

Enclosure 2

Redacted Version of
Phase I Cultural Resources Investigations and
Phase II National Register Site Evaluations,
Bell Bend Nuclear Power Plant, Luzerne County, Pennsylvania,
dated October 11, 2010.



gai consultants

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

Prepared by:
Barbara A. Munford, M.A.,
Lori A. Frye M.A., RPA
and Michael P. Kenneally, M.A.



GAI Consultants Inc.
385 East Waterfront Drive
Homestead, Pennsylvania

GAI Project No. C090846.00



October 11, 2010

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




... transforming ideas into reality®

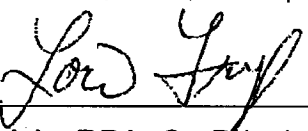
Technical Report
Phase I Cultural Resources Investigations and
Phase II National Register Site Evaluations

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

Prepared for:
UniStar Nuclear Energy, LLC

Prepared by:


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


Lori A. Frye M.A., RPA, Co-Principal Investigator
and

Michael P. Kenneally, M.A.,
with contributions by
Richard T. Baublitz, M.A.

GAI Consultants Inc.
385 East Waterfront Drive
Homestead, Pennsylvania

GAI Project No. C090846.00

October 11, 2010

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 multipomponent Paleoindian 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.

Table of Contents

Abstract

Chapter 1. Introduction and Project Overview	1
Project Summary	1
Area of Potential Effect	3
Summary of Results	4
Phase Ia Cultural Resources Investigation	4
Phase Ib Cultural Resources Investigation	5
Phase II National Register Evaluations	6
Curation	7
Regulatory Guidelines	7
Project Staff and Acknowledgements	7
Chapter 2. Environmental Setting	13
Physiography	13
Geology	13
Geomorphology and Drainage	14
Soils	15
Prehistoric Toolstone Resources	16
Modern and Past Climates	16
Paleoenvironment	17
Chapter 3. Culture History	23
Native American Prehistory	23
Paleoindian (15,000 to 10,000 B.P.)	23
Early Archaic (10,000-8000 B.P.)	24
Middle Archaic (8000-5000 B.P.)	25
Late Archaic (5000-3000 B.P.)	25
Early Woodland (3000-2100 B.P.)	26
Late Woodland (A.D. 900-1600)	28
Protohistoric/Contact (A.D. 1600-1750)	28
Euroamerican History	29
Contact Period (1615-1763)	30
Euroamerican Settlement (1763-1786)	31
Creation of Luzerne County and Development of Agriculture (1786-1840)	34
Modern Period (1940-Present)	51
Chapter 4. Background Research and Archaeological Potential	53
Background Research Summary	53
Archaeological Sites	54
Architectural Resources	56
Historic Map Research	57
Prehistoric Archaeological Potential	58
Historic Archaeological Potential	59
Chapter 5. Phase Ia Archaeological and Geomorphological Reconnaissance	67
Introduction	67
Goals and Methods	67
Results of Geomorphological Reconnaissance	67
Results of Archaeological Reconnaissance	68
Summary of Phase Ia Results	70

Chapter 6.	Phase Ib Archaeological Survey	75
	Overview and Objectives	75
	Initial Phase Ib Archaeological Survey	76
	Description and Archaeological Potential	76
	Initial Phase Ib Field Methods	77
	Results of Initial Phase Ib Fieldwork	81
	Supplemental Phase Ib Archaeological Survey	91
	Description and Archaeological Potential	91
	Supplemental Phase Ib Field Methods	93
	Results of Supplemental Phase Ib Fieldwork	94
	Summary of Phase Ib Archaeological Survey	101
	Identified Archaeological Sites	101
	Identified Isolated Finds	103
	Non-Site Materials	104
Chapter 7.	Phase II National Register Evaluations: Research Design and Methods	111
	Phase II Research Design	111
	Phase II Methods	112
	Site-Specific Archival Research	112
	Phase II Field Methods	112
	Overview of Phase II Field Results	114
Chapter 8.	Analytical Methods	117
	Introduction	117
	Laboratory Processing	117
	Methods of Historic/Modern Artifact Analysis	117
	Methods of Prehistoric Lithic Analysis	118
	Methods of Flotation Processing	119
Chapter 9.	Site 36LU278 (GAI Site 1)	121
Chapter 10.	Site 36LU279 (GAI Site 2)	127
	Site Setting	127
	Phase Ib Investigations	127
	Phase Ib Summary and Recommendations	129
	Phase II Methods	129
	Phase II Archival Research	129
	Phase II Fieldwork	136
	Phase II Soils and Geomorphology	137
	Artifact Distribution (Controlled Surface Collection and Shovel Tests)	137
	Test Units	139
	Machine Excavated Trenches	144
	Phase I/II Artifact Analysis	145
	Pattern Analysis	145
	Dating Analysis	147
	Summary and Evaluation	147
Chapter 11.	Site 36LU280 (GAI Site 3)	169
	Site Setting	169
	Phase Ib Survey	169
	Phase Ib Summary and Recommendations	171
	Phase II Methods	171
	Phase II Archival Research	171
	Stookey –Lockhart Ownership of Site 36LU280 (1802-1924)	172

