Cultural Resources Reconnaissance, Susquehanna Steam Electric Station, Luzerne County, Pennsylvania, for Constellation Power Generation.
- Phase I Cultural Resources Survey, Franklin 20-inch Storage Pipeline Project, Wayne and Summit Counties, Ohio, for Dominion East Ohio Gas.
- Phase IA Cultural Resources Reconnaissance, Berwick PA NPP-1, Areas 6, 7, and 8, and Confers Lane Parcel, Luzerne County, Pennsylvania, for Areva NP, Inc. and UniStar Nuclear Development, LLC.

2007

- Phase I Cultural Resources Survey, Dominion East Ohio Storage Expansion Project, Wayne and Summit Counties, Ohio, for Dominion Resources Services, Inc.
- Phase Ib Archaeological Survey, Falling Water Development Project, Monongalia County, West Virginia, for Backwater Properties, LLC.
- Phase I Cultural Resources Survey, Limestone Compressor Station and Pipeline Project, Clarion County, Pennsylvania, for Equitable Gas Company.
- Phase I Cultural Resources Survey, Keystone Station Water Pipeline Project, Armstrong County, Pennsylvania, for Reliant Energy Northeast Management.

- Phase Ia Cultural Resources Reconnaissance, Carrie Furnaces Redevelopment Project, Allegheny County, Pennsylvania, for Redevelopment Authority of Allegheny County.
- Phase I Cultural Resources Survey, Glade Run Loop 138kV Line, Armstrong County, Pennsylvania, for Allegheny Power.
- Phase Ia Cultural Resources Investigation, Majestic Star Casino, Pittsburgh, Allegheny County, Pennsylvania, for Chester Engineers.
- Phase I Cultural Resources Investigation, Calvert Cliffs Nuclear Power Plant, Calvert County, Maryland, for Tetra Tech NUS and UniStar Nuclear Development, LLC.

2006

- Phase I Survey of the Cove Point LNG Terminal Expansion, Calvert County, MD, for Dominion Cove Point LNG LP.
- Phase I Cultural Resources Survey, Bald Eagle II Wetlands Mitigation Project, Cove Point Expansion PL-1 EXT-2, Centre County, Pennsylvania, for Dominion Transmission, Inc.
- Phase I Cultural Resources Survey, Swann Wetland Development Project, Cove Point Expansion TL-532 Pipeline Project, Calvert County, Maryland, for Dominion Cove Point LNG, LP.
- Phase I Archaeological Survey, Wal-Mart Supercenter #4501-00, West Brownsville Borough, Washington County, Pennsylvania, for Wal-mart Stores, Inc.
- Phase I Cultural Resources Survey, State Line Pipeyard Project, Cove Point Expansion TL-453 and TL-536 Pipeline, Allegany County, New York, for Dominion Transmission, Inc., Clarksburg, West Virginia.
- Phase I/II Archaeological Investigations, MEMCO/AEP Riverbank Restoration Project, Mason County, West Virginia, for Madison Coal and Supply Company

2005

- Phase Ib Survey of the Graysville-Wind Ridge Area water system extension, Greene County, PA for Southwestern Pennsylvania Water Authority.
- Phase Ia Cultural Resources Survey of Oakbrooke Estates, Cecil Township, Washington County, Pennsylvania, for Oakbrooke Muse Partners, LP.

2004

- Phase Ia Archaeological Reconnaissance and Geomorphology Assessment of the Kirwan Heights Interchange and Collier Crossing Development, Collier Township, Allegheny County, Pennsylvania, for the Goldenberg Group, Inc.
- Archaeological Monitoring of PPL Gas Utilities First Quality Pipe Installation along SR 1002 on Great Island, Lock Haven, Clinton County, Pennsylvania, for PPL Gas Utilities.
- Phase I Cultural Resources Survey of the Cove Point LNG Terminal Expansion, Calvert County, Maryland, for Dominion Cove Point LNG, LP.
- Phase I Archaeological Survey of Access Roads 10B, 10C, 10D and 68, TL-263 12" Natural Gas Pipeline Repair Project, Wyoming and Boone Counties, West Virginia, for Dominion Transmission, Inc. (DTI).
- Phase Ia Archaeological Reconnaissance of the Mockingbird Compressor Station Access Road Widening, Wetzel County, West Virginia, for Dominion Transmission, Inc. (DTI).
- Phase I Archaeological Survey of the Sophia Storage Yard, TL-263 12" Natural Gas Pipeline Repair Project, Raleigh County, West Virginia, for Dominion Transmission, Inc. (DTI).
- Phase Ib Archaeological Survey of the Graysville-Wind Ridge Area Water System Extension, Greene County, Pennsylvania, for Bankson Engineers and the Southwestern Pennsylvania Water Authority.

- Phase II National Register Evaluation of Site 46Hm63, Romney Bridge Replacement, Hampshire County, West Virginia, for the West Virginia Department of Transportation, Division of Highways.

2003

- Phase Ib Archaeological Survey of the Romney Bridge Replacement, Hampshire County, West Virginia, for the West Virginia Department of Transportation, Division of Highways.
- Phase I, II, and III Investigations of Appalachian Corridor L (U.S. 19) and EIS for a 24-mile, Four-lane Highway, for the WVDOH.
- Phase I Survey of Two Project Areas (Wetlands Mitigation Area and Soil Borrow Area) for the Brunner Island Steam Electric Station, York County, PA, for the Pennsylvania Power and Light Company.
- Phase Ib Archaeological and Geomorphological Survey, Romney Bridge Replacement, Preferred Alternative 6, Hampshire County, WV for WVDOH.
- Phase Ib Survey of the U.S. Route 19/Lochgelly Interchange and WV 16 Reconnection, Fayette County, WV for Kimley-Horn and WVDOH.
- Phase I Cultural Resources Survey of U.S. Route 35 Wetland Mitigation Sites 3, 5A and 8, Mason County, West Virginia, for Kimley-Horn and Associates, Inc. and the West Virginia Department of Transportation, Division of Highways.

2002

- Phase Ia and Ib Surveys of the Federal #2 Mine, Monongalia County, WV, for Eastern Associated Coal Company.
- Phase Ia Survey (Archaeological and Historical Services) for the Tolsia Wetlands Mitigation Site MII-3, Wayne County, West Virginia, for Kimley-Horn and Associates, Inc. and WVDOH.
- Phase I Survey of the Burrell Township Sewer Authority, Strangford Area Project, Indiana County, PA, for the U.S. COE-Pittsburgh District.
- Phase III Data Recovery Investigation of Site 46Ni252, an Early Archaic through Middle/Late Woodland occupation, Nicholas County, WV, for the WVDOH.

1990-2001

- Phase III Data Recovery Investigations of Site 46NI267, a Woodland Occupation, Nicholas County, WV. WVDOH.
- Phase I Survey of the York Haven Bypass Road, York County, Pennsylvania, for the Pennsylvania Power and Light Company.
- Archaeological Testing and Data Recovery Investigations of the Altoona Railroaders Memorial Museum, Blair County, PA for the National Park Service.
- Archaeological Testing and Data Recovery Investigations of the Fort Necessity National Battlefield, Fayette County, PA for the National Park Service.
- Phase II/III testing of the Legion Ville site (36BV33), historic component, Harmony Township, Beaver County, PA for B.P. Mouradian.
- Phase I Survey of the East Towanda to East Sayre Transmission Line, Bradford County, PA for the Pennsylvania Electric Company.
- Phase I Survey of the York Haven Bypass Road, York County, Pennsylvania, for the Pennsylvania Power and Light Company
- Phase I Deep Testing of the Gas Pipeline between State Route 66 and the Latrobe Steel Plant, Westmoreland County, for Clinton Gas Marketing Inc.
- Field Director: Phase I survey of the Leidy Loop, Centre County, Pennsylvania, for Texas Eastern Gas Pipeline Company.

Terry J. Newell

Archaeologist

Education

Section 106 Essentials (Oct. 2006)
Waste Site Worker Protection (OSHA) Training – Skelly and Loy, Inc. (Aug. 1996)
24 Hour Lithic Workshop, University of Pittsburgh (Nov. 1988)
Connellsville Area High School (1982)

Previous Employment

Field Director, GAI Consultants, Inc., 2006-Present
Field Director and Laboratory Technician, Skelly and Loy, Inc., 1992-2006
Crew Chief, Field and Laboratory Technician, Christine Davis Consultants, 1992
Crew Chief, Field and Laboratory Technician, Mercyhurst University, 1991-1992
Crew Chief and Field Technician, Louis Berger, 1991
Field Technician, Goodwin and Associates, 1990
Field Technician, W.A.P.O.R.A., 1990
Crew Chief, Field and Laboratory Technician, University of Pittsburgh (Cultural Resource Management Program) 1986-1990

Professional Experience

2011

- Field Director. Phase I Cultural Resources Investigation, Wyoming Natural Gas Pipeline Project, Luzerne and Wyoming Counties, Pennsylvania, for Chief Gathering, LLC.
- Senior Archaeologist. Phase I Cultural Resource Investigations and Phase II National Register Evaluations, Appalachian Gateway Project, Greene, Washington, Allegheny, Westmoreland Counties, Pennsylvania, for Dominion Transmission, Inc.
- Senior Archaeologist. Phase I Cultural Resources Investigation, VEPCO, Warren County Project, Warren and Loudoun Counties, Virginia, for Natural Resource Group, LLC.

2010

- Field Director. Phase I Cultural Resource Investigations and Phase II National Register Evaluations, Appalachian Gateway, Barbour, Doddridge, Harrison, Kanawha, Marshall, and Wetzel Counties, West Virginia, for Dominion Transmission, Inc.
- Senior Archaeologist. ROD, MSI Bridge Replacement Project, Vandergrift Borough, Westmoreland County Department of Public Works, Pennsylvania
- Field Director. Phase I Archaeological Investigation, SM 116 Loop Line Project at Hamlin Compressor Station, Lincoln County, West Virginia, for Columbia Gas Transmission, LLC.
-

2009

- Field Director. Phase III Analysis and Report of the McDaniel Site (44Gn115), Hardy Transmission Project, Greene County, Virginia for Columbia Gas Transmission.
- Field Director. Phase III Data Recovery Excavations, Sites 46Ta23 and 46Ta24, Taylor County, West Virginia
- Field Director. Phase II Cultural Resources investigations of six (6) historic sites plus one (1) prehistoric site for PPL and Unistar at Bell Bend Nuclear Power Plant in Luzerne County, Pennsylvania. Directed a crew consisting of two (2) crew chiefs and fourteen (14) field technicians.

- Field Director. Phase III Cultural Resources Investigation for REX-Rockies Express Gas Pipeline in Ohio for Caprock.
- Field Director. Phase Ib Archaeological Survey, NIJUS001 (MD-146) Pipeline Project, Amwell Township, Washington County, Pennsylvania, for EQT Production Company.
- Field Director. Phase II Investigations of the Dun Glen Hotel Site for the Fire Suppression System, Fayette County, West Virginia, for National Park Service-NERI.

