

# Technical Report

## Phase I Cultural Resources Investigations and Phase II National Register Site Evaluations

Bell Bend Nuclear Power Plant  
Luzerne County, Pennsylvania  
ER 81-0658-079

Prepared for:  
UniStar Nuclear Energy, LLC

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GAI Project No. C090846.00

October 11, 2010

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

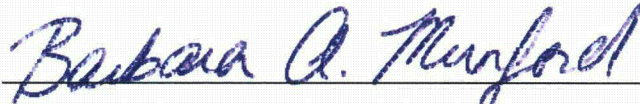


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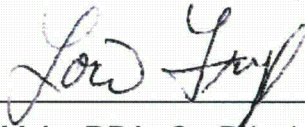
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## Abstract

Between June 2007 and November 2009, GAI Consultants, Inc. (GAI) conducted Phase I Cultural Resources Investigations and Phase II National Register Site Evaluations of the proposed Bell Bend Nuclear Power Plant (BBNPP), Luzerne County, Pennsylvania on behalf of UniStar Nuclear Energy, LLC (UniStar), under contracts to AREVA NP Inc. (AREVA) (Phase I) and UniStar (Phase II). The project area encompasses approximately 902 acres (365 hectares) of upland and low terrace/floodplain settings located adjacent to PPL's existing Susquehanna Steam Electric Station (SSES). PPL proposes construction of a new nuclear power generating unit in this locality. Additional proposed project impacts include construction of ancillary facilities, roadways, temporary construction laydowns, and wetland and stream mitigation.

GAI's Phase I investigations included Phase Ia reconnaissance-level studies, Phase Ib archaeological field surveys, and an architectural survey. [The results of Phase Ia investigations have been provided in previous reports (GAI 2007, Munford and Tuk 2008) and are summarized briefly in this document.] Phase Ib archaeological survey and the architectural survey identified archaeological sites and architectural resources over 50 years of age within the project Area of Potential Effect (APE) and assessed their potential eligibility for listing in the National Register of Historic Places (NRHP). Phase II testing investigated potentially-eligible archaeological sites that were subject to proposed project impacts in order to evaluate their NRHP eligibility conclusively and to provide recommendations on the need for further archaeological investigations.

The project APE for Phase Ib and II archaeological studies comprised the approximately 902-acre (365-hectare) proposed project footprint. For architectural resources, the project APE consisted of the project viewshed, defined, in general, as extending at least 0.8 kilometers (0.5 miles) beyond the boundaries of the 902-acre (365-hectare) project footprint.

GAI's Phase Ib survey of the BBNPP project area identified eleven (11) archaeological sites (36LU278, 36LU279, 36LU280, 36LU281, 36LU282, 36LU283, 36LU284, 36LU285, 36LU286, 36LU287 and 36LU288) and 25 Isolated Finds. The eleven sites include eight historic-period sites and three prehistoric sites. The historic-period sites range in age from early-nineteenth to late-twentieth century and represent farmsteads or domestic sites as well as one artifact scatter. The three prehistoric sites consist of two undated lithic scatters and one multipoint Paleohindian through Late Woodland site. Based on the results of Phase Ib survey and review by Pennsylvania Historic and Museum Commission-Bureau for Historic Preservation (PHMC-BHP), seven of the eleven sites (36LU279, 36LU280, 36LU281, 36LU283, 36LU285, and 36LU286 and 36LU288) were recommended as potentially-eligible for listing in the NRHP under Criterion D, and site avoidance or Phase II testing was recommended for these sites. The remaining four sites were concluded to be Not Eligible and no further work was recommended for these sites or for the 25 prehistoric Isolated Finds.

At the request of UniStar, GAI performed Phase II testing at these seven potentially-eligible sites—six historic period sites (36LU279, 36LU280, 36LU281, 36LU283, 36LU285, and 36LU286) and one prehistoric site (36LU288). Based on the results of this study, all seven archaeological sites (36LU279, 36LU280, 36LU281, 36LU283, 36LU285, 36LU286, and 36LU288) are recommended Not Eligible to the NRHP. No further investigations are recommended at these localities.

GAI's architectural survey documented 52 architectural and historic properties in the project viewshed. Based on the survey results and review by PHMC/BHP, seven of these resources

are recommended as eligible or potentially-eligible for listing in the NRHP—North Branch Pennsylvania Canal (141673); Union Reformed and Lutheran Church (155049); Woodcrest Farmstead (155052); Stone Arch Bridge (155054); North Market Street Bridge (155055); House/Red Brick Studios (155064); and Wapwallopen Historic District (155070). Once project design has been finalized, GAI will conduct a formal assessment of project effects and will present results in a separate Criteria of Effects Evaluation Report.



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## Chapter 1. Introduction and Project Overview

### Project Summary

GAI Consultants, Inc. (GAI) conducted Phase I and Phase II cultural resources investigations of the proposed Bell Bend Nuclear Power Plant (BBNPP), Luzerne County, Pennsylvania, between June 2007 and November 2009. This work was performed on behalf of UniStar Nuclear Energy, LLC (UniStar), under contracts to AREVA NP Inc. (AREVA) (Phase I) and UniStar (Phase II). The PPL Corporation (PPL) proposes construction of a new nuclear power generating unit adjacent to their existing Susquehanna Steam Electric Station (SSES) in this locality. The proposed project also includes construction of ancillary facilities (e.g., cooling water intake, access roads, parking areas), temporary construction laydowns, and wetland and stream mitigation areas. UniStar performed these studies in partial fulfillment of the Nuclear Regulatory Commission (NRC) Combined License Application (COLA), under the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended.

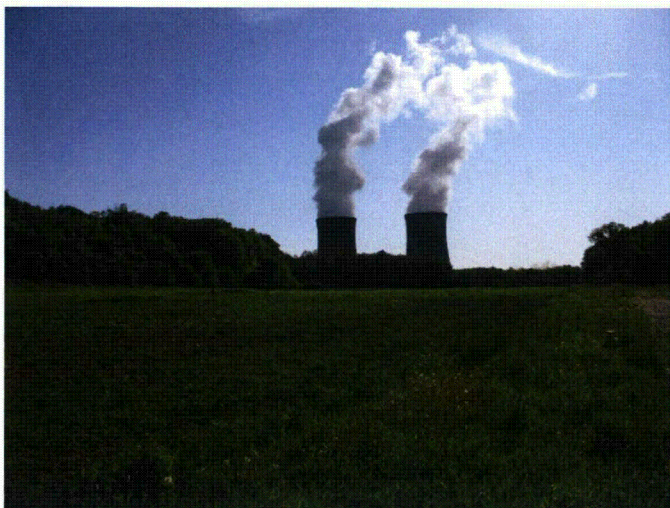
The purpose of GAI's Phase I survey was to identify archaeological sites and architectural resources over 50 years of age within the project Area of Potential (APE) and to assess their potential for listing in the National Register of Historic Places (NRHP). GAI's Phase II study investigated potentially-eligible archaeological sites that will be subject to proposed project impacts in order to evaluate their NRHP eligibility conclusively, and to provide recommendations on the need for further archaeological investigations.

As defined by UniStar, the proposed BBNPP Phase Ib project area consists of an approximately 902-acre\* (365-hectare) parcel situated adjacent to PPL's existing SSES facility, west of the North Branch Susquehanna River and approximately 4.8 kilometers (3.0 miles) northeast of the town of Berwick and 1.6 kilometers (1.0 mile) north of the community of Beach Haven (Figure 1-1). (*\*Final acreage calculation resulted in a change from the preliminarily reported 893-acre/251-hectare project area.*) The project area encompasses upland settings, primarily south and west of the SSES, and low terrace/floodplain settings along the Susquehanna River, to the east of this facility. Current land use includes cultivated fields, woodlands, and wetlands, as well as areas of disturbance resulting from prior construction (Photographs 1-1, 1-2, 1-3 and 1-4).



**Photograph 1-1. Overview of Project Setting from East Side of River (Council Cup) showing SSES and Surrounding Fields and Woodlands, Facing Northwest**





***Photograph 1-2. Overview of Project Area, West Alternative showing Cultivated Fields and Woodlands, Facing East***

***Photograph 1-3. Overview of Project Area, West Alternative showing Fallow Field (Wetland) and Woodlands, Facing East***



***Photograph 1-4. Overview of Project Area, Area 7 showing Cultivated Field, Facing Northeast***

GAI performed Phase Ia investigations of potential project alternatives and of the BBNPP preferred alternative, in June 2007 and January 2008, respectively. These studies included background research, a geomorphological and archaeological field reconnaissance, and an architectural survey. A letter report dated June 27, 2007 (GAI 2007), presented the results of Phase Ia cultural resources reconnaissance of two potential project alternatives (761 acres total). GAI provided results of cultural resources reconnaissance of additional project

localities (511 acres) and initial architectural survey of the project area in a February 22, 2008, Phase Ia Technical Report (Munford and Tuk 2008). The PHMC-BHP reviewed the Phase Ia study in a June 5, 2008 letter (Appendix A).

GAI conducted initial Phase Ib cultural resource investigations of the 639-acre\* (259-hectare) proposed BBNPP project area (preferred alternative) between May and August 2008 (Figure 1-2). *(\*Final calculation of the Switchyard 2 area, added during the course of initial Phase Ib fieldwork, has resulted in a change from the preliminarily-reported 630-acre/255 hectare project area.)* Work followed GAI's April 25, 2008, Phase Ib scope of work (Appendix B). Preliminary results of this study, encompassing archaeological survey and supplemental architectural survey, were presented in a Phase Ib Management Summary, dated September 9, 2008 (Munford et al. 2008). This report was reviewed by PHMC-BHP in letters dated October 28, 2008 (architectural resources) and March 2, 2009 (archaeological resources) (see Appendix A).

Supplemental Phase Ib cultural resource investigations of an additional 263 acres (106 hectares) of new project areas were performed between August and November 2008. GAI presented preliminary results of this study in a Supplemental Phase Ib Management Summary (Munford 2008) which has been reviewed by the PHMC-BHP (letter dated March 23, 2009) (see Appendix A). In total, Phase Ib investigations were conducted of 902 acres (365 hectares).

GAI conducted Phase II National Register Site Evaluations of seven potentially eligible sites (Sites 36LU279, 36LU280, 36LU281, 36LU283, 36LU285, 36LU286, and 36LU288) in the project area between July 7 and November 4, 2009. Phase II testing was conducted in accordance with GAI's May 29, 2009, Phase II Scope of Work (see Appendix B). Preliminary results of this study were presented to UniStar in a brief Phase II Management Summary, dated January 29, 2010 (Frye and Munford 2010).

Finally, a brief Management Summary on the Assessment of Effects to NRHP-eligible historic resources was provided to UniStar on February 12, 2010 (Kenneally and Tuk 2010).

This technical report, incorporating and/or summarizing data contained in the six previous documents presents the methods and results of GAI's Phase I Cultural Resources Survey and Phase II National Register Site Evaluations and provides recommendations on 1) the eligibility of identified cultural resources for listing in the NRHP; 2) the potential effects of the proposed project on these resources; and 3) the need for site avoidance, additional cultural resources investigations, or other measures where project effects may be adverse. A BHP Report Summary Form for the project is presented in Appendix C.

### **Area of Potential Effect**

The Area of Potential Effect (APE) for GAI's Phase Ib Archaeological Survey consists of the 902-acre (365-hectare) project footprint as delineated by UniStar and AREVA (see Figure 1-1).

The APE for the Architectural Survey consists of the project footprint in addition to the surrounding viewshed. The viewshed was defined as those areas within reasonable limits from which the proposed project may be seen, as appropriate, based on landforms, terrain, and vegetation features. Based on project information provided by the client, and in consultation with Ann Safley of the PHMC-BHP (teleconference on January 23, 2008), the limits of the viewshed for the study was defined as extending at least 0.8-kilometers (0.5 miles) beyond the project footprint. In some areas (i.e., along the elevated riverbank) the

viewshed APE was extended to include additional resources located within a clear line of sight of the project area, and in one case extended to 4.2 kilometers (2.6 miles).

## **Summary of Results**

### **Phase Ia Cultural Resources Investigation**

In June 2007, GAI conducted a Phase Ia archaeological and geomorphological reconnaissance of potential project alternatives (West Alternative and Southeast Alternative) for green space/power plant development, totaling approximately 760 acres (GAI 2007). These alternatives included parcels located both west and east of the North Branch Susquehanna River. In January 2008, following selection of the West Alternative as the preferred alternative, GAI performed a second Phase Ia survey (archaeological and geomorphological reconnaissance and architectural and historical survey) of an additional 511 acres (Area 6, Area 7, Area 8 and the Confers Lane Parcel) of new project areas west of the river (Munford and Tuk 2008). In total, 1,271 acres were investigated by Phase Ia survey. The goals of this work were to identify previously recorded cultural resources within the project vicinity, evaluate the project area's potential for unrecorded cultural resources, delineate localities for subsequent Phase Ib survey, and document architectural and historical resources in the project viewshed.

Phase Ia background research identified 24 previously-recorded archaeological sites within 1.6 kilometers (1.0 mile) of the project area and five architectural resources within a 0.8 kilometer (0.5 mile) radius of the project. Six of these sites (36LU15, 38LU16, 36LU48, 36LU49, 36LU50 and 36LU51) and one architectural resource (the North Branch Pennsylvania Canal/141573) were mapped within the Phase Ia project footprint.

GAI's reconnaissance-level architectural and historical survey, conducted in January 2008, recorded 52 resources within the proposed project viewshed. Ten of these surveyed resources were initially recommended eligible for NRHP listing, including one potential historic district (Wapwallopen Historic District) composed of ten individually-identified resources. (Note that eligibility recommendations for three of these 10 resources were subsequently revised due to additional research and PMHC-BHP review.)

The results of Phase Ia geomorphological and archaeological field reconnaissance of the project area indicated that undisturbed, relatively level, well-drained portions of the project area have a moderate to high archaeological potential, requiring subsequent Phase Ib archaeological survey to identify archaeological sites. Portions of the project characterized by wetlands, highly eroded soils, or slopes in excess of 15 percent were considered to have a low archaeological potential. These areas would not require systematic testing during subsequent Phase Ib investigations. Disturbed localities were determined to have no archaeological potential and were excluded from further investigation. Archaeological sites in upland settings were anticipated to be near surface in nature. Low terrace/floodplains adjacent to the Susquehanna River were concluded to have a potential for both near surface and deeply buried archaeological sites.

GAI presented the results and recommendations of these Phase Ia surveys in two reports (GAI 2007; Munford and Tuk 2008), which have been reviewed by the PHMC-BHP. In their June 5, 2008, review letter, the PHMC-BHP concurred with GAI's recommendations for additional Phase Ib archaeological fieldwork and requested further survey information for 22 of the 52 properties recorded by the architectural and historical survey, as well as submittal of Pennsylvania Historic Resource Survey (PHRS) forms for these 22 resources.



## Phase Ib Cultural Resources Investigation

In 2008, GAI conducted two separate Phase Ib cultural resources studies within the BBNPP project area—initial survey of 639 acres\* (259 hectares) and supplemental survey of 263 acres (106 hectares), for a total Phase Ib APE of 902 acres (365 hectares (see Figure 1-2). *(\*As noted above final calculation of the Switchyard 2 area, added during the course of initial Phase Ib fieldwork, resulted in a change from the originally-reported 630-acre (255-hectare) initial Phase Ib APE and the 893-acre/361-hectare total Phase Ib APE.)*

### Initial Phase Ib Investigation

The initial Phase Ib cultural resources investigation included an archaeological field survey and supplemental architectural and historical survey, as requested by PHMC-BHP. The 639-acre (259 hectare) initial Phase Ib project area included the West Alternative, Area 6, Area 7, Area 8, the Confers Lane Parcel, and the proposed Switchyard 2 Transmission Line Corridor (Switchyard 2) (see Figure 1-2). Phase Ib archaeological survey, performed between May 19 and July 3, 2008, was conducted in areas of moderate to high archaeological potential (approximately 350 acres/865 hectares) within the project area. Fieldwork included pedestrian ground survey, the excavation 3,789 STPs, and a program of deep testing in one low terrace/floodplain locality—involving mechanical excavation of 11 trenches, soil corings, and hand-screening of eight 1x1-meter test unit column samples. Initial Phase Ib survey resulted in the identification of 11 archaeological sites (36LU278, 36LU279, 36LU280, 36LU281, 36LU282, 36LU283, 36LU284, 36LU285, 36LU286, 36LU287 and 36LU288) and 25 Isolated Finds. Figure 1-3 illustrates assessments of archaeological potential and the location of identified archaeological sites within the project area. Phase Ib survey results are summarized in Table 1-1.

**Table 1-1. Summary of Phase Ib and Phase II Results**

Phase of Work	Total APE (acres)	Pedestrian Ground Survey or CSC* (acres)	# STPs	Deep Testing	#TUs	Plowzone Stripping (ft <sup>2</sup> /m <sup>2</sup> )	# Sites	# Isolated Finds	# Surveyed** and # NRHP Eligible Architectural Resources in Project Footprint
Initial Phase Ib	639	114 ac	3,789	11 trenches, 8 units	--	--	11	25	4 surveyed resources 1 NRHP-eligible resource
Supplemental Phase Ib	263	0	1,937	--	--	--	0	0	7 surveyed resources 1 NRHP-eligible resource
<b>Subtotal Phase Ib</b>	<b>902</b>	<b>114 ac</b>	<b>5,726</b>	<b>11 trenches, 8 units</b>	<b>--</b>	<b>--</b>	<b>11</b>	<b>25</b>	<b>11 surveyed resources 2 NRHP-eligible resources</b>
Phase II (7 sites)	N/A	4 sites 12 ac	1,169	--	80	29,658 ft <sup>2</sup> / 2755 m <sup>2</sup>	--	--	---
<b>Total Phase Ib and II</b>	<b>902</b>	<b>114 ac</b>	<b>6,895</b>	<b>11 trenches, 8 units</b>	<b>80</b>	<b>29,658 ft<sup>2</sup>/ 2755 m<sup>2</sup></b>	<b>11</b>	<b>25</b>	<b>11 surveyed resources 2 NRHP-eligible resources</b>

\*CSC=controlled surface collection within area of Phase Ib pedestrian ground survey ; \*\* Surveyed=resources surveyed during GAI's architectural survey of the current project

Based on the results of initial Phase Ib archaeological survey and in accordance with PHMC-BHP review (letter dated March 2, 2009), seven of the 11 sites (36LU279, 36LU280, 36LU281, 36LU283, 36LU285, 36LU286 and 36LU288) identified within the project APE were recommended as potentially eligible for listing in the NRHP, under Criterion D. For each of

these potentially-eligible sites, GAI recommended either avoidance by proposed construction or a Phase II National Register Site Evaluation. The other four sites (36LU278, 36LU282, 36LU284 and 36LU287) were recommended Not Eligible to the NRHP and no further work was recommended at these sites. The 25 Isolated Finds identified do not represent significant archaeological resources and GAI recommended no further archaeological investigations at these localities. Updated Pennsylvania Site Survey (PASS) Forms for the archaeological sites are provided in Appendix D.

Supplemental architectural and historical survey, conducted in August 2008, in conjunction with the initial Phase Ib survey, collected additional information on 22 of the 52 resources recorded during the previous architectural survey (Munford and Tuk 2008). As requested in PHMC-BHP's review of initial architectural survey results (June 5, 2008 letter), these resources included ten properties recommended by GAI as NRHP-eligible as well as 12 additional resources recommended as Not Eligible for listing in the NRHP. Results of this work, as well as completed PHRS forms for all 22 resources, were provided in GAI's Phase Ib Management Summary (Munford et al. 2008). The study recommended that ten of the surveyed resources were NRHP-eligible. One of these NRHP-eligible resources (North Branch Pennsylvania Canal/141673) is located within the initial Phase Ib project footprint (Areas 6 and 7). Based on additional research by GAI (November 16, 2009 letter to PHMC-BHP) and subsequent PHMC-BHP review and comments (March 17, 2010 letter), seven of the surveyed properties are recommended as NRHP-eligible or potentially-eligible. These seven resources include the North Branch Pennsylvania Canal (141673); Union Reformed and Lutheran Church (155049); Woodcrest Farmstead (155052); Stone Arch Bridge (155054); North Market Street Bridge (155055); House/Red Brick Studios (155064); and the Wapwallopen Historic District (155070). These resources are described in this report (Chapter 20); updated PHRS Forms for the NRHP-eligible or potentially NRHP-eligible resources are presented in Appendix E.

#### ***Supplemental Phase Ib Investigation***

Between August and November, 2008, GAI conducted Supplemental Phase Ib archaeological investigations of approximately 263 acres (106 hectares) of new project localities bordering the initial 639-acre/259-hectare project area (see Figure 1-2). The Supplemental Phase Ib APE encompassed seven lots (Lots 4, 64, 93F, 95, 96, 97/97C, and 100) located in upland settings south and northwest of the initial project area. GAI excavated 1,937 STPs in portions of the project area considered to have a moderate to high potential for archaeological sites (see Table 1-1; see Figure 1-3). No archaeological sites were identified during this work. Seven architectural resources, documented during GAI's previous architectural survey, were located within the project footprint; only one of these resources, the Stone Arch Bridge (155054/GAI-06) is recommended potentially eligible for listing in the NRHP. This resource is described in Chapter 20 of the current report and an Updated PHRS form is included in Appendix E. GAI presented results of Supplemental Phase Ib investigations in a Supplemental Phase Ib letter report (Munford 2008). The PHMC-BHP concurred with these recommendations in a review letter dated March 23, 2009 (see Appendix A).

#### **Phase II National Register Evaluations**

At the request of UniStar, GAI performed Phase II National Register Evaluations of seven potentially NRHP-eligible archaeological sites (Sites 36LU279, 36LU280, 36LU281, 36LU283, 36LU285, 36LU286 and 36LU288) within the BBNPP project area that could not be avoided by proposed project impacts. Of the seven sites, six were historic period sites and one (36LU288) was a prehistoric site. The Phase II study included site-specific archival research

(for the historic period resources) fieldwork and laboratory analysis. Phase II fieldwork was conducted between July 7 and November 4, 2009, in accordance with GAI's May 20, 2009 Phase II work plan (see Appendix B). Field methods included close-interval and/or judgmental shovel testing and test unit excavations (see Table 1-1). Sites located within cultivated fields were also subject to controlled surface collection and mechanical stripping of the plowzone within trenches.

Based on the results of the Phase II study, GAI recommends that all seven of the tested sites (36LU279, 36LU280, 36LU281, 36LU283, 36LU285, 36LU286 and 36LU288) are Not Eligible for listing in the National Register. [Note that due to the shallow depth of proposed impacts in the area of Site 36LU288, Phase II investigations in this locality were limited to an evaluation of archaeological components in the upper portion of the soil profile only (to depth of 80 cm/2.6 feet below surface); if the project should be modified to results in deeper impacts within this area, investigations of deeper deposits may be required.] Based on this assessment and pending PHMC-BHP review, proposed construction impacts will constitute a "No Effect" to these sites. Accordingly, GAI recommends no further archaeological investigations at Sites 36LU279, 36LU280, 36LU281, 36LU283, 36LU285, 36LU286 and 36LU288. Updated Pennsylvania Site Survey Forms for these sites are presented in Appendix D.

### **Curation**

All material remains and field records generated by these investigations will be donated by PPL to the Pennsylvania Historical and Museum Commission for long-term preservation at the State Museum of Pennsylvania. Submission of a Deed of Gift form is pending PPL's consultation with the Nuclear Regulatory Commission (NRC).

### **Regulatory Guidelines**

GAI's cultural resources investigations were 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*, *Guidelines for Archaeological Investigations in Pennsylvania* (PHMC-BHP 2008) and *Curation Guidelines* (PHMC 2005). The architectural survey was performed according to *Archaeology and Preservation: Secretary of the Interior's Standards and Guidelines* (48 FR 44716-44742); *National Register Bulletin 15- How to Apply the National Register Criteria for Evaluation* (National Park Service 1992a); and *National Register Bulletin 21- Defining Boundaries for National Register Properties* (National Park Service 1992b).

### **Project Staff and Acknowledgements**

Benjamin Resnick, M.A., RPA, (Group Manager, Cultural Resources) was project manager for GAI's study. Barbara A. Munford, M.A., (Senior Lead Archaeologist) served as project Principal Investigator for Phase I studies, was co-Principal Investigator for Phase II investigations and was a primary author for this report. Lori A. Frye, M.A., (Senior Lead Archaeologist) was co-Principal Investigator for the Phase II study and authored Phase II report sections. Jared N. Tuk, M.A., (Assistant Cultural Resources Manager) supervised the architectural and historical study contributed to report chapters. Qualifications of key project staff are provided in Appendix F.

Terry J. Newell (Archaeologist) supervised both Phase Ib and II archaeological fieldwork with a crew that included Doug Jeffries (Senior Technician), Christine Lasser (Senior Technician),



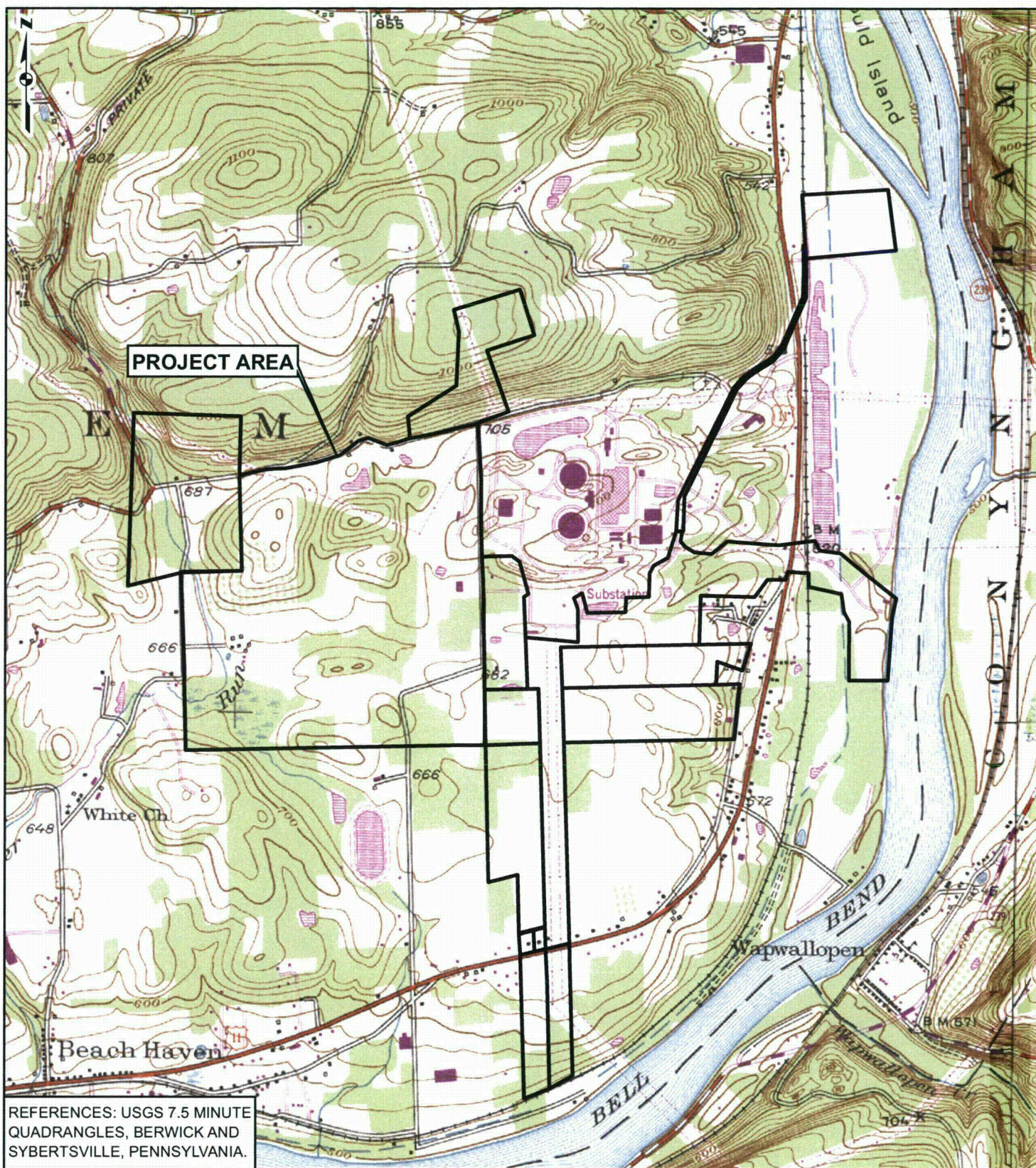
Scott Gajewski (Senior Technician), Corry Laughlin, Steve Brann, Amber Taylor, Stan Marcovitch, Benjamin Demchack, Craig Kelley, John Lanham, Samuel Williams, Brian Deshler, Monica Weetman, Andrew Carbo, and Phillip Karash.

Colleen Dugan (Archaeologist) and Sarah Marine (Archaeologist) performed historic artifact analysis. Marina Davis (Archaeologist) conducted prehistoric and historic artifact analysis. Matthew G. Hyland, Ph. D. (Architectural Historian) carried out the initial architectural field survey and he and Megan Otten (Cultural Resource Specialist) prepared PHRS forms for architectural resources. Hannah L. Cole, M.A., (Architectural Historian), Michael P. Kenneally, M.A., (Architectural Historian), and Donald E. Thompson (Cultural Resource Specialist), conducted archival and background research; Mike Kenneally also contributed to report sections. Richard T. Baublitz, M.A. (Lead Archaeologist) authored the Site 36LU286 chapter. Amanda Wasielewski and Steve Sarver prepared figures for this report.

For Phase I studies, conducted for AREVA, Lannis Selz (AREVA) was the project manager and Peter Gluckler (AREVA) was the technical manager for the project. During Phase Ib field investigations, Chuck Thompson and Lyndsay Stutzman (Kleinfelder) served as UniStar's/PPL's field coordinators at BBNPP and facilitated the field crew's daily access within the project area.

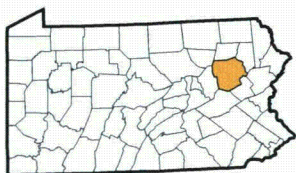
For Phase II field investigations, Dave Sullivan (UniStar) served as the project manager. Jerry Fields (PPL) provided project support and on-site expertise.






REFERENCES: USGS 7.5 MINUTE  
QUADRANGLES, BERWICK AND  
SYBERTSVILLE, PENNSYLVANIA.