	Development and Abandonment of Site 36LU280 (1924-Present).....	177
	Summary of Archival Research.....	177
	Phase II Fieldwork.....	178
	Phase II Soils and Geomorphology.....	178
	Artifact Distribution (Controlled Surface Collection and Shovel Tests).....	178
	Test Units.....	181
	Machine Excavated Trenches.....	186
	Features.....	188
	Phase I/II Artifact Analysis.....	193
	Pattern Analysis.....	194
	Dating Analysis.....	197
	Summary and Evaluation.....	199
Chapter 12.	Site 36LU281 (GAI Site 4).....	227
	Site Setting.....	227
	Phase Ib Investigations.....	227
	Phase Ib Summary and Recommendations.....	229
	Phase II Methods.....	229
	Phase II Archival Research.....	230
	Phase II Fieldwork.....	237
	Phase II Soils and Geomorphology.....	237
	Artifact Distribution (Controlled Surface Collection and Shovel Tests).....	237
	Test Units.....	240
	Machine Excavated Trenches.....	250
	Features.....	253
	Phase I/II Artifact Analysis.....	257
	Pattern Analysis.....	258
	Dating Analysis.....	265
	Summary and Evaluation.....	268
Chapter 13.	Site 36LU282 (GAI Site 6).....	293
Chapter 14.	Site 36LU283 (Site 7).....	299
	Site Setting.....	299
	Phase Ib Investigations.....	300
	Phase Ib Summary and Recommendations.....	303
	Phase II Methods.....	303
	Phase II Archival Research.....	304
	Phase II Fieldwork.....	311
	Phase II Soils and Geomorphology.....	311
	Artifact Distribution (Shovel Tests).....	312
	Test Units.....	314
	Features.....	319
	Phase I/II Artifact Analysis.....	339
	Pattern Analysis.....	340
	Dating Analysis.....	348
	Summary and Evaluation.....	350
Chapter 15.	Site 36LU284 (GAI Site 8).....	377
Chapter 16.	Site 36LU285 (GAI Site 9).....	389
	Site Setting.....	389
	Phase Ib Investigations.....	390
	Phase Ib Summary and Recommendations.....	391