Field Director 2006 – 2008

- Field Director. Phase III Cultural Resources investigation for REX-Rockies Express gas pipeline in Monroe County, Ohio (33MO077). Supervised a crew consisting of fourteen (14) field technicians and one (1) crew chief. Duties included photography, quality control, mapping with transit, and daily briefings with principal investigator.
- Phase I Cultural Resources Investigation and Phase II excavations of 7 prehistoric sites and 2 historic sites, Great Bend, Meig's County, Ohio for AEP. Supervised 20 + field technicians and 2 crew chiefs for survey of more than 630 acres. Supervised multiple crews, maintained quality control, presented daily briefings to Principal Investigators.
- Phase III Cultural Resources Investigation, Nuttalburg Mine Conveyor, Fayette County, West Virginia for New River Gorge National River (NPS/NERI). Limited excavation at National Register Eligible historic site.
- Phase III Cultural Resources Investigation, Hardy Transmission, Greene County, Virginia for Columbia Gas Transmission. Supervised 18 Field Technicians and 1 Crew Chief. Block excavations (213 m2) of multi-component prehistoric site (Woodland - Paleo Indian). Duties included photography, maintaining digital FS log, preliminary projectile point identification, quality control, mapping with transit, and daily briefings with Principal Investigator.
- Phase I Cultural Resources Investigation, Calvert Cliff's Nuclear Power Plant, Calvert County, Maryland for Tetra Tech, NUS, and Unistar Nuclear Development, LLC. Eight (8) features and more than 43,000 lithics. Supervised 20+ field Technicians and 1 Crew Chief for archaeological survey of 600 + acres, and maintained field mapping of testing, quality control of field records.
- Phase I Cultural Resources Investigation, Crawford Storage Line, Fairfield and Hocking Counties, Ohio for Columbia Gas Transmission. Supervised 12 + Field Technicians and 1 Crew Chief on proposed natural gas storage line. Maintained quality control, met with project personnel from other firms, briefed project archaeologist daily.
- Phase I Cultural Resources Investigation, Weaver Storage Line, Ashland and Holmes Counties, Ohio for Columbia Gas Transmission. Supervised 12 + Field Technicians and 1 Crew Chief for proposed natural gas storage line. Maintained quality control of field records, met with project personnel from other firms, briefed project archaeologist daily.
- Phase I Cultural Resources Investigation, Hardy Transmission, Elkton Storage Yard, Rockingham County, Virginia for Columbia Gas Transmission.
- Phase I Cultural Resources Investigation, 2" Plastic Replacement Line, Washington County, Pennsylvania for Columbia Gas Transmission.
- Phase I Cultural Resources Investigation, H-156 line, valve replacement, Allegheny County, Pennsylvania for Equi Trans.
- Phase I Cultural Resources Investigation, H-156 line replacement, Allegheny County, Pennsylvania for Equi Trans.
- Phase I Cultural Resources Investigation, 15 mile proposed pipeline alignment, Armstrong County, Pennsylvania for Keystone Power Station.
- Phase I Cultural Resources Investigation, proposed Avella sewage line, Washington County, Pennsylvania for Bankson Engineers.

- Phase I Cultural Resources Investigation, U.S. Route 15 relocation project, Steuben County, New York for Dominion Transmission, Inc.
- Phase I Cultural Resources Investigation, Mares Run Road pipe evaluation assessment, Lewis County, West Virginia for Dominion Transmission, Inc.
- Phase I Cultural Resources Investigation, Greensboro Sewage Collection and Treatment Facility, Greene County, Pennsylvania for Fayette Engineering.
- Cultural Resources Phase I/II Excavation and Monitoring, North Shore Connector, Allegheny County, Pennsylvania for Port Authority Transit of Allegheny County.

Field Director 1992-2005

- Phase I/II/III Cultural Resources Investigation, State Route 15 preferred alignment, Tioga County, Pennsylvania for Pennsylvania Dept. of Transportation. Supervised 20 + Field Technicians and 2 Crew Chiefs within multi-phase investigations of a Late Woodland village site. Duties included field documentation, quality control, and mapping with transit.
- Phase III Cultural Resources Investigation, Ronald McDonald House, Wilmington Delaware for Blue Ball Transportation. Supervised block excavations at prehistoric camp site.
- Phase III Cultural Resources Investigation, 99 Corridor, Centre County, Pennsylvania for Pennsylvania Dept. of Transportation. Transitional Archaic camp site (Wiser Site). Supervised 15 Field Technicians and 1 Crew Chief in block and feature excavations.

Crew Chief Experience 1992-2006

- Phase III Cultural Resources Investigation, I-80 Bridge Replacement, Northumberland County, Pennsylvania for Pennsylvania Dept. of Transportation. Helped supervise fieldwork of deep, block excavations and cultural features on floodplain of Susquehanna River.
- Phase II/III Cultural Resources Investigation, Tunkhannock Bypass, Wyoming County, Pennsylvania for Pennsylvania Dept. of Transportation. Helped supervise excavations of two prehistoric camp sites identified within right-of-way corridor.
- Phase III Cultural Resources Investigation, natural gas line replacement, Lancaster, Pennsylvania for Texas Eastern Transmission. Helped supervise prehistoric open camp site, (Persal Site)
- Phase I Cultural Resources Investigation, Corridor O, Clearfield County, Pennsylvania for Pennsylvania Dept. of Transportation.
- Phase I Cultural Resources Investigation, Mon-Fayette Expressway, Fayette and Washington Counties, Pennsylvania for Pennsylvania Dept. of Transportation.
- Phase I/II Cultural Resources Investigation, 218 mile gas pipeline survey, Fulton, Adams and Franklin Counties, Pennsylvania for Texas Eastern Transmission.
- Phase I/II Cultural Resources Investigation, I-80 / Bellefonte Interchange, Centre County, Pennsylvania for Pennsylvania Dept. of Transportation.
- Phase I/II Cultural Resources Investigation, Greensburg Bypass, Westmoreland County, Pennsylvania for Pennsylvania Turnpike Commission.
- Phase III Cultural Resources Investigation, 11.5 acre Monongahela village site, Westmoreland County, Pennsylvania for Sony Corp.

Field Technician Experience 1986-1992 (representative samples)

- Phase I Cultural Resources Investigation, Super Collider Project for the State of Texas (1991-1992)
- Phase I Cultural Resources Investigation, Fort Drum military base expansion, Fort Drum, New York for US Dept. of Defense (1991)

Appendix G

Erosion and Sedimentation Control Plan

REDACTED Appendix G
in its entirety

Appendix H
Methods of Prehistoric Lithic Analysis

Appendix H: Methods for Analysis of Prehistoric Lithic Artifacts

Introduction

This appendix provides an overview of the methods of lithic analysis used for this project. After washing and labeling, prehistoric artifacts recovered during the investigation were divided into specific artifact types, with a number of variables recorded for each type. Five basic categories of information can be derived from lithic artifacts: depositional, temporal/stylistic, functional, technological, and raw material. Each of these aspects of the lithic record are interrelated and cannot be completed divorced from one another. Raw material analysis identifies the lithic materials that were exploited; this information permits inferences to be made about procurement strategies and the related issues of exchange and settlement mobility. Technological analysis examines tool design and methods of production, maintenance, and recycling; this information helps to document the organization of technology and to address issues such as site function. Functional analysis determines the tasks in which tools were employed; this information also helps to document the organization of technology and site function. Temporal/stylistic analysis provides chronological as well as other cultural information; typically, however, only the most formalized stone tools are usually diagnostic (e.g., projectile points), and even these items tend to be less sensitive to temporal change or regional styles than are ceramics. Information about depositional processes help to identify activity areas, tool kits, and larger-scale site formation processes; this information is derived from crossmending and plotting artifact distributions.

The methods and procedures used to generate data about these five aspects of the lithic record are outlined below. As lithic artifacts were analyzed, information was recorded on analysis sheets as a series of codes; then, the codes were entered into a computer database program, Microsoft Access. For the purposes of data analysis and manipulation, this database was then converted to Excel data manipulation and table generation. These computer programs facilitated a better understanding of site-use.

Artifact Classes and Types

The analytical approach to stone tool production and use used here can be described as techno-morphological; that is, artifacts were grouped into general classes and further divided into specific types based upon key morphological attributes, which are linked to or indicative of particular stone tool production (reduction) strategies. Function was inferred from morphology as well as from use-wear. Surfaces and edges were examined for traces of use polish and damage with the unaided eye and with a 10x hand lens. A conservative approach to the identification of utilized and edge-retouched flakes was taken because of a number of other factors can produce similar edge-damage, such as, trampling of materials on living surfaces, spontaneous retouch during flake detachment, and trowel contact. Data derived from experimental and ethnoarchaeological research were relied upon in the identification and interpretation of artifact types. The works of Adams (2002), Andrefsky (1998), Callahan (1979), Clark (1986), Crabtree (1972), Flenniken (1981), Gould (1980), Parry (1987), Whittaker (1994) were drawn upon most heavily.

Organized by artifact classes, specific artifact types are listed below, followed by their code and a brief definition. All types were quantified by both count and weight in grams. Also discussed below are the specific variables or attributes that were recorded and how they were coded.

Bifaces

Bifaces are chipped stone tools that have been shaped by the removal of flakes from both faces or sides of a cobble or large flake. In most cases, they are hafted and used as projectile points and/or knives. Technically, bifaces are also cores, because the flakes detached from them during production and maintenance can be used as tools themselves. Attributes recorded on bifaces include raw material, cortex, condition, and maximum length, width, and thickness, recorded in mm. The condition of fragmentary projectile points is coded as tip (TIP), medial section (MED), and base (BAS). Based on attribute characteristics bifaces were then classified according to the following types:

1. Early-Stage Bifaces (EB) are cobbles or large flakes that have had their edges bifacially trimmed and a few large reduction flakes detached. These bifacial blanks are equivalent to Callahan's (1979) Stage 2 bifaces. Because of their crude condition, these bifaces can be hard to distinguish from freehand cores. In fact, early-stage production failures could easily be recycled into these other tool types.

2. Middle-Stage Bifaces (MB) look more like bifaces; they have been initially thinned and shaped. A lenticular cross section is developing, but edges are sinuous, and patches of cortex may still remain on one or both faces. These bifaces are roughly equivalent to Callahan's (1979) Stage 3 bifaces. Biface reduction is a continuum; therefore, middle-stage bifaces are often difficult to distinguish from early- and late-stage bifaces, depending upon the point at which their reduction was halted. In addition, rejected bifaces may have been used for other tasks (recycled).

3. Late-Stage Bifaces (LB) are essentially finished bifaces; they are well thinned, symmetrical in outline and cross section, and edges are centered. Small areas of cortex may still exist on one or both faces. These bifacial performs are roughly analogous to Callahan's (1979) Stage 4 bifaces.

4. Projectile Points (PP) are finished bifaces that were hafted and functioned as projectiles and/or knives. Intact projectile points and basal fragments were assigned to previous established point types.

5. Drills (DR) are slender bifaces that were used to perforate or pierce various materials, perhaps using a rotary motion. On occasion, projectiles are reworked into drills.

6. Choppers (CP) are large bifaces that have been employed in tasks that required heavy-duty cutting or chopping. These implements are often crudely formed and can be mistaken for cores or early-stage bifaces.

7. Other Bifaces (OB) are bifaces that do not fit easily into the above types (the note field may be used to record distinctive attributes).

8. Indeterminate Biface Fragments (IB) are sections of bifaces that are too badly damaged to be assigned to a specific type.

Unifaces

Unifaces include both formal tools, like endscrapers, and informal tools, like utilized and edge-retouched flakes. Flakes from cores or bifaces can be used as informal (expedient) tools or worked into formal tools. Three uniface types were recognized, and their raw material, cortex, and condition (whole or broken) was recorded. Maximum length, width, and thickness are recorded in mm.

1. Endscrapers (ES) are formalized unifaces that have uniformly retouched edges, which creates a working edge and a standardized shape. The working edge is transverse to the long axis of the tool, and retouching often erases obvious indications that the tool is made on a flake. In some cases, endscrapers are bifacially worked, but they are still classified as unifaces.

2. Sidescrapers (SS) are formalized unifaces that have uniformly retouched edges, creating a working edge with a relatively standardized shape. The working edge or edges are parallel to the long axis of the tool (or lateral margin of the original flake).