#### PROJECT LOCATION



LUZERNE COUNTY,  
PENNSYLVANIA

#### LEGEND

 PHASE Ib PROJECT AREA

0 1,000 2,000 4,000 Feet

FIGURE 1-1  
PROJECT LOCATION



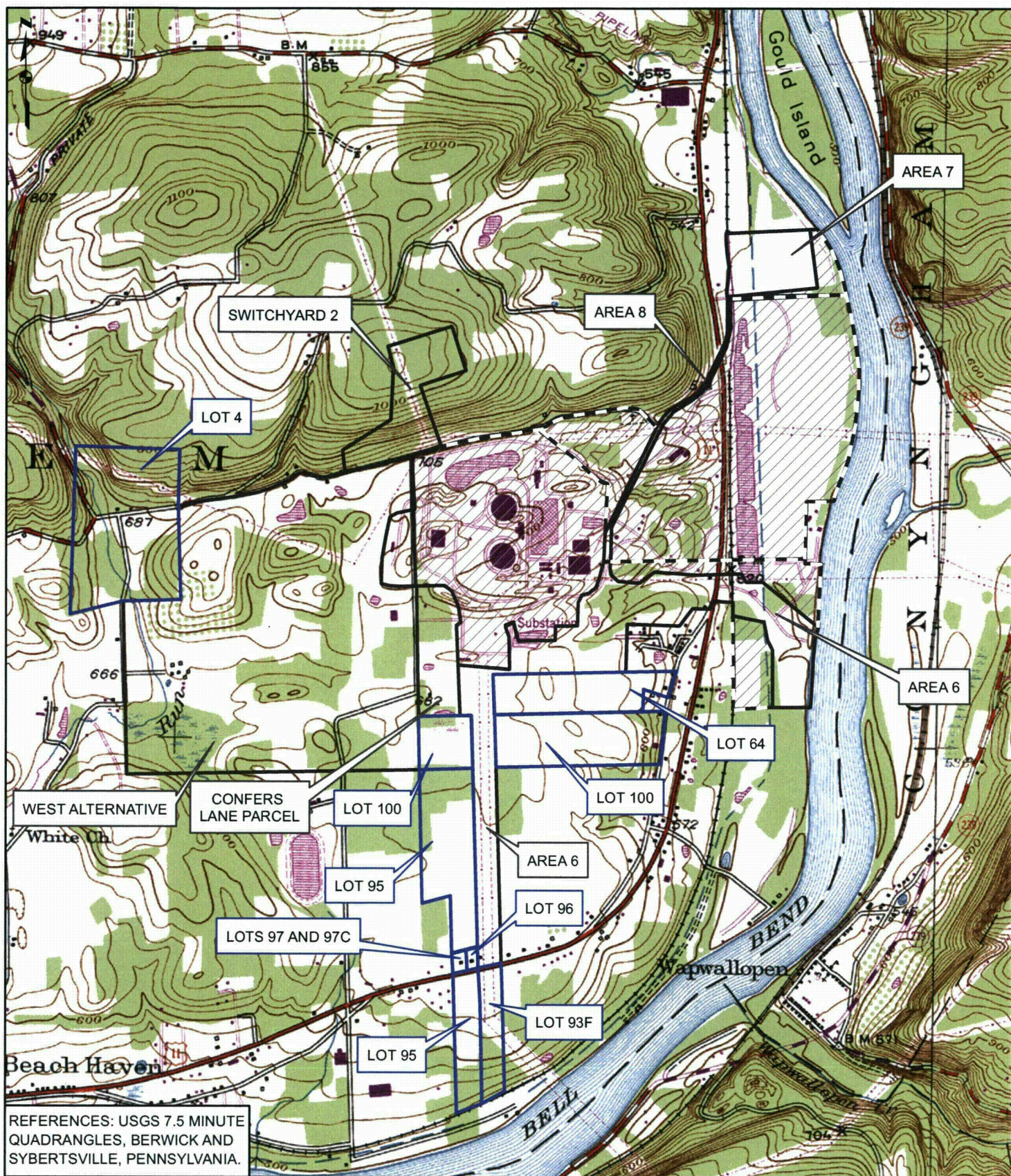
gai consultants

BELL BEND NUCLEAR POWER PLANT  
UNISTAR NUCLEAR DEVELOPMENT, LLC.

DRAWN BY: AJW  
CHECKED: BAM

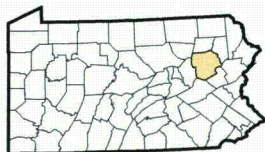
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APPROVED: BAM





REFERENCES: USGS 7.5 MINUTE  
QUADRANGLES, BERWICK AND  
SYBERTSVILLE, PENNSYLVANIA.

#### PROJECT LOCATION



LUZERNE COUNTY,  
PENNSYLVANIA

#### LEGEND

- SUPPLEMENTAL PHASE 1b AREA
- INITIAL PHASE 1b PROJECT AREA
- EXCLUDED AREA

0 1,000 2,000 4,000 Feet

FIGURE 1-2  
INITIAL AND SUPPLEMENTAL PHASE 1b  
PROJECT AREA



BELL BEND NUCLEAR POWER PLANT  
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**Figure 1-3. Phase Ib Project Area showing Archaeological Potential and Testing Locations**  
**B Size**

*REDACTED Figure 1-3  
Phase Ib Project Area showing  
Archaeological Potential and  
Testing Locations*

(back of Figure 1-3)

*Side 2 of REDACTED Figure 1-3.*

## **Chapter 2. Environmental Setting**

### **Physiography**

The Bell Bend project area is located in the Susquehanna Lowland Section of the Ridge and Valley physiographic province (Sevon 2000) (Figure 2-1). 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.

Near the project 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 project 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 project area (Area 7).

### **Geology**

The bedrock in the project area consists of Middle to Upper Devonian shale, claystone, sandstone and limestone (Inners 1978). The northern edge of the project 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. To the south of Beach Grove Road, between the roadway 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. To the south of the Harrell Formation, the remainder of the project area is 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.

### **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 westernmost portion of the project area (West Alternative) encompasses portions of this end moraine. Woodfordian Ground Moraine deposits are mapped on the majority of the uplands to the north and east of the moraine. This unit occurs on most of the uplands north of the project area, the uplands in the northern portion of the West Alternative, and the uplands west of the bend in Confers Lane. 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 project area 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. In the 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 the project area is located within Susquehanna River Basin, Subbasin Number 5 (The Central Susquehanna), Watershed B (Toby - Wapwallopen Creeks) and 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 Toby Creek--Wapwallopen Creek watershed--has a total drainage area of 403 square miles. Major streams in this watershed include Toby Creek, Wapwallopen Creek and Harvey Creek. Additionally, 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 Bell Bend project area, itself, is drained largely by Walker Run (located in the western portion of the project) and unnamed tributaries which flow southward directly into the Susquehanna River. An unnamed tributary drains the eastern portion of the project area,

emptying into the Susquehanna River just south of the existing SSES intake facility. Additionally, small patches of discontinuous wetlands are located throughout the APE.

Further to the west, Salem Creek, Glen Brook, and their tributaries drain the uplands between the project area and Berwick. The east bank of the Susquehanna River, opposite the project area is drained primarily by Wapwallopen, Little Wapwallopen and Nescopek Creeks, and their tributaries, which empty directly into the river.

## Soils

The BBNPP project area is mapped with 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. The portions of the project area to the north and west of U.S. Route 11 are mapped with glacial till and glacial outwash soils (Bush 1981). Glacial till soils weathered from sandstone, shale, siltstone, and conglomerates. Glacial till soils occur on the highest uplands to the north of the project area, and on the highest elevation knobs and hillsides within the project area. Areas of glacial till within the project area are mapped as Weikert and Klinesville channery silt loam (WeB, WeD), Oquaga and Lordstown channery silt loam (OIB, OIC), and Oquaga and Lordstown extremely stony silt loam (OpD, OXF). The majority of upland settings within the project area 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. Within the project area, localities of glacial outwash are mapped as Chenango gravelly loam (ChA, ChB ChC), Braceville gravelly loam (BrA, BrB, BrC), Atherton silt loam (At), Rexford loam (RdA, RdB, and Wyoming gravelly loam (WyD, WyF) (see Figure 2-2). Chenango gravelly loam is found across large areas of cultivated fields; smaller areas of open fields are mapped with Braceville gravelly loam. Areas of Atherton silt loam and Rexford loam are associated with poorly drained localities. Wyoming gravelly loam occurs on steep hillsides.

Upland portions of the project area have no potential for deeply buried cultural resources. Cultural resources in these areas are expected to be associated with the modern ground surface. Additionally, the ground surface has been disturbed to varying extent due to construction (primarily associated with the existing SSES facility) and agriculture.

The portions of the project area east of U.S. Route 11 occur on low terraces and floodplain of the Susquehanna River, formed in Late Holocene to recent-aged alluvial sediments. The Luzerne County soil survey (Bush 1981) maps two soil types in this portion of the project area: the well-drained Pope soils and the poorly-drained Holly soils. Holly soils likely represent low and former stream channels on the floodplain. Pope soils occur on higher terrace and natural levee landforms. Area 7 and the eastern portions of Area 6 occur on the low terraces and floodplain of the Susquehanna River. These areas, particularly the well-drained low terraces and natural levee landforms have a potential for deeply buried cultural resources. Hayes et al. (1981) performed an archaeological investigation of the Susquehanna floodplain east of the SSES. This study encountered a shallow buried (0.5-1.0 meters/1.6-3.3 feet) cultural bearing soil horizon with features and a deep "carbonized horizon" at a depth of 3.2 meters (10.5 feet) below surface, confirming the presence of deeply buried cultural materials.

The poorly-drained channel-like areas within Pope soils also have a potential for cultural resources. In particular, the edges of wetlands bordered by natural levee landforms may



have been utilized by prehistoric inhabitants. Due to their poor drainage, broader areas of the Holly soil are considered to have a lower potential for cultural resources.

### **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.

Four raw material types that could be attributed to specific geologic sources were deposited as artifacts at the Bell Bend sites (Figure 2-3). These include Shriver/Helderberg chert, Onondaga chert, Bald Eagle jasper, and rhyolite. 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 material is locally available and is the most common material at prehistoric sites in the 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. Bald Eagle jasper outcrops in central Pennsylvania, in the area of State College, approximately 130 kilometers (80 miles) to the west. Rhyolite is available from outcrops at South Mountain, near Chambersburg, Pennsylvania, approximately 150 kilometers (90 miles) southwest of the project area. 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 oolitic, tan, gray, gray grainy, gray translucent, gray banded, black, black translucent, blue-gray and dark greenish gray and indeterminate cherts. In addition to the various cherts, other unsourced toolstone materials found in the prehistoric artifact assemblages include jasper (unspecified), quartz, quartzite and sandstone. Within the Phase Ib and II Bell Bend prehistoric assemblages Shriver/Helderberg chert was the most common raw material type, followed by Onondaga chert. The remaining raw material types occurred in much 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 BP), a warmer and moister climate (although cooler than present) caused the northward movement of most plant communities and glacial retreat. Glacial deposits are 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 BP, 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 BP, 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**

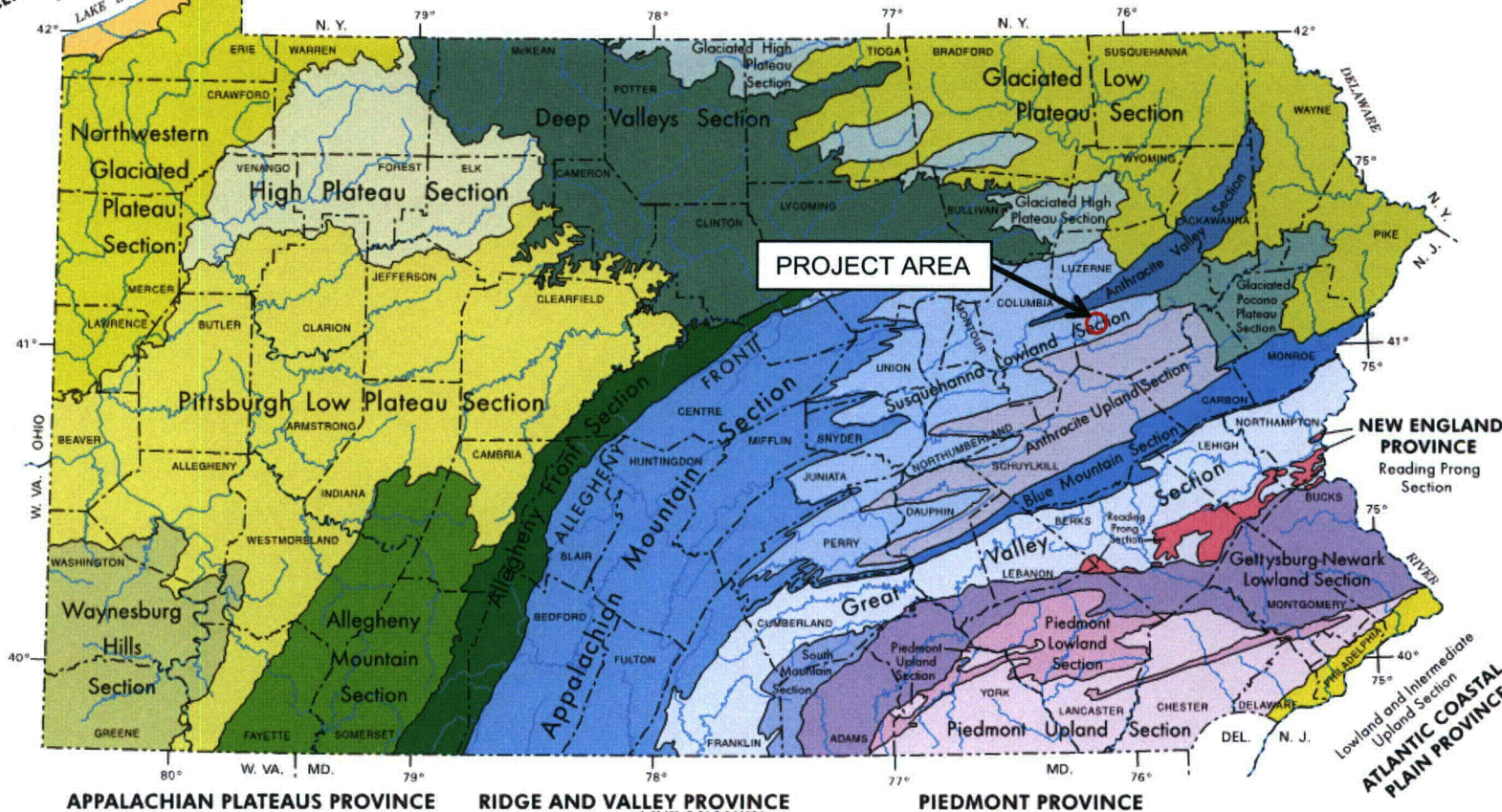
The project area falls within a basswood-beech-oak-hemlock Mixed Mesophytic forest region (Braun 1950) that became entrenched during the Holocene. Prehistoric faunal assemblages in the Appalachians revealed a rich and diverse fauna for forager exploitation. The white-tailed deer was the most commonly 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 the current project area.



DCNR

CENTRAL LOWLANDS PROVINCE  
Eastern Lake Section



CENTRAL LOWLANDS PROVINCE

EASTERN LAKE SECTION

NORTH-WESTERN GLACIATED PLATEAU SECTION

HIGH PLATEAU SECTION

PITTSBURGH LOW PLATEAU SECTION

WAYNESBURGH HILLS SECTION

ALLEGHENY MOUNTAIN SECTION

ALLEGHENY FRONT SECTION

DEEP VALLEYS SECTION

GLACIATED HIGH PLATEAU SECTION

GLACIATED LOW PLATEAU SECTION

GLACIATED POCONO PLATEAU SECTION

APPALACHIAN MTN SECTION

SUSQUEHANNA LOWLAND SECTION

ANTHRACITE VALLEY SECTION

ANTHRACITE UPLAND SECTION

BLUE MTN SECTION

GREAT VALLEY SECTION

SOUTH MTN SECTION

READING PRONG SECTION

GETTYSBURG-NEWARK LOWLAND SECTION

PIEDMONT LOWLAND SECTION

PIEDMONT UPLAND SECTION

LOWLAND AND INTERMEDIATE UPLAND SECTION

ATLANTIC COASTAL PLAIN PROVINCE

SYMBOLS

APPROXIMATE BOUNDARY BETWEEN PHYSIOGRAPHIC PROVINCES  
APPROXIMATE BOUNDARY BETWEEN PHYSIOGRAPHIC SECTIONS

REFERENCE:  
COMMONWEALTH OF PENNSYLVANIA,  
DCNR, 2000.

FIGURE 2-1  
PROJECT AREA IN RELATION TO PENNSYLVANIA PHYSIOGRAPHIC PROVINCES

LEGEND



PROJECT AREA



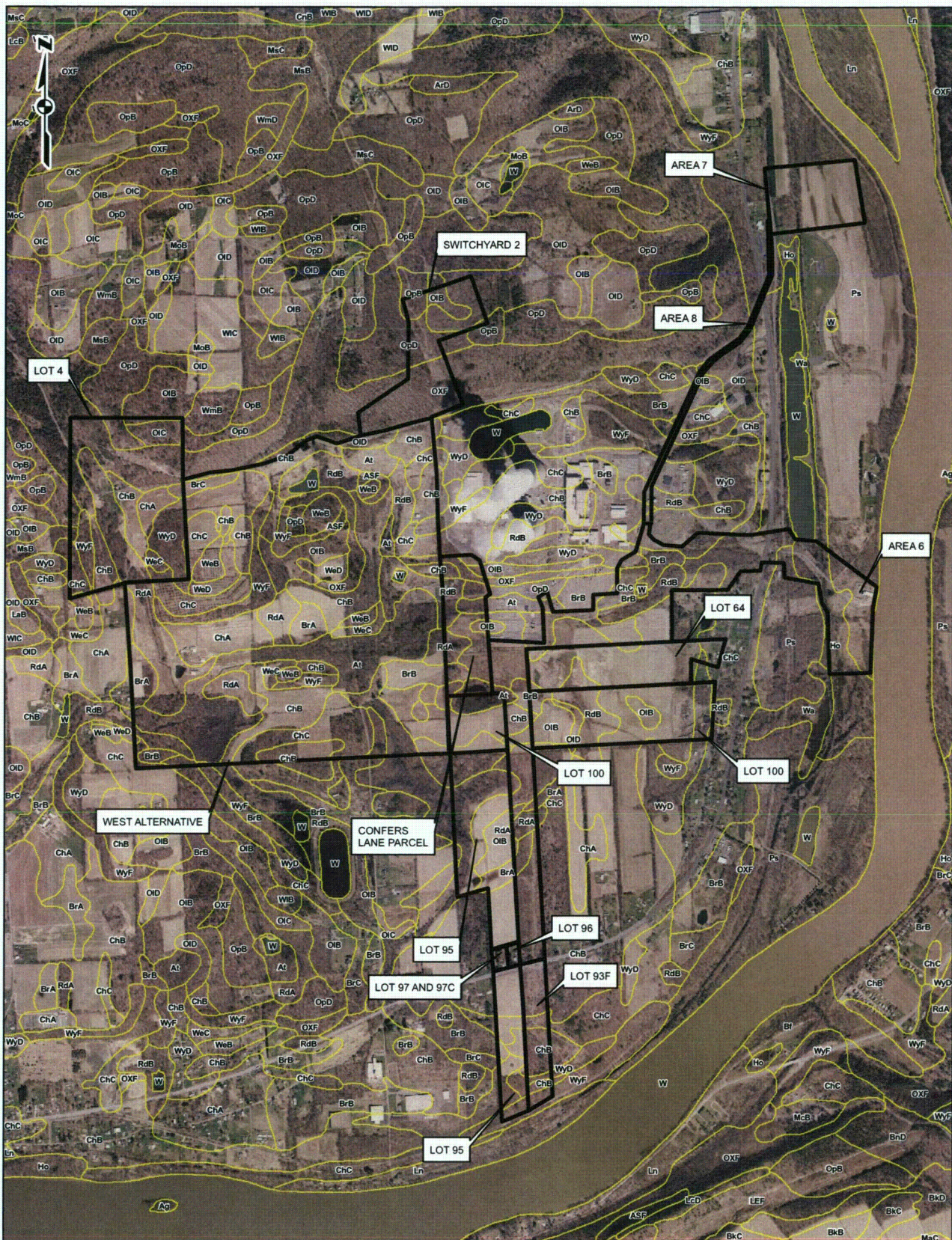
gai consultants

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UNISTAR NUCLEAR DEVELOPMENT, LLC.

DRWN: AJW  
CHECKED: BAM

DATE: 04/09/2010  
APPROVED: BAM





REFERENCES:  
PAMAP PROGRAM, COLOR ORTHOPHOTOS,  
LUZERNE COUNTY, 2005.

NATURAL RESOURCES CONSERVATION  
SERVICE, SSURGO DATABASE, LUZERNE  
COUNTY, PENNSYLVANIA, 2004.

PROJECT LOCATION



LUZERNE COUNTY, PENNSYLVANIA

#### LEGEND

- PHASE 1b PROJECT AREA
- SOIL BOUNDARY

0 650 1,300 2,600 Feet

FIGURE 2-2  
PROJECT AREA SOILS



BELL BEND NUCLEAR POWER PLANT  
UNISTAR NUCLEAR DEVELOPMENT, LLC.

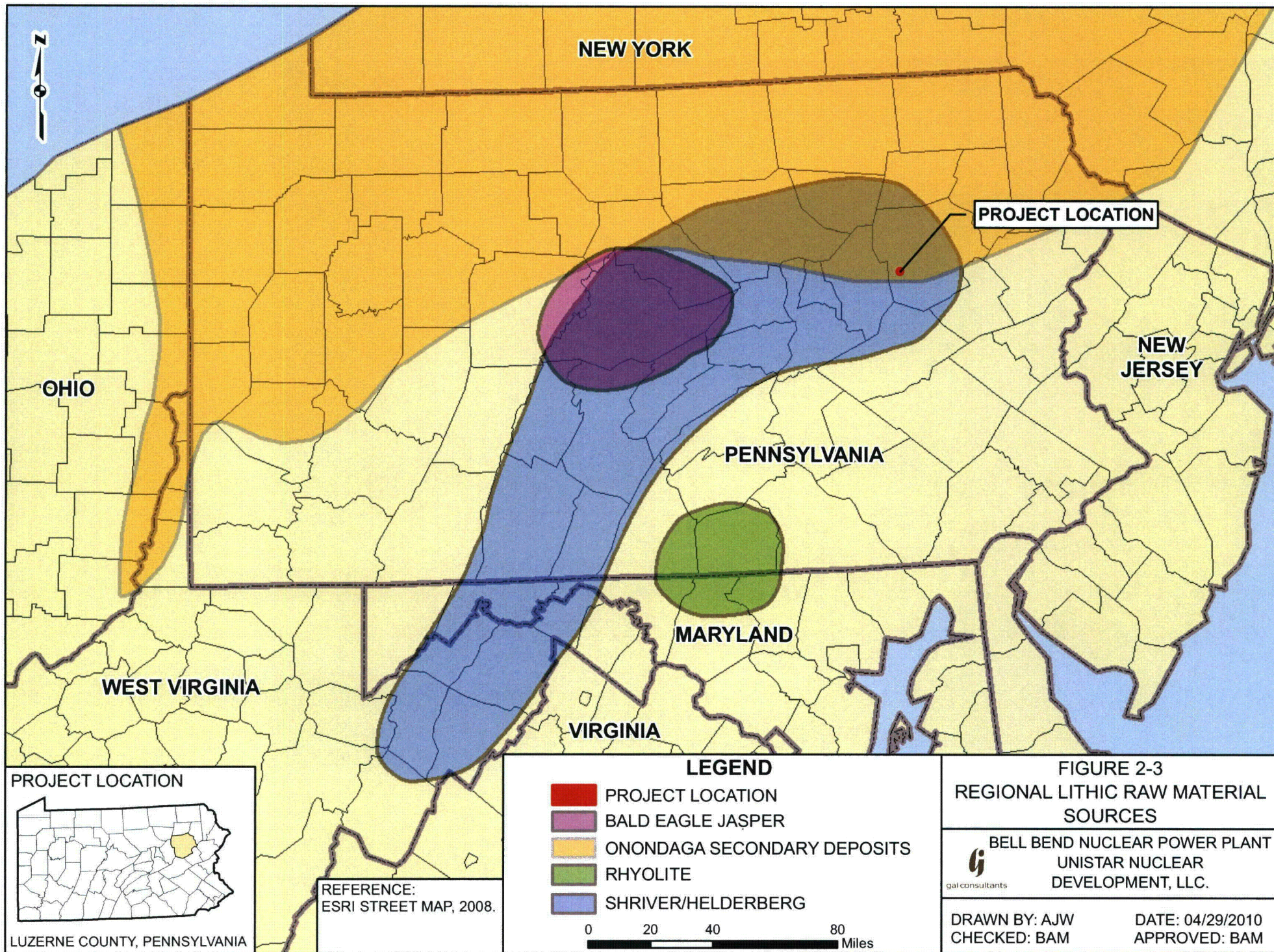
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## **Chapter 3. Culture History**

The purpose of this chapter is to provide a general context for the Phase I and II investigations of cultural resources within the BBNPP project area. 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 approximately 14,500 BP (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 graters. 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, Paleoindian 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. Only one previously recorded Paleoindian site is documented in Luzerne County, consisting of an isolated Paleoindian projectile point. Current field investigations of the Bell Bend project area, produced two Paleoindian points from Site 36LU288, situated on a low terrace/floodplain west of the North Branch Susquehanna River, as well as one Paleoindian point from a disturbed context in historic period Site 36LU286, in an upland setting.

#### 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 crossing the project area, only six sites with Early Archaic components have been identified. Near the project area, previous investigations identified three of the six Early Archaic components in floodplain or terrace settings similar to the project area (Bureau for Historic Preservation [BHP] 2010).

#### 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 near the project area in floodplain or terrace settings (BHP 2010).

#### 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 project's watersheds, Late Archaic components have been identified at 52 previously recorded sites. Of these 52, 13 occur near the Bell Bend project in floodplain or terrace settings similar to those found in the project area (BHP 2010).

#### 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 1995). 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 (BHP 2010). However, only nine recorded sites containing Early Woodland components are located near the project area, all situated on a floodplain or low terrace setting.

#### 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 project area (BHP 2010).

### 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 APE yielded Late Woodland components (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 1995). 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 projectile 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.

### Protohistoric/Contact (A.D. 1600-1750)

Just south of the portion of the Susquehanna River Valley comprising the project area, 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 reach 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).

Previously recorded archaeological sites near the project area include one site yielding a Protohistoric/Contact era component (BHP 2010). That site is identified as a cemetery.

### **Euroamerican History**

Located in northeastern Pennsylvania east of the city of Berwick, the study area is located in Salem, Nescopeck, and Conyngham Townships in western Luzerne County. The Susquehanna River flows through the study area, and divides Salem Township from Nescopeck and Conyngham Townships. The study area 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, mining of the large anthracite coal field in the Wyoming Valley to the north impacted the area.

### Contact Period (1615-1763)

Prior to European settlement, the study area, including present-day Luzerne County, was inhabited by the Susquehannock, Iroquois, Delaware, Shawnee, and Nanticoke tribes (Callender 1978:630; Jennings 1978:364-366). In 1615, while trying to secure Native American allies for Samuel de Champlain's Huron-led military expedition against the Onondaga, Etienne Brule, explored the Susquehanna River and its environs (Butterfield 1898:65-86). His travels through the area are noted by historians as the first European exploration of the Susquehanna River basin. Samuel de Champlain, in writing of Brule's exploration of the Susquehanna River noted that Brule witnessed, "...many powerful and warlike nations, carrying on wars against each other" (Butterfield 1898:80). However, the area remained unsettled by Europeans in the seventeenth century, and contact with Native American populations in the study area was scarce.

In 1662, King Charles II of England granted the Connecticut Charter to Governor John Winthrop, Jr. This charter essentially gave to the Connecticut colony all the land between its north and south boundaries from the Atlantic Ocean to the Pacific Ocean. Almost two decades later, in 1681, King Charles II granted William Penn the Charter of Pennsylvania containing the present boundaries of Pennsylvania. Unbeknownst to King Charles, these two charters contained conflicting land patents in the area of northern Pennsylvania. However, the region remained largely unsettled by English colonists until the latter half of the eighteenth century, and the conflicting land patents went unchallenged until then (Archambault 1924:277).

In the 1730s, Conrad Weiser, a Pennsylvanian German, who had resided among the Mohawk tribe from 1716 to 1729 and learned the language of the local Native American populations, led negotiations with Shikellimus, the Cayuga Chief, who lived in the village of Shamokin, located to the south of the current study area, and in the area of the present-day city of the same name. Weiser travelled throughout the area that would become Luzerne County in the spring of 1737 and noted the presence of Shawnee villages along the banks of the Susquehanna River (Pearce 1866:32).

As European land deals and settlement encroached westward from the coastal regions, members of the Delaware tribe migrated into the Susquehanna River area to escape the European expansion. In 1742, some of the Delaware went to Shamokin, where the Cayuga Chief Shikellimus resided, and others went to the waters of the Juniata River. However, most of the Delaware migrated to the Wyoming Valley where they constructed a village on the flats of the Susquehanna near present Wilkes-Barre (Pearce 1866:28). At the same time, King Nutimus of the Delaware settled in the area of present-day Nescopeck and constructed a substantial Delaware village called Nescopecken by the inhabitants (Bradsby 1893:610; Pearce 1866:29). As the Delaware migrated into the region, the powerful League of Iroquois, who had previously subjugated them through conquest, allowed them to become protectorates under tributary status (Kelley 1980:312). In 1748, small Native American settlements were also noted as being present along the Susquehanna River in the present areas of Wapwallopen, Beach Haven, and Shicksinny to the north of the current study area (Pearce 1866:29).

In the 1740s and 1750s, Moravian missionaries, led by Count Nicholas Louis Zinzendorf, the principal leader of the Moravian society, arrived in the area from the Pennsylvania settlements of Lehigh and Bethlehem located to the east. The preaching of Christianity was accepted by some of the Native American populations, and Chief Shikellimus at Shamokin converted. In 1744, the Moravians established a mission near present-day Wapwallopen. Among the missionaries who traveled throughout the region were John Martin Mach, Christian Frohlich,

and Daniel Zeisberger. In 1748, during John Martin Mach and Daniel Zeisberger's travels, they noted that a European family had settled in the region (Wapwallopen Historical Society 1964:15).

#### ***The French and Indian War 1754-1763***

Hostilities between Britain and France erupted in the mid-eighteenth century and led to the Seven Years' War, known as the French and Indian War on the North American continent. Most of the Shawnee and Delaware who were living in the Susquehanna River drainage allied themselves with the French during the conflict. Around this time, Teedyuscung, who lived in the Delaware village of Wyoming, near present Wilkes-Barre, became a Chief of the Delawares. He sent word south among the Native Americans of the Susquehanna River, and as far south as the Cherokees, to join together with the French to fight the British (Pearce 1866:40).

The Delaware village at Nescopeck served as the rendezvous point for the Native Americans and their allied French, and many Native Americans responded to Chief Teedyuscung's call (Bradsby 1893:610; Pearce 1866:40). This force of Native Americans commenced attacks on the English settlements to the east. This outbreak of hostilities from the Delaware and their French allies spurred the Pennsylvania Assembly to erect a series of forts in the western frontier of Pennsylvania and issue a declaration of war on the Delaware tribes. However, upon hearing of the declaration of war against the Delaware, and at the request of Pennsylvania Governor Morris, Teedyuscung and other Native American leaders entered into council, and eventually made peace with the English (Pearce 1866:40-51).

#### ***Euroamerican Settlement (1763-1786)***

The outbreak of the French and Indian War deterred Euroamerican settlement in the area. However, after the Treaty of Paris in 1763, which concluded hostilities and relinquished all French presence from Canada and territories east of the Mississippi River, the settlement of the Pennsylvania frontier was open to American colonists.

#### ***First Yankee-Pennamite War***

Conflict over the land previously granted to both Connecticut and Pennsylvania by King Charles II, including the current study area, occurred in the latter half of the eighteenth century. The first large-scale Euroamerican settlement in the region took place in 1762 and 1763, when the Hartford, Connecticut based Susquehanna Land Company sent settlers into the Wyoming Valley who located in the vicinity of present-day Wilkes-Barre (Pearce 1866:60). However, in April of 1763, shortly after the arrival of the Connecticut settlers, Chief Teedyuscung, who lived in the nearby Delaware village of Wyoming, perished in a suspicious fire. This event instigated the hostilities of the Native American populations, and in the summer and fall of 1763 attacks were led against settlers throughout the western frontiers of Pennsylvania. The attack on the Susquehanna Land Company settlement left twenty dead, and the remaining settlers withdrew back to Connecticut.

After the departure of the Connecticut settlers, the Pennamites, representing the colonial government of Pennsylvania in Philadelphia, arrived in the area to maintain a stockade that had been established by Captain Amos Ogden two years previous. In 1769, shortly after the Pennamites arrived, 340 Connecticut settlers moved back into the area, and by the end of the summer they had established five townships: Pittston, Plymouth, Wilkes-Barre, Nanticoke, later named Hanover, and Forty Fort, later named Kingston. In addition to establishing the five townships, the Connecticut settlers built Fort Durkee in the present area of Wilkes-Barre near



the Delaware village of Wyoming where Chief Teedyuscung had lived (Archambault 1924:277).

This influx of Connecticut settlers spurred the Pennamites to encourage more Pennsylvanian settlers to move into the area, and the conflicting land claims between the two groups created tension as they harassed each other for control of the area. One of the Connecticut settlers who moved into the study area in 1769 was Nathan Beach, who settled in what is known today as Beach Haven. That same year, Daniel Grant received a patent for a tract of land that encompassed both sides of Wapwallopen Creek in the location of present-day Wapwallopen (Wapwallopen Historical Society 1964:16).