	Phase II Methods	392
	Phase II Archival Research	392
	Phase II Fieldwork	399
	Phase II Soils and Geomorphology	399
	Artifact Distribution (Shovel Tests)	399
	Test Units and Features	401
	Phase I/II Artifact Analysis	431
	Pattern Analysis	431
	Dating Analysis	436
	Summary and Evaluation	437
Chapter 17.	Site 36LU286 (GAI Site 10)	463
	Site Setting	463
	Phase Ib Investigation	465
	Phase Ib Fieldwork	465
	Phase Ib Artifact Analysis	466
	Phase II Methods	467
	Phase II Archival Research	467
	Phase II Fieldwork	475
	Phase II Soils and Geomorphology	475
	Artifact Distribution (Shovel Tests)	475
	Test Units	476
	Features	495
	Phase I/II Artifact Analysis	497
	Prehistoric Artifacts	500
	Historic Artifact Pattern Analysis	501
	Historic Artifact Dating Analysis	504
	Summary and Evaluation	505
Chapter 18.	Site 36LU287 (GAI Site 11)	535
Chapter 19.	Site 36LU288 (GAI Site 5)	545
	Site Setting	545
	Phase Ib Investigations	547
	Phase Ib Methods and Results	547
	Phase Ib Artifact Analysis	547
	Phase II Methods	549
	Phase II Soils and Geomorphology	554
	Phase II Results	557
	Controlled Surface Collection	557
	Judgmental Shovel Testing	558
	Test Unit Excavations	558
	Plowzone Stripping	561
	Features	561
	Phase I/II Artifact Analysis	566
	Lithic Raw Material Types	567
	Bifaces	569
	Unifaces	572
	Corès	573
	Debitage	573
	Fire-Cracked Rock (FCR)	576
	Historic Artifact Assemblage	576
	Settlement Pattern Analysis	578
	Summary and Evaluation	580

Chapter 20. Architectural and Historical Survey..... 611
Introduction 611
Area of Potential Effect 620
Field Survey Results 620
Summary and Recommendations 657

Chapter 21. Summary and Recommendations..... 659
Project Summary 659
Archaeological Sites: Summary and Recommendations 659
 Historic Period Sites 661
 Prehistoric Sites..... 663
Architectural and Historical Resources: Summary and Recommendations 664
 Summary and Recommendations 664
 Assessment of Effects 666

REFERENCES..... 667

Appendices

Appendix A Correspondence
Appendix B Phase I and Phase II Workplans
Appendix C BHP Report Summary Form
Appendix D Updated Pennsylvania Archaeological Site Survey Forms
Appendix E Updated Pennsylvania Historic Resource Survey Forms
Appendix F Qualifications of Key Personnel
Appendix G Soil Profile Descriptions – Area 6 Deep Testing
Appendix H Artifact Catalogs
Appendix I Methods of Historic Analysis
Appendix J Methods of Prehistoric Lithic Analysis
Appendix K Archaeobotanical Analysis
Appendix L Erosion & Sedimentation Control Plans
Appendix M Radiocarbon Analysis

List of Figures

Figure 1-1.	Project Location	9
Figure 1-2.	Initial and Supplemental Phase Ib Project Area	10
Figure 1-3.	Phase Ib Project Area showing Archaeological Potential and Testing Locations	11
Figure 2-1.	Project Area in Relation to Pennsylvania Physiographic Provinces	18
Figure 2-2.	Project Area Soils.....	19
Figure 2-3.	Regional Lithic Raw Material Sources	21
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 Division, Washington D.C., 1856.	42
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	43
Figure 4-1.	Previously Recorded Cultural Resources in Project Vicinity.....	61
Figure 4-2.	Phase Ia Project Area and Vicinity 1873.....	63
Figure 4-3.	Phase Ia Project Area and Vicinity, 1894.....	64
Figure 4-4.	Phase Ia Project Area and Vicinity, 1955.....	65
Figure 5-1.	Phase Ia Project Location	71
Figure 5-2.	Phase Ia Project Area showing Archaeological Potential and Possible Cultural Locations	73
Figure 6-1.	Phase Ib Project Area showing Methods of Phase Ib Survey within Testing Locations	107
Figure 6-2.	Area 6, Section 1, Deep Testing Locations.....	109
Figure 6-3.	Archaeological Site Locations	110
Figure 9-1.	Site 36LU278 Location.....	123
Figure 9-2.	Site 36LU278 showing Phase Ib Testing Locations	124
Figure 9-3.	Site 36LU278: Representative STP Profile—STP 1	125
Figure 10-1.	Site 36LU279 Location.....	149
Figure 10-2.	Site 36LU279 showing Phase Ib Testing Locations	150
Figure 10-3.	Site 36LU279: Representative Soil Profile (STP 3)	151
Figure 10-4.	Site 36LU279 on Warrantee Map Showing Original Parcels	152
Figure 10-5.	Site 36LU286 Vicinity in 1873	153
Figure 10-6.	Site 36LU279 Vicinity in 1939	154
Figure 10-7.	Site 36LU279 Vicinity in 1955	155
Figure 10-8.	Site 36LU279 Vicinity in 1959	156