3. Retouched Flakes (RF) are expedient tools that have had one or more edges retouched, either to resharpen the working edge, to create a dulled edge for grasping, or to form a specific edge angle or shape. The flake itself could have been detached from a core or biface. It should be noted that severe edge-damage can be difficult to discern from intentional retouching. Retouch flake scars on edges typically exceed 2 mm in length.

4. Utilized Flakes (UF) are expedient tools that exhibit traces of use damage and/or polish on one or more edges. These flakes could have been detached from cores or bifaces, and they were employed with no prior modification. Both retouched flakes and utilized flakes represent simple tools that were usually employed in cutting and scraping tasks, and after tasks were completed, they were discarded. A discriminating criterion versus retouched flakes includes flake scars less than 2 mm in length.

5. Notched Flakes (NF) or spokeshaves are a special type of retouched flakes. The unifacial retouching of one of more flake edges resulted in a concave working edge(s).

6. Graver Flakes (GF) are a special type of retouched flake. Unifacial retouch of one or more edges resulting in acute projections distinguishes the morphology of this tool type.

7. Denticulated Flakes (DT) are a special type of retouched flake, with spaced unifacial flake removals from one or more edges forming a toothed or serrated edge.

8. Other Uniface Types (OU) are unifaces that do not fit easily into existing types.

9. Indeterminate Uniface Fragments (IU) are unifaces that are too fragmentary to be assigned to a specific type.

Cores

Cores are cobbles or blocks of raw material that have had one or more flakes detached, but they have not been shaped into tools or used extensively for tasks other than that of a nucleus from which flakes have been struck. Cores come in various shapes and sizes, depending upon their degree of reduction and the methods of reduction that were applied. Three core types were identified and variables recorded include raw material and cortex.

1. Freehand Cores (FC) are blocks or cobbles that have had flakes detached in multiple directions by holding the core in one hand and striking it with a hammerstone held in the other (Crabtree 1972). This procedure generates flakes that can be used for expedient tools or can be reworked into formalized tools. Freehand percussion cores come in various shapes and sizes, depending upon the raw material form and degree of reduction.

2. Bipolar Cores (BC) are usually cobbles that have had flakes detached by direct hard-hammer percussion on an anvil: the core is placed on the anvil and struck on the top with a hammerstone (Crabtree 1972; Hayden 1980). Cores typically assume a tabular shape, exhibit heavy crushing and battering, and flake scars tend to run between areas of crushing and battering. Bipolar cores are normally smaller than freehand cores. Most flakes that are

detached are only suitable for expedient flake tools. Bipolar reduction can also be used to recycle tools into usable flakes.

3. Tested Cobbles (TC) are unmodified cobbles, blocks, or nodules that have had a few flakes detached to examine raw material quality.

4. Other Core Types (OC) are cores that do not fit easily into existing types.

5. Blade Core (BC) displays multiple parallel removals of blades, often resulting in cone-like shape.

Debitage

Debitage includes all types of chipped-stone waste that bears no obvious traces of having been utilized or intentionally modified. All flakes were sorted by raw material type, and weighed. During detailed analysis, flakes were also sorted into the following categories:

1. Decortication Flakes (DF) are intact flakes with 50 percent or more cortex covering their dorsal surface. These are the first series of flakes detached during lithic reduction.

2. Early-Reduction Flakes (ER) are intact or nearly intact flakes with less than 50 percent dorsal cortex, fewer than four dorsal flake scars, on average, and irregularly shaped striking platforms with minimal faceting and lipping. Platform grinding is not always present. These flakes could have been detached from early-stage bifaces or cores of the freehand and bipolar types.

3. Biface-Reduction Flakes (BF) are intact or nearly intact flakes with multiple overlapping dorsal flake scars and small elliptically shaped platforms with multiple facets. Platform grinding is usually present. Platforms are distinctive because they represent tiny slivers of what once was the edge of a biface. Biface-reduction flakes are generated during the middle- and late-stages of biface reduction and also during biface maintenance (resharpening).

4. Bipolar-Reduction Flakes (BP) are intact or nearly intact flakes that have been struck from a bipolar core. They typically exhibit sheared cones or bulbs, closely spaced ripples, and crushed and splintered platforms. Crushing can also occur on the distal ends or terminations of these flakes, but it is a common misconception that platforms and bulbs are present on both ends of each flake. Not all flakes that are generated during bipolar reduction are readily distinguishable as bipolar flakes, and large amounts of shatter are usually generated.

5. Block Shatter (BS) are angular or blocky fragments that do not possess platforms or bulbs. Generally the result of uncontrolled fracturing along inclusions or internal fracture planes, block shatter is most frequently produced during the early reduction of cores and bifaces. Block shatter is common in bipolar reduction, and it is equivalent to "primary shatter" (Binford and Quimby 1963).

6. Flake Shatter (FS) consists of small, flat fragments or splinters that lack platforms, bulbs, and other obvious flake attributes. Flake shatter is generated throughout a reduction sequence but is most common in later stages. It is a common by-product of bipolar reduction and is equivalent to "secondary shatter" (Binford and Quimby 1963). Trampling of debitage on living surfaces also generates flake shatter, while thermal fracturing produces both flake and block shatter.

7. Flake Fragments (FF) are sections of flakes that are too fragmentary to be assigned to a particular flake type.

8. Indeterminate Flakes (IF) are flakes that could not be confidently assigned to any debitage category.

9. Blades (Bl) consist of flakes with dimensions of length measuring at least twice width, and displaying parallel lateral margins. Where recovered in large numbers, may be associated with prepared core and blade reduction technique (Crabtree 1972).

Detailed analysis included collecting data on cortex (see below). In addition, GAI recorded data on flake size using a template with concentric circles at 1, 2, 3, 4, 5, 6, 7, and 8 cm diameters. An artifact had to fit into the size grade by its maximum width. These size grades were labeled 1, 2, 3, etc.... If an artifact was size grade 1, it means the artifact, in maximum width, fit within and did not exceed the 1 cm diameter template boundaries.

Cobble Tools

Alluvial and glacial cobbles were often used prehistorically for various tasks with little or no prior modification. Cobbles of igneous and metamorphic rock were used as hammers, anvils, grinding stones, or a combination of functions. Battered, crushed, pitted, and/or smooth surfaces identify these cobbles as tools. When multiple functions are evident, the cobble is assigned to the artifact type that best represents its "dominant" or "primary" function; additional functions were recorded in the note field of the coding sheet. Two types of cobble tools were identified and raw material and condition were recorded.

1. Hammerstones (HS) are cobbles that show evidence of battering and crushing along their margins, indicating that they were intentionally used as percussors.

2. Manos (MN) or grinding stones are hand-sized cobbles with one or more flat surfaces that were used to crush and grind various materials, as is evidenced by smoothed and polished surfaces.

3. Metates (MT) or grinding slabs are large cobbles or blocks of bedrock with one or two flat or concave surfaces which exhibit evidence of grinding and crushing.

4. Pestles (PT) are linear cobbles that exhibit crushing and smoothing one or both ends or poles. Pestles can also be formalized tools that were shaped by pecking and grinding.

5. Mortars (MR) are large cobbles or blocks of bedrock with at least one deeply concave surface, which was used to crush and grind various materials.

6. Anvil Stones (AV) are cobbles or blocks of bedrock that were used as a base on which to rest materials while they were struck with a hammer. Surfaces that are interpreted as anvils tend to possess shallow, coarse-textured depressions with amorphous outlines.

7. Pitted Cobbles (PC) or “nutting stones” are cobbles or blocks of bedrock with at least one smooth depression no greater than about 4 cm in diameter. These depressions differ from anvil depressions in that they are smoother, often deeper, and tend to be circular or oval. These depressions are believed to be the result of processing nuts, as compared to anvil depressions, which are attributed to bipolar reduction.

8. Netsinkers (NS) are either notched cobbles or crudely flaked slabs. In the former, freehand or bipolar percussion was used to remove one or two flakes from both ends or sides of a flat cobble to create notches. In the latter, flakes or slabs of coarse-grained stone are shaped by the removal of flakes. These items are believed to have been attached to nets, but some specimens could have functioned as bolas stones.

9. Abraders (AB) are chunks of sandstone or related materials that were used to shape and sharpen tools made of various materials. Slotted abraders are believed to have been used in the manufacture and maintenance of bone and wood tools (e.g., needles, awls, and arrow shafts), and flat abraders are believed to have been sued in the manufacture and maintenance of stone tools (e.g., chipped stone platform preparation and polishing of groundstone tools) in addition to tools of bone and wood tools.

10. Other Cobble Tools (OT) are cobbles that do not fit into the above types. (Key attributes are recorded in the note field.) Broken cobble tools are assigned to one of the above types or are placed with the cracked rock if badly damaged.

Groundstone

1. Grooved Axes (AX) are formal tools that were designed to be hafted, and their primary function was heavy-duty woodworking.

2. Celts (CL) are ungrooved axes; they were still hafted but by a different method.

3. Adzes (GA) or gouges manufactured by granitic materials by pecking and grinding were hafted and functioned as heavy-duty woodworking tools, much like their chipped-stone counterparts.

4. Steatite Bowls (SB) are stone cooking vessels that were manufactured by carving, grinding, and polishing.

5. Other Groundstone Tools (OG) are those tools and ornaments that are not covered by the above types, for example, bannerstones, pipes and pendants.

6. Unfinished Groundstone (UF) consist of whole or fragmentary specimens that show some degree of modification (flaking, pecking, and/or grinding) indicating a represent unfinished groundstone implements, discarded during manufacture.

7. Indeterminate Groundstone Fragments (IG) are sections of groundstone tools or ornaments that are too badly damaged to be assigned to a specific type.

Fire-Cracked Rock

Fire-Cracked Rock (FCR) includes all fragments of lithic debris that cannot be attributed to stone tool production. Most specimens represent fire-cracked rock: cobbles and/or chunks of local bedrock that were used in heating and cooking activities.

Minerals

(a “type” category that applies to unmodified or minimally modified minerals found at a site):

1. Hematite (HM) is a high-grade form of iron ore.

2. Limonite (LM) is a low-grade earthy form of iron ore; it is softer, lighter in weight, and lighter in color than hematite. Limonite is typically brown or yellow, while hematite is red or reddish brown.

3. Mica (MC) is a light-weight mineral that readily splits into thin elastic layers.

4. Steatite (ST) is an impure form of talc that is easily worked because of its softness and massive structure.

5. Quartz Crystals (QC) are transparent crystals of silica.

6. Galena (GL) is the principal ore of lead; its luster is metallic, and cleavage is cubic.

7. Other Minerals (OM) are minerals that are not listed above.

Other Analytic Coding

Raw Material Analysis

1. Lithic Raw Material Type: lithic raw material identification was conducted on the entire lithic artifact assemblages. Lithic raw material types were identified on the basis of macroscopic characteristics: color, texture, hardness, and inclusions (Luedtke 1992).

2. Cortex was recorded for all chipped-stone artifacts with the following codes: A = absent, B = block cortex, C = cobble cortex, I = indeterminate cortex, and X = no observation. Block cortex denotes lithic procurement from primary sources or outcrops, while cobble cortex denotes secondary sources (e.g., gravel bars and glacial till). Generally, block cortex is flat and may be coarse textured, while cobble cortex is rounded, smooth, and often polished. Chert cobbles can contain internal fracture planes, however, and when exposed by knapping, can appear similar to block cortex. Cortex is coded as indeterminate when it was unclear whether the cortex exhibited on an artifact was cobble or block. No observation is coded when the presence or absence of cortex could not be determined; this is normally limited to argillite.