The conflict between the Connecticut and Pennsylvania settlers culminated on April 2, 1770. On that date, the Connecticut "Yankees" battled with the Pennamites and captured the Pennamite's newly constructed Fort Wyoming, effectively diminishing the influence that the Pennsylvania settlers had in the area (Archambault 1924:280). This battle ended the hostilities between the two groups in the area, and ended what would become known as the First Yankee-Pennamite War. For the next dozen years the Connecticut settlers controlled the area.

In 1773, Nathan Wales III and Ebenezer Gray, Jr. were appointed by a Connecticut committee to survey and lay out a new township on the banks of the Susquehanna River to be called Salem, after Salem, Connecticut. Thomas Gray was appointed clerk of the township, and on July 7, 1773, Nathan and Ebenezer reported on their progress in laying out the township to the Connecticut committee. As mentioned previously, Nathan Beach had settled in the area in 1769, and it was voted at the committee that he would have an equal share with the other proprietors of the remaining undivided land in the township of Salem, allowing that he paid his equal proportion of the cost of surveying and laying out the township (Bradsby 1893:642).

On June 29, 1774, a large region, including the area encompassed by Salem Township, was organized into a county under the administration of Connecticut and named Westmoreland. The population of that vast area, which now includes Luzerne, Wyoming, Susquehanna, Bradford, and a portion of Wayne Counties, was 1,922 in 1774 (Pearce 1866:178). The proprietors of Salem Township met in Windham, Connecticut on November 7, 1774, and voted that Ebenezer Lathrop, Jr. and Asa Edgerton lay out 106 100-acre lots, two lots to each proprietor, and the remaining land be divided equally (Bradsby 1893:643).

#### ***Revolutionary War 1775-1783***

At the outbreak of hostilities between the American colonists and the British, a town meeting was held in Wilkes-Barre on August 1, 1775 and settlers resolved to join the American colonists in their fight against Britain. Hasty forts were constructed throughout the region. On August 23, 1776, two companies were raised from the frontier inhabitants that totaled 84 men apiece. Robert Durkee recruited men from the east side of the Susquehanna River, while Samuel Ransom recruited from the west (Pearce 1866:121).

As General George Washington retreated from the advances of General Howe in New Jersey, Congress ordered the two companies of men mustered from the Wyoming Valley region to join the Continental Army on December 23, 1776 (Pearce 1866:121). These companies joined the Connecticut line under leadership of Colonel Zebulon Butler, where they joined him in numerous battles including Bound Brook, Germantown, Brandywine, Millstone, and Mill Creek.

While a substantial portion of the men from the Wyoming Valley region were engaged with Colonel Zebulon Butler to the east, the League of Iroquois openly sided with the British forces

in the summer of 1777. Shortly after the announcement, in the spring of 1778, Iroquois scouting parties were observed moving among the Susquehanna River valley within the project area. This caused alarm among the mostly defenseless citizens of the area, and messages were sent requesting the return of the area's two companies of men. However, as the companies were already engaged, and needed in the east, it was ordered that another company of men be mustered in Westmoreland for the defense of the frontier. This action resulted in the raising of around 40 mostly old and young from the region under Captain Dethick Hewitt (Pearce 1866:124).

As small skirmishes began to occur in the western frontiers of Pennsylvania, Robert Durkee and Samuel Ransom, with around thirty men from the Wyoming Valley companies left the ranks of Colonel Zebulon Butler then in Morristown, New Jersey. They headed west for the Wyoming Valley, and on June 23, 1778 merged into one company. Colonel Zebulon Butler, after receiving permission for a leave of absence joined the men in the Wyoming Valley. A few days later, June 30, 1778, British Colonel John Butler in command of 800 men, including 500 Seneca and Cayuga warriors, advanced on Forty Fort near Wilkes-Barre, where Colonel Zebulon Butler with 386 militiamen awaited.

The resulting battle on July 3, 1778, known as the Battle of Wyoming, resulted in Colonel Zebulon Butler's forces being outflanked by the force of the Iroquois Seneca and Cayuga resulting in a retreat that quickly became a rout. In the ensuing rout many of the American force were pushed into the Susquehanna River where many perished trying to cross. Only 60 of the American militiamen escaped the battle, and it is reported that the captives were put to death, with the Seneca and Cayuga taking 227 scalps of the slain militiamen (Stefon et al. 1998:144-149).

The following day, July 4, 1778, British Major John Butler demanded the surrender of all American forts in the vicinity. The terms of the surrender included that settlers living in the area were to leave, and none were to take up arms for the Continental Army. This action led to a substantial depopulation of the settlers within the study area.

On July 4, 1779, General George Washington appointed General John Sullivan to lead an organized campaign against the Iroquois along the Pennsylvania and New York borders. The campaign was a success and resulted in the 1784 Treaty of Ft. Stanwix, in which the Iroquois ceded their lands in Pennsylvania and western New York. Among the soldiers present in General John Sullivan's army was Nathan Beach who was one of the first settlers in Salem Township, having settled in the area of present-day Beach Haven in 1769 (Bradsby 1893:643). The Treaty of Ft. Stanwix effectually ended significant Native American populations in the Susquehanna River regions (Stefon et al. 1998:141-149).

Settlement in the project area increased after General John Sullivan's campaign, and at the end of the Revolutionary War, many of the early settlers returned to their homes and farms. Nathan Beach returned and served the area as postmaster before serving as justice of the peace and representing the county in the legislature. In 1780, Sebastian Seybert settled at the mouth of Seybert's Creek a mile west of Beach Haven. To accommodate the returning and newly arriving settlers, he operated a gristmill and sawmill, as well as a distillery and clothiery. The gristmill that served the farmers in the area consisted of a single run of stones and was able to grind four-to-six bushels a day, while the sawmill cut 1,000 board feet a day (Bradsby 1893:643-644).

### ***Second Yankee-Pennamite War***

As the population in the area increased, the conflicting land claims between Pennsylvania and Connecticut ignited again, and Congress was asked to settle the matter. On December 30, 1782, the Decree of Trenton established the Pennsylvania claim on the disputed land. In response, the Commonwealth of Pennsylvania ruled that the Connecticut Yankees who lived in the area were not citizens, could not vote, and did not own the land upon which they resided.

These decrees by the Pennsylvania legislature rekindled the long-brewing conflict between the Connecticut and Pennsylvania settlers and in May of 1784, the Second Yankee-Pennamite War commenced. A group of Connecticut settlers living in the Wyoming Valley was gathered together by Pennamites and forced-marched back to Connecticut. In November of 1784, the Connecticut settlers returned to the valley in number, and captured and destroyed Fort Dickinson. After this victory, the Connecticut settlers suggested that Westmoreland, a new State, be created. In an attempt to restore order, Pennsylvania reversed its ruling concerning Connecticut settler land ownership, and decreed that the existing land grants would be honored (Luzerne County 2006).

### **Creation of Luzerne County and Development of Agriculture (1786-1840)**

As part of the compromises ending the Second Yankee-Pennamite War, Pennsylvania created a new county from Northumberland County on September 23, 1786, and named it Luzerne County. The new 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. Originally, this area encompassed present day Lackawanna, Wyoming, Susquehanna, and Bradford Counties (Pearce 1866:157).

The first settlers who arrived in the region typically practiced a diverse system of farming. These farmers cleared the land on which they settled and in the process gathered material for the construction of their houses. Due to the lack of easily accessible transportation routes and the paucity of markets in the frontier regions, they relied on a system of farming that produced a wide variety of crops and livestock, and incorporated the whole family as a labor force. In utilizing this strategy, settlers were able to exchange goods and services locally and obtain commodities not produced on individual farms (PHMC 2005:12).

Although the PHMC is developing a Pennsylvania Agricultural Context, a context has not yet been developed for the region in which the current project area is located. However, it is closest to the North and West Branch Susquehanna Diversified Farming Region which emerged as a distinct farming region after 1830. Typical characteristics of this area include a diversified approach to farming that revolved primarily around the raising of swine and cultivation of corn (PHMC 2005:2-4). Prior to emerging as a distinct agricultural district, the building stock of the region was similar to that of most of the Commonwealth of Pennsylvania, consisting of small, one-story, one or two room log houses and log structures. Farms typically contained few outbuildings (PHMC 2005:19). By 1840, the building stock within the North and West Branch Susquehanna Diversified Farming Region typically consisted of the two-story, "four-over-four" house plan, and the banked Pennsylvania Barn (PHMC 2005:159-165).

The small isolated population of farmers living in the study area at this time farmed on a relatively small-scale. Their productions typically focused on subsistence based crops, but they were also engaged in producing goods for distant markets. Due to the distance from the established markets in the east, and the paucity of efficient transportation routes, frontier farmers in Pennsylvania typically relied on high-value, compact, and less perishable items

such as wheat, whisky, and salted pork. However, for local consumption farmers also typically grew corn, oats, hay, garden vegetables, and orchard products. Livestock was also important on the farm and cattle, hogs, and poultry were typically raised (PHMC 2005 E:15).

Lu Ann De Cunzo in her seminal work, *A Historical Archaeology of Delaware* established three agricultural ecosystems for rural nineteenth century agricultural communities in Delaware's New Castle and Kent Counties. These consisted of areas in which farmers focused on capitalized farms raising dairy and beef cows, areas where farmers focused on large farms producing wheat and dairy cows, and areas where farmers focused on diversified farms designed to provide for the farmers families first, with the subsequent surplus of wheat, butter, and livestock sent to market (De Cunzo 2004:126). While De Cunzo's work focused on the farming patterns of Delaware the latter farming ecosystem seems to mirror the farming strategies incorporated by farmers within the current study area. While this farming system worked well in the mid-nineteenth century, these farmers did not appear to have the same level of economic stability as farmers focused in more specialized (and less diverse) agricultural practices. By the early to mid-twentieth century, only one of the farmsteads subjected to Phase II investigations (Site 35LU286 – Site 10) was still a viable commercial farm. This farming operation was specialized and the landowners continued to add to their landholdings and make improvements to their farm over the years.

Shortly after the organization of Luzerne County, George Walker settled in the area that would eventually become Nescopeck Township. Walker, who arrived in 1786, cleared his land and began the construction of a gristmill. However, a flood destroyed the unfinished mill and the endeavor was abandoned. Settlement of the area would not be discouraged however, and in the same year Samuel Mifflin arrived at the location of present Nescopeck and opened a store to accommodate the pioneers who were pushing west into the study area. The store was of frame construction, and ran by William Baird, who also lived in the building. At the time it was the only store in Nescopeck Township. A short time after the establishment of the store, George Rough built a blacksmith shop, and a Mr. Steiner opened a ferry that connected Nescopeck with Berwick and Beach Haven to the east. These actions, along with the construction of a frame hotel by John Myers in 1807, and another by John Rothermel in 1815, were the catalyst for the development of Nescopeck. The celebrated American artist P. F. Rothermel, who established renown for painting scenes of battle from the American Civil War, was born in this hotel (Bradsby 1893:610-612).

As settlement in the area increased, it was recognized that a highway connecting the established trade centers of eastern Pennsylvania and the burgeoning region was needed. Evan Owen, a proprietor from Berwick, was living in Philadelphia promoting land sales to potential settlers and investors. At that time, the only route for goods into the area was overland from Philadelphia to Middletown, which was located on the banks of the Susquehanna, just south of present-day Harrisburg. At Middletown, the goods were loaded onto barges, which were then poled upriver to the Nescopeck and Berwick area. To ease the burden of this travel, and allow a more efficient influx of goods in and out of the area, Evan Owen, who was also a noted surveyor, was charged with the task of establishing a highway into the region. In 1790, Owen reported on the completion of the route that traversed from Nescopeck to Lehigh, which became known as the Lehigh-Nescopeck Highway (Barton 1976:75). This road established a link between the newly opened frontiers of Pennsylvania and the more established trade routes and trade centers of the Atlantic Seaboard. This route allowed the farmers in the study area to transport their goods more efficiently to market, and spurred further settlement in the area.

Salem Township was officially incorporated in 1790 (Pearce 1866:183). However, as previously mentioned, small scale Euroamerican settlement was present in the area since 1769, when Nathan Beach settled in the area of Beach Haven, and in 1780 when Sebastian Seybert moved into the area and began operating his mills and stores. In 1788, a 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 establishment of the gristmills in the study area was a testament to the growing number of farmers in the vicinity by that time. By 1796, settlement within Salem Township included 45 taxable inhabitants living in 44 houses, 28 horses, 19 oxen, and 77 cows (Pearce 1866:219-220).

Nescopeck Township was officially incorporated in 1792 (Pearce 1866:183). However, as mentioned previously, Euroamerican settlement had occurred on the banks of Nescopeck Creek as early as 1786. In 1796, Nescopeck Township included the present-day townships of Hollenback, Sugarloaf, Butler, Black Creek, and Hazel. That sizeable area contained 31 taxable residents, 36 horses, and 58 cows (Pearce 1866:210).

The decade between 1790 and 1800 witnessed a rapid increase in settlement in the study area, and the population of Luzerne County rose from 2,000 to almost 13,000. Some of this settlement was in the form of Connecticut Yankees returning to their previous landholdings, as well as others migrating into the area. In the early-nineteenth century, most of the settlement in Luzerne County was agrarian in nature. Joseph Walton, a blacksmith and farmer, settled in the area of Beach Haven in 1803, and operated his forge while also farming his land (Bradsby 1893:644). With the establishment of a blacksmith and grist and sawmills the settlers within the study area had local access to many of the necessities needed for the prosperity of the region.

The influx of farmers moving into the study area led to the formation of the Luzerne Agricultural Society in 1810. The object of the society was, "the improvement and advancement of agriculture, by introducing improved breeds of horses, cattle, sheep, swine, and the best grain, such as wheat, rye, corn &c., and the improvement of soil by lime and manure" (Pearce 1866:342). In 1828, the farmers of Luzerne County produced a surplus of 190,000 bushels of wheat, 100,000 bushels of corn, 1,000 barrels of pork, 500 barrels of whisky, among other valuable grain products. In all, the farmers in that year produced a surplus of agricultural products valued at \$600,000 (Pearce 1866:340).

As the agricultural development and settlement increased within the study area, the President, Managers, and Company of the Susquehanna and Tioga Turnpike Road was incorporated in 1807 to construct a turnpike from Berwick to the Tioga River at Elmira, New York. Construction of the road began in Berwick and proceeded north until it reached Elmira in 1825. However, even before the completion of the route, it was considered the first good wagon road in that part of the state. In 1816, a bridge was constructed by the Nescopeck Bridge Company that crossed the Susquehanna River and connected Nescopeck to Berwick (Bradsby 1893: 612). The construction of this bridge essentially connected the Susquehanna and Lehigh Turnpike, which had been surveyed by Evan Owen in 1790, to the Tioga and Susquehanna Turnpike. Shortly after the construction of the bridge, a stage coach stop was established at Berwick that ran to points north twice daily (Nescopeck Centennial Committee 1996: 34). Tolls were set up along the highway every four miles. These 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.

Around 1825, the large anthracite coal deposits that had been discovered in the Wyoming Valley began to be extracted. The presence of these deposits were known to the early settlers and the few blacksmiths in the county were recorded as using the coal in their forges, but the anthracite proved inefficient for domestic use as it was difficult to burn. However, on February 11, 1808, Judge Jesse Fell, a resident of the Wyoming Valley, released his invention of a simple iron grate that allowed sufficient air-flow to burn anthracite coal in a domestic setting. This invention spurred the promotion of anthracite coal for both industrial and domestic use.

While the extraction of the anthracite reserves in the Wyoming Valley to the northeast of the study area changed the agrarian nature of that region, the townships within the study area largely maintained their agricultural character. However, the growing anthracite industry in Luzerne County resulted in the construction of numerous transportation routes within the study area that connected the region to more established markets to the east and south. These transportation routes also benefited the farmers in the area as they provided an easier avenue for the import and export of goods.



Construction of the North Branch Canal began in Berwick in 1828, with Alexander Jameson driving the oxen and Nathan Beach handling the plow that was used for the initial excavation.

***Photograph 3-1. North Branch of the Pennsylvania Canal, Locks Located at Berwick, Unknown Date, Unknown Photographer.***

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. This 55-mile section of the canal contained nine locks, each of which was 17 feet wide and 90 feet long. 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. The canal originally featured a large aqueduct crossing Fishing Creek at Rupert (near Bloomsburg), a weigh-lock at Beach Haven, and a dam crossing the river at Nanticoke (Shank 1991:51).

The canal spurred a general economic boom by providing an efficient means of transporting goods in and out of the region. Beach Haven became a prominent focal point on the canal, as a weigh-lock and regular canal lock were located there and, in 1830, a boatyard was constructed to service boats in need of repair. A rope ferry operated by William Hicks connected Wapwallopen to the North Branch Canal near Beach Haven at this time. This ferry provided the mills and farmers of Wapwallopen access to the canal (Janosov 1991:84). Nescopeck also benefited from the canal and was noted for its rapid growth and business as many residents from Nescopeck became employed in the canal industry (Bradsby 1893:612).

In 1834, the canal was extended northeast another 17 miles through Wilkes-Barre to Pittston. This extension was originally known as the Wyoming Extension. In 1836, construction began on a further extension from Pittston to Athens, Pennsylvania and the New York state line. However, due to financial difficulties and the rugged terrain through which it passed, this section of the canal was not fully operable until 1856. The entire section of the North Branch Canal in Pennsylvania, from Northumberland to the New York state line, was 169 miles long and contained 43 locks that navigated an elevation change of 334 feet. In addition to the locks, 229 bridges were built to carry local traffic over the canal, 29 aqueducts were constructed, and five dams were constructed to allow slackwater in the river, as well as provide water to fill the canal sections. Eventually, the canal was connected to the Erie Canal by an 18 mile privately-built section in New York state (Shank 1991:51).

The cost of the canal and its branches, at completion, was \$1,598,379.34 (Columbia County Historical & Genealogical Society nd:2). However, being the main route in the area to both the Atlantic seaboard and the Great Lakes, the canal soon became lucrative, and was essential in transporting the agricultural commodities of the area, as well as the anthracite coal reserves of the Wyoming Valley.

#### ***Growth of Agriculture in Southwest Luzerne County (1840-1940)***

The access to the canal and the Susquehanna and Tioga Turnpike caused a growth in agriculture within the study area, as farmers were more easily and quickly able to transport their goods to distant markets. The 1850 United States Federal Census agricultural schedule reveals that farmers in Luzerne County were predominately engaged in the harvesting of corn, oats, potatoes, wheat, rye, and buckwheat. Luzerne County farmers produced 290,112 bushels of corn, 287,797 bushels of oats, 183,047 bushels of potatoes, 165,328 bushels of wheat, 125,604 bushels of rye, and 116,173 bushels of buckwheat in the 1849 harvest. Farmers in the county also produced 997 bushels of clover seed, 831 bushels of peas and beans, 292 bushels of flaxseed, 291 bushels of barley, 237 bushels of other grass seed, 4,748 pounds of flax, 1,000 pounds of tobacco, 114 pounds of hops, 10 pounds of silk cocoons, and two pounds of hemp (United States Federal Census 1850).

Farmers typically supplemented their grain crops by dairy farming, and milk cows were an important aspect on most farms. In 1850, farmers in Luzerne County owned a total of 7,902 milk cows. In the previous year, Luzerne County produced 558,168 pounds of butter and 91,613 pounds of cheese. The county also contained 18,496 sheep, 16,364 swine, 8,548 other cattle, 4,950 horses, 2,347 working oxen, and 16 asses and mules. In the year of 1849, \$139,236 worth of animals were slaughtered, and 49,372 pounds of wool were gathered. Farmers typically harvested hay to accommodate their livestock, and Luzerne County produced 31,601 tons in the 1849 harvest.

Bees also were kept, and in 1849, Luzerne County farmers produced 25,521 pounds of honey and beeswax. Farmers also engaged in the production of maple sugar and, in 1849, 19,758 pounds of maple sugar, and 143 gallons of molasses were produced. The harvesting of orchards resulted in \$8,335 worth of fruit, and produce from market gardens generated \$8,192. Home-made manufactures also found their way to the market, and in 1849, Luzerne County farmers created \$17,883 worth of home-made goods.

Agricultural pursuits not engaged by Luzerne County farmers in 1849 included the growing of rice, cotton, sweet potatoes, wine, and cane sugar. The raising of rice, cotton, and cane sugar were not suitable to the northern climate, and the fermenting of wine may have been a regional preference, perhaps superseded by the distilling of whisky, as seen in the high production of rye.



As part of the current project, Phase II archaeological investigations were conducted within the study area on property that historically had been four individual farms located north of Beach Haven in Salem Township. The archaeological investigations resulted in the identification of six sites: Site 36LU279, Site 36LU280, Site 36LU281, Site 36LU283, Site 36LU285, and Site 36LU286. Two of these historic farms contained two individual archaeological sites within their historical property boundaries. Thus, Sites 36LU279 and 36LU286 are located on what was historically a single farm, and Sites 36LU281 and 36LU283 are located on what was historically a single farm. These sites (Site 36LU279 and 36LU286 and Site 36LU281 and 36LU283) represent different occupation episodes on the same farm. In order to establish a sense of the farming practices occurring within the study area, United States Federal Census Agriculture Schedules were reviewed for the individual owners of the farms that contained these sites.

In 1850, Jeremiah Hess, an early settler of the region, owned the farm on which Sites 36LU279 and 36LU286 are located. The 1850 agricultural schedule reveals that Jeremiah Hess owned three horses, four milk cows, four other cattle, and 13 swine (Table 3-1). In 1849, the livestock on the farm provided \$75 worth of animals slaughtered, and 300 pounds of butter. The Hess farm's harvest of 1849 also produced 200 bushels of corn, 150 bushels of wheat, 100 bushels of oats, 100 bushels of potatoes, 40 bushels of rye, 20 bushels of buckwheat, two bushels of clover seed, and 12 tons of hay. Hess also kept bees on the farm, and 50 pounds of honey and beeswax were produced. The family also engaged in home-made manufactures, and \$13.00 worth of commodities was created in 1849.

Jeremiah Hess did not own asses and mules, working oxen, or sheep, and no wool was produced on the farm in 1850. In 1849, the farm did not produce cheese, and it appears that the milk cows present on the farm were utilized solely for the production of butter. Furthermore, the Hess farm did not cultivate orchards or market gardens, and tobacco, peas and beans, barley, hops, other grass seed, flax, flaxseed, and hemp were not harvested in 1849. The production of silk cocoons, maple sugar, and molasses was also absent from the 1849 harvest.

James Lockhart owned the farm on which Site 36LU280 is located in 1850. The United States agricultural schedule of that year reveals that James Lockhart owned two horses, four milk cows, one other cattle, and 25 swine (see Table 3-1). In 1849, the livestock on the farm provided \$48 worth of animals slaughtered, and 260 pounds of butter. Although James Lockhart did not own sheep, he produced 23 pounds of wool during the 1849 season, so it is likely that he owned sheep prior to the 1850 census. The Lockhart farm's harvest of 1849 produced 200 bushels of corn, 100 bushels of oats, 80 bushels of wheat, 60 bushels of rye, 60 bushels of potatoes, 36 bushels of buckwheat, and six tons of hay. Bees were also kept on the farm, and 15 pounds of honey and beeswax were produced. The family also engaged in home-manufactures, and produced \$20 worth of commodities.

In 1850, James Lockhart did not own asses and mules, working oxen, or sheep, and the farm did not produce cheese. Furthermore, the Lockhart farm did not cultivate orchards or market gardens, and tobacco, peas and beans, barley, hops, clover seed, other grass seed, flax, flaxseed, and hemp were also not harvested. The production of silk cocoons, maple sugar, and molasses was also absent on the farm.

In 1850, William Hicks owned the farm on which Sites 36LU281 and 36LU283 are located. The 1850 agricultural schedule reveals that William Hicks owned five horses, five milk cows, three other cattle, 15 sheep, and 20 swine (see Table 3-1). In 1849, the livestock on the farm provided \$109 worth of animals slaughtered, 300 pounds of butter, and 30 pounds of wool.

**Table 3-1. 1850 Agricultural Schedule Information**

Product/Livestock/Acreage	SITE / OWNER			
	Site 36LU279 and 36LU286 Jeremiah Hess	Site 36LU280 James Lockhart	Site 36LU281 and 36LU283 William Hicks	Luzerne County
Improved Land (acres)	60	50	120	134,580
Unimproved land (acres)	14	125	55	147,889
Cash Value of farm	\$3,000.00	\$3,000.00	\$5,200.00	\$6,100,255
Value of Farming Implements	\$250.00	\$300.00	\$150.00	\$236,103
Horses	3	2	5	4,950
Asses and Mules	0	0	0	16
Milch Cows	4	4	5	7,902
Working Oxen	0	0	0	2,347
Other Cattle	4	1	3	8,548
Sheep	0	0	15	18,496
Swine	13	25	20	16,364
Value of Livestock	\$394.00	\$330.00	\$514.00	\$654,805
Wheat (bushels)	150	80	150	165,328
Rye (bushels)	40	60	60	125,604
Indian Corn (bushels)	200	200	200	290,122
Oats (bushels)	100	100	200	287,797
Tobacco (lbs.)	0	0	0	1,000
Wool (lbs.)	0	23	30	49,372
Peas & Beans (bushels)	0	0	0	831
Irish Potatoes (bushels)	100	60	100	183,047
Barley (bushels)	0	0	0	291
Buckwheat (bushels)	20	36	40	116,173
Value of Orchard Products	\$0.00	\$0.00	\$0.00	\$8,335
Value of Produce of Market Gardens	\$0.00	\$0.00	\$0.00	\$8,192
Butter (lbs.)	300	260	300	558,168
Cheese (lbs.)	0	0	0	91,613
Hay (tons)	12	6	14	31,601
Clover Seed (bushels)	2	0	0	997
Other Grass Seed (bushels)	0	0	0	237
Hops (lbs.)	0	0	0	114
Flax (lbs.)	0	0	0	4,748
Hemp (lbs.)	0	0	0	2
Flaxseed (bushels)	0	0	0	292
Silk Cocoons	0	0	0	10
Maple Sugar (lbs.)	0	0	0	19,758
Molasses (gallons)	0	0	0	143
Beeswax and Honey (lbs.)	50	15	500	25,521
Value of Home-made Manufactures	\$13.00	\$20.00	\$15.00	\$17,883
Value of Animals slaughtered	\$75.00	\$84.00	\$109.00	\$139,236

The harvest of that year also produced 200 bushels of corn, 200 bushels of oats, 150 bushels of wheat, 100 bushels of potatoes, 60 bushels of rye, 40 bushels of buckwheat, and 14 tons of hay. Hicks also kept bees on the farm, and 500 pounds of honey and beeswax were produced. The family also engaged in home-manufactures, and \$15 worth of commodities was produced in 1849.

William Hicks did not own asses and mules, or working oxen. Furthermore, the Hicks farm did not produce cheese from its milk cows, nor did the family cultivate orchards or market gardens, and tobacco, peas and beans, barley, hops, clover seed, other grass seed, flax, flaxseed, and hemp were not harvested. The production of silk cocoons, maple sugar, and molasses was also absent on the farm.

In 1850, the owner of the farm on which Site 36LU285 is located is unknown. Therefore, the 1850 agricultural schedule information is not provided for that farm. The enumerations from the 1850 United States Federal Census agricultural schedule are provided below in Table 3-1. These records provide a glimpse into the general activities of the farmers within the study area. The farms on which Sites 36LU279 and 36LU286, 36LU280, and 36LU281 and 36LU283 are located, all contained horses, milk cows, other cattle, and swine. In 1849, all of the abovementioned farms used livestock for slaughter and butter production. It also appears that all of the farms kept bees, as honey and beeswax were produced on each farm in 1849. Wheat, rye, corn, oats, potatoes, buckwheat, and hay were also cultivated on each farm in the 1849 harvest, and appear to be the staple crops in the area at that time. Home-made manufactures were also produced on all of the subject farms.

None of the abovementioned farms contained asses and mules, or working oxen. A review of the Luzerne County totals revealed that these animals were comparatively low in Luzerne County in 1850. While all of the abovementioned farms contained milk cows, none produced cheese, even though Luzerne County produced 91,613 pounds in 1849. This suggests that farmers in the project area focused predominately on the production of butter from their milk cows. Crops that were not grown on any of the abovementioned farms, but grown in Luzerne County, include tobacco, peas and beans, barley, hops, other grass seed, flax, flaxseed, and hemp. These products also appear to be secondary crops in Luzerne County, as the harvests were comparatively low. While none of the abovementioned farms cultivated orchards or market gardens, \$8,335 from orchards and \$8,192 from market gardens were generated respectively from such enterprise in Luzerne County. Finally, none of the abovementioned farms produced silk cocoons, molasses, or maple sugar. While the gathering of silk cocoons was a rare endeavor in Luzerne County in 1849, only 10 pounds were recorded harvested, the production of maple sugar, 19,758 pounds, and molasses, 143 gallons, may have been popular on some farms.

Although there were 18,496 sheep in Luzerne County in 1850, out of the above-reviewed farms, only William Hicks's farm raised sheep, and this farm produced 30 pounds of wool in 1849. Also of note is that Jeremiah Hess's farm was the only farm reviewed that produced clover seed, and his farm produced two bushels out of the 237 bushels harvested in Luzerne County in 1849.

The 1850 agricultural schedule shows that the farmers in the study area still practiced a diverse strategy of agricultural production. The output from the farms appears to contain both subsistence commodities as well as produce destined for distant markets. In 1850, the 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.

However, the prominence of the canal as a means of transportation was short-lived, for 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. This event was one of many that ushered in the era of the railroad, which would eventually make the canals obsolete. As the Lehigh and Susquehanna Railroad created a more efficient and faster means of transporting coal, the need for more rail lines connecting the anthracite fields to other markets was realized. Eventually, the transportation of coal out of the Wyoming Valley became dominated by the rail lines.

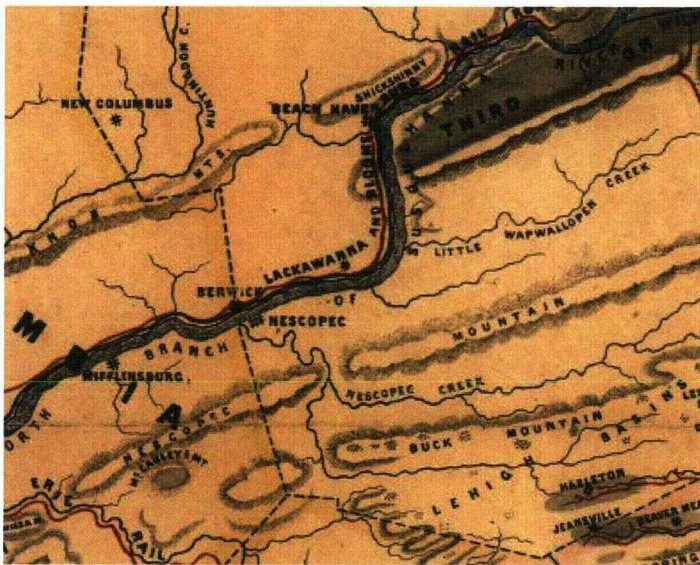
In 1852, the Lackawanna and Bloomsburg Railroad was incorporated, and by 1856 it was in operation. Eventually, an 80-mile long stretch of track connected Scranton to Northumberland and became the first line in this portion of the Susquehanna valley. Construction of the line



began in 1854 and, by 1858, had reached Berwick. When the line reached Bloomsburg in the same year it gained the distinction of the first railroad to reach that city. Within the study area, the railroad runs along the west bank of the Susquehanna River, adjacent to the North Branch of the Pennsylvania Canal. This railroad had a station stop in both Berwick and Beach Haven, and accommodated the residents and farmers within the study area.

By 1858, the North Branch Canal was sold to the Sunbury and Erie Railroad Company. They operated a 65-mile-long section of the canal from Northumberland to Wilkes-Barre. In 1869, it was sold to the Pennsylvania Canal Company, who operated it until its closure in 1901.

A powder mill was constructed by William Silvers on lower Wapwallopen Creek, to the east of the village of Wapwallopen, in 1856. This mill produced black powder that was used for blasting in the anthracite mines to the north. Shortly after opening his mill, Silvers sold a share in the interest to G. P. Parrish of Wilkes-Barre. The Parrish, Silver & Company powder works operated from the banks of Wapwallopen Creek from 1856 to 1859. Financial setbacks, resulting from a flood and explosion at the works, forced the Parrish, Silver & Company into bankruptcy, and the DuPont Company purchased the mill in 1859.



Division, Washington D.C., 1856.