Figure 10-9.	Site 36LU279 Vicinity in 1969	157
Figure 10-10.	Site 36LU279 Phase II Testing Locations	158
Figure 10-11.	Site 36LU279 CSC Artifact Distribution	161
Figure 10-12.	Site 36LU279: STP Artifact Distribution	162
Figure 10-13.	Site 36LU279: Architectural Artifact Distribution	163
Figure 10-14.	Site 36LU279: Kitchen Artifact Distribution	164
Figure 10-15.	Site 36LU279: Test Unit 2, South Wall Profile	165
Figure 10-16.	Site 36LU279: Test Unit 3, South Wall Profile	166
Figure 10-17.	Site 36LU279: Test Unit 5, South Wall Profile	167
Figure 11-1.	Site 36LU280 Location	201
Figure 11-2.	Site 36LU280 showing Phase Ib Testing Locations	202
Figure 11-3.	Site 36LU280: Representative Phase Ib Soil Profile (STP S2).....	203
Figure 11-4.	Site 36LU280 on Warrantee Map showing Original Parcels.....	204
Figure 11-5.	Site 36LU280 Vicinity in 1873	205
Figure 11-6.	Site 36LU280 Vicinity in 1939	206
Figure 11-7.	Site 36LU280 Vicinity in 1955	207
Figure 11-8.	Site 36LU280 Vicinity in 1959	208
Figure 11-9.	Site 36LU280 Vicinity in 1969	209
Figure 11-10.	Site 36LU280 Phase II Testing Locations	211
Figure 11-11.	Site 36LU280 CSC Artifact Distribution	213
Figure 11-12.	Site 36LU280 STP Historic Artifact Distribution	214
Figure 11-13.	Site 36LU280 Kitchen Artifact Distribution	215
Figure 11-14.	Site 36LU280 Architectural Historic Artifact Distribution.....	216
Figure 11-15.	Site 36LU280: Test Unit 3, West Wall Profile	217
Figure 11-16.	Site 36LU280: Phase II Trench Planview	219
Figure 11-17.	Site 36LU280: Feature 4, Plan View	221
Figure 11-18.	Site 36LU280: Feature 4, East Profile	222
Figure 11-19.	Site 36LU280: Feature 5, Planview	223
Figure 11-20.	Site 36LU280: Features 1 and 6, Planview.....	224
Figure 11-21.	Site 36LU280: Features 1 and 7, Planview.....	225
Figure 11-22.	Site 36LU280: Feature 7, East Wall Profile	226
Figure 12-1.	Site 36LU281 Location	269
Figure 12-2.	Site 36LU281 showing Phase Ib Testing Locations	270
Figure 12-3.	Site 36LU281: Representative Phase Ib Soil Profile (STP 1).....	271
Figure 12-4.	Site 36LU281 on Warrantee Map showing Original Parcels.....	272
Figure 12-5.	Site 36LU281 Vicinity in 1873	273
Figure 12-6.	Site 36LU281 Vicinity in 1939	274
Figure 12-7.	Site 36LU281 Vicinity in 1955	275
Figure 12-8.	Site 36LU281 Vicinity in 1959	276
Figure 12-9.	Site 36LU281 Vicinity in 1969	277
Figure 12-10.	Site 36LU281 Phase II Testing Locations	279