Stylistic Analysis

Only projectile points were stylistically analyzed. In this analysis, the effects or resharpening and recycling on projectile point morphology were considered. Finished bifaces were segregated into groups on the basis of morphology and technology. The latter refers to those aspects of production, maintenance, recycling, and hafting that are "preserved" on the surfaces of each specimen through evidence of percussion and pressure flaking, edge grinding, breakage, morphology etc..

General Tool Attributes

1. Condition was recorded for tools as: whole (whl); base (bas); distal section (tip); medial section (med), and indeterminate (brk).

2. Size was recorded on stone tools as: length, width, and thickness (recorded to 0.1 mm).

3. Weight: recorded to 0.1 g.

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Appendix I
Methods of Historic Analysis

Appendix I. Methods for Historic Artifact Analysis

Introduction

Historic artifacts recovered during investigations are subjected to identification and analysis using GAI's Historic Coding scheme. Artifact analysis is focused on creating an inventory of artifact classes and sub-classes to examine issues of chronology and function for each site containing historic/modern components.

Whenever possible, proveniences were assigned dates based on Mean Dates (MOD) and Termini Post Quem (TPQ), or the earliest possible date for each specific context.

Once washed, artifacts are sorted into major artifact classes such as ceramics, glass, metal, small finds, and clothing. The materials are then subjected to a preliminary analysis, which includes a basic description of artifacts by material class, and relevant attributes. Included among the recorded attributes, as applicable, are:

- type
- beginning and end dates of production
- form
- motif/decoration
- color
- manufacturing technique
- functional group
- base
- finish
- embossment
- maker's mark/manufacturer
- material
- pattern class and subclass.

Artifact Class and Sub-Class Codes

Class Codes

Class Code	Class
1	Kitchen
2	Architecture
4	Personal
5	Clothing
6	Arms
7	Furnishings
8	Tobacco Pipes
9	Activities
11	Faunal
12	Floral
13	Prehistoric
99	Unidentifiable

Sub-Class Codes

Sub-Class codes are used in association with the class codes, to further identify the basic typology of the artifacts. Sub-Classes may not give an exact determination of the artifacts, but it better refines the artifact type so that, in a database format, the artifact can be looked up more efficiently. One example of this is the toy sub-class that covers all toy types from marbles to dolls to baseballs. Another

example could be the use of the ceramic sub-class that, like the toy subclass, may not provide intricate details of the object (such as color or form) but helps narrow down the typology.

After artifacts are sorted into their proper class and sub-class more detailed analysis takes place based on the type of object.

Sub-Class Code	Sub-Class
32	Activities-Other
76	Ammunition
49	Architectural Decorative Elements
50	Architectural-Other
78	Arms Related-Other
33	Automobile Related
66	Belts/Straps
95	Bone
2	Bottles/Jars
46	Brick, Block
45	Building Materials
30	Cans/Tins
1	Ceramics
65	Cloth
68	Clothing Fasteners
69	Clothing Related-Other
58	Coins
29	Commercial Kiln
28	Commercial Pharmaceutical
57	Cosmetics
3	Cutlery
8	Decorative Table Glass
41	Door Parts
44	Electrical
19	Farming
52	Flooring Materials
34	Flowerpots
80	Furniture Hardware
84	Furniture Related-Other
81	Furniture-Decorative
5	Glassware-Other
75	Gun Parts
77	Gunflints
20	Hand Tools
21	Heating
16	Household Items
61	Hygiene
99	Indeterminate
55	Jewelry
56	Keys
7	Kitchen Related-Other
6	Kitchenware (Utensils, Pots, etc.)
83	Lighting

Sub-Class Code	Sub-Class
25	Livestock/Pets
15	MachineParts/Hardware
27	Manufacturing
31	Misc.Small Hardware
47	Mortar, Cement
23	Musical
42	Nails,Spikes,Etc.
62	Perfume/Cologne
63	Personal-Other
59	Pharmaceutical
53	Plaster
43	Plumbing
24	Recreation
85	Red Clay
60	Religious/Ritual
51	Roofing Materials
22	Sewing
96	Shell
67	Shoe Parts
88	Smoking Related-Other
87	Stoneware
17	Toys
26	Transportation
4	Tumblers, Stemware
86	White Ball Clay
40	Window Glass
54	Wood
18	Writing

Ceramic Artifacts

Historic ceramic analysis is focused on identifying ware and type categories, form, motif, colors, percent complete, other decorative attributes, and maker's marks, in order to interpret site chronology. Maker's marks are described in detail and dated, when possible. Depending on the percentage completed, a decorative pattern can be identified and dated. The minimum number of vessels (MNI) is defined once the sherds were coded and cross-mended.

Ware type is the first trait that is assessed for analysis, and is based on the ceramic paste and base glaze types. The most common ware types for kitchen ceramic are:

Ware Types

Yellowware..... *yellow paste with a yellow glaze*

Creamware ..... *creamy colored paste as well as a cream-colored glaze*

Pearlware..... *white paste with a blue green tinted glaze*

Ironstone ..... *white paste with a blue gray tinted glaze*

Whiteware ..... *white paste with a white glaze*

Stoneware..... *gray, buff, or red paste with a gray, cream, or brown glaze*

Redware..... *red paste with a clear, brown, or black glaze*

Porcelain ..... *vitreous or semi-vitreous white paste with a generally white glaze*

Vessel Part

Part is the portion of the vessel that has been recovered. The most common vessel parts are:

Rim ..... *the top rim of a bowl, plate, or cup*

Body ..... *the general pieces that do not connect to a rim or base. This is where most of the decoration is placed on a piece*

Base ..... *the base or foundation of a piece. Most times this is where the maker's mark is placed*

Decoration

Decoration encompasses many different techniques, some of which are datable. The most common techniques used are:

Hand painted ..... *simple designs used to decorate, usually*

Sponge ware ..... *technique that uses sponges dipped in paint used to decorate*

Transfer print ..... *a technique where a general design is laid out and transferred in a small dotted pattern onto the surface of a vessel*

Decal ..... *an updated from of transfer printing where a pre-made design is adhered to the vessel*

Shell edge ..... *blue, green, or red color is used to decorate the outer edge of a plate*

Glass Artifacts

Glass artifacts, much like ceramics, are tabulated according to major groups (e.g., bottle glass, window glass, lamp glass, tableware, tumblers), and then separated into functional categories whenever possible.

Dating information is based on the identification of diagnostic technological attributes (e.g., mold seams and evidence of snap-case manufacture), in addition to identifiable bottle embossments.

Attributes recorded for glass artifacts include:

- manufacturing technique
- decoration
- finish type
- base type
- color
- functional group/form

The beginning and end dates for every datable attribute is determined. Maker's marks and embossments are identified, described and dated, when possible. A Maker's Mark is the unique identifying mark of a specific company that is placed on the base of plate, bowls, cups, and bottles

Manufacturing Technique

Manufacturing Technique is the process by which the glass object is made. The most common types of manufacture are:

- Free Blown
- Blown in Mold
- Machine Made
- Molded with Applied or Improved Finish

Decoration

Decoration of glass can come in the form of a blown or etched design in the body of a piece or in the application of color labels.

Finish/Base Type

Finish type refers to the type of rim/lip on the bottle. The type of finish can,, in some cases, be used to provide a date range of bottle manufacture. The way that the finish was applied (by hand or by machine) can also be a determining factor in age. Some of the more common bottle finishes are:

- Crown Finish
- Blob Top Finish
- Oil Finish
- Bead Finish
- Sheared Finish
- String Rim Finish
- Patent Finish
- Prescription Finish

Color

Color is also an age-determining factor, since some unique colors were used for a limited time. The most common colors in historic glass are

- Sun Colored Amethyst
- Cobalt
- Olive Green
- Amber
- White Opaque
- Aqua
- Clear

Form

Form is the part of the vessel that has been recovered. The most common vessel forms are:

Lip/Rim ..... *the top rim of a bottle or glass*

Body ..... *the general pieces that do not connect to a rim or base. This is where most of the decoration is placed on a piece*

Base ..... *the base or foundation of a piece. Most times this is where the maker's mark is placed*

Other Artifacts

Other historic/modern artifact classes include architectural debris (e.g., bricks, nails, window glass, etc.), clothing (type and materials identified when possible), and miscellaneous small finds. When necessary, attributes such as character, wear, decoration, and material are coded, as well.

Nails and screws can be assigned date ranges based upon their type of manufacture. The most datable types are:

- Cut nails
- Wrought nails
- Wire nails
- Self-starting screws

Artifact Dating

Artifact dating is based on the identification of maker's marks, diagnostic-manufacturing methods, such as bottle mold seams, bottle pontil marks, ceramic bodies and glazes, and known dates of production. A general guideline of accepted dates has been set up and is to be used for dating artifacts that have no maker's marks.

Artifact Type		Begin Date		End Date		Mean Date	Reference
Creamware	Plain		1775		1820	1797.5	South 1977
	Annular		1780		1815	1797.5	South 1977
	Hand painted (underglaze)		1785		1815	1800	Mullins 1988
	Hand painted (overglaze)		1765		1810	1787.5	Mullins 1988
	Whieldon ware	ca.	1750		1775	1762.5	Brown 1982
Pearlware	Plain		1780		1830	1805	South 1977
	Shell edge		1780		1830	1805	South 1977
	Hand painted Polychrome		1795		1820	1807.5	South 1977, Mullins 1988
	Hand painted Blue		1780		1820	1800	South 1977
	Annular/Dipped		1790		1820	1805	South 1977
	Mocha		1795		1820	1807.5	Noel Hume 1969
	Common Cable		1800		1820	1810	Noel Hume 1969
	Marbleware		1800		1820	1810	Brown 1982
	Transfer print Blue		1795		1840	1817.5	South 1977
	Transfer print Black		1795		1840	1817.5	South 1977
	Transfer print Brown		1795		1840	1817.5	South 1977
	Spatter		1790		1850	1820	Azizzi et al 1996
Refined Earthenware	Annular		1790		1890	1840	South 1977
	Dipped		1790		1890	1840	South 1977
	Overglaze decal		1890	pres.	2005	1947.5	Haskell 1981
	Tin Glazed		1671	ca.	1780	1725.5	Mullins 1988
	Transfer print Blue		1795		1860	1827.5	South 1977; Majewski and O'Brien 1984
Whiteware	Plain		1830	pres.	2005	1917.5	Price 1979; Noel Hume 1980
	Embossed		1850		1900	1875	Price 1979; Wetherbee 1980
	Annular/Dipped		1830		1860	1845	Price 1979; Mullins 1988
	Green or blue shell edge		1830		1860	1845	Lofstrum et al. 1982; Miller and Hunter 1990
	Spongeware		1830		1871	1850.5	Robacker and Robacker 1978
	Floral hand painted		1840		1860	1850	Lofstrum et al. 1982; Majewski and O'Brien 1984
	Transfer printed Blue		1828		1860	1844	Majewski and O'Brien 1984; Mullins 1988
	Transfer printed Flow Blue		1844		1860	1852	Lofstrum et al. 1982
	Transfer printed Red		1828		1850	1839	Majewski and O'Brien 1984
	Transfer printed Green		1828		1850	1839	Majewski and O'Brien 1984
	Transfer printed Purple		1830		1860	1845	Lofstrum et al. 1982
	Transfer printed Brown		1828		1850	1839	Majewski and O'Brien 1984
	Transfer printed Black		1828		1850	1839	Majewski and O'Brien 1984; Mullins 1988
	Overglaze Decal		1890	pres.	2005	1947.5	Haskell 1981