The DuPont Company, originally based near Wilmington, Delaware, had grown into one of the largest powder manufacturers in the country. Realizing the need to locate closer to the anthracite market they purchased the mill in Wapwallopen, which became the first DuPont operation outside of Delaware (Janosov 1991:84).

**Figure 3-1. Lackawanna and Bloomsburg Railroad and North Branch Canal, From, "Map of the Canal and Railroads for Transporting Anthracite Coal from the Several Coal Fields to the City of New York," Library of Congress, Geography and Map**

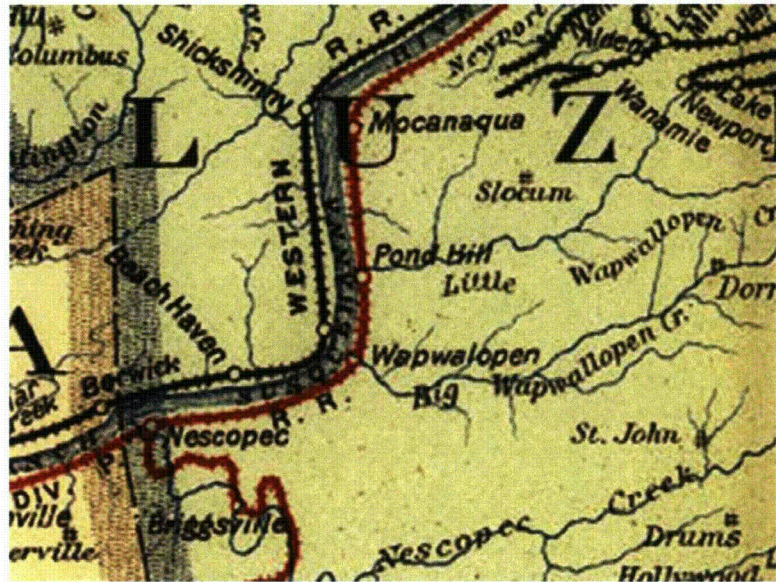
While the railroads became the preferred means of transportation for coal, agricultural products, and other supplies, the North Branch of the Pennsylvania Canal continued to be used in a limited capacity. Furthermore, the canal was the preferred choice for transporting the blasting powder manufactured at the DuPont powder works. The water-based travel provided a safer environment than the railroad for the volatile and dangerous powder (Janosov 1991:85).

The Pennsylvania Railroad was initially chartered on April 13, 1846, with the express purpose of connecting Philadelphia with Pittsburgh, generating a direct link with Philadelphia and the Ohio River traffic in what was then the new west. The line extending to Pittsburgh was completed in 1852. However, the burgeoning industry in the nation in the mid-nineteenth century encouraged speculators of the railroad to expand their interests in lines, and numerous smaller local lines were purchased, as new branches were constructed.



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 the study area, also known as the North and West Branch Railroad, operated between Catawissa and the rich anthracite region of Wilkes-Barre.

**Figure 3-2. Map showing Rail Lines and Stops in Beach Haven, Nescopeck, and Wapwallopen, from "Rail Road Map of Pennsylvania," Library of Congress, Geography and Map Division, Washington D.C., 1895**



This line travelled along the east bank of the North Branch of the Susquehanna River, and a station stop was located at Nescopeck and the village of Wapwallopen. Shortly after the completion of the line a repair shed was constructed in Nescopeck to service the rail cars (Nescopeck Centennial Committee 1996:37). This railroad connected earlier constructed lines to the south and essentially established a link between Sunbury and Wilkes-Barre.

The speed at which agricultural products could be delivered to distant markets via the railroad increased the amount and types of products that could be viably shipped. The 1870 agriculture schedule reveals that farmers in Luzerne County continued to cultivate the prominent crops of corn, oats, potatoes, wheat, rye, and buckwheat. While the increase in agricultural production in Luzerne County is due in part to the increased population, the general trends in preferred crops and increases on the individual farms are observable. The potato harvest increased significantly from 183,047 bushels in 1849 to 573,322 bushels in 1869. The production of oats also nearly doubled from 287,797 to 475,988 bushels. Corn and buckwheat production rose slightly, from 290,122 to 368,537 bushels of corn, and from 116,173 to 197,160 bushels of buckwheat. The production of wheat and rye experienced a decrease in production between the 1849 and 1869 harvests, with wheat dropping from 165,328 to 104,157 bushels, and rye dropping from 125,604 to 115,339 bushels.

However, dairy farming continued to be prominent on farms, and the number of milk cows owned in 1870 increased from 7,902 in 1850 to 12,306. Subsequently, the production of butter doubled between the two decades, from 558,168 pounds in 1849 to 1,068,585 pounds in 1869. Of note is that as farmers in Luzerne County focused more on the production of butter, the production of cheese decreased by more than half, from 91,613 to 40,306 pounds.

Between the two decades, there was a decrease in sheep, swine, other cattle, and working oxen in Luzerne County. With the decrease in sheep, the production of wool also decreased, from 49,372 to 38,555 pounds. However, the ownership of asses, mules, and horses increased slightly in the county between the two decades. This may be a reflection of the increase of animal drawn agricultural implements. The production of honey and beeswax also increased slightly between the 1850 and 1870 agricultural schedules. The 1870 schedule

enumerated the production of honey and beeswax separately, revealing that 30,030 pounds of honey and 1,455 pounds of beeswax were produced in 1869.

There was a decrease in the harvests of clover seed, peas and beans, maple sugar, flax, and flaxseed. The most significant decreases were in the production of flaxseed, which fell from 292 bushels in 1849 to only 8 bushels in 1869. The cultivation of flax decreased from 4,748 pounds to 400 pounds. The production of maple sugar decreased from 19,758 to 6,268 pounds. While the production was limited in 1849, the growing of tobacco and hemp was not undertaken in Luzerne County during the year of 1869, nor was the harvesting of silk cocoons. The absence of these products in Luzerne County at that time was most likely due to the advent of the railroads that allowed those products to be readily purchased from distant markets.

Just as recorded in the 1850 agricultural schedule, rice, cotton, and sweet potatoes were not harvested in the 1869 harvest in Luzerne County. The production of wine was not recorded in the 1870 agricultural schedule. However, Sorghum sugar and cane molasses productions were enumerated, and Luzerne County did not produce these commodities.

In 1870, John Hess, the son of Jeremiah Hess, owned the farm in Salem Township where Sites 36LU279 and 36LU2860 are located. The 1870 agricultural schedule reveals that John Hess owned four horses, seven milk cows, four sheep, and seven swine (Table 3-2). In 1869, the livestock on the farm provided \$222 worth of animals slaughtered, 400 pounds of butter, and 200 pounds of wool. The harvest of 1869 also produced 300 bushels of oats, 250 bushels of corn, 185 bushels of wheat, 100 bushels of potatoes, 75 bushels of rye, and 20 tons of hay. An orchard on the farm provided \$10 worth of products, and bees were also kept and 50 pounds of honey were produced. The bees were not used for the production of beeswax.

The John Hess farm did not contain asses and mules, working oxen, or other cattle in 1870. Even though John Hess owned seven milk cows, no cheese was produced on the farm. Furthermore, the Hess farm did not cultivate a market garden, and peas and beans, sweet potatoes, barley, hops, buckwheat, clover seed, other grass seed, flax, and flaxseed were not harvested. Maple sugar, molasses, and home-made manufactures were also not produced on the farm in 1869.

In 1870, James Lockhart still owned the farm in Salem Township where Site 36LU280 is located. The 1870 agricultural schedule revealed that he owned three horses, eight milk cows, two other cattle, and four swine (see Table 3-2). In 1869, the livestock on the farm provided \$286 worth of animals slaughtered, and 700 pounds of butter. The harvest of 1869 also produced 200 bushels of corn, 157 bushels of potatoes, 150 bushels of wheat, 80 bushels of oats, and 18 tons of hay. An orchard on the farm produced \$30 worth of product.

James Lockhart's farm did not have asses and mules, working oxen, or sheep, and no wool was produced on the farm. Like the other farms under review, James Lockhart's farm did not produce cheese, and it appears that the milk cows present on the farm were used solely for the production of butter. Furthermore, the Lockhart farm did not cultivate a market garden, and rye, peas and beans, sweet potatoes, barley, hops, buckwheat, clover seed, other grass seed, flax, and flaxseed were not harvested in 1869. Maple sugar, molasses, honey and beeswax, and home-made manufactures were also not produced on the farm in 1869.

William Hicks also still owned the farm in Salem Township where Sites 36LU281 and 36LU283 are located (see Table 3-2). The 1870 agricultural schedule revealed that William Hicks owned four horses, one milk cow, one other cattle, and seven swine. In 1869, the



livestock on the farm provided \$60 worth of slaughtered animals, and 600 pounds of butter. The harvest of 1869 also produced 150 bushels of corn, 150 bushels of oats, 150 bushels of potatoes, 100 bushels of wheat, 50 bushels of rye, 50 bushels of buckwheat, and 12 tons of hay. An orchard on the farm produced \$10.00 worth of products.

**Table 3-2. 1870 Agricultural Schedule Information**

Product/Livestock/Acreage	SITE / OWNER				
	Site 36LU279 and 36LU286 John Hess	Site 36LU280 James Lockhart	Site 36LU281 and 36LU283 William Hicks	Site 36LU285 Henry Thomas	Luzerne County
Improved Land (acres)	100	65	60	70	194,115
Unimproved Land (acres)	40	45	40	25	174,381
Cash Value of Farm	\$6,000.00	\$1,000.00	\$10,000.00	\$3,000.00	\$21,565,724
Value of Farming Implements	\$279.00	\$115.00	\$280.00	\$140.00	\$610,880
Wages Paid for Labor and Board	\$400.00	\$1,511.00	\$210.00	\$26.00	\$423,181
Horses	4	3	4	4	7,431
Asses and Mules	0	0	0	0	264
Milch Cows	7	8	1	3	12,306
Working Oxen	0	0	0	0	1,014
Other Cattle	0	2	1	1	8,196
Sheep	4	0	0	21	12,051
Swine	7	4	7	7	10,430
Value of Livestock	\$787.00	\$951.00	\$720.00	\$817.00	\$2,056,063
Wheat (bushels)	185	150	100	80	104,157
Rye (bushels)	75	0	50	42	115,339
Indian Corn (bushels)	250	200	150	300	368,537
Oats (bushels)	300	80	150	0	475,988
Wool (lbs.)	200	0	0	37	38,555
Peas & Beans (bushels)	0	0	0	0	528
Irish Potatoes (bushels)	100	157	150	100	573,322
Sweet Potatoes (bushels)	0	0	0	0	12
Barley (bushels)	0	0	0	0	625
Buckwheat (bushels)	0	0	50	30	197,160
Value of Orchard Products	\$10.00	\$30.00	\$10.00	\$5.00	\$78,263
Wine (gallons)	0	0	0	0	324
Value of Produce of Market Gardens	\$0.00	\$0.00	\$0.00	\$0.00	\$68,851
Butter (lbs.)	400	700	600	210	1,068,585
Cheese (lbs.)	0	0	0	0	40,306
Hay (tons)	20	18	12	8	58,145
Clover Seed (bushels)	0	0	0	0	612
Other Grass Seed (bushels)	0	0	0	0	394
Hops (lbs.)	0	0	0	0	2,204
Flax (lbs.)	0	0	0	0	400
Flaxseed (bushels)	0	0	0	0	8
Maple Sugar (lbs.)	0	0	0	0	6,268
Sorghum Molasses (gallons)	0	0	0	0	122
Maple Molasses (gallons)	0	0	0	0	784
Beeswax (lbs.)	0	0	0	0	1,455
Honey	50	0	0	0	\$30,030
Value of Home-made Manufactures	\$0.00	\$0.00	\$0.00	\$0.00	\$18,583
Value of Animals slaughtered	\$222.00	\$286.00	\$60.00	\$139.00	\$410,612
Estimated Value of Farm Production	\$1,608.00	\$1,277.00	\$171.00	\$676.00	\$3,224,040

In 1870, William Hicks did not own asses and mules, working oxen, or sheep, and no wool or cheese was produced on the farm in 1869. Furthermore, Hicks's farm did not cultivate a market garden, and peas and beans, sweet potatoes, barley, hops, clover seed, other grass

seed, flax, and flaxseed were not harvested. The production of wine, maple sugar, molasses, honey and beeswax, and home-made manufactures was also absent on the farm in 1869.

Henry Thomas owned the farm in Salem Township where Site 36LU285 is located in 1870. The agricultural schedule for that year reveals that Henry Thomas owned four horses, three milk cows, one other cattle, 21 sheep, and seven swine (see Table 3-2). In 1869, the livestock on the farm provided \$139 worth of animals slaughtered, 210 pounds of butter, and 37 pounds of wool. The harvest of 1869 also produced 80 bushels of wheat, 42 bushels of rye, 300 bushels of corn, 100 bushels of potatoes, 30 bushels of buckwheat, eight tons of hay, and \$5.00 worth of orchard products.

Henry Thomas did not own asses and mules, or working oxen, and cheese was not produced on the farm in 1869. Furthermore, the Thomas farm did not cultivate a market garden, and wine, maple sugar, molasses, honey and beeswax, and home-made manufactures were not produced on the farm in 1869.

Between the 1849 and 1869 harvest, all of the abovementioned farms recorded in the 1850 Agricultural Schedule began cultivating orchards. This trend is mirrored in the Luzerne County records, as the value of orchard products increased from \$8,335 in 1849 to \$78,263 in 1869. All of the abovementioned farms also continued to raise horses, milk cows, and swine, and they all slaughtered animals and continued to produce butter from their milk cows.

Henry Thomas's farm, where Site 36LU285 is located, appears to be typical of the area, as it also practiced a diverse farming strategy. The Luzerne County staples of wheat, corn, potatoes, and rye were cultivated, and Henry Thomas also cultivated buckwheat although two of the farms did not continue this practice. Like the other farms subject to this study, Henry Thomas's farm also raised milk cows for the production of butter, and swine, and he also raised other cattle, and numerous sheep.

All of the reviewed farms cultivated wheat, corn, potatoes, and tended orchards. While all the reviewed farms harvested rye and buckwheat in 1849, in 1869 only William Hicks and Henry Thomas cultivated those crops. Also in 1849 all of the reviewed farms kept bees, however, in 1869 only John Hess's farm kept bees, which produced 50 pounds of honey. John Hess and Thomas Henry were the only reviewed farmers that raised sheep.

Although produced in Luzerne County, none of the farms where the above-mentioned sites are located was engaged in the production of peas and beans, sweet potatoes, barley, wine, market gardens, cheese, clover seed, other grass seed, hops, flax, flaxseed, maple sugar, sorghum molasses, maple molasses, or beeswax. While some farms in Luzerne County kept asses and mules, and working oxen, none of the farms where the abovementioned sites are located did. Products that were not produced in Luzerne County in 1870 included cotton, rice, tobacco, hemp, silk cocoons, sorghum sugar, and cane molasses.

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% 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. In 1882, the DuPont powder works contracted with the Pennsylvania Railroad to haul its powder in specialized cars to the



mines in the north, and abandoned its use of the canal. With the decline in the use of the North Branch Canal, the prosperity of Beach Haven also declined. However, the area remained a viable agricultural region, and the townships within the study area continued to maintain their agricultural character. However, a review of the 1880 United States Federal Census revealed that most agricultural production in Luzerne County had slightly declined from the previous decade.

The farmers of Luzerne County continued to rely on corn, oats, potatoes, wheat, rye, and buckwheat crops in 1880. However, the only crops that witnessed an increase in production were corn and rye, and these were only slight increases. Bushels of corn rose from 368,537 in 1869 to 478,648 in 1879, and the rye harvest rose slightly from 115,339 bushels in 1869 to 118,219 bushels in 1879. The other traditionally predominate crops, including oats, potatoes, wheat, and buckwheat slightly decreased in production between the 1869 and 1879 harvest. The cultivation of orchard products generated \$76,724 in 1879, down from \$78,263 in 1869.

Dairy production was also down from the previous decade and, in 1880, Luzerne County farmers owned 8,364 milk cows, as compared to 12,306 in 1870. In turn, the production of butter decreased from 1,068,585 pounds to 746,261, and cheese production decreased from 40,306 pounds to only 766 pounds. The number of sheep, other cattle, asses and mules, working oxen, and horses also decreased. However, the numbers of swine in Luzerne County increased, as did the production of honey and beeswax. The 1880 agricultural schedule was the first census that recorded poultry on farms, and indicated 346,070 dozens of eggs were collected from 80,163 barnyard poultry and 9,948 other poultry. The values of home-made manufactures and slaughtered animals were not enumerated in the 1880 agriculture schedule.

The production of flaxseed, flax, barley, clover grass, maple sugar, sorghum molasses, and maple molasses also decreased. However, 35,736 pounds of tobacco were harvested in 1879, when none was harvested in 1869. Clover seed, and peas and bean harvests also witnessed a slight increase. The only crop that was not harvested in Luzerne County in 1879 that was harvested in 1869 was hops. Cotton, rice, cane sugar, silk cocoons, sweet potatoes, and hemp continued not to be cultivated in 1879. Unlike the previous Federal Agricultural Schedules, the value of slaughtered animals and home-made manufactures was not enumerated.

In 1880, John Hess still owned the farm in Salem Township where Sites 36LU279 and 36LU286 are located. The 1880 agricultural schedule revealed that John Hess owned four horses, seven milk cows, six swine, and 40 barnyard poultry in 1880 (see Tabel 3-3). In 1879, the milk cows on the farm produced 500 pounds of butter, and poultry provided 250 dozen eggs. The harvest of 1879 produced 500 bushels of corn, 200 bushels of wheat, 200 bushels of oats, 200 bushels of potatoes, 20 bushels of rye, and 15 tons of hay. An orchard on the farm produced 30 bushels of apples and generated \$6.00 worth of products.

John Hess did not own asses and mules, working oxen, other cattle, or sheep, and no wool was produced on the farm in 1880. Just as in the previous decades, the farm did not produce cheese. Furthermore, the Hess farm did not cultivate a market garden, and tobacco, peas and beans, sweet potatoes, barley, buckwheat, clover seed, clover grass, flax, and flaxseed were not harvested in 1879. The production of wine, maple sugar, molasses, and honey and beeswax was also absent on the farm.

In 1880, Charles Lockhart, the son of James Lockhart, owned the farm in Salem Township where Site 36LU280 is located. The 1880 agricultural schedule revealed that Charles Lockhart owned three horses, eight milk cows, three other cattle, seven swine, 50 barnyard

poultry, and five other poultry (Table 3-3). In 1879, the milk cows on the farm produced 800 pounds of butter, and the poultry provided 300 dozen eggs. The harvest of 1879 produced 300 bushels of corn, 245 bushels of wheat, 160 bushels of potatoes, 90 bushels of oats, and 14 tons of hay. An orchard on the farm produced 50 bushels of apples and generated \$10.00 worth of products.

**Table 3-3. 1880 Agricultural Schedule Information**

Product/Livestock/Acreage	SITE / OWNER			
	Site 36LU279 and 36LU286 John Hess	Site 36LU280 Charles Lockhart	Site 36LU285 Thomas Henry	Luzerne County
Improved Land (acres)	100	60	60	153,858
Unimproved land (acres)	40	30	12	136,502
Cash Value of farm	\$6,000.00	\$5,000.00	\$4,000.00	\$12,695,779
Value of Farming Implements	\$200.00	\$150.00	\$150.00	\$412,578
Wages Paid for Labor and Board	\$125.00	\$60.00	\$0.00	Not listed
Horses	4	3	3	5,866
Asses and Mules	0	0	0	228
Milch Cows	7	8	4	8,364
Working Oxen	0	0	0	358
Other Cattle	0	3	4	7,167
Sheep	0	0	19	5,085
Swine	6	7	11	13,672
Value of Livestock	\$300.00	\$770.00	\$425.00	\$875,882
Poultry (Barnyard/Other)	40/0	50/5	60/3	80,163/9,948
Eggs Produced (dozens)	250	300	300	346,070
Wheat (bushels)	200	245	96	85,112
Rye (bushels)	20	0	51	118,219
Indian Corn (bushels)	500	300	450	478,648
Oats (bushels)	200	90	116	295,574
Tobacco (lbs.)	0	0	0	35,736
Wool (lbs.)	0	0	70	22,225
Peas & Beans (bushels)	0	0	0	638
Irish Potatoes (bushels)	200	160	100	483,413
Sweet Potatoes (bushels)	0	0	0	219
Barley (bushels)	0	0	0	190
Buckwheat (bushels)	0	0	37	162,257
Apple Bearing Trees/Bushels	100/30	60/50	60/60	n/a
Value of Orchard Products	\$6.00	\$10.00	\$15.00	\$76,724
Wine (gallons)	0	0	0	n/a
Value of Produce of Market Gardens	\$0.00	\$0.00	\$0.00	\$54,168
Butter (lbs.)	500	800	400	746,261
Cheese (lbs.)	0	0	0	766
Hay (tons)	15	14	8	29,321
Clover Seed (bushels)	0	0	0	763
Clover Grass (bushels)	0	0	0	321
Flax (lbs.)	0	0	0	177
Flaxseed (bushels)	0	0	0	1
Maple Sugar (lbs.)	0	0	0	2,785
Maple Molasses (lbs.)	0	0	0	214
Sorghum Molasses (gallons)	0	0	0	15
Honey (lbs.)	0	0	100	36,898
Beeswax (lbs.)	0	0	0	1,800
Estimated Value of Farm Production	\$1,000.00	\$900.00	\$750.00	\$1,528,178

Charles Lockhart did not own asses and mules, working oxen, or sheep, and no wool or cheese was produced on the farm in 1879. Furthermore, the Lockhart farm did not cultivate a market garden, and rye, tobacco, peas and beans, sweet potatoes, barley, buckwheat, clover seed, clover grass, flax, and flaxseed were not harvested. The production of wine, maple sugar, molasses, and honey and beeswax was also absent on the farm.

The farm in Salem Township that was owned by William Hicks in 1870, where Sites 36LU281 and 36LU283 are located, was not entered into the 1880 agricultural schedule. According to historical documents, William Hicks died sometime around 1880, as his farm was sold through an administrator a year later. William Hicks' son, Thomas Hicks, was entered into the Salem Township agricultural schedule as working a farm that he rented for a share of the products. The acreage that Thomas Hicks farmed does not match the acreage his father owned, and it is assumed that the farm was either not being used extensively, or it was rented to other tenants. Regardless, no documentary evidence was recovered concerning the farming activities, if any, conducted on the property in 1880.

Henry Thomas still owned the farm where Site 36LU285 is located in 1880. The agricultural schedule of that year revealed that he owned three horses, four milk cows, four other cattle, 19 sheep, 11 swine, 60 barnyard poultry, and three other poultry (see Table 3-3). In 1879, the livestock on the farm produced 400 pounds of butter, 70 pounds of wool, and 300 dozen eggs. The harvest of 1879 produced 96 bushels of wheat, 51 bushels of rye, 450 bushels of corn, 116 bushels of oats, 100 bushels of potatoes, and 37 bushels of buckwheat. An orchard on the farm produced 60 bushels of apples and generated \$15.00 worth of products.

All of the farms under review continued to cultivate the areas staples of wheat, corn, oats, potatoes, and hay in the 1879 harvest (see Table 3-3). In 1880, all of the farms under review raised horses, milk cows, swine, and poultry, and all the farms produced butter from their milk cows, and eggs from their poultry. Only Henry Thomas's farm, where Site 36LU285 is located, raised sheep and produced wool. Orchards continued to be cultivated and, in 1880, all of the farms contained apple orchards.

None of the farms under review was engaged in the cultivation of tobacco, peas and beans, sweet potatoes, barley, buckwheat, wine, market gardens, cheese, clover seed, clover grass, flax, flaxseed, maple sugar, maple molasses, sorghum molasses, honey, or beeswax (see Table 3-3). Only Charles Lockhart and Henry Thomas owned other cattle in 1880, and only John Hess and Henry Thomas cultivated rye. Products that were not produced at all in Luzerne County in 1880 included cotton, rice, hops, and cane sugar.

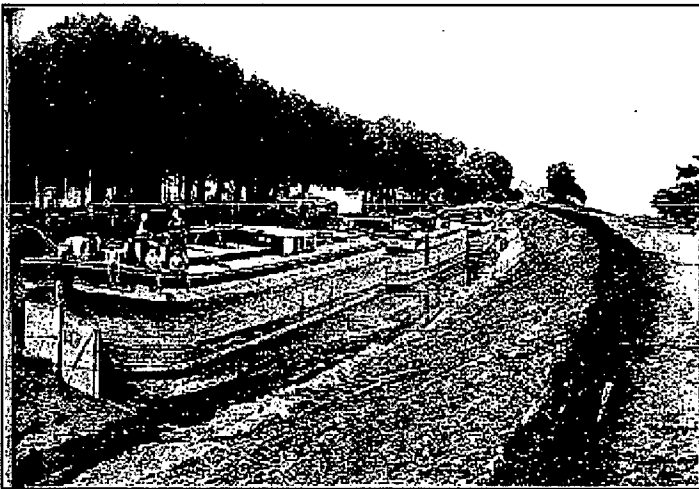
As recorded in the agricultural schedule of the 1850, 1870, and 1880 Federal Census, Luzerne County witnessed a steady increase in the production of corn, sweet potatoes, and honey and beeswax. The increase in the production of corn was the most significant, with 290,122 bushels produced in the 1849 harvest and 478,648 bushels produced in the 1879 harvest. While sweet potatoes were grown in steadily increasing numbers, the yield was never very large, with none grown in the 1849 harvest, 12 bushels in the 1869 harvest, and 219 bushels in the 1879 harvest. Apiarian pursuits also steadily increased in Luzerne County, with 25,521 pounds of honey and beeswax produced in 1849, to 38,698 pounds produced in 1879. However, none of the farms under review produced honey or beeswax in 1879.

The number of working oxen, other cattle, and sheep in Luzerne County steadily decreased between the 1850, 1870, and 1880 agricultural schedule. Working oxen in Luzerne County fell from 2,347 in 1850 to 358 by 1880, other cattle fell from 8,548 to 7,167, and sheep decreased from 18,496 to 5,085. Subsequently, the production of wool in Luzerne County

dropped from 49,372 pounds in 1849 to 22,225 pounds in 1879. However, Henry Thomas's farm, where Site 36LU285 is located, continued to raise sheep and produce wool. While butter production saw a sharp increase in production between the 1850 and 1870 agricultural schedules, in 1880 it decreased, with 1,068,585 pounds produced in 1869, and only 746,261 pounds produced in 1879. However, the production of butter continued to increase through the years on the farms subject to this study. While none of the farms subject to this study ever produced cheese, the amount of cheese produced in Luzerne County decreased from 91,613 pounds in 1849 to only 766 pounds in 1879.

The cultivation of wheat, flax, flaxseed, and maple sugar in Luzerne County also decreased between the 1850, 1870, and 1880 agricultural schedule. Wheat dropped from 165,328 bushels in the 1849 harvest to 85,112 bushels in the 1879 harvest, flax decreased from 4,748 pounds to 177 pounds, and flaxseed decreased from 292 bushels to only one bushel. The production of maple sugar also dropped from 19,758 pounds in 1849 to 214 pounds in 1879. Orchard production peaked in 1870, and while apple orchards were still present on the farms under review, excluding Henry Thomas's farm, where Site 36LU285 is located, the value of their products had declined.

The overall decline in agricultural production in Luzerne County was most likely due to the growing anthracite industry in the region at that time. In the late 1800s, many Luzerne County residents became employed in the coal mines, as well as in other burgeoning industry related jobs. However, the farms within the study area were shaped by the population growth prompted by the nearby industrial regions. While the farms continued to practice a diversified



mix of production, farmer's goods became oriented to these local markets (PHMC 2005 E:152). The transportation routes established earlier continued to be used by the farmers within the study area.

**Photograph 3-2. North Branch of the Pennsylvania Canal, showing Canal Boats in Dry Canal Prism, Circa 1900, Beach Haven.**

From, "The Amazing Pennsylvania Canals"  
William H. Shank, 1991.

The economic development and population within the study area continued to grow. By 1892, the village of Nescopeck had a population of 650 people, two hotels, a grist mill, three general stores, two drug stores, one furniture store, one grocery store, one hardware store, one meat market, a blacksmith, a carpenter, a railroad round house and machine shop that employed 60 people, and some small trading stores (Bradsby 1893:612). At the same time across the river, 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). In 1899, the Du Pont powder mills hydraulic presses, located in Wapwallopen, produced 1,000 kegs of black powder a day that was used for blasting in the mines to the north (Bump 1899:103). However, an explosion at the Du Pont powder works in 1911 destroyed part of the mill, and the works were never rebuilt (Wapwallopen Historical Society 1964:17).



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 resulted in the Lattimer Massacre in September of 1897, in which a Sheriff posse opened fire on miners killing 16 and wounding 38. In 1902, the "Great Strike" occurred in which 140,000 United Mine Workers went on strike. The confrontation lasted nine months, and was only settled with President Theodore Roosevelt's assistance. After the settlement of the "Great Strike" the production of anthracite coal increased dramatically and peak employment in the area's coal fields was reached in 1914, when 181,000 people were employed in northeastern Pennsylvania's anthracite mines. 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, however, production rapidly declined as advances in oil, natural gas, and electricity encouraged consumers to switch to other fuels (Luzerne County 2006).

#### Modern Period (1940-Present)

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 demand from the war the use and mining of anthracite coal sharply declined again. Further diminishing the output of anthracite coal in Luzerne County was the Knox Mine Disaster, which occurred near the small town of Port Griffith, between Scranton and Wilkes-Barre. On January 22, 1959, the Knox Coal Company's mines under the Susquehanna River collapsed, sending 2.7 million gallons of water per minute into the underground mine system. A total of 10.37 billion gallons of water flooded the mines, and within months two of the area's largest mine companies announced the ceasing of their anthracite operations in the region. This tragedy essentially ended the underground anthracite mining in the area, and it is estimated that the disaster cost the county 7,500 jobs (Luzerne County 2006).

Another disaster struck Luzerne County in 1972, in the form of the Hurricane Agnes flood. Agnes was the first named tropical storm/hurricane of the season, and came ashore as a mild hurricane on June 23, 1972. The storm settled over Pennsylvania and New York, and 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). PPL also manages the Susquehanna Riverlands within the current study area. The Susquehanna Riverlands consists of a public recreation area and encompasses portions of the North Branch of the Pennsylvania Canal, along with a wetlands nature area, a 30-acre lake, parks, and trails.

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## Chapter 4. Background Research and Archaeological Potential

This chapter summarizes the results of background research and initial assessment of the project's archaeological potential as presented in GAI's previous Phase Ia reports (GAI 2007, Munford and Tuk 2008) and Phase Ib management summaries (Munford et al. 2008, Munford 2008).

### Background Research Summary

GAI conducted background research for the BBNPP project as part of the 2008 Phase Ia cultural resources investigation; this research included review of preliminary background research performed in association with the 2007 Phase Ia study of the West and Southeast Alternatives. Detailed results of background research have been provided in GAI's Phase Ia Technical Report (Munford and Tuk 2008) which has been reviewed by PHMC-BHP (letter dated June 5, 2008) (see Appendix A).

Background research was performed to identify previously recorded cultural resources in the project vicinity in order to 1) assess the project area's potential for unrecorded archaeological resources and 2) provide a context for evaluating resources identified within the project APE. Background research included a review of Pennsylvania Archaeological Site Survey (PASS) files, Pennsylvania Historic Resource Survey (PHRS) Forms, National Register files, and pertinent cultural resource studies on file at the PHMC-BHP in Harrisburg. In addition, GAI examined cultural resource files available through the PHMC-BHP's on-line Cultural Resources Geographic Information System (CRGIS) and cultural resource reports provided by UniStar. A review of historic maps and historic aerial photographs of the project vicinity was also conducted. [Site-specific background research, performed as part of subsequent Phase II investigations, is presented in individual Phase II site chapters (Chapters 10, 11, 12, 14, 16, and 17).]

The project Area of Potential Effect (APE) for the background research effort encompassed the footprints of proposed project localities west of the North Branch Susquehanna River, including the West Alternative, Area 6, Area 7, Area 8, and the Confers Lane Parcel. GAI collected data on previously-recorded archaeological sites and National Register properties identified within a 1.0-mile (1.6-kilometer) radius of this project APE and on historic/architectural resources recorded within approximately 0.5 miles (0.8 kilometers) of the project APE.