Figure 12-11.	Site 36LU281 Controlled Surface Collection Artifact Distribution	281
Figure 12-12.	Site 36LU281 STP Historic Artifact Distribution	282
Figure 12-13.	Site 36LU281 Architectural Historic Artifact Distribution	283
Figure 12-14.	Site 36LU281 Kitchen Artifact Distribution	284
Figure 12-15.	Site 36LU281: Test Unit 1, North Wall Profile	285
Figure 12-16.	Site 36LU281: Test Unit 2, West Wall Profile	286
Figure 12-17.	Site 36LU281: Test Unit 4, West Wall Profile	287
Figure 12-18.	Site 36LU281: Test Unit 7, North Wall Profile	288
Figure 12-19.	Site 36LU281: Phase II Trench Planview	289
Figure 12-20.	Site 36LU281: Test Unit 3, Feature 1, East Wall Profile	291
Figure 12-21.	Site 36LU281: Feature 3, Planview	292
Figure 13-1.	Site 36LU282 Location	295
Figure 13-2.	Site 36LU282 showing Phase Ib Testing Locations	296
Figure 13-3.	Site 36LU282: Representative Phase Ib Soil Profile (STP 1)	297
Figure 14-1.	Site 36LU283 Location	351
Figure 14-2.	Site 36LU283 Showing Phase Ib Testing Locations	352
Figure 14-3.	Site 36LU283: Representative Phase Ib STP Profiles (Locus 1—STP A8 and B3; Locus 2—A6)	353
Figure 14-4.	36LU283 on Warrantee Map showing Original Land Parcels	354
Figure 14-5.	Site 36LU283 Vicinity in 1873	355
Figure 14-6.	Site 36LU283 Vicinity in 1939	356
Figure 14-7.	Site 36LU283 Vicinity in 1955	357
Figure 14-8.	Site 36LU283 Vicinity in 1959	358
Figure 14-9.	Site 36LU283 Vicinity in 1969	359
Figure 14-10.	Site 36LU283 Phase II Testing Locations	361
Figure 14-11.	Site 36LU283: STP Soil Data	363
Figure 14-12.	Site 36LU283: Artifact Distribution	364
Figure 14-13.	Site 36LU283: Kitchen Artifact Distribution	365
Figure 14-14.	Site 36LU283: Architectural Artifact Distribution	366
Figure 14-15.	Site 36LU283: Test Unit 6, West Wall Profile	367
Figure 14-16.	Site 36LU283: Test Unit 11, South Wall Profile	368
Figure 14-17.	Site 36LU283: Locus 1 Detail	369
Figure 14-18.	Site 36LU283: Test Unit 12, West Wall Profile	370
Figure 14-19.	Site 36LU283: Locus 2 Detail	371
Figure 14-20.	Site 36LU283: Test Units 3 and 4, East Wall Profile	372
Figure 14-21.	Site 36LU283: Test Unit 5, North Wall Profile	373
Figure 14-22.	Site 36LU283: Test Unit 7, West Wall Profile	374
Figure 14-23.	Site 36LU283: Test Unit 1, South Wall Profile	375
Figure 14-24.	Site 36LU283: Test Unit 9, South Wall Profile	376
Figure 15-1.	Site 36LU284 Location	381