Artifact Type		Begin Date		End Date		Mean Date	Reference
	Banded		1830		1860	1845	Majewski and O'Brien 1984
Ironstone	Plain		1840	pres.	2005	1922.5	Wetherbee 1980
Yellowware	Plain		1830		1900	1865	Ketchum 1987
	Colored glaze		1827		1922	1874.5	Brown 1982
	Annular		1827		1922	1874.5	Brown 1982: 15
	Rockingham type glaze		1845	ca.	1900	1872.5	South 1977
Refined Redware	Slip decorated		1733		1850	1791.5	Magid 1984
	Astbury ware	ca.	1725		1750	1737.5	Brown 1982
	Buckley or Agateware		1720		1775	1747.5	Azizi et al 1996
Stoneware	Iron glazed	ca.	1700		1830	1765	Mullins 1988
	English brownware		1690		1775	1732.5	South 1977
	Albany slip glaze		1805		1920	1862.5	Ramsey 1939
	Bristol slip glaze		1835	pres.	2009	1920	Miller et al 2000
	Albany and Bristol slip glaze		1835		1920	1877.5	Ramsey 1939; Miller et al 2000
	Basalt	ca.	1766		1830	1798	Hughes 1968
	Westerwald	ca.	1650		1800	1725	Mullins 1988
	White salt glazed	ca.	1720		1780	1750	Mullins 1988
Glass Tints	Olive	late	1730		1870	1800	IMAC 1984
	Amethyst		1880		1915	1897.5	Miller and Pacey 1985
	Cobalt	ca.	1890		1960	1925	IMAC 1984
	White Opaque		1890		1960	1925	Fike 1984
Glass Manuf. Technique	Applied color label		1935	pres.	2009	1970	Deiss 1981:95
	Applied lip	late	1820	early	1870	1845	Deiss 1981
	Blob top		1879	ca.	1920	1899.5	Lief 1965:14
	Blown in mold		1800	early	1870	1835	Deiss 1981
	Canning jar lid liners (white)	post	1869	ca.	1950	1909.5	Toulouse 1971:345
	Carnival Glass	ca.	1907	ca.	1950	1928.5	Husfloen 1992
	Coca Cola® Bottles		1900	pres.	2009	1952.5	
	Cork closure		1825		1875	1850	Deiss 1981:91-96
	Crown finish		1892	pres.	2009	1948.5	Lief 1965:14
	Dip mold, 3-part	ca.	1825	ca.	1925	1875	IMAC 1984
	Free blown	pre	1700	ca.	1870	1785	IMAC 1984
	Ground Pontil	ca.	1730		1860	1795	South 1977
	Light bulb glass		1879	pres.	2009	1942	Jarvis 1958:214
	Machine made		1903	pres.	2009	1954	Deiss 1981
	Privacy (Window) Imbedded Wire	ca.	1892	pres.	2009	1948.5	Encyclopedia Britannica 1898:1408
	Safety (Window)	ca.	1915	pres.	2009	1960	Panati 1987:158
	Standardized screw threads		1919	pres.	2009	1962	Deiss 1981
	Stippled		1939	pres.	2009	1972	Busch 1983
	Non-returnable lightweight beer bottles		1938	pres.	2009	1971.5	Busch 1983
	"Fed. Law Prohibits Sale or Re-use of This Bottle"	ca.	1933	ca.	1964	1948.5	Busch 1981
	Tooled lip	early	1870	ca.	1915	1892.5	Deiss 1981
Nails	Cut	ca.	1790	ca.	1890	1840	Nelson 1968
	Wire	ca.	1880	pres.	2009	1942.5	Nelson 1968; IMAC 1984

Artifact Type		Begin Date		End Date		Mean Date	Reference
	Galvanized	ca.	1901	pres.	2009	1953	Fontana et al 1962:50
	Wrought	pre	1700	ca.	1830	1765	IMAC 1984
	Screw, self starting	ca.	1846	pres.	2009	1925.5	Devoto 1943:214
Other/Small Finds	Aluminum Foil		1947	pres.	2009	1976	Panati 1987:113
	Bakelite Plastic	ca.	1907				Wolfe 1945:19
	Barbed Wire	ca.	1875	pres.	2009	1940	Buckles 1978:488
	Cement	ca.	1899	pres.	2009	1952	Cleland 1983:93
	Electric Insulator		1865	pres.	2009	1935	Cleland 1983
	Hard Rubber	ca.	1851	pres.	2009	1928	Luscomb 1967
	Modern, Misc.	ca.	1950	pres.	2009	1977.5	
	Nylon Bristles		1938	pres.	2009	1971.5	Panati 1987:209
	Pull Tab Can Closure		1962	pres.	2009	1983.5	Keen 1982:31
	Union Metallic Cartridge Company	ca.	1867		1902	1884.5	Rosenberg and Kvietok 1982:83

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Appendix J
Archaebotanical Analysis

October 20, 2011

Report on the Analysis of Flotation-recovered Archeobotanical Remains Recovered During Phase II National Register Evaluation of Site 36LU301, Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania.

Introduction

Phase II National Register Evaluation of Site 36LU301 located within the proposed Bell Bend Nuclear Power Plant project area in Luzerne County, Pennsylvania included the collection of soil samples from feature contexts for the recovery of plant macro-remains. A prehistoric cultural occupation is indicated at the site by the presence of soil anomalies identified by mechanical plowzone stripping and the recovery of a low density of non-diagnostic prehistoric artifacts (Munford 2011). A historic land use overlay at the site is also indicated. The study of plant remains collected from five thermal features of indeterminate origin (possible prehistoric hearth features, historic burn pits, or natural thermal areas) was undertaken in order to explore feature origin, site formation processes and the cultural history of the site.

Table 01: Summary of flotation samples analyzed from Phase II investigations at 36LU301.

Feature	Description	FLOTATION		
		No. of Samples	Volume (liters)	Weight of Carbonized Plant Material (grams)
150	Thermal, indeterminate origin	1	6	5.54
153	Thermal, indeterminate origin	1	5	5.96
154	Thermal, indeterminate origin	1	6	4.73
161	Thermal, indeterminate origin	1	7.5	0.05
171	Thermal, indeterminate origin	1	36	1.2
5 features		5	60.5	17.48

Methods

Archaeological soil samples were individually processed at GAI's Homestead, Pennsylvania laboratory using a Flote-Tech flotation system equipped with 0.325mm fine fraction and 1.0mm coarse fraction screens. The Flote-Tech system is a multi-modal flotation system which facilitates the separation and recovery of plant macro-remains from the soil matrix by agitation in water. Processing resulted in two (light and heavy) fractions of material. Samples were air dried. Recovered fractions were submitted to archeobotanical consultant Justine McKnight in Severna Park, Maryland and analyzed following the procedures described below.

Heavy and light flotation fractions were carefully passed through graduated geological sieves to provide divisions for analysis. The processed samples yielded carbonized and uncarbonized plant remains. Uncarbonized plant remains observed in the flotation-derived botanical assemblage included root fibers and uncarbonized seeds. Flotation fraction remainders include a rock and gravel matrix, insect egg cases and body parts (modern), coal, and coal clinker. The flotation samples also contained moderate quantities of spherical carbon residue. This residue is formed when plants high in silica (such as grasses) are burned and the silica melts and fuses into droplets which persist in the archaeological record. These round, black droplets are often

mistaken for small seeds. Unfortunately, this material lacks any diagnostic morphology on which to venture a taxonomic classification of the original plants from which the silica derived.

Working beneath low power magnification, carbonized botanical remains were separated from fraction matrices. The greater-than or equal-to 2mm carbonized botanical specimens were examined under 10X to 40X magnification and sorted into general categories of material (i.e. wood, miscellaneous, etc.). Descriptions were recorded for each category of the greater-than or equal-to 2mm plant material. The less-than 2mm size fractions were examined under low magnification and scanned for the carbonized remains of seeds and cultivated plants. Uncarbonized plant remains were described and identified, but they were not quantified or separated from fraction matrices.

Identifications were routinely attempted on all miscellaneous plant remains recovered, and on a sub-sample of twenty randomly selected wood fragments from each sample containing *more* than twenty specimens, in accordance with standard practice (Pearsall 2000). Identifications of all classes of botanical remains were made to the genus level when possible, to the family level when limited diagnostic information was available, and to the species level only when the assignment could be made with absolute certainty. All identifications were made under low magnification (10X to 40X) with the aid of standard texts (Edlin 1969; Kozlowski 1972; Martin and Barkely 1961; Panshin and deZeeuw 1980), and checked against plant specimens from a modern reference collection representative of the flora of Pennsylvania.

Results of Analysis

Flotation processing of a total of 60.5 liters of fill from five features produced 17.48 grams of carbonized plant material (a mean average of 0.2889 grams per liter of feature soil). The samples contained the remains of burned wood (predominantly pine), twig fragments and unidentifiable amorphous carbon. In addition, uncarbonized (modern) seeds were present in all samples. An inventory of flotation-recovered plant macro-remains is provided in Table 02.

Wood

Wood charcoal was present in each of the five flotation samples analyzed from the indeterminate thermal features excavated at Site 36LU301. A total of 2,500 fragments of carbonized wood weighing 17.48 were flotation-recovered. Of these, a random sub-sample of 83 fragments (a maximum of 20 fragments per sample) was selected for identification, revealing an overwhelming predominance of pine species *(Pinus spp.)* (75 fragments or 90 percent of the subsample selected for identification). Hickory *(Carya spp.)* (four fragments or five percent), American chestnut *(Castanea dentata)* (one fragment or one percent) and white oak *(Quercus spp. LEUCOBALANUS group)* (one fragment or one percent) were also identified. Two fragments of wood (two percent) were classed as ‘unidentifiable’ due to the absence of key features necessary for taxonomic identification.

Table 02: Inventory of Flotation-recovered Plant Remains from Five Features at Site 36LU301.

FS No.	243	244	245	247	248, 249, 250	total
Lot	41-1	41-1	41-1	41-1	41-1	5 samples
Trench	5	5	5	5	5	
Feature Number	150	153	154	161	171	
portion	Southeast Half	Northwest Half	West Half	East Half	West Half	
Level	1	1	1		3	
volume (liters)	6	5	6	7.5	36	60.5
weight analyzed carbonized plant remains (grams)	5.54	5.96	4.73	0.05	1.2	17.48
WOOD CHARCOAL (carbonized) (no of fragments)	812	635	854	3	196	2500
total weight (grams)	5.54	5.58	4.57	0.02	1.2	16.91
Carya spp. (hickory)			4			4
Castanea dentata (American chestnut)					1	1
Pinus spp. (pine)	20	20	16		19	75
Quercus spp. (white oak group)				1		1
unidentifiable				2		2
total identified fragments	20	20	20	3	20	83
MISCELLANEOUS (carbonized) (n of fragments)	0	28	21	9	0	58
total weight (grams)	0	0.38	0.16	0.03	0	0.57
amorphous carbon		28	21	3		52
twig				6		6
SEEDS (uncarbonized) (presence)	x	x	x	x	x	100%
Acalypha sp. (copperleaves)			x	x	x	60%
Amaranthus spp. (pigweed)	x	x	x	x		80%
Mollugo verticillata (carpetweed)	x	x		x	x	80%
Portulacca oleraceae (purselane)				x	x	40%
Oxalis stricta (sheep sorrel)				x	x	40%
Polygonum/Rumex (knotweed/dock)					x	20%
POACEAE (grass family)	x		x	x	x	80%