GAI's background research identified 24 previously-recorded archaeological sites and five previously-recorded architectural resources within the project vicinity (Figure 4-1, Table 4-1). Six of these sites and one architectural resource were mapped within the Phase Ia project footprint.

**Table 4-1. Summary of Previously Recorded Cultural Resources in Phase Ia Project Vicinity**

Resource Type	West Alternative	Area 6	Area 7	Area 8	Confers Lane	# in Phase Ia Project Footprint	# outside Project Footprint	Total in Project Vicinity
Archaeological Sites	0	0	1*	5	0	6	18	24
Architectural Resources	0	1*	1*	1*	0	1*	4**	5
<b>Total</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>0</b>	<b>7</b>	<b>22</b>	<b>29</b>

\*architectural resource extends through Areas 6, 7 and 8

\* site also mapped within Phase Ib project APE

\*\*includes one architectural resource mapped within Phase Ib project APE

Following the completion of Phase Ia studies, the BBNPP Phase Ib project APE was defined as a 639-acre (258.6-hectare) area that excluded portions of Area 6 and the majority of Area 8. Later in 2008, 263 acres (106.4 hectares) of new project localities (Lots 4, 64, 93F, 95, 96, 97/97C and 100) were added to the APE (see Figure 1-1). The new project localities were situated immediately adjacent to the initial project area, within the scope of the previous background research study area; accordingly, no additional review of previously-recorded resources was necessary. The total 902-acre (365-hectare) Phase Ib project APE included the mapped location of one previously-recorded archaeological site (36LU0051) and two previously-recorded architectural resources [North Branch Canal (141673) and SR 7228 Bridge (135820)].

The following section summarizes initial background results and, where appropriate, highlights results that apply to the subsequent Phase Ib project APE. As noted above, a full discussion of background research results is provided in GAI's Phase Ia Technical Report (Munford and Tuk 2008).

#### Archaeological Sites

Table 4-2 presents a summary of the 24 previously-recorded archaeological sites located within a one-mile radius of the project APE. A discussion of these sites has been provided in the previous Phase Ia report (Munford and Tuk 2008). Six of the 24 sites (36LU0015, 36LU0016, 36LU0048, 36LU0049, 36LU0050, and 36LU0051) are mapped within the Phase Ia project footprint. All six of these sites are prehistoric occupations identified on the low terrace/floodplain west of the Susquehanna River; one site (36LU0051) is mapped within Area 7 and the remaining five occur within the Phase Ia Area 8 (see Figure 4-1).

Due to modifications in project design (noted above) only one of the previously-recorded sites (36LU0051) was mapped within the subsequent Phase Ib project footprint (see Figure 4-1, see Table 4-2). The five sites mapped in Area 8 (36LU0015, 36LU0016, 36LU0048, 36LU0049, and 36LU0050) all occurred in portions of this parcel that were excluded from the Phase Ib project APE.

**Table 4-2. Previously Recorded Archaeological Sites within 1-Mile Radius of Phase Ia Project APE**

Site Number	Site Name	Landform	Site Type	Age	In Phase Ia Project Footprint?	Recommended NRHP Status
36LU0015	SES-3	Floodplain	Prehistoric Open	A, LA	Yes Area 8	Eligible
36LU0016	SES-6	Floodplain	Prehistoric Open	A, LA, EW, MW, LW	Yes Area 8	Eligible
36LU0017	SES-13	Floodplain	Prehistoric Open	LA, A, Tr, LW	No*	Undetermined
36LU0018	Yorkoski	Floodplain/Terrace	Prehistoric Open	A	No	Undetermined
36LU0019	Stone Crusher	Floodplain/Terrace	Prehistoric Open	A, EA, LA, Tr, W, EW, LW	No	Undetermined
36LU0020	--	Floodplain/Terrace	Prehistoric Open	A, Tr	No	Undetermined
36LU0021	S.Wapwallopen	Floodplain/Terrace	Prehistoric and Historic Open	A, W, EW, MW, LW, Hist	No	Undetermined
36LU0022	Bobby Peter	Floodplain/Terrace	Prehistoric Open	A, MA, LA, W, EW, LW	No	Undetermined
36LU0023	Smith	Floodplain/Terrace	Prehistoric Open H	A	No	Undetermined
36LU0024	Kibler	Floodplain/Terrace	Prehistoric Open	A (probable)	No	Undetermined



Site Number	Site Name	Landform	Site Type	Age	In Phase Ia Project Footprint?	Recommended NRHP Status
36LU0025	Heller	Terrace	Prehistoric Open	A	No	Undetermined
36LU0043	Knouse (Wapwallopen)	Floodplain	Prehistoric Burials, Historic	LW, Historic, Contact	No	Undetermined
36LU0048	SES-16	Floodplain	Prehistoric Open	Unknown Prehist	Yes Area 8	Undetermined
36LU0049	SES-8	Floodplain	Prehistoric Open	A, LA, Tr, W, EW, LW	Yes Area 8	NRHP Eligible
36LU0050	SES-10	Floodplain	Prehistoric Open	A, LA	Yes Area 8	Not Eligible
36LU0051**	SES-11	Floodplain	Prehistoric Open	W, LW	Yes Area 7	NRHP Eligible
36LU0052	SES-14	Floodplain	Prehistoric Open	A, LA, Tr, EW	No	Undetermined
36LU0056	--	Floodplain	Prehistoric Open	Unknown Prehist	No	Undetermined
36LU0090	Sapphire	Floodplain/Terrace	Prehistoric Open Village (?)	LA, Tr, W, EW, MW, LW	No	Undetermined
36LU0105	Ruben	Floodplain/ Island	Prehistoric Open	LA, Tr, W, EW, MW, LW	No	Undetermined
36LU0183	Baluski	Terrace	Prehistoric Open Camp	A, EA	No	Not Eligible
36LU0188	Barn Field (B1)	Terrace	Prehistoric Open	A, EA, MA, LA, Tr, W, EW, LW	No	Undetermined
36LU0191	--	Terrace	Prehistoric Open Camp	LA, Tr	No	Rec. NRHP Eligible by PHMC-BHP
36LU0270	Beach Haven I	Terrace	Prehistoric Open Village (?)	MA, LA, Tr	No	Rec. NRHP Eligible by PHMC-BHP

A=Archaic; EA=Early Archaic; MA=Middle Archaic; LA=Late Archaic; Tr=Transitional; W=Woodland; EW=Early Woodland; MW=Middle Woodland; LW=Late Woodland

\*Site 36LU0017 is mapped immediately north of Area 7

\*\*Site 36LU0051 is also mapped within Phase Ib project APE (Area 7)

Site 36LU0051 (as well as the other five excluded sites) represents a prehistoric occupation situated on the low terrace/floodplain west of the Susquehanna River. These sites were investigated as part of a 1980 survey of the Susquehanna SES floodplain (Hayes et al 1981). Site 36LU0051, mapped at the extreme northeast corner of Area 7, was recorded as a Woodland/Late Woodland occupation with artifacts extending to a depth of 0.68 meters (2.2 feet) below surface; no features were identified. Site 36LU0051 has been recommended as eligible for listing in the NRHP. [Although the site's mapped location occurs within the Phase Ib project footprint, it should be noted that GAI's subsequent Phase Ib survey and Phase II testing did not relocate this site. Based on these results and review by PHMC-BHP, it is concluded that Site 36LU0051 is slightly mismapped and likely lies immediately outside (east of) the current project footprint (see Chapter 19).]

## Architectural Resources

Background research identified five previously-recorded architectural resources within approximately 0.5 miles (0.8 kilometers) of the project APE (see Figure 4-1, Table 4-3). These resources have been discussed in GAI's Phase Ia Technical Report (Munford and Tuk 2008) and are included in the Architectural and Historical Survey section (Chapter 20) of this document. One of these five resources, the North Branch Pennsylvania Canal (141673), was mapped within the Phase Ia project footprint (Areas 6, 7 and 8). The four remaining resources recorded in the project vicinity include the Union Reformed & Lutheran Church (086527) (known as the Old River Church) and three bridges (092644, 135820 and 135679). As indicated in Table 4-3, based on previous documentation only one of these resources, the North Branch Pennsylvania Canal, was recommended eligible for listing in the NRHP. The three bridges were recommended Not Eligible and the eligibility of the Old River Church was indicated as undetermined.

**Table 4-3. Previously Recorded Architectural Resources within Approximately 0.5-Mile Radius of Phase Ia Project APE**

Resource Number	Name	Resource Type	Date	Township	In Phase Ia Project Footprint?	Recommended NRHP Status
086527/ 155049	Union Reformed & Lutheran Church (Old River Church)	Church and Cemetery	1833	Conyngham	No	Undetermined*
092644	L.R. 40028 Bridge	Bridge	Unknown	Salem	No	Not Eligible
135679	SR 239 Bridge	Bridge	1940	Conyngham	No	Not Eligible
135820**	SR 7228 Bridge	Concrete Bridge	1937	Salem	No	Not Eligible
141673**	North Branch Pennsylvania Canal	Canal and Locks	1828, 1831	Salem	Yes Areas 6, 7 and 8	Eligible

\*Union Reformed & Lutheran Church was recorded as Undetermined by previous documentation but has been recommended NRHP Eligible based on results of GAI's Architectural Survey.

\*\*135820 and 141673 are also mapped within the Phase Ib project APE

Of these five previously-recorded architectural resources, only two—the North Branch Pennsylvania Canal (141673) and the SR 7228 Bridge (135820)—were located within the BBNPP Phase Ib project footprint (see Table 4-3). These resources are described briefly below.

The North Branch Pennsylvania Canal (141673) is a linear resource located on the floodplain in the eastern portion of the project area, immediately east of the railway and US Route 11. It transects Areas 6, 7 and 8 (portions of Area 8 were subsequently excluded from the Phase Ib APE) and extends further north and south beyond the project limits. Built between 1828 and 1831, the canal is represented by the remains of the canal prism, towpath, locks, and associated features. A PHRS form prepared for a section of the canal and canal locks between Beach Haven and Berwick recommended that this resource is eligible for NRHP listing. Portions of the canal and towpath in the project area are encompassed within the PPL Susquehanna Riverlands Environmental Preserve, a public-use area located on the lowlands east of US Route 11. This preserve includes a lake (Lake Took-A-While), picnic areas, walking trails, and interpretative materials. The section of the canal within Areas 6 and 8 contains water, while the majority of the canal prism in Area 7 is dry.

The SR 7228 Bridge (135820), located in the northwest corner of the project area, is a vernacular concrete structure that spans Walker Run. It is situated along North Market Street, 91 meters (300 feet) north of the project's West Alternative—and within the footprint of Supplemental Phase Ib Lot 4. Built in 1937, this bridge has been recommended as Not Eligible to the NRHP.

#### Historic Map Research

The 1873 Beers *Atlas of Luzerne County, Pennsylvania, Salem Township* (Figure 4-2) depicts scattered development within the project vicinity on the uplands and low terrace/floodplain west of the North Branch Susquehanna River. Located at the edges of Salem Township, the towns of Berwick to the southwest and Shickshinny to the north are the largest in the area. The small community of Beach Haven, west of the river's Bell Bend, is marked by a crossroads and includes houses, a school, and a church. The Susquehanna and Tioga Turnpike, a roadway that largely follows the course of the current US Route 11, hugs the western edge of the river's low terrace/floodplain. To its east lies the single track of the Lackawanna and Bloomsburg Railroad (also known as the Bloomsburg Division of the Delaware, Lackawanna and Western Railway). The Wyoming Valley Canal (also known as the North Branch Pennsylvania Canal), in turn, parallels the east edge of the railroad. These three linear resources extend through the project area and continue north and south along the river. Roadways also cross the uplands in much their current orientations, including Beach Grove Road, North Market Street, and Confers Lane, as well as additional roads to the north and west.

The Beers 1873 map (see Figure 4-2) illustrates scattered residential development along most of the roadways in the project vicinity. Approximately half a dozen structures are located along the Susquehanna and Tioga Turnpike within the project area. Houses are also depicted in the upland portion of the project area along Beach Grove Road, North Market Street, and Confers Lane. Two of these houses are located in the area of possible archaeological sites, identified by GAI's 2007 Phase Ia reconnaissance. These include a structure labeled "J. Hess" in the area of the Kisner Farmstead Site (Site 36LU286), and a structure (labeled "B. Thomas") in the location of the Johnson/Folk Barn Site (Site 36LU285). Additional structures are mapped at the bend in Confers Lane ("W. Hicks") (in the vicinity of the Sink Site/36LU283) and south of Beach Grove Road ["J.B. Courtright," "J. Lockhart" and "T. Edwards"(?)]. The Hill School and a saw mill are depicted on the north side of Beach Grove Road, immediately northwest of the project area. A single structure (labeled as "S.G", possibly S. Gould?) is illustrated on the low terrace/floodplain portion of the project area between the canal and the river, within the current Area 6.

The 1894 Shickshinny, Pennsylvania 15-Minute Quadrangle (Figure 4-3) does not illustrate individual structures west of the river. Berwick is represented by a grid of streets while the communities of Beach Haven, Shickshinny, and Wapwallopen (east of the river) are each shown as a crossroads. Two nearby ferries are depicted: the Hicks Ferry at Bell Bend, and the Beach Haven Ferry in the community of Beach Haven. The Susquehanna and Tioga Turnpike and upland roadways appear in the same locations as on the Beers 1873 map. The Delaware Lackawanna and Western (DL&W) Bloomsburg Division Railroad and the Wyoming Division Pennsylvania Canal (formerly Wyoming Valley Canal) both follow the west side of the river, and extend through lowland portions of the Phase Ia project area (Areas 6, 7, and 8). The Sunbury Division Railroad lies on the east side of the river.

The 1955 Shickshinny, Pennsylvania 15-Minute Quadrangle (Figure 4-4) indicates continued development along the river. Berwick is still the largest nearby town, followed in size by

Shickshinny. The map also depicts limited growth in Beach Haven and Wapwallopen, as well as the small communities of Dogtown and Mocanaqua to the north. US Route 11 (former Susquehanna and Tioga Turnpike) is identified in its current path and houses line this roadway throughout the project area, and further southwest into Beach Haven and Berwick. Just outside the southern edge of the project area, houses also flank a remnant of the former Susquehanna and Tioga Turnpike. The DL&W Railroad borders the east side of US Route 11. Immediately to its east lies the now-abandoned canal. No structures are depicted on the low/terrace floodplain portion of the project area between the railroad and the river, a locality containing large open areas and more limited strips and patches of woodlands. Uplands within the project area include open areas, woodlands and orchards, as well as isolated structures along Confers Lane, North Market Street, and Beach Grove Road. Four of these structures occur in the location of possible archaeological sites identified during GAI's 2007 Phase Ia reconnaissance [i.e., the Kisner Farmstead Site (36LU286), the Johnson/Folk Barn Site (36LU285), the Sink House Site (36LU283) and the Shortz House Site (36LU284)].

Based on a review of these maps, late-nineteenth to mid-twentieth century land use in the immediate project vicinity consisted primarily of scattered residences and farmsteads located in proximity to roads, railroads, and waterways.

#### Prehistoric Archaeological Potential

Background research indicates that previously-recorded prehistoric archaeological sites in the project vicinity all occupy low terrace or floodplain settings adjacent to the North Branch Susquehanna River (see Table 4-2). Thirteen of these sites are situated west of the river (as is the BBNPP project area) and eleven lie to its east. The large majority of the west bank sites ( $n=10$ ) are clustered between the existing SSES intake structure (located in Area 6 of the current project) and Gould Island, 2.1 kilometers (1.3 miles) to the north. Recorded site types include two possible villages (36LU0090/Sapphire Site and 36LU0270/Beach Haven I), two camps (36LU0183 and 36LU0191) and one prehistoric cemetery (36LU0043/Knouse Site). The remaining sites are documented as prehistoric open-air habitations. The previously-recorded sites are predominantly multicomponent sites, with components ranging in age from the Early Archaic to Late Woodland periods; two sites also contain historic or historic/contact components. Unspecified Archaic ( $n=16$ ), Late Archaic ( $n=13$ ), Late Woodland ( $n=11$ ), Transitional  $n=10$ ), and Early Woodland ( $n=9$ ) components are most common at these sites.

The six sites mapped within the Phase Ia footprint (36LU0015, 36LU0016, 36LU0048, 36LU0049, 36LU0050, and 36LU0051) consist of Archaic through Woodland occupations. Four of these sites yielded artifacts from relatively shallow depths (0.3 to 0.68 meters/1.0 to 2.2 feet) while two sites (36LU0016 and 36LU0049) produced artifacts from depths of 1.55 to 2.1 meters (5.1 to 6.9 feet) below surface, respectively. Both of these sites also contained prehistoric cultural features—Site 36LU0016, at depths of between 0.4 to 0.55 meters (1.3 to 1.8 feet) below surface, and Site 36LU0049, at depths of 1.7 meters (5.2 feet) and 3.2 meters (10.5 feet) below surface (Hayes et al. 1981, p 121 and 178).

Based on this data, undisturbed, relatively well-drained, low terrace/floodplain portions of the project area adjacent to the North Branch Susquehanna River are considered to have a moderate to high potential to yield unrecorded prehistoric sites. Within the project APE such localities include portions of Areas 6 and 7 (as well as portions of Area 8 that were excluded from the Phase Ib project area). It is expected that identified sites will consist of small, open, prehistoric camps consisting of low-density lithic scatters with diagnostic artifacts and, perhaps, features; larger village sites with a higher density of artifacts and features may also occur. Prehistoric resources are likely to be multicomponent, Archaic through Woodland



period occupations. Alluvial settings within the project area may contain both near-surface and deeply-buried cultural resources.

Undisturbed, relatively well-drained, relatively-level to gently-sloping upland portions of the project area (e.g., West Alternative, Area 6 and the Confers Lane Parcel) are also concluded to have a moderate to high archaeological potential. Although no previously-recorded sites in the project vicinity occurred in such upland settings, these localities have a potential to contain the remains of small, short-term, resource extraction camps. Identified sites are expected to consist of small, low-density prehistoric lithic scatters, yielding diagnostic artifacts, and possibly, features. Prehistoric sites are expected to date to the Archaic through Woodland periods. Archaeological resources in these upland settings are anticipated to be near-surface in nature.

Portions of the project area characterized by wetlands or slopes in excess of 15 percent were considered to have a low archaeological potential. Low potential wetland localities are expected to occur largely in the area of Walker Run (in the West Alternative), and in portions of the floodplain/ low terrace in Areas 6 and 7.

Disturbed localities were determined to have no archaeological potential. Disturbances within the project area are expected to result largely from construction of the existing SSES facility, as well as from road construction.

### **Historic Archaeological Potential**

The results of background research indicate that only two previously-recorded archaeological sites (Sites 36LU0021 and 36LU0043) in the project vicinity contain historic components; both of these sites occur in low terrace or floodplain settings. Site 36LU0043 (the Knouse Site) dates to the contact period, while the historic component of Site 36LU0021 is undated. Previously-recorded archaeological and historic resources mapped within the project vicinity include the North Branch Pennsylvania Canal, a church and three bridges. The canal and two of the bridges are situated in low terrace/floodplain settings, while the church and one bridge are located in upland settings.

A review of historic maps indicates that late-nineteenth to mid-twentieth century land use in the immediate project vicinity consisted primarily of scattered residences and farmsteads located in proximity to roads, railroads and waterways (Beers 1873, USGS 1894, USGS 1955). During the late-nineteenth century residential development occurred along the Susquehanna and Tioga Turnpike (US Route 11), as well as along the upland roadways within the project area, including Beach Grove Road, North Market Street and Confers Lane (see Figure 4-2). Transportation-related development is indicated by the presence of the North Branch Pennsylvania Canal, the Bloomsburg Division of the Delaware, Lackawanna & Western Railway, two nearby ferries (Hicks Ferry at Bell Bend and the Beach Haven Ferry in the community of Beach Haven) and various roadways (see Figures 4-2 and 4-3). The 1955 USGS quadrangle (see Figure 4-4) depicts large open areas (cultivated fields) and more limited strips of and patches of woodlands on the low terrace/floodplain portions of the project area. The upland settings within the project area include open areas, woodlands and orchards, as well as isolated structures flanking roadways.

Based on these data, GAI concludes that the project area has a moderate to high potential to contain unrecorded historic period archaeological sites. Historic period sites are expected to represent residential occupations, farmsteads, or agricultural-related activities. These sites are likely to occur in undisturbed, relatively-level to gently-sloping, well-drained upland settings as well as in low terrace/floodplain settings. Within the project area, historic period

sites are anticipated in along roadways on the broad upland flats in the western portion of the project (e.g., West Alternative, Confers Lane Parcel) and, perhaps, in proximity to roadways and agricultural fields within the low terrace/floodplain areas adjacent to the river.

**Figure 4-1. Previously Recorded Cultural Resources in Project Vicinity**

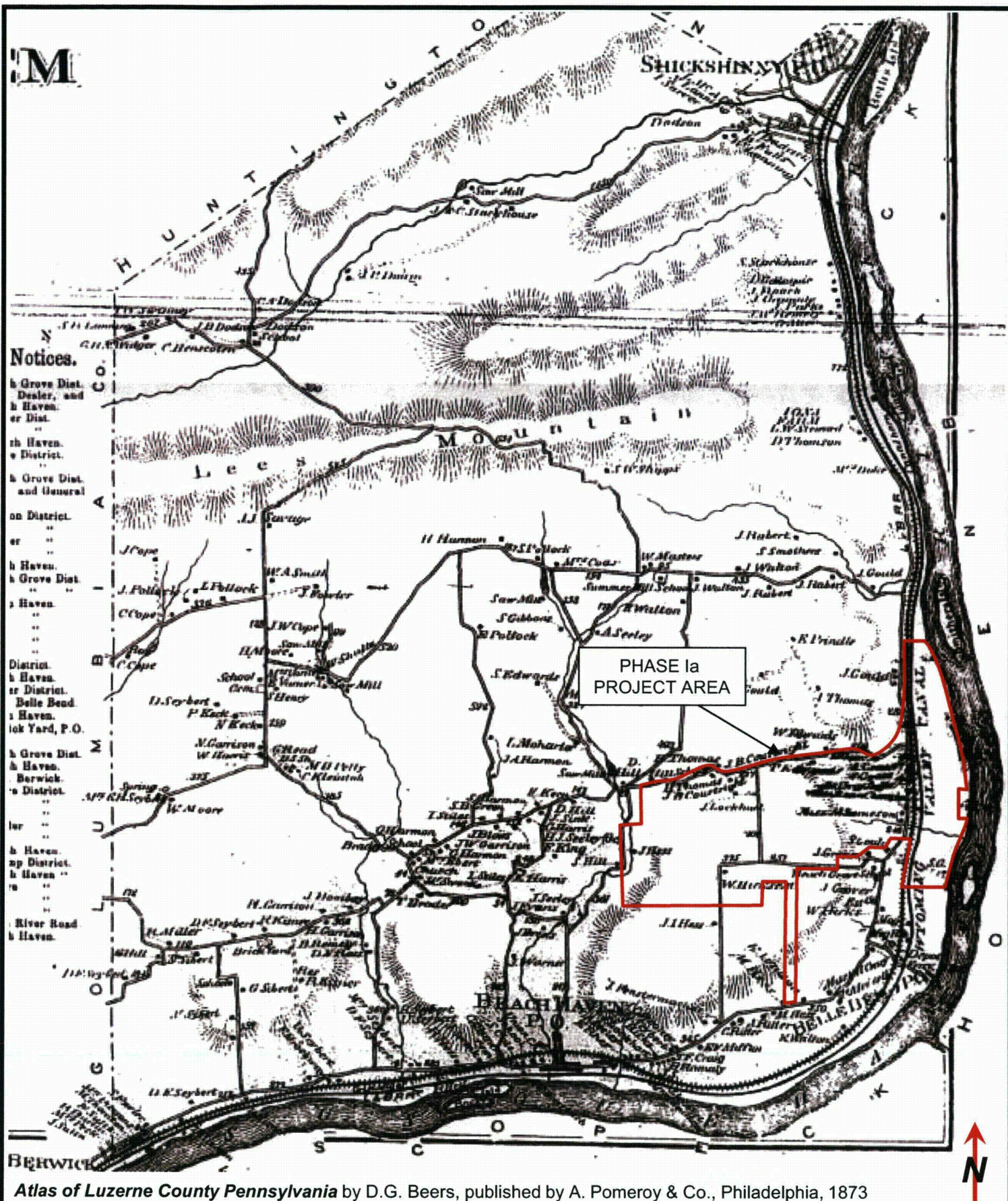
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*REDACTED Figure 4-1  
Previously Recorded Cultural  
Resources in Project Vicinity*

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*Side 2 of REDACTED Figure 4-1.*







USGS: 15 MINUTE QUAD  
SHICKSHINNY, PENNSYLVANIA, 1894

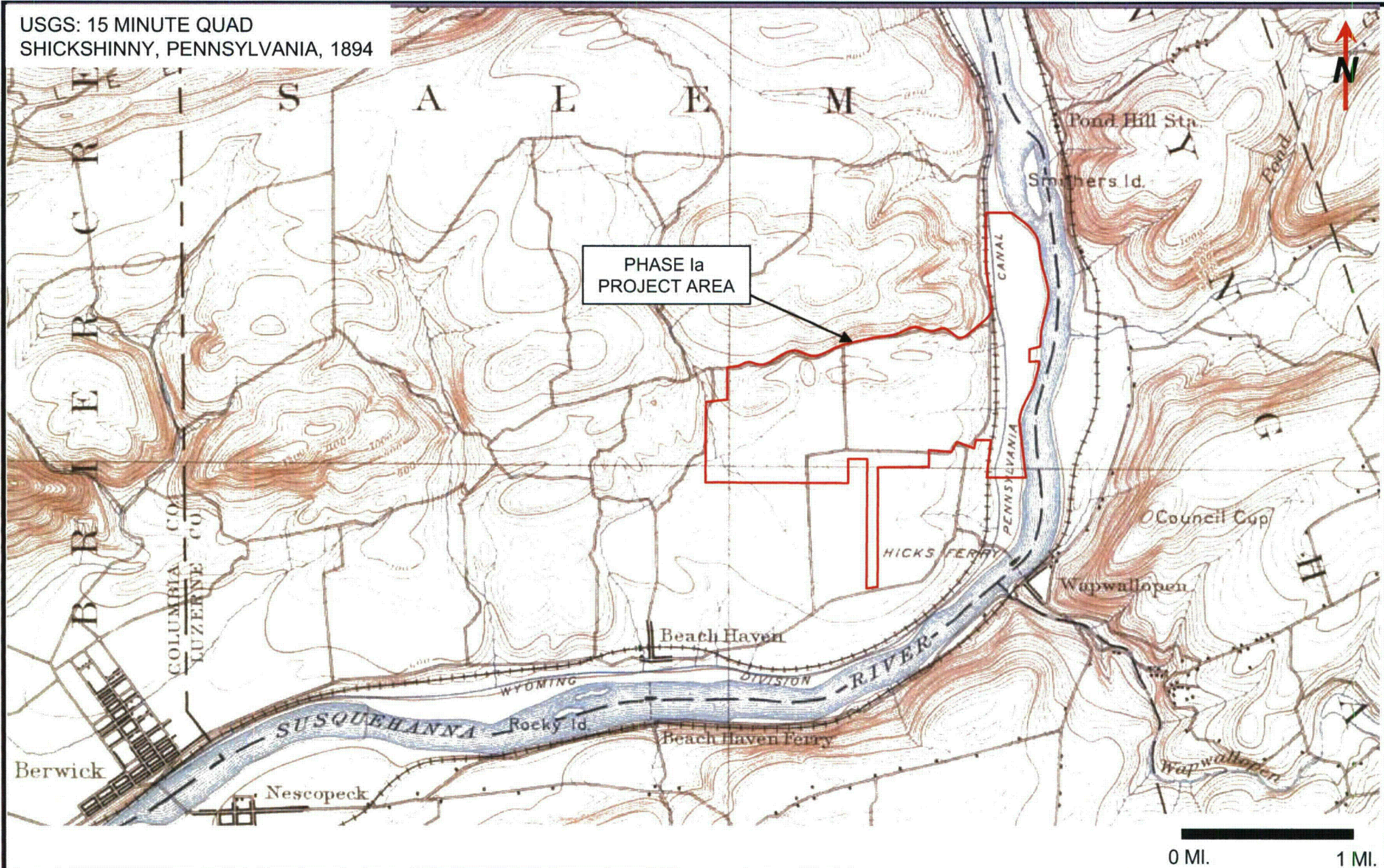


FIGURE 4-3. PHASE Ia PROJECT AREA AND VICINITY, 1894

BERWICK NPP-1 UNISTAR NUCLEAR DEVELOPMENT, LLC.



gai consultants

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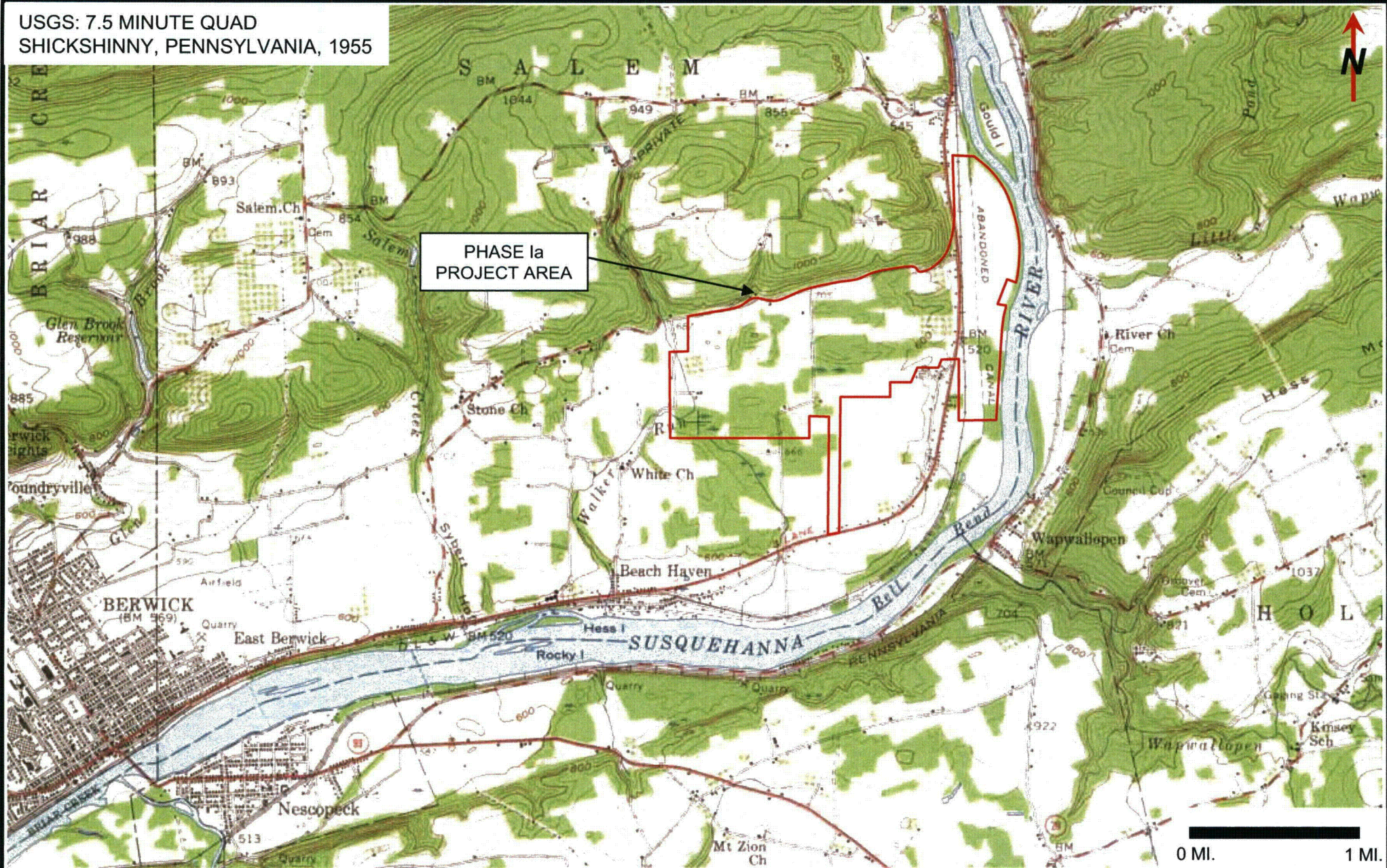
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SHICKSHINNY, PENNSYLVANIA, 1955





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## **Chapter 5. Phase Ia Archaeological and Geomorphological Reconnaissance**

### **Introduction**

In 2007 and 2008, GAI conducted Phase Ia geomorphological and archaeological reconnaissance of BBNPP project localities in order to evaluate the project area's potential to contain unrecorded cultural resources and to delineate localities for subsequent Phase Ib survey. Phase Ia reconnaissance performed in June 2007, investigated approximately 761 acres (308 hectares) of potential project alternatives for green space/power plant development west and east of the river—the West Alternative (408-acres/165-hectares) and the Southeast Alternative (353-acres/143-hectares). In January 2008, following selection of the West Alternative as the preferred alternative, GAI conducted Phase Ia reconnaissance of an additional 511 acres (207 hectares) of new project localities between the SSES facility and the west bank of the river (Areas 6, 7, 8, and the Confers Lane Parcel). In total, approximately 1,272 acres (515 hectares) were investigated by these two Phase Ia field reconnaissance studies (Figure 5-1). The results of these studies have been provided in a Phase Ia letter report (GAI 2007) and in a Phase Ia technical report (Munford and Tuk 2008), which has been reviewed by the PHMC-BHP (June 5, 2008 review letter) (see Appendix A).