Figure 15-2.	Site 36LU284 showing Phase Ib Testing Locations	382
Figure 15-3.	Site 36LU284 and Vicinity, 1939	383
Figure 15-4.	Site 36LU284 and Vicinity, 1955	384
Figure 15-5.	Site 36LU284 and Vicinity, 1959	385
Figure 15-6.	Site 36LU284 and Vicinity, 1969	386
Figure 15-7.	Site 36LU284: Representative Phase Ib Soil Profiles (STP A5 and J1)	387
Figure 16-1.	Site 36LU285 Location	439
Figure 16-2.	Site 36LU285 showing Phase Ib Testing Locations	440
Figure 16-3.	Site 36LU285: Representative Phase Ib Soil Profiles (STP A4 and B2)	441
Figure 16-4.	Site 36LU285 on Warrantee Map showing Original Parcels	442
Figure 16-5.	Site 36LU285 Vicinity in 1873	443
Figure 16-6.	Site 36LU285 Vicinity in 1939	444
Figure 16-7.	Site 36LU285 Vicinity in 1955	445
Figure 16-8.	Site 36LU285 Vicinity in 1959	446
Figure 16-9.	Site 36LU285 Vicinity in 1969	447
Figure 16-10.	Site 36LU285 Phase II Testing Locations	449
Figure 16-11.	Site 36LU285: STP Soil Data	451
Figure 16-12.	Site 36LU285: Artifact Distribution	452
Figure 16-13.	Site 36LU285: Architectural Artifact Distribution	453
Figure 16-14.	Site 36LU285: Kitchen Artifact Distribution	454
Figure 16-15.	Site 36LU285: Site Detail Map	455
Figure 16-16.	Site 36LU285: Test Units 5, 3, and 6, East Wall Profile	456
Figure 16-17.	Site 36LU285: Feature 7, Northeast Profile	457
Figure 16-18.	Site 36LU285: Test Units 4 and 9, North Wall Profile	458
Figure 16-19.	Site 36LU285: Planview TU 4 and TU 5	459
Figure 16-20.	Site 36LU285: Test Units 1 and 2, South Wall Profile	460
Figure 16-21.	Site 36LU285: TUs 8, 10, 11, and 12, Planview	461
Figure 16-22.	Site 36LU285: Test Units 11 and 12, North Wall Profile	462
Figure 17-1.	Site 36LU286 Location	507
Figure 17-2.	Site 36LU286 showing Phase Ib Testing Locations	508
Figure 17-3.	Site 36LU286: Representative Phase Ib Soil Profiles (STP 2 and STP J1)	509
Figure 17-4.	Site 36LU286: Representative Phase Ib Soil Profiles (STP J4 and STP 4)	510
Figure 17-5.	Site 36LU286 on Warrantee Map showing Original Parcels	511
Figure 17-6.	Site 36LU286 and Vicinity on 1873 Map	512
Figure 17-7.	Site 36LU286 and Vicinity on 1939 Aerial Photograph	513
Figure 17-8.	Site 36LU286 and Vicinity in 1955	514
Figure 17-9.	Site 36LU286 and Vicinity on 1959 Aerial Photograph	515
Figure 17-10.	Site 36LU286 and Vicinity on 1969 Aerial Photograph	516
Figure 17-11.	Site 36LU286 and Vicinity on 2005 Aerial Photograph	517
Figure 17-12.	Site 36LU286: Phase II Testing Locations	519
Figure 17-13.	Site 36LU286: Artifact Distribution	521

Figure 17-14.	Site 36LU286: Kitchen Artifact Distribution	522
Figure 17-15.	Site 36LU286: Architectural Artifact Distribution	523
Figure 17-16.	Site 36LU286: Test Unit 1/Feature 1, North Wall Profile	524
Figure 17-17.	Site 36LU286: Test Unit 1/Feature 1 Planview	525
Figure 17-18.	Site 36LU286: Test Unit 14, North Wall Profile	526
Figure 17-19.	Site 36LU286: Test Unit 2, South Wall Profile	527
Figure 17-20.	Site 36LU286: Test Unit 3, North Wall Profile	528
Figure 17-21.	Site 36LU286: Test Unit 11, West Wall Profile	529
Figure 17-22.	Site 36LU286: Test Unit 16, North Wall Profile	530
Figure 17-23.	Site 36LU286: Test Unit 9, South Wall Profile	531
Figure 17-24.	Site 36LU286: Test Unit 13, West Wall Profile	532
Figure 17-25.	Site 36LU286: Test Unit 12, North Wall Profile	533
Figure 17-26.	Site 36LU286: Test Unit 12, Feature 2 and 3, Planview	534
Figure 18-1.	Site 36LU287 Location	537
Figure 18-2.	Site 36LU287 showing Phase Ib Testing Locations	538
Figure 18-3.	Site 36LU287 Vicinity in 1939	539
Figure 18-4.	Site 36LU287 Vicinity in 1955	540
Figure 18-5.	Site 36LU287 Vicinity in 1959	541
Figure 18-6.	Site 36LU287 Vicinity in 1969	542
Figure 18-7.	Site 36LU287: Representative Phase Ib Soil Profile (STP J3)	543
Figure 19-1.	Site 36LU288 Location	582
Figure 19-2.	Site 36LU288 showing Phase Ib Testing Locations	583
Figure 19-3.	Site 36LU288: Representative Phase Ib STP Profiles (STPs A1, A15 and E9)	585
Figure 19-4.	Site 36LU288: Phase II Testing Locations	587
Figure 19-5.	Site 36LU288: Phase II Testing Locations showing Distribution of Ab Horizon and Features	589
Figure 19-6.	Site 36LU288: Test Units 14 and 11, West Wall Profile	591
Figure 19-7.	Site 36LU288: Test Unit 2, South Wall Profile	593
Figure 19-8.	Site 36LU288: Test Unit 8, South Wall Profile	594
Figure 19-9.	Site 36LU288: Test Unit 13, East Wall Profile	595
Figure 19-10.	Site 36LU288: Test Unit 19, South Wall Profile	596
Figure 19-11.	Site 36LU288: Test Units 16 and 14, South Wall Profile	597
Figure 19-12.	Site 36LU288: Test Unit 12, South Wall Profile	599
Figure 19-13.	Site 36LU288: Test Unit 10, South Wall Profile	600
Figure 19-14.	Site 36LU288: Test Unit 14, East Wall Profile, showing Feature 1	601
Figure 19-15.	Site 36LU288: Test Unit 15, South Wall Profile, showing Feature 1	602
Figure 19-16.	Site 36LU288: Feature 1 Planview	603
Figure 19-17.	Site 36LU288: Feature 1, South Profile	605
Figure 19-18.	Site 36LU288: Feature 2, Plan View	606
Figure 19-19.	Site 36LU288: Feature 2, West Profile	607
Figure 19-20.	Site 36LU288: Feature 2, West Profile in Trench 6 Wall	608