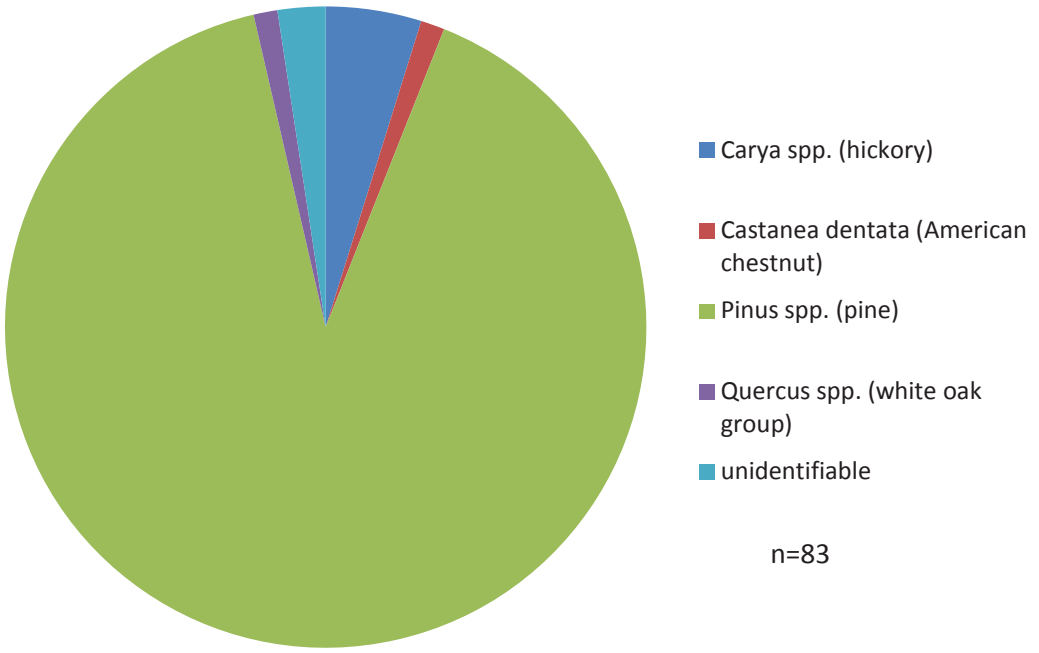

Figure 01: Percentage composition of wood types identified.

Miscellaneous
Miscellaneous (carbonized) plant remains were recovered from Features 153, 154 and 161. Fifty-two fragments of amorphous carbon (distributed across all three features) and six twig fragments (confined to Feature 161) were recovered.

Uncarbonized Seeds
In addition to the carbonized macro-botanical remains, uncarbonized seeds were observed within all of the flotation samples analyzed. These seeds are probably modern in origin. Seven taxa were represented in the uncarbonized seed assemblage, including copperleaf *(Acalypha sp.)*, pigweed *(Amaranthus spp.),* carpetweed *(Mollugo verticillata)*, purselane *(Portulaca oleracea)*, sheep sorrel *(Oxalis stricta)*, knotweed or dock *(Polygonum/Rumex)* and grass (POACEAE).

It is highly unlikely that these uncarbonized seeds are prehistoric in origin. Although the persistence of uncarbonized plant remains from consistently xeric or water-saturated environments does occur (Minnis 1981; Pearsall 2000), such soil conditions do not characterize Site 36LU301. Uncarbonized plant remains occurring within archaeological soil samples from similar site environments are usually considered to be intrusive modern specimens (Minnis 1981; Keepax 1977). The recovery of uncarbonized plant remains may reveal specific contamination episodes associated with fluvial processes, animal (i.e. rodent, insect, gastropod) burrowing, the action of root growth and decay, aeolian forces, or by the combined effects of these factors.

Discussion
Phase II archaeobotanical investigations at Site 36LU301 focused on the examination of five thermal features of indeterminate origin. The assemblage revealed the presence of wood

charcoal (dominated by pine), and amorphous carbon and small twig fragments. Plant food remains were conspicuously absent from the assemblage.

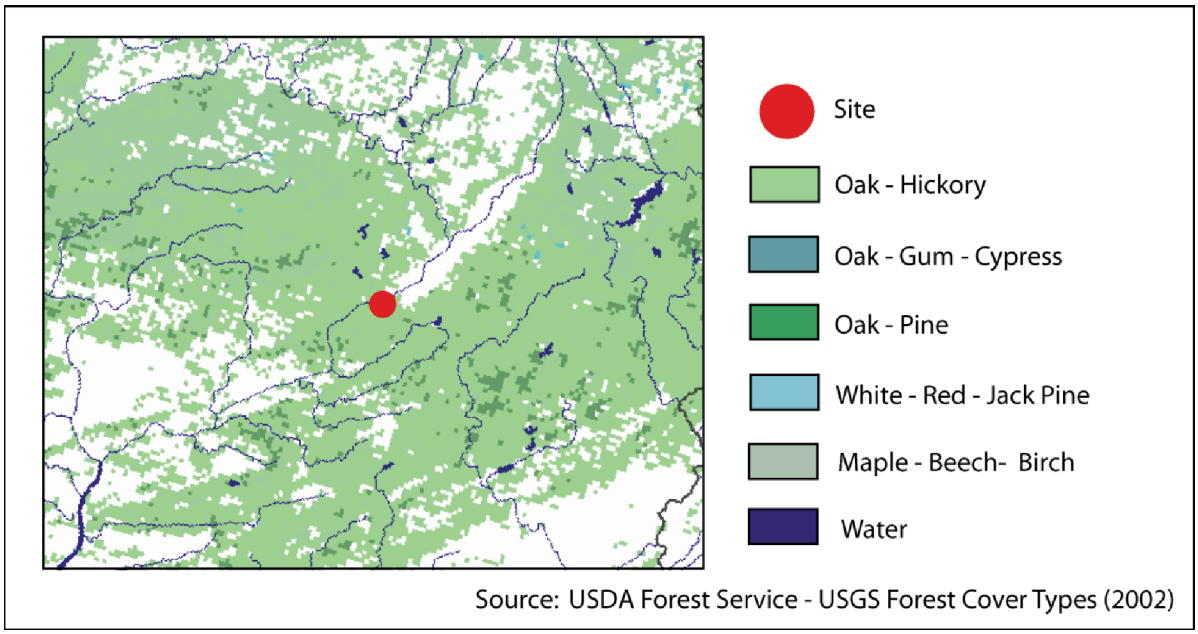

Figure 02: Forest cover in the vicinity of the Bell Bend project area.

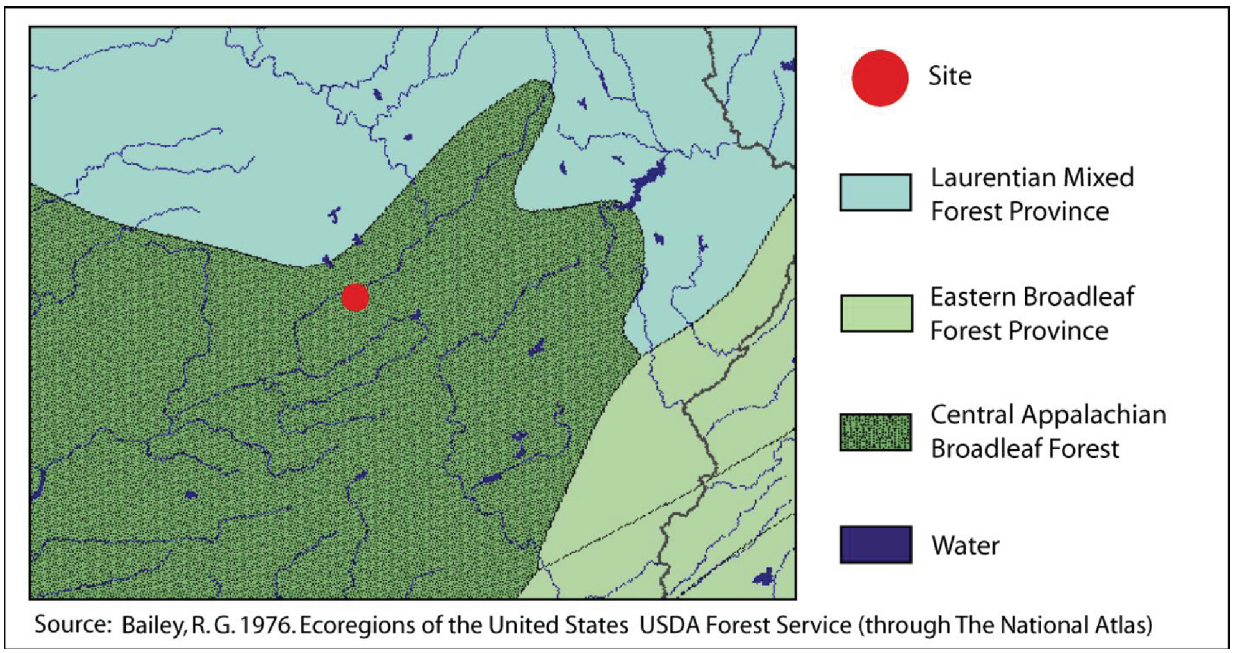

Figure 03: Ecoregions in the vicinity of the Bell Bend project area.

The Bell Bend project area lies within the Ridge and Valley Section of the Oak-Chestnut Forest Region as described by Braun (1950), and within the Appalachian Oak Forest according to Kuchler (1964). Using Bailey's *Ecoregions* (1976) the project area lies within the Central

Appalachian Broadleaf Forest Province, and in close proximity to the Laurentian Mixed Forest Province to the north and the Eastern Broadleaf forest that extends eastward (see Figures 02, 03). Native vegetation over the project area was a tall broadleaf deciduous forest dominated by oaks and hickories. Sub-dominants would have included maples, American chestnut, beech, yellow poplar and some pine. The wood assemblage recovered archaeologically from Site 36LU301 is dominated by pine species, which suggests that the features were associated with secondary forest growth or forest disturbance. It is possible that the pine wood identified at the site relates to historic land use activities, where pine lumber was intentionally selected as a building material for the construction of homes and farm outbuildings. This pattern of historic fuel wood selection was documented archeobotanically at other sites studied within the Bell Bend project area (Munford, Frye and Kenneally 2010). The ubiquity and abundance of uncarbonized seeds in the flotation samples analyzed from the Site 36LU301 features indicates that recent land use was favorable to disturbance-loving species and agricultural weeds.

A comparison of the plant data by feature reveals some patterns of difference. Examination of charcoal densities can be made using the measure of grams of carbonized plant material per liter of feature fill (Figure 04). Features 150, 153 and 154 produced the greatest densities, while Features 161 and 171 produced only scant carbonized material. The composition of wood charcoal types identified across the sampled features suggests similarities between Features 150, 153, 154 and 171, where pine wood is exclusive or most prevalent (Figure 05).

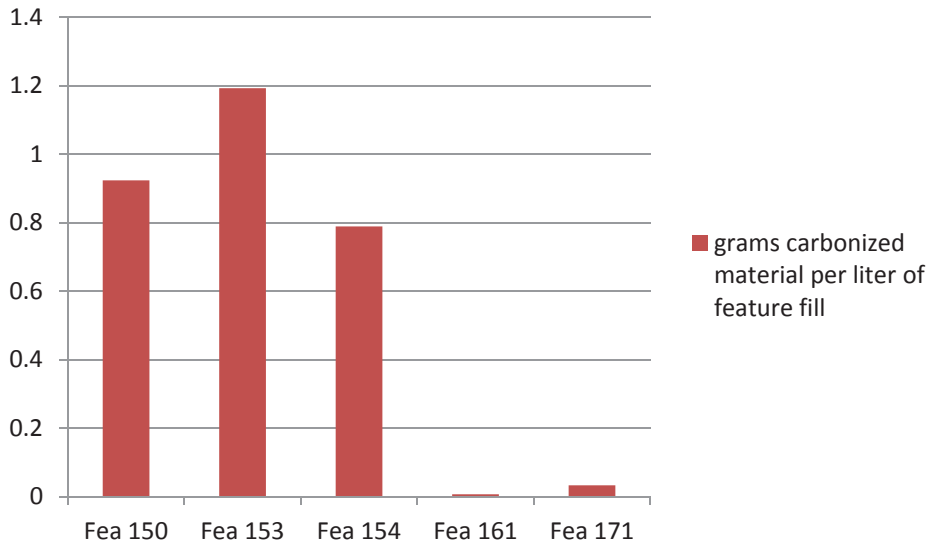

Figure 04: Comparison of charcoal densities by feature.