### **Goals and Methods**

Specific goals of the geomorphological and archaeological reconnaissance were to 1) identify surface-visible cultural resources; 2) evaluate surface disturbances and landform age; 3) assess the potential for deeply-buried archaeological sites; and 4) refine preliminary estimates of archaeological sensitivity derived from background research.

During the geomorphological reconnaissance, GAI's Senior Staff Soil Scientist performed a walkover of the project area, and observed and recorded geomorphic conditions and the extent of surface disturbances. Judgmentally-placed auger probes were excavated, where possible, to evaluate soil profiles. As part of this study, a review of appropriate topographic maps and soil survey data was also conducted.

In conjunction with the geomorphological assessment, GAI project archaeologists conducted an archaeological reconnaissance to ground-truth preliminary assessments of archaeological potential based on background research. Local ground conditions and topographic settings were assessed to evaluate further the project area's archaeological potential. Surface artifacts, structural remains, and possible cultural features or sites were recorded and plotted on project maps.

Data collected from the geomorphological assessment and the archaeological reconnaissance was then combined with information from the background research to refine initial assessments of archaeological potential for the project. Areas of high to moderate archaeological potential, low archaeological potential, and disturbances were plotted on project maps and were used to guide Phase Ib investigations of the project area.

### **Results of Geomorphological Reconnaissance**

Geomorphological reconnaissance confirmed that the upland portions of the project area, predominantly west of US Route 11, consist of glacial till and glacial outwash soils (Bush 1982). Glacial till soils are found on the highest elevation knobs within the project area as well as on the highest uplands immediately to the project's north (e.g., portions of the West Alternative and Switchyard 2). The large majority of Areas 6 and 8 west of the highway are mapped with glacial outwash soils. These outwash soils occur on broad, gently sloping areas

that represent the highest outwash terraces of the Susquehanna River. These terraces are Late Illinoian to Wisconsin in age. Wetlands that have developed on these terraces are also formed in glacial outwash. Upland portions of the project area include large cultivated fields, woodlands, orchards and fallow fields. Due to the residual nature of soils, cultural resources within the upland portions of the project area are expected to be associated with the modern ground surface. These areas have no potential for deeply buried cultural resources.

The portions of the project area east of US Route 11 consist of landforms formed in Holocene to recent alluvial sediments. The landforms represent the Late Holocene to recent low terraces and floodplain of the Susquehanna River. Two soil types are mapped in this portion of the project area: the well-drained Pope soils and the poorly-drained Holly soils (Bush 1981). Holly soils likely represent low and former channel locations on the floodplain while the Pope soils represent higher terrace and natural levee landforms. Areas mapped with Pope soils, including the poorly-drained channel-like swales observed within these localities (e.g., Area 7), have a high potential for cultural resources. Particularly, the margins of wetlands bordered by natural levee landforms represent a high potential setting for archaeological sites. Due to poor drainage capabilities, broader areas of Holly soils have a lower archaeological potential. Mapped wetlands, often associated with Holly soils in this area, are considered to have a low potential for archaeological sites.

Low terrace and floodplain settings within the project area (i.e., portions of Areas 6 and 8 and all of Area 7), particularly the well-drained low terraces and natural levee landforms, have a potential for both near-surface and deeply buried cultural resources. As described in the Phase Ia report (Munford and Tuk 2008) and noted in the background research discussion of the current document (see Chapter 4), Hayes et al. (1981) performed an archaeological investigation of the Susquehanna floodplain east of the SSES. This study documented a shallow (0.5 to 1.0 meter/1.6 to 3.2-foot deep) soil horizon producing prehistoric artifacts and features, as well as deeply-buried culture bearing soil horizons yielding artifacts from up to 2.15 meters (7.0 feet) below surface and cultural features at depths of 1.3 meters (4.3 feet) and 3.2 meters (10.5 feet) below surface (Hayes et al. 1981, p 178). This work confirmed the presence of deeply buried cultural deposits in the immediate project vicinity. Accordingly, depending on the proposed depth of project impacts, deep testing of low terrace/floodplain areas within the project area may be required to evaluate fully the potential for cultural resources.

Disturbances within the study area are largely associated with construction of the existing SSES facility—both on the uplands west of US Route 11 and in the area of the intake structure along the river, within Area 6. Additional ground surface disturbances have resulted from cultivation, quarrying, and roadway construction.

### **Results of Archaeological Reconnaissance**

Based on the results of archaeological field reconnaissance and background research, GAI characterized the project APE in terms of its archaeological potential: high to moderate potential, low potential, and disturbed/no potential. Relatively undisturbed, well-drained, level to gently-sloping upland settings and floodplain/low terrace settings along the Susquehanna River were determined to have high to moderate archaeological potential. Steep slopes (slopes in excess of 15 percent), poorly-drained/wetland areas, and highly eroded fields were considered to have low archaeological potential. Areas disturbed by grading, landfill, and recent construction activities were determined to have no archaeological potential. Figure 5-2 illustrates archaeological potential within the project and Table 5-1 summarizes archaeological potential by test area.

Phase Ia reconnaissance of the total 1,272 acre (514.8 hectare) project APE identified 562 acres (227.4 hectares) (44.2 percent) of moderate to high archaeological potential, requiring subsequent systematic Phase Ib shovel testing or pedestrian ground survey. The remainder of the project area consisted of 446 acres (180.6 hectares) (35.1 percent) of low archaeological potential and 264 acres (106.5 hectares) (20.2 percent) of disturbed localities (no archaeological potential) (see Table 5-1). The low potential and disturbed areas were eliminated from Phase Ib shovel testing or pedestrian ground survey.

**Table 5-1. Summary of Archaeological Potential and Identified Cultural Resources for Total Phase Ia APE**

Area	Total Acres	High-Moderate Potential acres (% total)	Low Potential acres (% total)	Disturbed/ No Potential acres (% total)	Cultural Resources Documented by Phase Ia Reconnaissance	Previously-Recorded Cultural Resources in Project Footprint**
Southeast Alternative	353.0	102.0 (28.9%)	246.0 (69.7%)	5.0 (1.4%)	1 Possible archaeological component—Union Reformed Lutheran Church (Old River Church)	2 Union Reformed and Lutheran Church (Old River Church) (086562) Bridge (135679)
<b>APE West of River</b>						
West Alternative	407.5	224.0 (55%)	122.0 (30%)	61.5 (15%)	3 Site 36LU283 (Sink Site) * Site 36LU285 (Johnston/Folk Barn Site) * Site 36LU286 (Kisner Farmstead) *	0
Area 6	173.6	87.9 (37%)	37.4 (48%)	48.3 (25%)	1 Stone Walls * (GAI-02)	1 North Branch PA Canal * (141673/GAI-10)
Area 7	37.5	34.1 (14%)	0.2 (0.3%)	3.2 (2%)	1 Possible House Site *	2 Site 36LU0051 * North Branch PA Canal * (141673/GAI-10)
Area 8	272.4	103.1 (44%)	34.1 (44%)	135.2 (69%)	1 Beach Grove Cemetery (GAI-01)	6 Site 36LU0015 Site 36LU0016 Site 36LU0048 Site 36LU0049 Site 36LU0050 North Branch PA Canal (141673/GAI-10)
Confers Lane	27.4	10.9 (5%)	6.6 (8%)	9.9 (5%)	1 Site 36LU284 (Shortz Site) *	0
<b>Subtotal</b>	<b>918.4</b>	<b>460 (46%)</b>	<b>200.3 (15%)</b>	<b>258.1 (39%)</b>	<b>7</b>	<b>7</b>
<b>Total</b>	<b>1271.4</b>	<b>562 (44.2%)</b>	<b>446.3 (35.1%)</b>	<b>263.1 (20.2%)</b>	<b>4 sites, 2 possible sites, architectural resources</b>	<b>2</b> <b>6 sites, 3 architectural resources</b>

\*Resource also mapped within subsequent Phase Ib APE;

\*\*does not include resources surveyed by GAI during current Architectural Survey

As subsequently defined, the Phase Ib project APE (project preferred alternative) was located within portions of the Phase Ia study area west of the river. The approximately 918 acre (371.5 hectare) Phase Ia project area west of the river includes 460 acres (186.2 hectares) of moderate to high archaeological potential, 200 acres (80.9 hectares) of low potential and 258 acres (104.4 hectares) of disturbance/no potential. Nearly half of the moderate to high potential localities are located in the West Alternative (224 acres/90.6 hectares).

Based on observations of surface remains and on information provided by PPL staff, GAI's Phase Ia reconnaissance documented seven possible unrecorded cultural resources within the project APE west of the river; the single possible cultural resource in the Southeast Alternative was a potential archaeological component associated with the Union Reformed and Lutheran Church. Of the seven possible unrecorded cultural resources in the APE west of the river four resources represent historic archaeological sites, including three sites in the West Alternative (Sink Site/36LU283, Johnson-Folk Barn Site/36LU285, and the Kisner Farmstead/36LU286) and one site in the Confers Lane Parcel (Shortz Site/36LU284). All four sites were identified by PPL staff during the course of the field reconnaissance as representing the locations of former residences or farmsteads. Additionally, GAI documented the remains of a stone foundation at Site 36LU283 and recorded piles of gravel and rubble at Site 36LU286. No surface remains were observed at Sites 36LU284 or 36LU285 during Phase Ia reconnaissance. (These four sites were located within the subsequent Phase Ib project APE and were investigated during Phase Ib survey.)

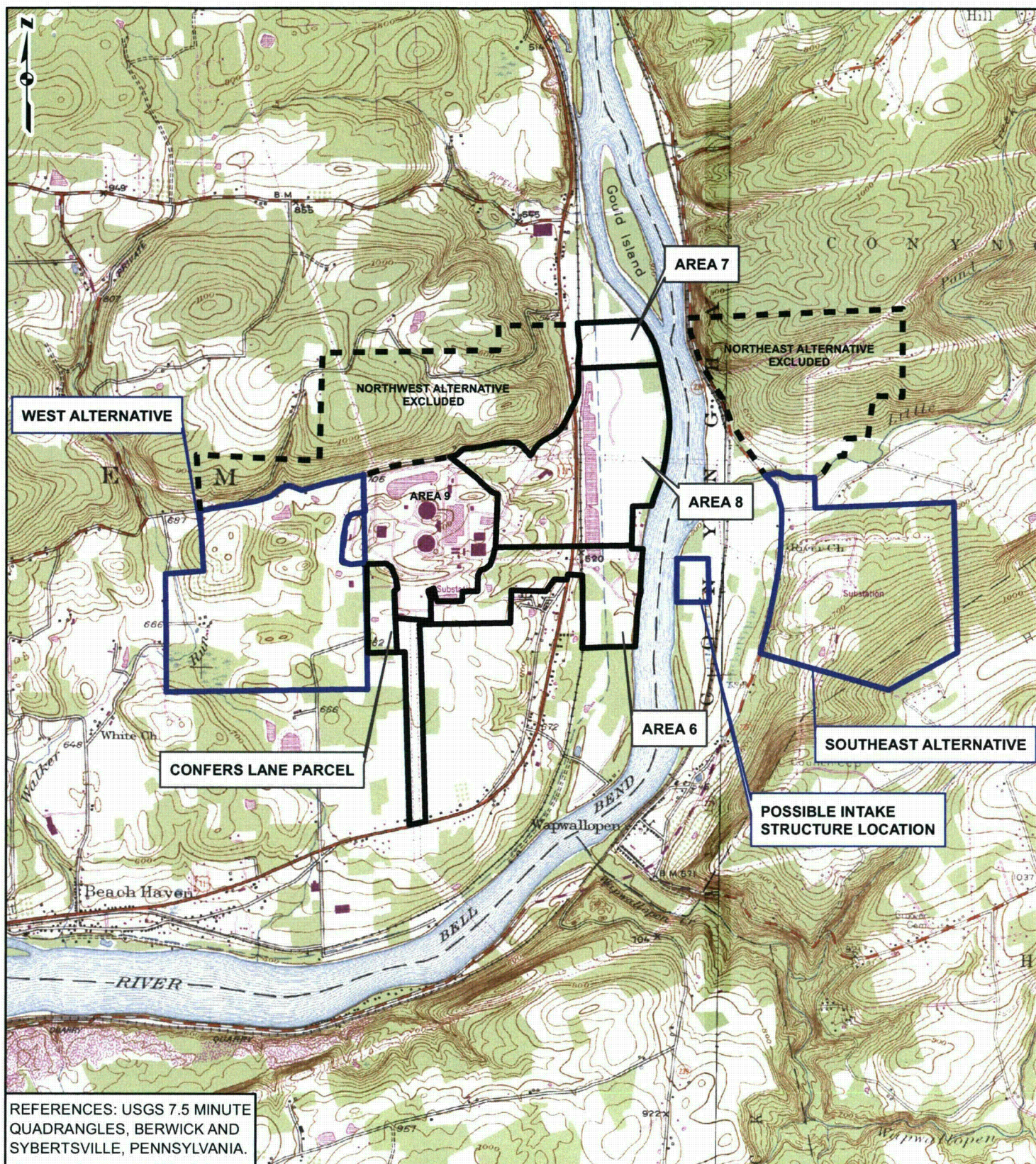
Two of the observed cultural resources—the Beach Grove Cemetery (Area 8) and a fieldstone wall (Area 6)—represent architectural/historic properties. Both of these resources were recorded during GAI's architectural survey (Munford and Tuk 2008) and are described in Chapter 20. (Note that Beach Grove Cemetery lies with a portion of Area 8 that was eliminated from the Phase Ib project area.)

The possible house site noted in Area 7 consisted of a clearing with evergreen trees, which was considered to represent the location of a possible former residence. (This locality was located within the Phase Ib APE and was investigated by Phase Ib survey.)

### **Summary of Phase Ia Results**

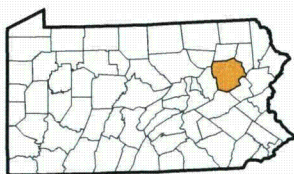
The geomorphological and archaeological reconnaissance characterized the project area in terms of its archaeological potential (i.e., high/moderate, low or disturbed/no potential) and, based on surface observations and informant data, identified possible unrecorded cultural resources within the project APE. Based on this reconnaissance, upland portions of the project are expected to contain near-surface sites, while the low terrace/floodplain portion may yield both near-surface and deeply buried cultural deposits. In total, the 1,272-acre (514.8 hectare) Phase Ia project area includes 562 acres (227.4 hectares) (44.2 percent) of high to moderate archaeological potential, 446 acres (180.6 hectares) (35.1 percent) of low archaeological potential, and 263.1 acres (106.5 hectares) (20.2 percent) of disturbance/no archaeological potential. High to moderate potential localities are found in both upland and low terrace/floodplain settings.





REFERENCES: USGS 7.5 MINUTE QUADRANGLES, BERWICK AND SYBERTSVILLE, PENNSYLVANIA.

#### PROJECT LOCATION



LUZERNE COUNTY,  
PENNSYLVANIA

#### LEGEND

- PROJECT AREA - 2008 PHASE Ia
- PROJECT AREA - 2007 PHASE Ia
- UNSURVEYED AREA

0 1,500 3,000 6,000 Feet

FIGURE 5-1  
PHASE Ia PROJECT LOCATION



BELL BEND NUCLEAR POWER PLANT  
UNISTAR NUCLEAR DEVELOPMENT, LLC.

DRAWN BY: AJW  
CHECKED: BAM

DATE: 05/26/2010  
APPROVED: BAM



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**Figure 5-2. Phase Ia Project Area showing Archaeological Potential and Possible Cultural Locations**

B Size

*REDACTED Figure 5-2  
Phase Ia Project Area showing  
Archaeological Potential and  
Possible Cultural Locations*

(back of Figure 5-2)

*Side 2 of REDACTED Figure 5-2.*



## Chapter 6. Phase Ib Archaeological Survey

### Overview and Objectives

The goals of GAI's Phase Ib archaeological survey were to identify, delineate and evaluate the potential National Register eligibility of previously unrecorded historic and prehistoric sites in the project APE. GAI conducted two Phase Ib studies for the proposed BBNPP project. Initial Phase Ib survey of the approximately 639-acre (258.6-hectare) preferred alternative on the west side of the river was conducted between May and July 2008. Supplemental Phase Ib survey, performed between August and November, 2008, investigated an additional 263 acres (106 hectares) of new project areas abutting the southern and northwestern edges of the initial project area (see Figure 1-2).

The overall Phase Ib study area encompassed approximately 902 acres (365 hectares) of project area west of the river. Table 6-1 presents a summary of total Phase Ib results by test area for both Initial and Supplemental Phase Ib studies. In total, Phase Ib survey of the BBNPP project area included pedestrian ground survey, the excavation of 5,726 STPs, and a program of deep testing (11 trenches and 8 column sample units). This work resulted in the identification of 11 archaeological sites and 25 isolated finds (all located within the initial Phase Ib project area). Descriptions of Initial and Supplemental Phase Ib surveys are presented below and results are summarized at the end of this chapter.

**Table 6-1. Summary of Initial and Supplemental Phase Ib Archaeological Survey Results**

Area	Pedestrian Ground Survey	# STPs	Deep Testing	Sites	Isolated Finds
<b>Initial Phase Ib (639 acres)</b>					
West Alternative	Yes	2285	--	9	19
Confers Lane Parcel	No	265	--	1	0
Area 6	Yes	713	11 trenches, 8 units	0	1
Area 7	Yes	269	--	1	5
Area 8	No	0	--	0	0
Switchyard 2	No	257	--	0	0
<b>Subtotal Initial Phase Ib</b>		<b>3,789</b>	<b>11 trenches, 8 units</b>	<b>11</b>	<b>25</b>
<b>Supplemental Phase Ib (263 acres)</b>					
Lot 4	No	250	--	0	0
Lot 64	No	114	--	0	0
Lot 93F	No	79	--	0	0
Lot 95	No	668	--	0	0
Lot 96	No	19	--	0	0
Lot 97/97C	No	18	--	0	0
Lot 100	No	789	--	0	0
<b>Subtotal Supplemental Phase Ib</b>		<b>1937</b>	<b>--</b>	<b>0</b>	<b>0</b>
<b>Total</b>		<b>5,726</b>	<b>11 trenches, 8 units</b>	<b>11</b>	<b>25</b>

## **Initial Phase Ib Archaeological Survey**

### **Description and Archaeological Potential**

GAI's initial Phase Ib survey, conducted between May 19 and July 2, 2008, investigated an approximately 639-acre (259-hectare) preferred project alternative defined by UniStar west of the river. The APE for this study encompassed approximately 630 acres (255 hectares) included within the previous Phase Ia APE, plus the additional 39-acre (15.8-hectare) Switchyard 2 parcel, located to the north and added during the course of Phase Ib fieldwork (see Figure 1-2). Large portions of Phase Ia Areas 6 and 8 were excluded from the Phase Ib project APE. Based on the results of the Phase Ia field reconnaissance, GAI concluded that approximately 350 acres (142-hectares) of the project APE possessed a moderate to high archaeological potential and would require systematic Phase Ib survey. In their June 5, 2008, review letter, PHMC-BHP concurred with GAI's recommendations for a Phase Ib study.

The Initial BBNPP Phase Ib project area was divided into six test areas: the West Alternative, Area 6, Area 7, Area 8, Confers Lane Parcel, and Switchyard 2. The West Alternative, located in an upland setting west of the existing SSES facility and representing the location of the proposed new power generation unit, is the largest of these test areas. GAI defined numerous Phase Ib test sections within each of the five main project areas; no testing was conducted in Area 8, an existing, previously-disturbed railway corridor connecting Areas 6 and 7 and located largely within the SSES facility (see Figure 1-2). The individual test sections varied in size and generally represent separate landforms, changes in land use, or logical divisions reflecting the presence of field boundaries, roadways, or other cultural features (see Figure 1-2). Test sections were numbered sequentially within each area (i.e., West Alternative: Sections 1-24 and 27-31; Confers Lane Parcel: Sections 25 and 26; Area 6: Sections 1-5; Area 7: Sections 1-4; Switchyard 2: Section 1). GAI conducted Phase Ib survey within each of these sections.

Figure 1-3 illustrates assessments of archeological potential within the Phase Ib project area and Table 6-2 presents a summary of this information. The project's 350 acres (142 hectares) of moderate to high archaeological potential were located predominantly (89 percent) in upland settings (311 acres/126 hectares); minor amounts occurred in low terrace/floodplain settings (39 acres/16 hectares). The remainder of the project area included approximately 174 (70.4 hectares) of low archaeological potential (e.g., slopes in excess of 15 percent, wetlands or recent deposits) and 115 acres (46.5 hectares) of prior disturbance (no archaeological potential). These areas were excluded from systematic Phase Ib survey. Due to refinements in assessments of archaeological sensitivity, resulting from detailed field observations made during the course of Phase Ib fieldwork, approximately 45.8 acres (18.5 hectares) of uplands assessed with low archaeological potential were also examined by pedestrian ground survey or shovel testing. These areas include 14.8 acres (6.0 hectares) of eroded fields in the West Alternative (Sections 10 and 11), and 31 acres (12.5 hectares) along the edges of wooded wetlands or slopes in the West Alternative (Sections 16, 18, 23 and 28—25.8 acres/10.4 hectares), and Area 6 (Section 5—5.2 acres/2.1 hectares).

**Table 6-2. Summary of Archaeological Potential and Previously-Identified Cultural Resources in Phase Ib APE**

Area	Total Acres	High-Moderate Potential acres (% total)	Low Potential acres (% total)	Disturbed/ No Potential acres (% total)	Phase Ia-Identified Cultural Resources in Phase Ib APE	Previously-Recorded NRHP-Eligible Cultural Resources in Phase Ib APE
<b>Initial Phase Ib</b>						
West Alternative	408.3	224.7	122.1	61.5	3 sites	0
Area 6	130.1	71.8	22.6	35.7	1 architectural resource (stone walls)	North Branch Canal (141673/GAI 10)
Area 7	27.8	25.9	0	1.9	1 poss house site	Site 36LU0051 North Branch Canal (141673/GAI-10)
Area 8	6.1	0	0	6.1	0	0
Confers Lane	27.4	10.9	6.6	9.9	1 site	0
Switchyard 2	39	16.7	22.4	0	0	0
<b>Subtotal</b>	<b>638.8</b>	<b>350</b>	<b>173.7</b>	<b>115.1</b>	<b>6</b> (4 sites, 1 possible site, 1 architectural resource)	<b>2</b> (1 site, 1 architectural resource)
<b>Supplemental Phase Ib</b>						
Lot 4	86.8	22.1	63.2	1.5	0	0*
Lot 64	34.5	7.1	6.9	20.5	0	0
Lot 93F	15.7	7.5	8.2	0	0	0
Lot 95	61.8	39.72	22.1	0	0	0
Lot 96	1.2	1.2	0	0	0	0
Lot 97/97C	1.5	1.5	0	0	0	0
Lot 100	61.1	36.0	15.6	9.5	0	0
<b>Subtotal</b>	<b>262.5</b>	<b>115</b>	<b>116</b>	<b>31.5</b>	<b>0</b>	<b>1</b>
<b>Total</b>	<b>902</b>	<b>465</b>	<b>290</b>	<b>147</b>	<b>6</b> (4 sites, 1 possible site, 1 architectural resource)	<b>2</b> (1 site, 1 architectural resource)*

\*Stone Arch Bridge (155054/GAI-06), documented in Lot 4 during GAI's Architectural Survey for the current project, is recommended as NRHP eligible

### Initial Phase Ib Field Methods

Phase Ib field methods varied based on project setting (upland versus lowland) and on ground conditions affecting ground surface visibility (poor or good visibility). Field investigations consisted of pedestrian ground survey and shovel testing, as well as a program of deep testing in one low terrace/floodplain locality. Figure 6-1 illustrates methods of Phase Ib survey within each test section.

### Upland Settings

The majority of the initial Phase Ib project area occurs in upland settings. In upland portions of the project area with a moderate to high archaeological potential, Phase Ib survey



consisted of pedestrian ground survey or systematic shovel testing to identify near-surface archaeological sites. Pedestrian ground survey was conducted in approximately 96 acres (39 hectares) of previously cultivated fields that had been recently plowed and disked in advance of fieldwork in order to provide good ground surface visibility (Photograph 6-1, see Figure 6-1).



***Photograph 6-1. View of Pedestrian Ground Survey in Area 6, Section 5, Facing East***

Archaeologists systematically walked these fields along transects spaced at 5-meter intervals. Diagnostic artifacts and a representative sample of nondiagnostic artifacts observed on the surface were plotted on project maps, bagged, and provenienced (Photograph 6-2). Widely dispersed surface artifacts were individually point provenienced. Concentrations of surface artifacts were provenienced within 5-meter surface collection units. Judgmental STPs were



excavated in select localities within these fields to document soil stratigraphy and assess the presence of subplowzone cultural deposits.

***Photograph 6-2. View of Surface Collection in West Alternative, Section 7, Facing North***

Shovel testing was required in approximately 215 acres (87 hectares) of upland fields and woodlands with poor ground surface visibility (Photographs 6-3 and 6-4) (see Figure 6-1). Systematic STPs were excavated at 15-meter (50 foot) intervals within transects spaced 15 meters (50 feet) apart. Judgmental STPs were excavated in select areas to confirm the presence of cultural artifacts, disturbed soils or recent deposits. When a shovel test yielded artifacts, radial STPs were excavated at 5-meter (15-foot) intervals around the initial positive findspot in order to investigate the locality further. In areas of standing structures or archaeological sites, 5-meter (15-foot) interval shovel testing was conducted, where appropriate, to assist in evaluating the resource and to



define site boundaries. GAI excavated 3,491 STPs in upland settings within the Initial Phase Ib APE.



**Photograph 6-3. View of Shovel Testing in West Alternative, Section 31 (Site 10), Facing Southeast**

**Photograph 6-4. View of Shovel Testing in Woodlands, West Alternative, Facing North**



STPs measured 50 cm in diameter and were hand-excavated in natural strata to at least 10 cm into the subsoil and 10 cm below the deepest artifact recovery. Excavated soils were screened through 0.25-in (0.6-cm) wire mesh for systematic artifact recovery. Prehistoric and historic artifacts recovered during survey were bagged and labeled with appropriate provenience information. GAI archaeologists recorded results of individual STPs on standardized field forms, noting depths of soil horizons, soil texture and Munsell color, and the presence of artifacts. STP locations were recorded on project maps and were backfilled upon completion.

Identified archaeological resources were recorded on standardized forms, plotted on maps, documented with photographs, and their locations were recorded using mapping grade GPS equipment.

#### **Lowland Settings**

Based on the results of Phase Ia reconnaissance, moderate to high potential portions of the project APE in low terrace/floodplain settings (Area 7 and portions of Area 6) were determined to have a potential for both near-surface and deeply-buried archaeological sites. Phone consultation with Steve McDougal (PHMC-BHP) on April 8, 2008, resulted in PHMC-BHP's



concurrence on restricting deep testing to evaluate the potential for deeply-buried archaeological resources to those localities with proposed deep project impacts (i.e., Area 6 floodplain). Due to anticipated shallow impacts resulting from proposed use as a laydown area [personal communication, phone conference with Mark Hunter (UniStar), February 2, 2008; (Document 38-9090613-000)], deep testing was not required in portions of the low terrace/floodplain within Area 7.

In addition to this subsurface testing, GAI documented portions of the previously-recorded North Branch Pennsylvania Canal (141673/GAI-10) located within Areas 6 and 7. In portions of the canal that contain water (e.g., Area 6) GAI recorded the canal with digital photographs. In Area 7, where the canal bed was dry, documentation included both photography and a measured drawing of the canal in cross section. A description of the canal, along with this cross-section, is provided in the architectural survey section of this document (Chapter 20).

#### ***Near-Surface Testing***

Low terrace/floodplain settings with proposed shallow project impacts were investigated by pedestrian ground survey or systematic shovel testing to evaluate the presence of near-surface archaeological resources. Approximately 18 acres (7 hectares) of recently plowed and disked low terrace/floodplain fields with good ground surface visibility (Area 7, Sections 1 and 2) were subject to pedestrian ground survey (see Figure 6-1). Judgmental STPs were excavated in select locations within these fields. Systematic shovel testing was conducted in approximately 13 acres (5 hectares) of poor ground surface visibility within the shallow-impact, low terrace/floodplain settings (Area 7, Sections 3 and 4). STPs in these lowland settings were excavated to a depth of 80 cm below ground surface. GAI excavated 298 STPs in low terrace/floodplain portions of the project.

#### ***Deep Testing***

Deep testing was proposed for portions of Area 6 (Sections 1 and 2), which are expected to be subject to deep impacts from proposed construction of a new intake structure and blow down lines [personal communication, phone conference with Mark Hunter (UniStar), February 2, 2008; (Document 38-9090613-000)]. Deep testing was monitored by Dr. David Cremeens, GAI's Senior Staff Soil Scientist, during site visits in May, June and July 2008. The objective of this testing was to evaluate the potential for deeply-buried cultural resources and determine the depth to Pleistocene deposits in these localities. In Section 1, deep testing was conducted by a combination of backhoe trenching (and soil coring with a drill rig in Section 1, followed by hand-screening of 1x1-meter test unit column samples (Photograph 6-5). In Section 2, initial



hand-augering revealed a shallow depth to bedrock (ranging from 42 to 78 cm), unexpected based on topography and on the earlier reconnaissance. The documentation of shallow bedrock negated the need for deep testing in this section and, accordingly, Section 2 was investigated by shovel testing (see Figure 6-1).

***Photograph 6-5. Overview of Area 6 (Section 1) showing Open Field on Low Terrace/Floodplain Subject to Deep Testing, Facing South***

## Results of Initial Phase Ib Fieldwork

Phase Ib survey of the Initial BBNPP project area consisted of pedestrian ground survey of 114 acres (46 hectares) of cultivated fields, the excavation of 3,789 STPs, and a program of deep testing (eleven trenches, soil corings, and eight test unit column samples) in a low terrace/floodplain field.

The survey resulted in the identification of eleven archaeological sites (three prehistoric and eight historic) and 25 prehistoric isolated finds, as well as dispersed historic/modern surface artifacts representing non-site field scatters. Table 6-3 presents a summary of Phase Ib survey results by testing location (for both Initial and Supplemental Phase Ib survey). The locations of the eleven identified archaeological sites (Sites 36LU278, 36LU279, 36LU280, 36LU281, 36LU282, 36LU283, 36LU284, 36LU285, 36LU286, 36LU287, and 36LU288) are illustrated on Figure 6-1. The sections below describe field investigations within each of the initial Phase Ib test areas.