Figure 19-21.	Site 36LU288: Distribution of Flaked Stone Tools and Features.....	609
Figure 20-1.	Initial Phase Ia Identified Architectural and Historical Resources.....	615
Figure 20-2.	Identified Architectural and Historical Resources Requiring PHRS Forms	617
Figure 20-3.	North Branch Pennsylvania Canal (141673/GAI-10), South Profile	625
Figure 20-4.	Recommended NRHP Boundary for North Branch Pennsylvania Canal (141673).....	626
Figure 20-5.	Plan of the Union Reformed and Lutheran Church.....	628
Figure 20-6.	Recommended NRHP Boundary for Union Reformed and Lutheran Church (155049).....	630
Figure 20-7.	Recommended NRHP Boundary for Woodcrest (155052).....	635
Figure 20-8.	Recommended NRHP Boundary for Stone Arch Bridge (155054).....	639
Figure 20-9.	Recommended NRHP Boundary for North Market Street Bridge (155055).....	643
Figure 20-10.	Recommended NRHP Boundary for Red Brick Studios (155064).....	647
Figure 20-11.	Wapwallopen, 1873 Beers Map	650
Figure 20-12.	Wapwallopen, 1890 USGS Shickshinny Quadrangle	652
Figure 20-13.	Preliminary NRHP Boundary of Wapwallopen Historic District (155070).....	656

List of Tables

Table 1-1.	Summary of Phase Ib and Phase II Results	5
Table 3-1.	1850 Agricultural Schedule Information	40
Table 3-2.	1870 Agricultural Schedule Information	45
Table 3-3.	1880 Agricultural Schedule Information	48
Table 4-1.	Summary of Previously Recorded Cultural Resources in Phase Ia Project Vicinity	53
Table 4-2.	Previously Recorded Archaeological Sites within 1-Mile Radius of Phase Ia Project APE	54
Table 4-3.	Previously Recorded Architectural Resources within Approximately 0.5-Mile Radius of Phase Ia Project APE.....	56
Table 5-1.	Summary of Archaeological Potential and Identified Cultural Resources for Total Phase Ia APE	69
Table 6-1.	Summary of Initial and Supplemental Phase Ib Archaeological Survey Results	75
Table 6-2.	Summary of Archaeological Potential and Previously-Identified Cultural Resources in Phase Ib APE	77
Table 6-3.	Summary of Phase Ib Archaeological Survey Results by Testing Location	81
Table 6-4.	GAI-Surveyed Architectural Resources within Supplemental Phase Ib APE	93
Table 6-5.	Identified Archaeological Sites: Phase Ib Summary and Recommendations	102
Table 6-6.	Summary of Identified Isolated Finds	103
Table 6-7.	Summary of Non-Site Artifacts by Testing Location.....	105