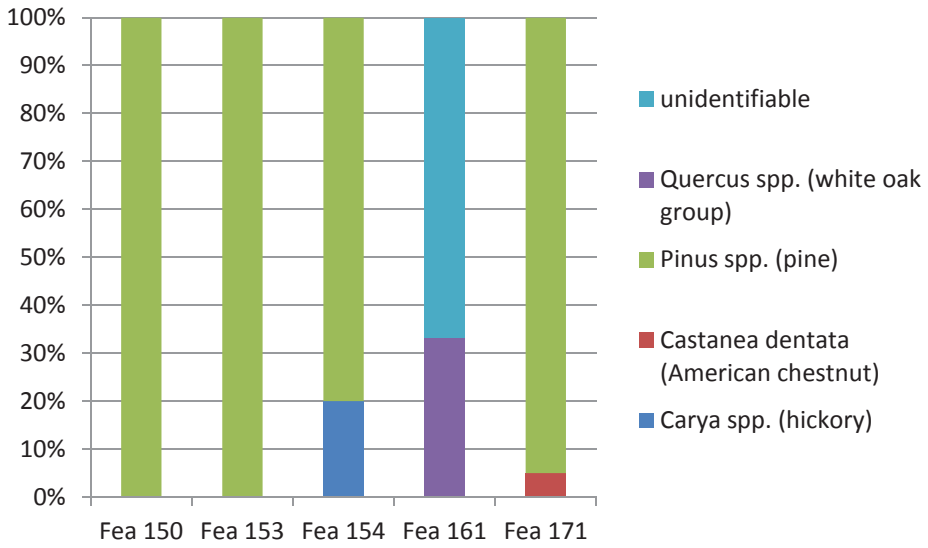

Figure 05: Wood types identified by feature.

The archeobotanical remains from the 36LU301 features can be compared to assemblages from other sites within the Bell Bend project area (Munford, Frye and Kenneally 2010). Site 36LU288 is a multi-component site where Phase II testing confirmed the presence of multiple prehistoric occupations as well as historic site use. Archeobotanical data was collected from two prehistoric hearth features, where 57 liters of feature fill produced 27.46 grams of carbonized plant macro-remains (a mean average of approximately 0.482 grams per liter). Recovered plant macro-remains were limited to wood charcoal and uncarbonized seeds. While charcoal densities were significantly greater at Site 36LU288, the plant material types identified at both sites are strikingly similar.

Summary

Analysis of flotation-recovered plant macro-remains from five thermal features of indeterminate origin was undertaken as part of recent Phase II National Register Evaluation of Site 36LU301. A total of 60.5 liters of processed sediment yielded wood charcoal (predominantly pine), twig fragments and amorphous carbon. No comestible plant remains were identified. The studied features fail to produce any firm evidence of prehistoric cultural use. While it is possible that the recovered plant artifacts relate to prehistoric occupations, their association with modern weed seeds combined with the absence of food remains could be interpreted as evidence of historic or modern land use.

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Appendix K

Radiocarbon Analysis

Beta Analytic Inc.
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Miami, Florida 33155 USA
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Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

Consistent Accuracy . . .
. . . Delivered On-time

November 28, 2011

Ms. Barbara A. Munford
GAI Consultants, Incorporated
385 East Waterfront Drive
Homestead, PA 15120-5005
USA

RE: Radiocarbon Dating Results For Samples 36LU301F150, 36LU301F153, 36LU301F154, 36LU301F171

Dear Ms. Munford:

Enclosed are the radiocarbon dating results for four samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

Thank you for prepaying the analyses. A receipt is enclosed with the mailed report copy. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Ms. Barbara A. Munford — 5HSRUW'DWH¸ □□□□ □

GAI Consultants, Incorporated — 0DWHULDO5HFHLYHG¸ □□□□ □

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
%HWD □□□□435	˘□□□ □± 40 BP	□□□□R□oo	˘□□□ □± 40 BP
SAMPLE : 36LU301F150			
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□6,*0$ &$/,%5$7,□1 ¸ &DO%& □□˙□WR□˙□□□&DO%3 ˘□□□WR˘˙□□□$1' &DO%& □˙˙□WR□˙□□□&DO%3 ˘˙□□WR˘ˆ˘□□			
□□			
%HWD □□□□436	□˙□□□□± 40 BP	□□˘□□R□oo	□ˆ˙□□□± 40 BP
SAMPLE : 36LU301F153			
1/□6,6 ¸ $0 6□6WDQGDUGGHOLYHU\			
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□□			
%HWD □□□□437	□ˆ□□□± 30 BP	□□˘□ˆR□oo	□ˆ˘□□□± 30 BP
SAMPLE : 36LU301F154			
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□□			
%HWD □□□□438	ˆ□˘□□□± 30 BP	□□˘□□R□oo	ˆ□˘□□□± 30 BP
SAMPLE : 36LU301F171			
1/□6,6 ¸ $0 6□6WDQGDUGGHOLYHU\			
0$7(5,$/□35(75($70(17 ¸ □FKDUUHGPDWHULDO¸DFLGDONDOLacid			
□6,*0$ &$/,%5$7,□1 ¸ &DO%& ˘□˘□WR˘□□□&DO%3 ˙□□□WRˆ□□□□			
□□			

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

Laboratory number: **Beta-309435**

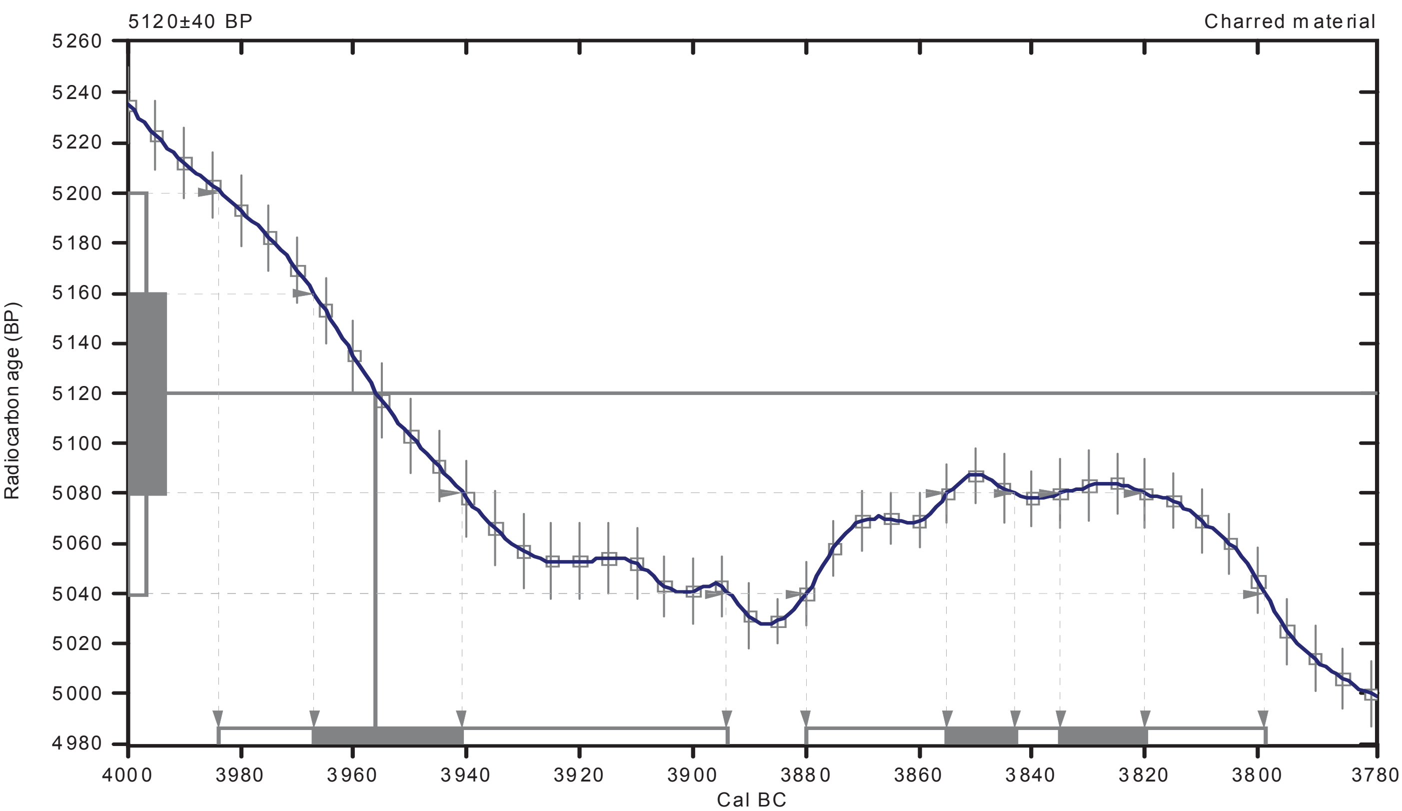
Conventional radiocarbon age: **5120±40 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 3980 to 3890 (Cal BP 5930 to 5840) and Cal BC 3880 to 3800 (Cal BP 5830 to 5750)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 3960 (Cal BP 5910)

1 Sigma calibrated results: (68% probability) Cal BC 3970 to 3940 (Cal BP 5920 to 5890) and
Cal BC 3860 to 3840 (Cal BP 5800 to 5790) and
Cal BC 3840 to 3820 (Cal BP 5780 to 5770)



References:

Database used

INTCAL09

References to INTCAL09 database

Heaton,et.al.,2009, Radiocarbon 51(4):1151-1164, Reimer,et.al, 2009, Radiocarbon 51(4):1111-1150, Stuiver,et.al,1993, Radiocarbon 35(1):137-189, Oeschger,et.al.,1975,Tellus 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

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□DERUDWRU\ QXPEHU¸ %HWD□□□˜□□□