**Table 6-3. Summary of Phase Ib Archaeological Survey Results by Testing Location**

Testing Location	Pedestrian Survey*	# STPs/ Other	# Pos. STPs	Sites	Isolated Finds
<b>INITIAL Phase Ib</b>					
<b>West Alternative</b>					
1	X	4	0	36LU278	IF 1 IF 24 IF 25 IF 27
2	X	4	0	--	--
3	X	4	0	36LU282	IF 6 IF 7 IF 8 IF 9
4	X	4	0	--	--
5	X	4	0	--	--
6	X	4	1	--	IF 2 IF 3 IF 4 IF 5 IF 10
7	X	3	1	36LU279	IF 11 IF 12 IF 14
8	X	3	0	--	--
9	X	4	0	--	--
10	X	4	1	--	--
11	X	4	0	--	--
12	X	3	0	--	IF 15
13	X	4	1	36LU280	--
14	X	4	1	36LU281	--
15	X	4	0	--	--
16	--	417	2	--	--
17	--	201	9	36LU285	IF 22
18	--	392	2	--	--
19	--	117	0	--	--
20	--	111	0	--	--
21	--	115	2	36LU287	--
22	--	140	2	--	--
23	--	229	0	--	--

Testing Location	Pedestrian Survey*	# STPs/ Other	# Pos. STPs	Sites	Isolated Finds
24	--	54	0	--	--
27	--	218	0	--	--
28	--	15	0	--	--
29	--	43	2	--	IF 25
30	--	117	40	36LU283	--
31	--	59	18	36LU286	--
<i>Subtotal</i>	<i>15 sections</i>	<i>2285</i>	<i>53</i>	<i>9</i>	<i>19</i>
<b>Confers Lane</b>					
25	--	70	0	--	--
26	--	195	31	36LU284	--
<i>Subtotal</i>	<i>--</i>	<i>265</i>	<i>31</i>	<i>1</i>	<i>0</i>
<b>Area 6</b>					
1	--	Deep Testing (11 trenches/ 8 units)	0	--	--
2	--	29	0	--	--
3	X	3	0	--	IF 16
4	--	449	4	--	--
5	--	232	4	--	--
<i>Subtotal</i>	<i>1 section</i>	<i>713</i>	<i>8</i>	<i>0</i>	<i>1</i>
<b>Area 7</b>					
1	X	8	1	--	IF 17 IF 18 IF 19 IF 20 IF 21
2	X	134	13	36LU288	--
3	--	58	3	--	--
4	--	69	6	--	--
<i>Subtotal</i>	<i>2 sections</i>	<i>269</i>	<i>23</i>	<i>1</i>	<i>5</i>
<b>Area 8</b>					
	--	0	0	--	--
<b>Switchyard 2</b>					
	--	257	0	--	--
<b>Total Initial Phase Ib</b>	<b>18 sections/ 114 acres</b>	<b>3,789 STPs plus deep testing</b>	<b>115</b>	<b>11 sites</b>	<b>25 IFs</b>
<b>SUPPLEMENTAL Phase Ib</b>					
<b>Lot 4</b>					
1	--	81	0	--	--
2	--	12	0	--	--
3	--	157	0	--	--
<i>Subtotal</i>	<i>--</i>	<i>250</i>	<i>0</i>	<i>--</i>	<i>--</i>
<b>Lot 64</b>					
1	--	114	0	--	--
<b>Lot 93F</b>					
1	--	79	0	--	--
<b>Lot 95</b>					
1	--	424	0	--	--
2	--	226	2	--	--
3	--	18	0	--	--
<i>Subtotal</i>	<i>--</i>	<i>668</i>	<i>2</i>	<i>--</i>	<i>--</i>
<b>Lot 96</b>					
1	--	19	0	--	--
<b>Lot 97/97C</b>					
1	--	18	0	--	--



Testing Location	Pedestrian Survey*	# STPs/ Other	# Pos. STPs	Sites	Isolated Finds
<b>Lot 100</b>				--	--
1	--	492	2	--	--
2	--	297	0	--	--
<i>Subtotal</i>		789	2	--	--
<i>Total Supplemental Phase Ib</i>		<b>1,937</b>	4	0 sites	0 IFs
<b>Total Phase Ib</b>	<b>18 sections/ 114 acres</b>	<b>5,726</b>	<b>119</b>	<b>11 sites</b>	<b>25 IFs</b>

\*X=systematic pedestrian ground survey was conducted in section

### West Alternative

The West Alternative, the largest contiguous test area in the project APE, consists of a 408-acre upland parcel located at the western margin of the project (see Figures 1-2 and 1-3). It is bounded generally by Beach Grove Road to the south, North Market Street to the west, and Confers Lane to the east.

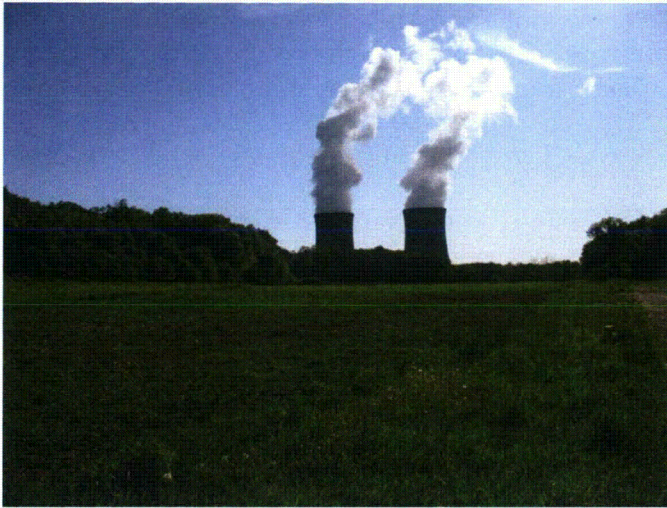
The West Alternative encompasses broad, relatively-level, upland flats, as well as low wetlands, and hilltops with gentle to moderately-steep side slopes and previously disturbed areas. Large cultivated fields occur on the relatively well drained upland flats (Photographs 6-6 and 6-7).

**Photograph 6-6. Overview of Broad Upland Fields in West Alternative (Sections 9 and 10), Facing Northeast**



Woodlands are located within areas of higher elevation bordering the fields and in wetland areas. An abandoned apple orchard is situated on the hilltop and side slopes in the west central portion of this test area. Walker Run flows through the western edge of this test area and wetlands associated with this stream have been mapped in a large area of fallow fields and woodlands in the southwest quadrant of the West Alternative; wooded wetlands also occur along tributaries extending through the central and northern portions of this parcel. The northeast corner of this test area (west of the intersection of Confers Lane and Beach Grove Road) has been extensively disturbed by former cut and fill activities associated with construction of the existing SSES facility; this disturbed area currently includes buildings, parking areas, and fallow fields. A transmission corridor extends in a northwest/southeast orientation through the northern portion of the West Alternative and connects with the SSES facility.





**Photograph 6-7. Overview of Cultivated Fields in West Alternative (Sections 3-6), Facing West**

GAI defined and surveyed 29 separate test sections (Sections 1-24 and 27-31) within the West Alternative (see Figure 1-3). These include 26 sections of moderate to high archaeological, as well as three sections (Sections 10, 11 and 28) that were assessed with low archaeological potential during the Phase Ia reconnaissance. Based on detailed field observations during the course of Phase Ib fieldwork, GAI

concluded that Phase Ib survey could be conducted within Sections 10 and 11, comprising eroded fields, and within Section 28, a small, relatively well drained, wooded area between Confers Lane and a wetland. In addition, Phase Ib survey was expanded to include a band of low archaeological potential bordering Sections 16, 18 and 23, as it was concluded that areas of wetlands and steep slopes within in this band were discontinuous in nature (see Figure 6-1).

Of the 29 separate test sections, fifteen (Sections 1-15) represent recently cultivated fields and eleven (Sections 19-28 and 30) are wooded. Section 16 includes woodlands and a fallow field; Sections 17 and 29 encompass fallow fields; and Section 18 consists largely of an abandoned apple orchard. Section 31, situated in the western portion of the West Alternative, represents the location of a former farmstead (the Kisner Site/36LU286) located in an open area at the edge of a cultivated field.

During Phase Ib survey, GAI excavated 2,285 STPs and conducted pedestrian ground survey of 85 acres of recently cultivated fields (Sections 1-15) in the West Alternative (see Figure 6-1, see Table 6-3). This work resulted in the identification of nine archaeological sites and 19 Isolated Finds. These sites include seven historic period sites (36LU279, 36LU280, 36LU281, 36LU283/Sink Site, 36LU285/Johnson-Folk Barn Site, 36LU286/Kisner Site, and 36LU287) and two prehistoric lithic scatters (36LU278 and 36LU282) (see Figure 6-1, see Table 6-4). The historic period sites include six domestic sites or farmsteads and one historic artifact scatter. They are located in proximity to roadways (Confers Lane, North Market Street, Beach Grove Road or farm lanes) in the southeast, west and northern portions of the West Alternative. The two prehistoric lithic scatters represent low density surface artifact scatters identified during pedestrian ground survey of cultivated fields in the western portion of the West Alternative (Sections 1 and 3). These sites are summarized at the end of this chapter and are described in individual site chapters (Chapters 9-14 and 16-18).

#### ***Confers Lane Parcel***

The Confers Lane Parcel is a 27.4-acre upland area flanking the east edge of Confers Lane, immediately opposite the West Alternative (see Figures 1-2 and 1-3). It is bordered by the existing SSES facility to the north and east, Confers Lane to the west, and a pond and wetland to the south. This parcel includes woodlands and areas of open, overgrown clearings. It is relatively level, with a steep wooded slope associated with the adjacent SSES facility in its extreme northeast corner. An area of construction disturbance is located in the center of the



parcel and a building and parking lot lie near its northern edge. Wooded wetlands occur in the northern portion as well as at the southern edge of this area (where a pond is also located). A narrow paved access land extends southeast from Confers Lane to a clearing near the south central portion of this test area (Photograph 6-8).



**Photograph 6-8. Confers Lane Parcel showing Paved Access Road and Woodlands, Facing Southeast**

GAI identified and conducted shovel testing in two areas of moderate to high archaeological potential in the Confers Lane Parcel (Sections 25 and 26) (see Figure 6-1). (Note that these sections were numbered and surveyed in conjunction with survey of the West Alternative.) A total of 265 STPs were excavated within this parcel, resulting in

the identification of one historic period archaeological site (36LU284/Shortz Site) (see Table 6-3). This domestic site is located in the southern, wooded portion of the parcel (Section 26) and includes a brick well/cistern and a shallow surface depression, possibly representing the location of a former structure.

#### **Area 6**

Area 6 is a 103.1-acre parcel that encompasses both upland settings immediately south and east of the SSES facility and low terrace/floodplain settings along the river, east of US Route 11 (see Figures 1-2 and 1-3). The upland portion of Area 6 includes a transmission corridor extending southward from the SSES facility to US Route 11, as well as a cultivated field, a fallow field, and woodlands to the southeast and east of the plant (Photograph 6-9).



**Photograph 6-9. Upland Portion of Area 6 showing Pedestrian Ground Survey of Cultivated Field (Section 3) with Disturbance to the South and Transmission Line and Switchyard in Background, Facing West**

The edge of Area 6 bordering the plant has been disturbed by prior construction. The low terrace/floodplain portion of Area 6 includes an open grassy field, adjacent to the river, woodlands, wetlands, and areas of disturbance resulting from construction of the existing SSES intake structure. This lowland area is cut by three north/south oriented linear

resources—US Route 11 (155056/GAI-12), the Delaware, Lackawanna & Western Railway (155053/GAI-11), and the North Branch Pennsylvania Canal (141673/GAI-10). All three of these architectural resources were documented during GAI's architectural survey of the project area; only one resource, the North Branch Pennsylvania Canal, has been recommended eligible for listing in the NRHP (see discussion in Chapter 20 of this document).

GAI defined five localities of moderate to high archaeological potential within Area 6 (Sections 1-5) (see Figure 1-3). Sections 1 (open, overgrown field) and 2 (woodland) are situated in the eastern, lowland portion of this test area. Sections 3-5 occur in upland settings and include one recently cultivated field (Section 3), one largely overgrown transmission line corridor (Section 4), and one fallow field and adjacent woodland (Section 5). Section 4, representing the transmission line corridor, included a 6.8 acre (2.7 hectare) portion of a cultivated field for which access had not been obtained at the time of initial Phase Ib fieldwork; this "stay-off" property was surveyed during the course of subsequent Supplemental Phase Ib investigations, following receipt of property access.

Phase Ib investigations consisted of the excavation of 713 STPs, pedestrian ground survey of one approximately 11-acre cultivated field (Section 3) and deep testing in Section 1, open field adjacent to the river and south of the existing intake structure (see Figure 6-1, see Table 6-3). These investigations identified one Isolated Find (IF/16) in Section 3.

The stone walls (GAI-02) observed in Area 6, Section 5 during Phase Ia reconnaissance were documented by GAI's architectural survey. Phase Ib shovel testing was also conducted in the vicinity of these walls and this work yielded no artifacts or further evidence of structural remains. No archaeological site was identified in this locality. These parallel stone walls likely represent a boundary marker and were determined by PHMC-BHP to be not eligible for listing in the NRHP (June 5, 2008 letter, see Appendix A). No further investigation of this resource is required.

Area 6, Section 1 consists of an approximately 8-acre (3.2-hectare) fallow field adjacent to the Susquehanna River. It has a mounded surface topography, with the highest elevation in its south-central portion. This field was vegetated in tall grass and brush and was bordered by a screen of trees to the east, along the riverbank, and by wooded wetlands to the north, south and west. The North Branch Pennsylvania Canal lies within the wetland area west of the field and an unnamed drainage marks its northern end. Eleven trenches (six with soil corings in their base) were mechanically excavated (using a trackhoe) to expose soil stratigraphy and permit an assessment of the locality's potential for deeply-buried cultural deposits (Figure 6-2). Soil profiles were recorded for each backhoe trench and are provided in Appendix G.

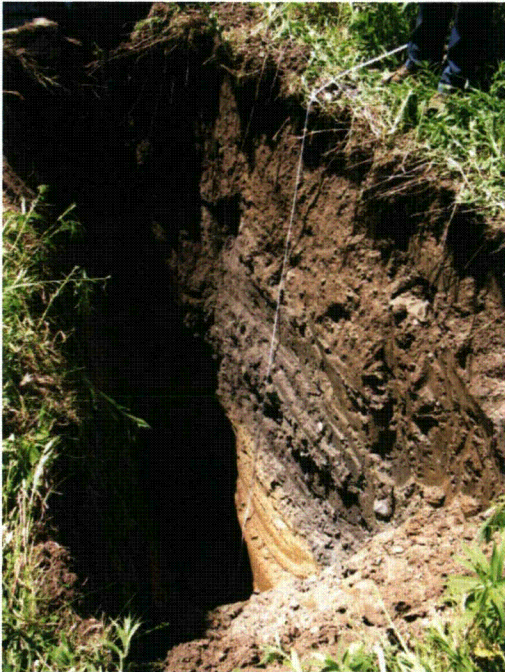
Deep testing began with the excavation of five initial trenches (BHTs 1-5), placed in a staggered north-south transect across the field, and extending to a maximum depth of a 4.2 meters (13.8 feet) or, in one trench, to bedrock (encountered at 1.2 meters/3.9 feet below surface) (Photographs 6-10 and 6-11). These trenches exposed an unanticipated 1.0 to 4.0-meter- (3.3 to 13.1-foot) thick surface fill deposit above natural soils.

Because of the depth necessary to expose natural soils and evaluate the depth of Pleistocene deposits, a second set of six trenches (Trenches 6-11) was excavated approximately 1.0 to 2.0 meters (3 to 7 feet) into the fill and a track-mounted drill rig was used to collect a continuous sample soil core in the base of each trench (see Figure 6-2, Photograph 6-12). Cores were collected to a maximum depth of 8.5 meters (27.9 feet) below ground surface. As documented in the soil borings, the natural soils underlying the surface fill deposit consisted of a single soil profile [Ab-(BE)-Bt(x)-BC] developed on an alluvial terrace. No buried soils were



observed below the surface of the terrace. Pleistocene deposits were not observed in any of the cores. The depth to bedrock, encountered at the base of the soil borings, ranged from 5.9 to 8.5 meters (19.4 to 27.9 feet).

***Photograph 6-10. Deep Testing in Area 6, Section 1, showing Mechanical Excavation of Trench, Facing South***



***Photograph 6-11. Deep Testing in Area 6, Section 1, showing Upper Fill Deposit Exposed in Profile of Trench, Facing South***

***Photograph 6-12. Deep Testing in Area 6, Section 1, showing Drill Rig Excavating a Soil Coring in Base of Trench, Facing North***





Based on the results of a June 19, 2008 phone consultation with Steve McDougal (PHMC-BHP), natural soils below the surface fill were sampled with eight mechanically-excavated 1x1-m test unit column samples (TUs 1-8). These eight test localities were situated along a proposed 30-meter (100-foot)-wide right-of-way corridor extending north-south through the central portion of the field, and then turning eastward to continue to the riverbank [personal communication, phone conference with Michael Cain (PPL), June 16, 2008 (Document 38-9090613-000)] (see Figure 6-2). In each location, a trackhoe was first used to excavate a trench through the fill and into the underlying natural soils. A unit was positioned along the side of the excavated trench. At each test location, the approximately 4.0-meter (13-foot)-thick surface fill deposit was mechanically removed as a single layer and the 1x1-meter (3x3-foot) column sample was then mechanically-excavated in 20-cm (8-inch) levels from the lower portion of the fill deposit to the BC horizon or bedrock (approximately 1 meter/3 feet of excavation). Soils from each 20-cm (8-inch) level were placed on plastic sheeting in separate, labeled piles, adjacent to the trench (see Photograph 6-13). Soils from each level were hand-screened and recovered artifacts were bagged by provenience. Standardized excavation forms were completed for each level. A profile was drawn of one wall of each unit. Soil

profiles were recorded for each test unit column sample and are presented in Appendix G. Following the completion of hand-screening, each test location was mechanically backfilled. Due to the unconsolidated nature of the thick, surface fill layer, many of these units experience slumping prior to backfilling.



**Photograph 6-13. Site 36LU288: Area 6, Section 1, Mechanically Excavated Piles of Soil from TU 7 Column Sample**

The Phase Ib program of deep testing in Area 6, Section 1 identified no archaeological sites. Importantly, deep testing determined that this field is capped by up to 4.2 meters (13.8 feet) of fill material. Scattered historic/modern artifacts were recovered from fill deposits and the upper portion of the former ground surface (now buried by up to 4.2 meters/13.8 feet of fill) in trenches and column samples. Two prehistoric artifacts (one early stage biface fragment and one piece of debitage) were also found in a fill deposit immediately above shallow bedrock (Test Unit 3). Due to their disturbed context, these artifacts do not represent historic or prehistoric archaeological sites and were recorded as non-site materials (see Non-site Artifact Catalog in Appendix H). Additionally, deep testing documented no buried soils below the single ground surface lying between the surface fill deposit and the top of bedrock. Many of the soil corings exposed Cg horizons suggesting the presence of marshy or swampy conditions in the area, perhaps associated with an abandoned stream channel. These deposits do not represent a dry land surface that was stable for any period of time. The results of deep testing indicate that any cultural resources found in Area 6, Section 1 are expected to be associated with the natural soil (Ab-Bxb-BC) found immediately below the fill mantle. Based on the presence of a weakly-developed fragipan (Bx) subsoil, the age of the

low terrace landform in Area 6, Section 1 is estimated to date to the mid-Holocene (4000 to 6000 years old).

#### **Area 7**

Area 7 represents a low terrace/floodplain setting along the west bank of the river, in the northeastern corner of the project APE (see Figures 1-2 and 1-3). The North Branch Pennsylvania Canal (141673/GAI-10) extends through the western portion of this 27.8-acre (11.3-hectare) test area, separating a fallow field and woodland to the west from two large, adjacent cultivated fields to the east. A narrow paved access road for the Susquehanna Riverlands Environmental Preserve bounds the southern edge of Area 7, near its southwest corner. All of Area 7 was considered to have a moderate to high archaeological potential.

Four test sections (Sections 1-4) were identified and surveyed in Area 7 during Phase Ib investigations (see Figure 1-2). Sections 1 and 2 represent cultivated fields (Photograph 6-14), while Sections 3 and 4 consist of a fallow field and a wooded lot, respectively. As noted above, although this lowland setting has a potential for both near-surface and deeply buried cultural materials, due to the shallow nature of proposed project impacts, no deep testing was required (see Figure 6-1).



**Photograph 6-14. View of Area 7 (Section 1) showing Cultivated Field on Low Terrace/Floodplain, Facing Northeast**

Phase Ib survey of Area 7 included excavation of 269 STPs and pedestrian ground survey of 18 acres of cultivated fields (Sections 1 and 2) (see Table 6-3). This work resulted in the identification of one prehistoric archaeological site (36LU288) in Section 1 and five prehistoric Isolated Finds (IFs 17-21) in Section 2. Based on Phase Ib results, Site 36LU288 represents a low density, multicomponent prehistoric lithic scatter. This site is summarized below and a site description is presented in Chapter 19.

A possible archaeological site (house site), suggested by a clearing with evergreen trees, was mapped in Area 7 (Section 4) during Phase Ia reconnaissance of the project. Phase Ib shovel testing in this locality produced no artifacts and uncovered no evidence of structural remains or features. Furthermore, historic map research indicates no structure in this locality. Accordingly, this locality does not represent an archaeological.

The majority of the North Branch Pennsylvania Canal (141673/GAI-10) located in Area 7 consists of a dry canal bed, overgrown with vegetation (Photograph 6-15). The canal prism at the southernmost edge of Area 7 retains shallow water, while directly south of the paved access road, the portion of the canal within the Susquehanna Riverlands Environmental Preserve is fully watered. During Phase Ib survey, GAI documented the canal with photographs and also recorded a cross section of the canal with a measured drawing. A



description of the canal, along with this cross section, is provided in the Architectural Survey section of this document (Chapter 20).

**Photograph 6-15. View of North Branch Pennsylvania Canal in Area 7 showing Dry Canal Prism, Facing Southwest**



#### **Area 8**

Area 8 comprises a narrow rail spur corridor extending northeastward from the upland portion of the SSES facility to join the railway on the low terrace/floodplain, near the PPL Susquehanna Energy Information Center (see Figures 1-2 and 1-3). This entire 6.1 acre area has been subject to previous disturbance associated with railway construction and development of the existing power plant (see Figure 6-1). No Phase Ib investigations were conducted within this locality.

#### **Switchyard 2**

Switchyard 2 is a 39-acre upland parcel located north of Beach Grove, opposite the intersection of Confers Lane and Beach Grove Road, which marks the boundary between the project's West Alternative and the existing SSES facility (Figures 1-2 and 1-3). Switchyard 2 is bisected by a northwest/southeast oriented transmission corridor (Photograph 6-16). The southern portion of this test area occupies a steep wooded hillside, while its northern portion lies on a relatively level to gently sloping, wooded hilltop.



GAI conducted Phase Ib shovel testing within the largely wooded hilltop (Section 1) in the northern portion of Switchyard 2 (see Figure 6-1). The 257 STPs excavated in this locality produced no artifacts and resulted in the identification of no archaeological sites (see Table 6-3).

**Photograph 6-16. Switchyard 2 showing Shovel Testing in Transmission Line Corridor, Facing Southwest**



## Supplemental Phase Ib Archaeological Survey

### Description and Archaeological Potential

Supplemental Phase Ib survey was conducted of approximately 263 acres (106 hectares) of new project localities added subsequent to completion of the Initial Phase Ib survey in July 2008. The supplemental project area consisted of seven lots (Lots 4, 64, 93F, 95, 96, 97/97C, and 100) located in upland settings south and west of the initial project area (see Figure 1-2, Photographs 6-17 and 6-18). Six of seven lots in the Supplemental Phase Ib APE were situated south of Area 6 and the existing SSES facility, while one lot (Lot 4) occurred at the northwest corner of the project's West Alternative. These lots varied from large cultivated fields (e.g., Lot 100) to small residential parcels (e.g., Lots 96 and 97/97C). Supplemental Phase Ib field archaeological fieldwork of these new project localities was conducted primarily

between August 5 and September 11, 2008, with a return field visit on November 13, 2008 to survey one initial stay-off property (Lot 97/97C).



**Photograph 6-17. Overview of Project Area in Cornfield, Lot 100, Facing North**



**Photograph 6-18. Overview of Project Area in Fallow Field, Lot 4, Facing South**

GAI evaluated archaeological potential within the Supplemental Phase Ib APE based on a review of project mapping, the results of previous background research, and observations and evaluations of adjacent parcels during Phase Ia and Phase Ib investigations of the initial BBNPP project area (see Figure 1-3). Based on these data, undisturbed, relatively level, well-

drained portions of the project area were considered to have a moderate to high potential for prehistoric and historic archaeological resources, requiring a Phase Ib archaeological survey to identify sites. Portions of the project area characterized by wetlands or slopes in excess of 15 percent were considered to have a low archaeological potential. These areas would not require systematic testing during Phase Ib investigations. Disturbed localities were determined to have no archaeological potential and were excluded from further investigation. Due to the upland setting of the project APE, archaeological sites were anticipated to be near-surface in nature; the project area has no potential for deeply buried sites.

GAI's August 6, 2008, Supplemental Phase Ib Scope of Work (see Appendix B) was based on project mapping (BBNPP, Wetland Impact Plan, Current Design, Sargent & Lundy, 6/26/08) provided by Peter Gluckler (AREVA) on July 1, 2008 (AREVA Document 38-9079793-002, AREVA Document 38-9080315-001, and AREVA Document 38-9084011-001) and on instructions from Peter Vlad (UniStar) (July 16, 2008, email). The scope estimated that the Supplemental Phase Ib APE comprised 235 acres (95 hectares) consisting of approximately 197 acres (80 hectares) of moderate to high archaeological potential, 30 acres (12 hectares) of low potential, and 8 acres (3 hectares) of disturbance/no potential. Estimates of both project size and archaeological potential were revised during the course of Phase Ib fieldwork. As directed by representatives of AREVA and UniStar [Chuck Thompson (Kleinfelder), August 18, 2008, personal communication, and Peter Gluckler (AREVA), September 2, 2008, email—AREVA Document 38-9079793-002, AREVA Document 38-9080315-001, and AREVA Document 38-9084011-001], the project APE was expanded to include Lot 93F and the southern portion of Lot 95, resulting in a total Supplemental Phase Ib project APE of 262.6 acres (106.3 hectares).

Assessments of archaeological potential were refined based on detailed, on-the-ground field observations made during the course of Phase Ib fieldwork (i.e., recent quarrying and topsoil removal disturbances in Lots 64 and 100) as well as the results of a wetlands survey conducted by Normandeau Associates (AREVA Document 38-9092360-000), which delineated additional wetland localities (characterized by low archaeological potential) within the supplemental project APE (i.e., in Lots 64 and 100).

In total, GAI identified 115 acres (46.5 hectares) of moderate to high archaeological potential within the 263-acre (106-hectare) project APE (see Table 6-3) requiring systematic Phase Ib survey (see Table 6-2). Also investigated during the course of fieldwork was one 6.8-acre (2.75-hectare) stay-off property defined during Initial Phase Ib as part of Area 6, Section 4 (transmission corridor). This parcel was tested along with Lot 100, Section 1, but its acreage is included in the Initial Phase Ib APE.

GAI defined test sections within each lot, representing separate areas of moderate to high archaeological. Test sections were numbered sequentially within each lot (i.e., Lot 4: Sections 1-3; Lot 64: Section 1; Lot 93F: Section 1; Lot 95: Sections 1-3; Lot 96: Section 1; and Lot 100: Section 1-2) (see Figure 1-3). A summary of Supplemental Phase Ib survey results by test section is presented in Table 6-3.

Also included within the footprint of the Supplemental Phase Ib project area are seven architectural and historical resources mapped during GAI's architectural survey for the current project (Table 6-4). These seven resources include one resource (Stone Arch Bridge; 155054/GAI-06) recommended as eligible to the NRHP (see discussion in Chapter 20). Three of these seven GAI-surveyed architectural and historical resources are located in Lot 4. Lots 64, 93F/95, 96 and 100 each contain a single resource.



**Table 6-4. GAI-Surveyed Architectural Resources within Supplemental Phase Ib APE**

Resource Number	Name	Address	Resource Type	Date	NRHP Recommendation	Location within APE
155059 (GAI-05)	Hummel Farmstead	371 Beach Grove Rd, Salem Twp.	Farmstead	c1890	Not Eligible	Lot 4
155054 (GAI-06)	Stone Arch Bridge	Beach Grove Rd. at Stone Church Rd., Salem Twp.	Bridge	c1935	Potentially Eligible, Criterion C	Lot 4
155056 (GAI-12)	Susquehanna and Tioga Turnpike	US Rt. 11, Salem Twp.	Highway	1807-1810	Not Eligible*	Lot 93F Lot 95
155061 (GAI-14)	House	49 Bell Bend Rd., Salem Twp.	House	c1875	Not Eligible	Lot 64
GAI-15	House	65 Bell Bend Rd., Salem Twp.	House	c1880	Not Eligible	Lot 100
GAI-24	House	1069 Salem Blvd., Salem Twp.	House	c1925	Not Eligible	Lot 96
GAI-52 (135820)	Bridge	N. Market St., Salem Twp.	Bridge	1937	Not Eligible	Lot 4

\*Initially recommended Eligible by GAI but determined Not Eligible by PHMC-BHP

#### Supplemental Phase Ib Field Methods

Due to poor ground surface visibility throughout localities of moderate to high archaeological potential in the Supplemental Phase Ib project APE, systematic shovel testing was required within all test sections (see Figure 6-1). Previously cultivated fields (whether fallow or planted in corn) could not be plowed and disked, accordingly, pedestrian ground survey of these areas could not be conducted.

At the time of fieldwork, the majority of cultivated fields in the project APE were planted in corn, which reached heights of 2.4 to 3.0 meters (8 to 10 feet). Due to the unanticipated density of these cornfields, it was necessary to first clear transects through the cornfields to permit access for subsequent shovel testing (Photograph 6-19). Beginning with Lot 100, GAI archaeologists initially attempted to hand-clear transects using machetes. When this process proved too time-consuming, and potentially dangerous, a bobcat with a brush hog attachment was employed to clear these transects mechanically (Photograph 6-20). Cleared transects were spaced at 15-meter (50-foot) intervals; they averaged 1.5 meters (5 feet) in width and extended for the length of the field. GAI archaeologists used a compass to help the machine operator maintain each transect's orientation during mechanical clearing. Following completion of clearing activities, shovel testing was conducted within these transects. Shovel test pits were excavated as described for initial Phase Ib survey above.

***Photograph 6-19. Hand-Clearing of  
Densely-Planted Corn in Lot 100, Facing  
North***



***Photograph 6-20. Machine-Clearing of  
Transect through Cornfield in Lot 100,  
Facing North***

#### Results of Supplemental Phase Ib Fieldwork

GAI's Phase Ib survey of the Supplemental BBNPP project area involved the excavation of 1,937 STPs (see Table 6-3). Only four of these STPs were positive, producing just four historic artifacts (3 fragments of glass and 1 ceramic sherd). These artifacts represent field scatters or roadway scatters. No archaeological sites or isolated finds were identified within the project APE. Table 6-3 presents a summary of Phase Ib survey results by testing location. A brief description of testing within each lot is provided below.

##### ***Lot 4***

Lot 4 is located at the northwest corner of the project's West Alternative, at the intersection of Beach Grove Road and North Market Street (see Figures 1-2 and 1-3). It encompasses steep wooded hillsides to the north of Beach Grove Road and woodlands, open fallow fields, and wetlands to the south of Beach Grove Road (Photograph 6-21). Walker Run bisects the western half of this lot. As indicated in Table 6-4, Lot 4 contains three architectural resources [155059 (GAI-05), 155054 (GAI-06) and 135820 (GAI-52)] recorded during GAI's architectural



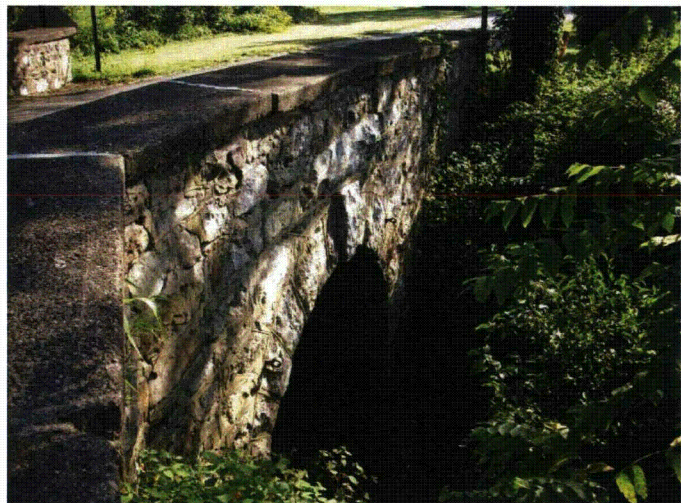
survey for the current project (Munford and Tuk 2008). The Hummell Farmstead (155059/GAI-05) is located north of the roadway intersection (Photograph 6-22). The farmstead's yard was disturbed by landscaping and not subject to shovel testing. The stone arch bridge (155054/GAI-06) (Photograph 6-23) and the concrete bridge (135820/GAI-52) both span Walker Run in this area. Of these three resources, only the stone arch bridge (155054/GAI-06) is recommended as potentially eligible for listing in the NRHP (see Table 6-4). A discussion of these resources is provided in Chapter 20 of this document and an Updated PHRS form for 155054 (GAI-06) is included in Appendix E.