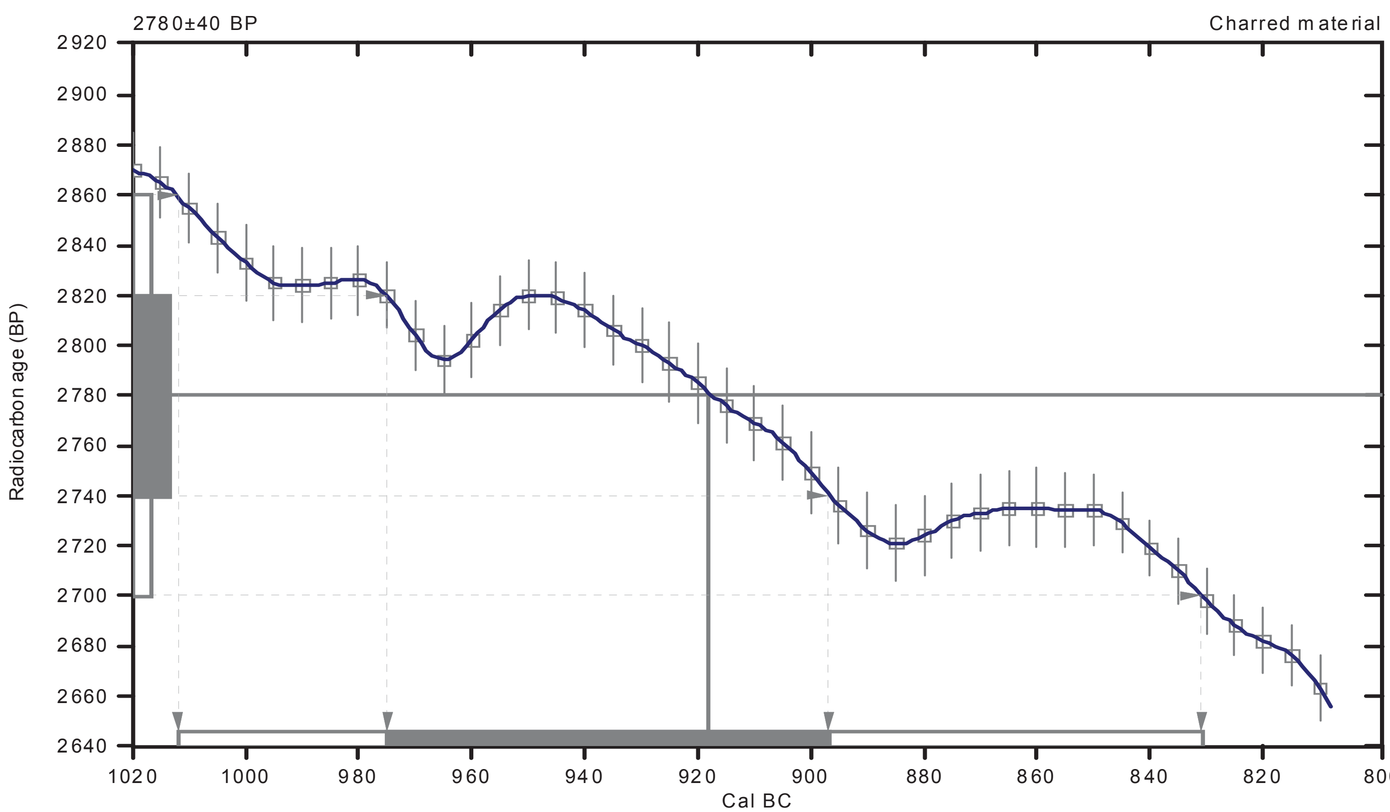
Conventional radiocarbon age: **2780±40 BP**

2 Sigma calibrated result: &DO%& □□□□WR˙□□□&DO%3 □˜□□WR□ˆ˙□□
(95% probability)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 920 (Cal BP 2870)

1 Sigma calibrated result: Cal BC 980 to 900 (Cal BP 2920 to 2850)
(68% probability)



References:

Database used

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References to INTCAL09 database

Heaton,et.al.,2009, Radiocarbon 51(4):1151-1164, Reimer,et.al, 2009, Radiocarbon 51(4):1111-1150, Stuiver,et.al,1993, Radiocarbon 35(1):137-189, Oeschger,et.al.,1975,Tellus 27:168-192

Mathematics used for calibration scenario

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□DERUDWRU\ QXPEHU¸ **Beta-309437**

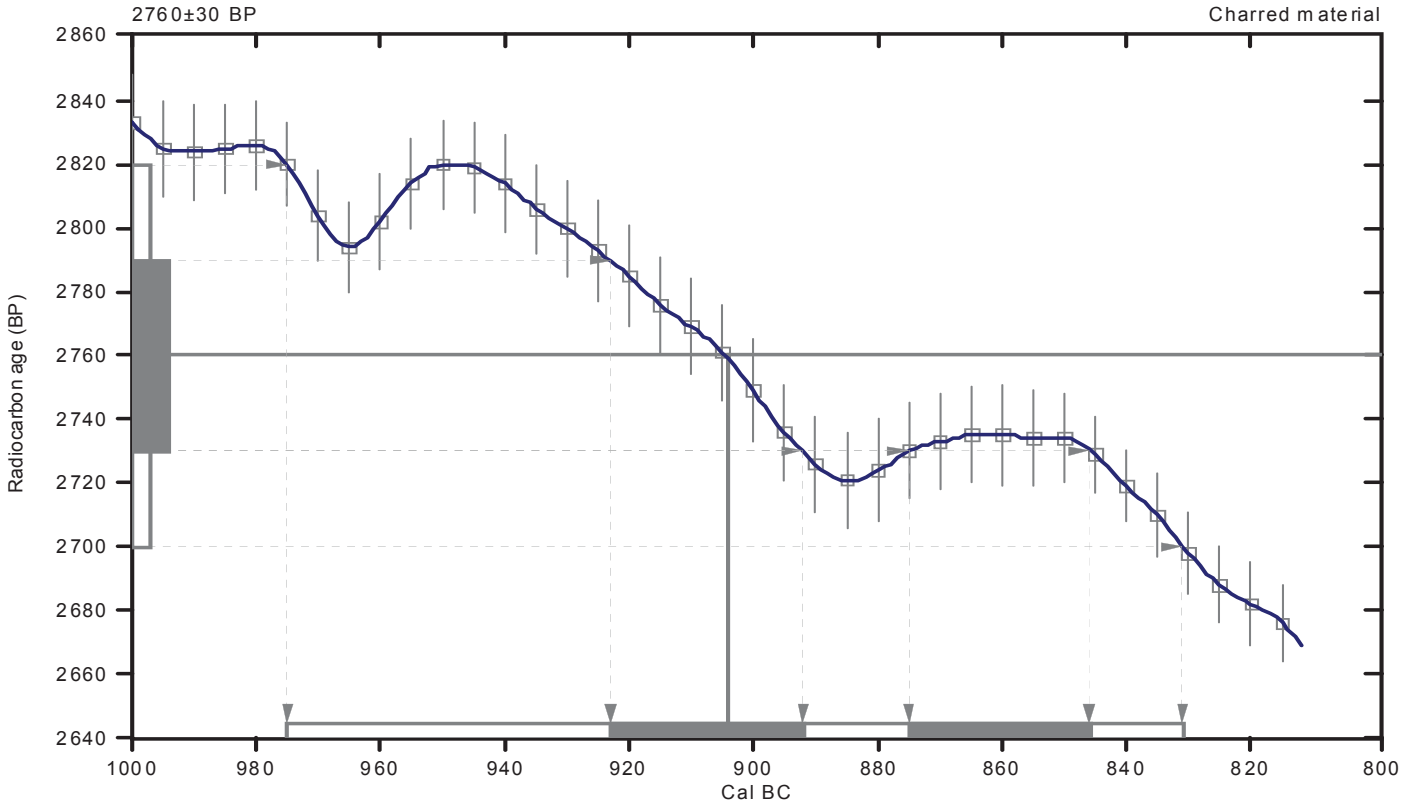
Conventional radiocarbon age: □ˆ □□“ □□%3

2 Sigma calibrated result: (95% probability) **Cal BC 980 to 830 (Cal BP 2920 to 2780)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 900 (Cal BP 2850)

1 Sigma calibrated results: (68% probability) Cal BC 920 to 890 (Cal BP 2870 to 2840) and Cal BC 880 to 850 (Cal BP 2820 to 2800)



References:

Database used

INTCAL09

References to INTCAL09 database

Heaton,et.al.,2009, Radiocarbon 51(4):1151-1164, Reimer,et.al, 2009, Radiocarbon 51(4):1111-1150, Stuiver,et.al,1993, Radiocarbon 35(1):137-189, Oeschger,et.al.,1975,Tellus 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

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□DERUDWRU\ QXPEHU¿ **Beta-309438**

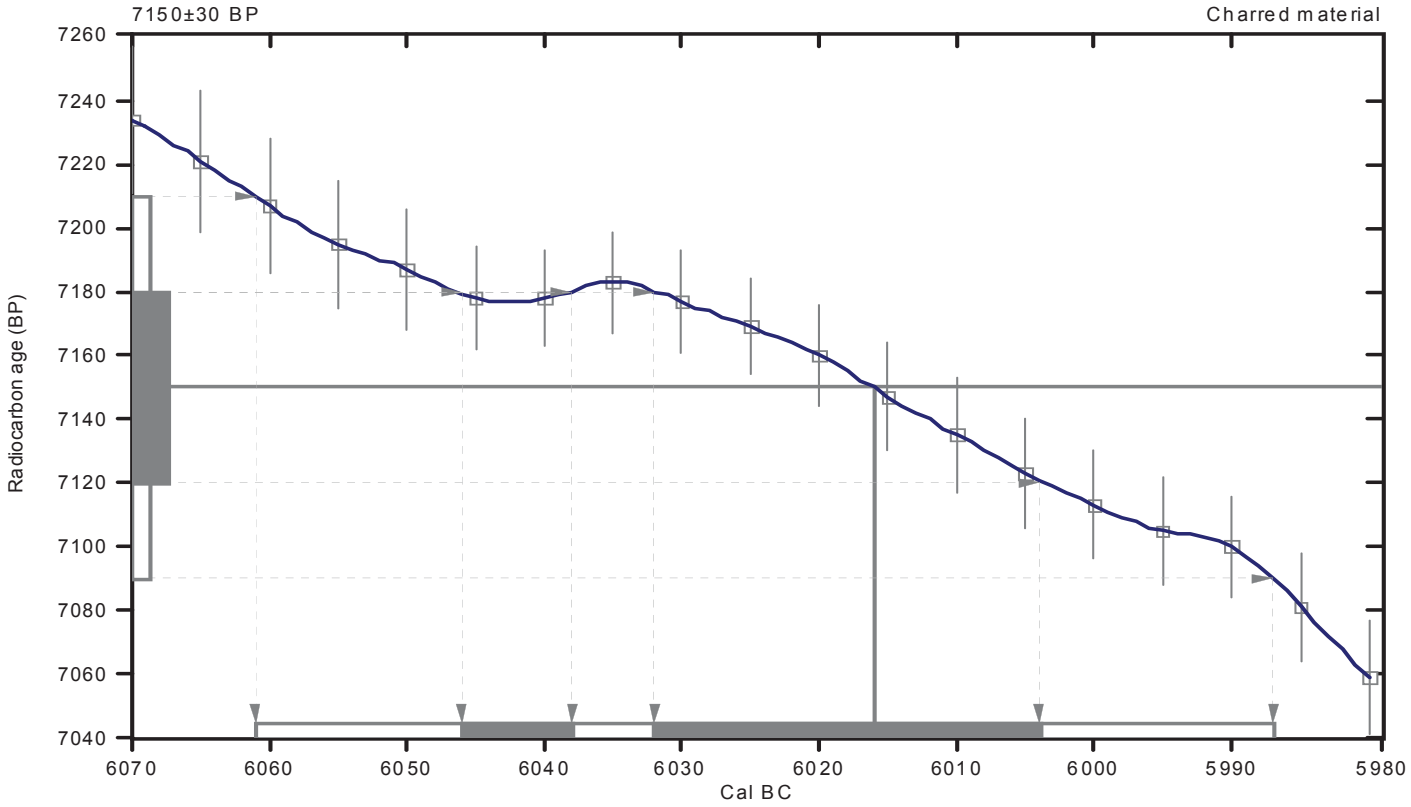
Conventional radiocarbon age: **7150±30 BP**

2 Sigma calibrated result: (95% probability) **&DO%&& □□□□ WR ˜ ″ ″ □ □&DO%3 ˙ □□□□ WR ˆ ″ □□□□**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 6020 (Cal BP 7970)

1 Sigma calibrated results: (68% probability) Cal BC 6050 to 6040 (Cal BP 8000 to 7990) and Cal BC 6030 to 6000 (Cal BP 7980 to 7950)



References:

Database used

INTCAL09

References to INTCAL09 database

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