***Photograph 6-21. Lot 4, Section 1, showing Overgrown Fallow Field, Facing Northeast***



***Photograph 6-22. Lot 4, View of Hummel Farmstead (155059/GAI-05) from North Market Street, Facing North***



***Photograph 6-23. Lot 4, Stone Arch Bridge (155054/GAI-06), Facing Northeast***



GAI conducted Phase Ib survey in three localities (Sections 1-3) within Lot 4 (see Figure 6-1). Section 1 consists of an overgrown fallow field located southeast of the intersection of Beach Grove Rd and North Market Street (see Photograph 6-21). A garage sits adjacent to the roadway intersection. Section 2 represents a small wooded hilltop in the southeast corner of Lot 4. Section 3, situated in the southwest corner of Lot 4, includes an overgrown fallow field (to the east) and woodland (to the west).

GAI excavated 250 STPs in Lot 4 (see Table 6-3). This work produced no artifacts and identified no archaeological sites.

#### **Lot 64**

Lot 64 is located in an upland setting along the southern edge of Area 6, east of the transmission corridor (see Figures 1-2 and 1-3). Supplemental Phase Ib shovel testing was conducted in a cornfield (Section 1) in the eastern half of this lot (Photograph 6-24). Disturbances in the western portion of this lot include an active rock quarry and an area of recent topsoil removal, which, according to the landowner, occurred within the past year (personal communication, Mr. Dotzul, August 2008) (Photograph 6-25). The eastern end of the lot consists of wetlands and steep slopes, as well as an area of residential disturbance (along Bell Bend Road). A house (155061/GAI-14) recorded during GAI's architectural survey

and recommended as not eligible to the NRHP, lies within the eastern end of Lot 64 (see Table 6-4).



**Photograph 6-24. Lot 64 showing Disturbed Area of Topsoil Removal in Foreground and Section 1 Cornfield in Distance, Facing East**



**Photograph 6-25. Lot 64 showing Disturbed Area of Recent Topsoil Removal and Rock Quarry in Distance, Facing West**



GAI conducted Phase Ib survey in one large cornfield (Section 1) located in the central portion of Lot 64 (see Figure 6-1). The 114 STPs excavated in this area produced no artifacts and resulted in the identification of no archaeological sites (see Table 6-3).

#### **Lot 93F**

Lot 93F, added to the project area during the course of fieldwork, represents a portion of an existing transmission corridor extending southward from US Route 11 to the railroad tracks (see Figures 1-2 and 1-3). The northern half of this parcel consists of a fallow field vegetated in overgrown grass and brush (Photograph 6-26); the southern half is steeply sloping woodland. The installation of transmission towers, and the construction and use of gravel access roads and several ATV tracks have resulted in limited localized disturbances within this parcel. US Route 11 (also known as the Susquehanna and Tioga Turnpike) (155056/GAI-12), bounding the northern edge of Lot 93F, was recorded during GAI's architectural survey. This roadway was recommended as initially recommended NRHP-eligible, but based on further investigation and PHMC-BHP review comments it has been determined Not Eligible for listing in the NRHP (see Table 6-4, see discussion in Chapter 20).



GAI excavated 79 STPs in the relatively level northern portion of this lot (Section 1) (see Figure 6-1); no artifacts were recovered (see Table 6-3).

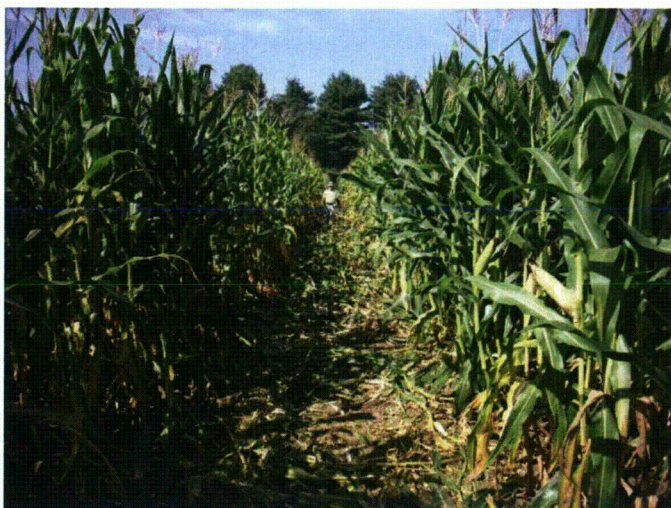
**Photograph 6-26. Lot 93F, Section 1, showing Overgrown Fallow Field within Existing Transmission Corridor, Facing South**

#### **Lot 95**

Lot 95 borders the western edge of the transmission corridor (Area 6) and extends both north and south of US Route 11 (see Figures 1-2 and 1-3). GAI conducted Phase Ib shovel testing in three areas of moderate to high archaeological potential (Sections 1-3) within this upland parcel (see Figure 6-1). The portion of Lot 95 north of U.S. Route 11 consists largely of cornfields (Section 1) (Photograph 6-27), with a wooded wetland along its northern and western edges. A small, relatively well-drained, wooded area (Section 3) lies in the northeast corner. South of the roadway, this parcel encompasses a cornfield and a fallow field (Section 2) (Photograph 6-28). South of these cultivated fields, a steep wooded slope descends to the railroad track. Disturbances within this lot consist of cultivation and field access roads.

US Route 11 (the Susquehanna and Tioga Turnpike) (155056/GAI-12), marks the northern edge of Section 2 (Photograph 6-29). As noted above, this resource was initially recommended as NRHP-eligible but has been determined Not Eligible for listing in the NRHP by PHMC-BHP (see Table 6-4, see discussion in Chapter 20).





***Photograph 6-27. Lot 95, Section 1, showing Shovel Testing in Cleared Transect through Cornfield, Woodland in Distance, Facing West***



***Photograph 6-28. Lot 95, Section 2, showing Shovel Testing in Fallow Field, Facing South***



***Photograph 6-29. Lot 95 showing US Route 11 (Susquehanna and Tioga Turnpike) (155056/GAI-12) at Northern Edge of Section 2 Cornfield, Facing South***



GAI excavated 668 shovel tests in Lot 95 (see Table 6-3). Two positive STPs in Section 2 (cornfield south of U.S. Route 11) each produced a single artifact (1 fragment of glass and 1 historic ceramic). Radial shovel testing in these localities yielded no additional artifacts. These artifacts are concluded to represent modern/historic field or roadway scatter. No archaeological sites were identified in Lot 95.

#### **Lot 96**

Lot 96 is a residential parcel, situated along the north edge of US Route 11, immediately west of the existing transmission corridor (Area 6) (see Figures 1-2 and 1-3, Photograph 6-30). This property contains GAI-24, an architectural resource consisting of three abandoned structures (a circa-1925 dwelling, a garage and a garage/shed) and recommended as not eligible for listing in the NRHP (see Table 6-4, see discussion in Chapter 20). A lawn and a



border of pine trees surround the structures. Disturbances within Lot 96 include residential construction, landscaping, gravel driveways, and the installation and removal of a pool (behind the house). GAI excavated 19 STPs in this area (see Figure 6-1, see Table 6-3). No artifacts were recovered and no archaeological sites were identified in Lot 96.

**Photograph 6-30. Lot 96, Section 1, showing GAI-24 (Abandoned Dwelling and Garage), Facing North**

#### **Lot 97/97C**

Lot 97/97C consists of adjoining residential parcels situated north of Route 11, immediately west of Lot 96 (see Figures 1-2 and 1-3). A dwelling, less than 50 years of age, is located on this lot (Photograph 6-31). Due to lack of property access, Lot 97/97C was not investigated during the August through September fieldwork. Following notification that property access was granted (November 11, 2008, email from Rick Williamson, AREVA), GAI returned to the project area on November 13, 2008, to survey this parcel. Eighteen STPs were excavated in Lot 97/97C. Shovel testing produced no artifacts and revealed no archaeological sites in this lot (see Table 6-3).



**Photograph 16-31. Lot 97/97C, showing Residence, Facing East**



### **Lot 100**

Lot 100 occupies a broad upland flat south of Lot 64 and the Confers Lane Parcel, and extending eastward from the West Alternative to Bell Bend Road (see Figures 1-2 and 1-3). An existing transmission line corridor (Area 6) bisects its western half. This parcel includes extensive cornfields (Photograph 6-32). Wetlands are located in its northwest corner and along a small drainage crossing its central portion. The eastern end of Lot 100 encompasses an active quarry (Photograph 6-33), steep wooded wetlands, and residential properties.



Disturbances within this lot include cultivation, quarrying, installation of transmission towers, and limited residential-related construction. GAI-15, a residential property recorded during GAI's architectural survey, is located at the eastern end of Lot 100 along Bell Bend Road; this property has been determined Not Eligible for listing in the NRHP (see Table 6-4, see discussion in Chapter 20).

***Photograph 6-32. Lot 100, Section 1, Shovel Test Transect in Cornfield, Facing North***



***Photograph 6-33. Lot 100, View of Quarry at Eastern Edge of Section 2, Facing Southwest***

GAI identified and surveyed two areas of moderate to high archaeological potential (Sections 1-2) within Lot 100 (see Figure 6-1). Section 1 represents the cornfield covering the western two-thirds of the parcel and spanning the transmission corridor; Section 2 consists of the cornfield in the eastern one-third of the lot. Section 1 included a 6.8-acre (2.75-hectare) portion of the cornfield located within the existing transmission corridor right-of-way that had been defined as a "stay-off" property (within Area 6) during the initial Phase Ib survey, due to lack of property access. Access was obtained following the completion of Initial Phase Ib fieldwork and, therefore, GAI conducted survey of this area during Supplemental Phase Ib investigations of Lot 100, Section 1.

Supplemental Phase Ib survey in Lot 100 consisted of the excavation of 789 STP (see Table 6-3). Two positive STPs were found in Section 1, each yielding a single fragment of glass (see Table 6-3). Radial shovel testing at these two dispersed localities produced no additional artifacts. These artifacts are concluded to represent modern/historic field scatter; they do not constitute archaeological sites. No archaeological sites were identified in Lot 100.

### **Summary of Phase Ib Archaeological Survey**

The overall BBNPP Phase Ib project APE comprised 902 acres (365 hectares), including the 639-acre (259-hectare) Initial Phase Ib study area and the 263-acre (106-hectare) Supplemental Phase Ib project area. The total Phase Ib project APE included approximately 465 acres (188 hectares) of moderate to high potential, 290 acres (117 hectares) of low archaeological potential and 147 acres (59 hectares) of disturbance. Phase Ib fieldwork was conducted within the 465 acres (188 hectares) of moderate to high potential as well as approximately 45.8 acres (18.5 hectares) of eroded fields and woodlands at the edges of wetlands or slopes that were initially characterized as low potential. GAI Phase Ib fieldwork included the excavation of 5,726 STP, pedestrian ground survey of 114 acres of cultivated fields and a program of deep testing in one low terrace/floodplain locality.

Phase Ib survey produced a total of 2,171 artifacts (2089 historic specimens and 82 prehistoric lithics) and resulted in the identification of eleven archaeological sites and 25 prehistoric Isolated Finds, as well as dispersed historic/modern artifacts representing field scatters. Of the eleven sites, eight are historic period sites and three are prehistoric.

#### **Identified Archaeological Sites**

The eleven archaeological sites identified during Phase Ib survey include Sites 36LU278, 36LU279, 36LU280, 36LU281, 36LU282, 36LU283, 36LU284, 36LU285, 36LU286, 36LU287, and 36LU288. Table 6-5 presents a summary of Phase Ib testing results and recommendations for each site. All eleven sites are situated within the Initial Phase Ib project APE. The eight historic period sites all occur in upland settings in the western portion of the project—seven sites in the West Alternative (36LU278, 36LU279, 36LU280, 36LU281, 36LU282, 36LU283, 36LU285, 36LU286, and 36LU287) and one site in the Confers Lane Parcel (36LU284). Based on the results of Phase survey the historic sites represent five domestic occupations, two farmsteads, and one artifact scatter.

The three prehistoric sites consist of two small low-density lithic scatters (36LU279 and 36LU282) and one large, low density lithic scatter or camp (36LU288). Both of the small lithic scatters are located in upland settings within the West Alternative, while Site 36LU288 occupies a low terrace/floodplain in Area 7, along the west bank of the river.

Based on the results of Phase Ib investigations, GAI recommended that seven of the eleven identified sites are potentially eligible for listing in the NRHP. These include six historic sites (Sites 36LU279, 36LU280, 36LU281, 36LU283, 36LU285, and 36LU286) and one prehistoric site (Site 36LU288). Site avoidance or Phase II National Register Evaluations were recommended for each of these seven localities. The remaining four sites (36LU278, 36LU282, 36LU284 and 36LU287) were recommended Not Eligible and no further work was recommended for these localities. PHMC-BHP reviewed preliminary Phase Ib results presented in GAI's Phase Ib Management Summary (Munford and Tuk 2008) and in a March 2, 2009 review letter (see Appendix A) concurred with GAI's recommendations on site eligibility and further work.



**Table 6-5. Identified Archaeological Sites: Phase Ib Summary and Recommendations**

Site #	GAI Site #	Site Name	Area	Section	Setting	Landform	Dimensions (m)	Artifacts (Prehist)	Artifacts (Hist)	Site Type	Age	Phase Ib NRHP Eligibility Recommendations	Recommendations
36LU278	1	--	West Alt	1	Upland	Hillside	3x21	3	--	Lithic Scatter	Unknown Prehistoric	Not Eligible	No Further Work
36LU279	2	--	West Alt	7	Upland	Broad Flat	38x76	--	159	Domestic Site	Early to Mid 19th	Potentially Eligible	Avoid/Phase II
36LU280	3	--	West Alt	13	Upland	Broad Flat	20x20	--	107	Domestic Site	Early 19th to Mid 20th c	Potentially Eligible	Avoid/Phase II
36LU281	4	--	West Alt	14	Upland	Broad Flat	30x45	--	366	Domestic Site	Mid 19th to Early 20th c	Potentially Eligible	Avoid/Phase II
36LU282	6	--	West Alt	3	Upland	Broad Flat	5x5	2	--	Lithic Scatter	Unknown Prehistoric	Not Eligible	No Further Work
36LU283	7	Sink Site	West Alt	30	Upland	Broad Flat	52x145	--	386	Farmstead	Late 19th to Mid 20th c	Potentially Eligible	Avoid/Phase II
36LU284	8	Shortz	Confers Lane	26	Upland	Broad Flat	122x168	--	135	Domestic Site	Mid to Late 20th c	Not Eligible	No Further Work
36LU285	9	Johnson/Folk	West Alt	17	Upland	Broad Flat	25x115	2	76	Domestic Site	Mid to Late 19th c and 20th c	Potentially Eligible	Avoid/Phase II
36LU286	10	Kisner	West Alt	31	Upland	Broad Flat	128x137	--	228	Farmstead	Mid 19th to 20th c	Potentially Eligible	Avoid/Phase II
36LU287	11	--	West Alt	21	Upland	Broad Flat	10x20	--	23	Artifact Scatter	19th c	Not Eligible	No Further Work
36LU288	5	--	Area 7	2	Lowland	Low Terrace/ Floodplain	152x260	48	34	Lithic Scatter	Paleo, LA, TA/EW, LW	Potentially Eligible	Avoid/Phase II

\*Paleo=Paleoindian, LA=Late Archaic, TA=Terminal Archaic, EW=Early Woodland, LW=Late Woodland

Phase II investigations of the seven potentially-eligible sites are discussed in the following chapters and site descriptions each of eleven identified sites are provided in Chapters 9-19. Artifacts catalogs for each site are presented in Appendix H.

#### Identified Isolated Finds

GAI's Phase Ib survey identified 25 prehistoric Isolated Finds within the BBNPP project area (IF 1-12, 14-25 and 27) (Table 6-6). As with the identified sites, all of these resources were found within the initial Phase Ib project APE.

**Table 6-6. Summary of Identified Isolated Finds**

IF	Area	Section	Setting	Age	Description	Lithic Raw Material	Recommended NRHP Eligibility
IF 1	West Alt.	1	Upland	Unknown Prehistoric	Untyped projectile point	Gray chert	NE
IF 2	West Alt.	6	Upland	Early Archaic	Kirk corner-notched projectile point	Black chert	NE
IF 3	West Alt.	6	Upland	Early/Middle Archaic	MacCorkle-like projectile point	Black chert	NE
IF 4	West Alt.	6	Upland	Middle to Late Archaic	Piney Island projectile point	Black chert	NE
IF 5	West Alt.	6	Upland	Early/Middle Archaic	Kanawha projectile point	Gray chert	NE
IF 6	West Alt.	3	Upland	Unknown Prehistoric	Debitage	Indeterminate Chert	NE
IF 7	West Alt.	3	Upland	Unknown Prehistoric	Utilized flake	Black chert	NE
IF 8	West Alt.	3	Upland	Unknown Prehistoric	Debitage	Black translucent chert	NE
IF 9	West Alt.	3	Upland	Unknown Prehistoric	Retouched flake	Gray chert	NE
IF 10	West Alt.	6	Upland	Unknown Prehistoric	Untyped projectile point tip	Black chert	
IF 11	West Alt.	7	Upland	Late Archaic	Brewerton eared-notched projectile point	Dark gray chert	
IF 12	West Alt.	7	Upland	Unknown Prehistoric	Untyped projectile point	Black chert	NE
IF 13	DELETED						
IF 14	West Alt.	7	Upland	Unknown Prehistoric	Debitage	Black chert	NE
IF 15	West Alt.	12	Upland	Early Archaic	Palmer projectile point	Gray chert	NE
IF 16	Area 6	3	Upland	Unknown Prehistoric	Late stage biface	Black chert	NE
IF 17	Area 7	2	Low Terrace/ Floodplain	Unknown Prehistoric	Debitage	Rhyolite	NE
IF 18	Area 7	2	Low Terrace/ Floodplain	Unknown Prehistoric	Late stage biface	Dark gray chert	NE
IF 19	Area 7	2	Low Terrace/ Floodplain	Unknown Prehistoric	Debitage	Indeterminate chert	NE
IF 20	Area 7	2	Low Terrace/ Floodplain	Unknown Prehistoric	Mid stage biface	Gray chert	NE
IF 21	Area 7	2	Low Terrace/ Floodplain	Unknown Prehistoric	Debitage	Gray grainy chert	NE
IF 22	West Alt.	17	Upland	Unknown Prehistoric	Debitage	Dark gray chert	NE
IF 23	West Alt.	29	Upland	Unknown Prehistoric	Debitage	Gray chert	NE
IF 24	West Alt.	1	Upland	Unknown Prehistoric	Debitage	Jasper	NE
IF 25	West Alt.	1	Upland	Unknown Prehistoric	Debitage	Gray grainy chert	NE
IF 26	DELETED						
IF 27	West Alt.	1	Upland	Unknown Prehistoric	Untyped projectile point tip	Gray chert	NE

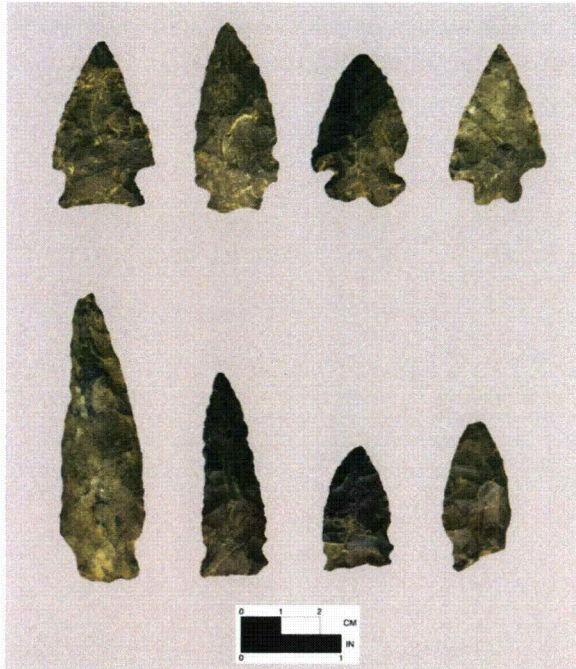
\* NE=Not Eligible

In accordance with PHMC/BHP guidelines (PHMC/BHP 1991), these resources represent localities that produced fewer than three artifacts within a 15-meter (50-foot) radius. (Note that IFs 13 and 26 have been deleted; IF 13 was determined to be noncultural and IF 26 was incorporated into Site 1). Each of these isolated finds consists of a single lithic artifact. All but two of the isolated finds were found on the surface of cultivated fields during pedestrian ground

survey; IFs 22 and 23 were recovered from shovel tests. Twenty of the isolated finds (80 percent) were found on upland flats within the West Alternative; five were located on the low terrace/floodplain in Area 7, adjacent to the Susquehanna River. An artifact catalog for Isolated Finds is included in Appendix H.

The isolated finds consist of 10 projectile points, three bifaces, one utilized flake, one retouched flake, and ten pieces of debitage. The sample of projectile points includes six diagnostic points, all found in upland settings and ranging in age from the Early Archaic through Late Archaic periods. These diagnostic specimens include one Early Archaic Kirk Corner-notched point (IF 2), one Early Archaic Palmer point (IF 15), one Early/Middle Archaic MacCorkle-like point (IF 3), one Early/Middle Archaic Kanawha point (IF 5);

one Middle to Late Archaic Piney Island point (IF 4), and one Late Archaic Brewerton Eared-notched points (Photograph 6-34).



**Photograph 6-34. Isolated Finds—Diagnostic Projectile Points**

Top—Early Archaic Kirk Corner-notched point (IF 2), Early Archaic Palmer point (IF 15), Early/Middle Archaic MacCorkle-like point (IF 3), Early/Middle Archaic Kanawha point (IF 5); Bottom—Middle to Late Archaic Piney Island point (IF 4), Late Archaic Brewerton Eared-notched point (IF 11), Untyped point (IF 12), Untyped point (IF 1)

The isolated finds represent brief, ephemeral prehistoric utilization of upland settings within the BBNPP project area during the Early through Late Archaic periods, as well as brief undated

prehistoric use of the lowland portions of the project area. These artifacts do not represent significant archaeological resources. Accordingly, GAI recommends no further investigations of these localities. PHMC-BHP reviewed preliminary Phase Ib results presented in GAI's Phase Ib Management Summary (Munford and Tuk 2008) and in their March 2, 2009 review letter (see Appendix A) concurred with GAI's recommendations on NRHP eligibility and further work.

#### Non-Site Materials

A total of 577 artifacts (575 historic specimens and 2 prehistoric lithics) were recovered from non-site contexts during GAI's Phase Ib survey. These artifacts consist of isolated, widely dispersed specimens scattered across cultivated fields or in isolated shovel tests. Nearly three-quarters (72 percent,  $n=413$ ) of the non-site specimens were located in upland portions of the project area, predominantly in the West Alternative (the largest of the BBNPP test areas); the remaining artifacts ( $n=164$ ) were found in low terrace/floodplain settings (Table 6-7). Of the 575 historic non-site artifacts, 78 percent ( $n=449$ ) were recovered during pedestrian ground survey (surface collection) of cultivated fields and 10.6 percent ( $n=61$ ) were recovered from isolated positive STPs. The remaining 65 historic artifacts and the two prehistoric lithics were found in disturbed fill deposits during deep testing in Area 6 (backhoe trenches and 1x1-meter column samples).



The 575 historic non-site artifacts consist largely of ceramics (40.69 percent,  $n=234$ )—predominantly redware and whiteware sherds, as well as bottle/container glass (26.9 percent,  $n=155$ ), and window glass (13.04 percent,  $n=75$ ). Low frequencies of a variety of other materials including tin cans, flowerpot fragments, nails, brick, clay pigeons, and indeterminate metal fragments were also recovered. Temporally diagnostic artifacts identified in this assemblage indicate that the bulk of the artifacts are twentieth century in age. These artifacts represent historic and/or modern field scatter; they do not represent the remains of historic archaeological sites.

The prehistoric lithics ( $n=2$ ) were found in a disturbed fill deposit directly above bedrock in Area 6, Section 1; these lithics have been displaced from unknown location and do not represent the remains of a prehistoric site in this locality. No further investigation of these non-site materials is recommended. An artifact catalog for non-site materials is provided in Appendix H.

**Table 6-7. Summary of Non-Site Artifacts by Testing Location**

Test Area/ Section	Prehistoric	Historic	Setting	Testing Method
<b>WEST ALTERNATIVE</b>				
1	--	7	Upland	PS
3	--	28	Upland	PS
4	--	34	Upland	PS
5	--	28	Upland	PS
6	--	57	Upland	PS
7	--	37	Upland	PS
8	--	3	Upland	PS
9	--	10	Upland	PS
10	--	50	Upland	PS
11	--	5	Upland	PS
12	--	54	Upland	PS
13	--	31	Upland	PS
14	--	18	Upland	PS
15	--	3	Upland	PS
16	--	2	Upland	STPs
17	--	2	Upland	STPs
18	--	2	Upland	STPs
22	--	4	Upland	STPs
29	--	1	Upland	STPs
<b>SubTotal</b>		<b>376</b>		
<b>AREA 6</b>				
1	2	65	Floodplain	Deep Testing
2	--	15	Floodplain	STPs
3	--	13	Upland	PS
4	--	4	Upland	STPs
5	--	16	Upland	STPs
<b>Subtotal</b>	<b>2</b>	<b>113</b>		
<b>AREA 7</b>				
1	--	67	Floodplain	PS
3	--	4	Floodplain	STPs
4	--	11	Floodplain	STPs
<b>Subtotal</b>		<b>82</b>		
Lot 95 (Section 1)	--	2	Upland	STPs
Lot 100 (Section 2)	--	2	Upland	STPs
<b>TOTAL</b>	<b>2</b>	<b>575</b>		

\*PS=Pedestrian Ground Survey (Surface Collection); STPs=Shovel Test Pits

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**Figure 6-1. Phase Ib Project Area showing Methods of Phase Ib Survey within Testing Locations**  
B Size

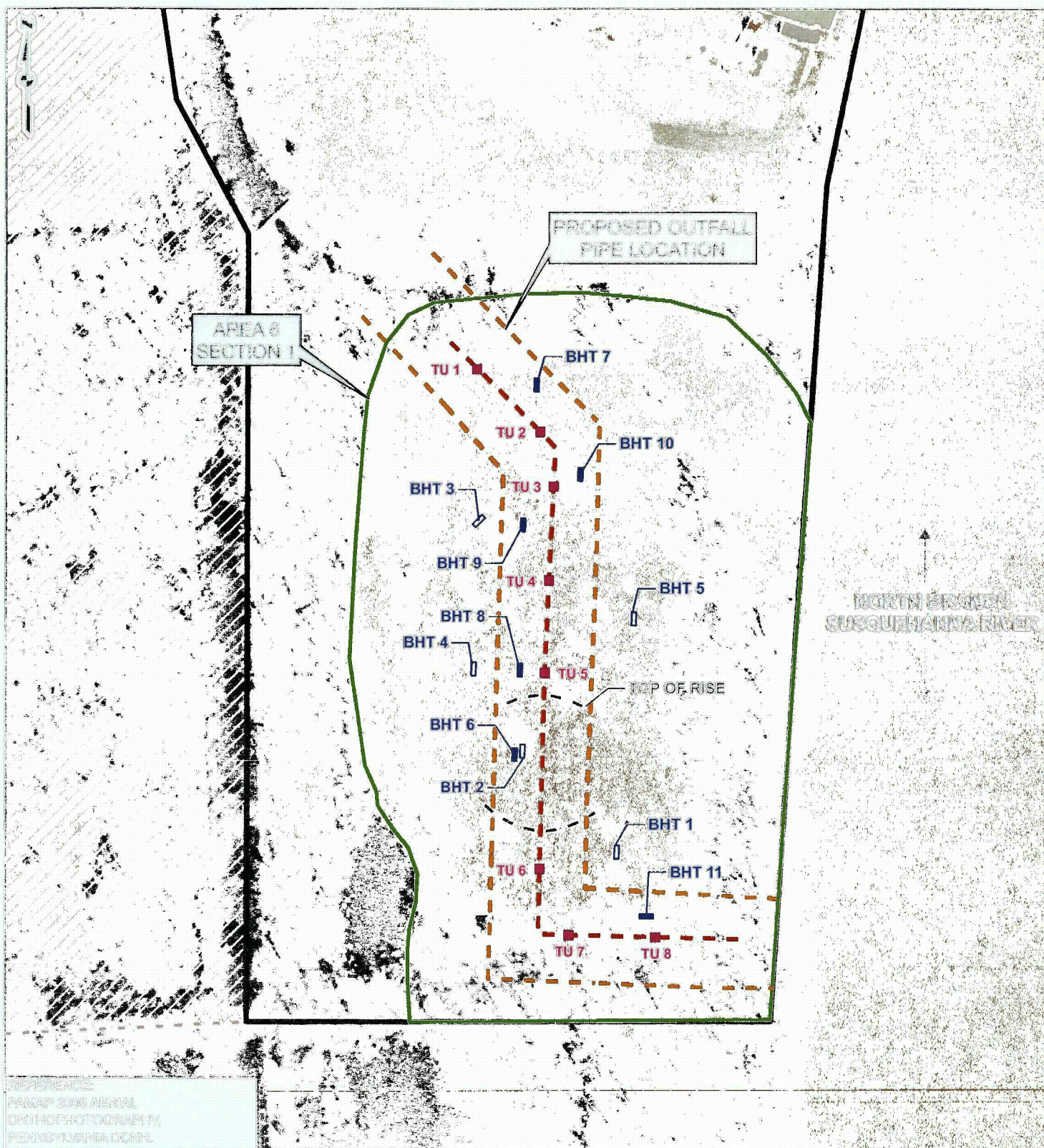
*REDACTED Figure 6-1  
Phase Ib Project Area showing  
Methods of Phase Ib Survey  
within Testing Locations*



(back of Figure 6-1)

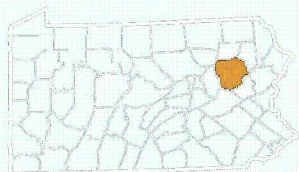
*Side 2 of REDACTED Figure 6-1.*





REFERENCE  
FAMAP 2006 AERIAL  
ORTHOGRAPHY,  
PENNSYLVANIA DCMR

#### PROJECT LOCATION



LUZERNE COUNTY,  
PENNSYLVANIA

#### LEGEND

- TEST UNIT
  - 1x1 METER SCREENED COLUMN SAMPLE
  - - - PROPOSED CENTERLINE
  - - - PROPOSED CONSTRUCTION LIMITS
  - BACKHOE TRENCH R1-6  
TO A DEPTH OF ~4.0 METERS BELOW GROUND SURFACE
  - BACKHOE TRENCH / CORE BORING S6-11  
TO A DEPTH OF ~13.0 METERS BELOW GROUND SURFACE
  - AREA 8, SECTION 1 AREA
  - PHASE 2 PROJECT AREA
  - EXCLUDED AREA
- 0 75 150 300 Feet

FIGURE 3-2  
AREA 8, SECTION 1  
DEEP TESTING LOCATIONS



BELL BEND NUCLEAR POWER PLANT  
UNISTAR NUCLEAR DEVELOPMENT, LLC

DRAWN BY: AJW  
CHECKED: BAM

DATE: 04/28/2010  
APPROVED: BAM



**Figure 6-3. Archaeological Site Locations**

*REDACTED Figure 6-3  
Archaeological Site Locations*