Table 7-1.	Summary of Phase II Field Results by Site.....	115
Table 10-1.	Site 36LU279: Phase Ib Artifact Pattern Analysis.....	128
Table 10-2.	Site 36LU279: Phase Ib Artifact Dating Analysis	129
Table 10-3.	Site 36LU279: Chain-of-Title	130
Table 10-4.	Site 36LU279: Tax Assessment for Jeremiah and John Hess.....	132
Table 10-5.	Site 36LU279: Agricultural Census Data.....	133
Table 10-6.	Site 36LU279: Controlled Surface Collection, Historic Artifact Pattern Table.....	137
Table 10-7.	Site 36LU279: Phase II STP Excavations, Artifact Pattern Analysis	138
Table 10-8.	Site 36LU279, Test Unit Summary Information.....	139
Table 10-9.	Site 36LU279: TUs 2, 4, and 8 Artifact Pattern Analysis	140
Table 10-10.	Site 36LU279: Test Units 3, 6 and 7, Artifact Pattern Analysis.....	142
Table 10-11.	Site 36LU279, Test Units 1 and 5, Pattern Table.....	144
Table 10-12.	Site 36LU279: Artifact Pattern Analysis	145
Table 10-13.	Site 36LU279: Historic Artifact Dating Analysis	147
Table 11-1.	Site 36LU280: Phase Ib Artifact Pattern Analysis.....	170
Table 11-2.	Site 36LU280: Phase Ib Artifact Dating Analysis	170
Table 11-3.	Site 36LU280: Chain-of-Title	171
Table 11-4.	Site 36LU280: James Lockhart's Tax Assessments (1830-1870).....	174
Table 11-5.	Site 36LU280: 1850-1880 Agricultural Census Data	174
Table 11-6.	Site 36LU280: Phase II Controlled Surface Collection, Artifact Pattern Analysis	179
Table 11-7.	Site 36LU280: Phase II STP Artifact Pattern Analysis.....	180
Table 11-8.	Site 36LU280: Test Unit Summary.....	181
Table 11-9.	Site 36LU280: Test Unit 1, Artifact Pattern Analysis.....	182
Table 11-10.	Site 36LU280: Test Unit 2, Pattern Analysis	183
Table 11-11.	Site 36LU280: Test Unit 3, Artifact Pattern Analysis.....	184
Table 11-12.	Site 36LU280: Test Unit 4, Artifact Pattern Analysis	185
Table 11-13.	Site 36LU280: Trench 1 and 1 Extensions, Artifact Pattern Analysis.....	187
Table 11-14.	Site 36LU280: Trench 2, Artifact Pattern Analysis	187
Table 11-15.	Site 36LU280: Trench 3, Artifact Pattern Analysis	188
Table 11-16.	Site 36LU280: Feature 3, Artifact Pattern Analysis.....	190
Table 11-17.	Site 36LU280: Feature 5, Artifact Pattern Analysis.....	191
Table 11-18.	Site 36LU280: Feature 7, Artifact Pattern Analysis	193
Table 11-19.	Site 36LU280: Historic Artifact Pattern Analysis.....	194
Table 11-20.	Site 36LU280: Dating Analysis.....	197
Table 12-1.	Site 36LU281: Phase Ib Artifact Pattern Analysis.....	228
Table 12-2.	Site 36LU281: Phase Ib Artifact Dating Analysis	229
Table 12-3.	Site 36LU281: Chain-of-Title	230
Table 12-4.	Site 36LU281: Emanuel Kirkendall Tax Assessments.....	231
Table 12-5.	Site 36LU281: Samuel Hicks Tax Assessments	232
Table 12-6.	Site 36LU281: William Hicks Tax Assessments.....	233

Table 12-7.	Site 36LU281: William Hicks Agricultural Census.....	233
Table 12-8.	Site 36LU281: CSC Artifact Pattern Analysis.....	238
Table 12-9.	Site 36LU281: STP Artifact Pattern Analysis	239
Table 12-10.	Site 36LU281: Test Unit Summary Information.....	241
Table 12-11.	Site 36LU281: Test Units 1, 2, 4 and 5, Artifact Pattern Analysis.....	244
Table 12-12.	Site 36LU281: Test Units 3, 6, 7, and 8, Artifact Pattern Analysis.....	247
Table 12-13.	Site 36LU281: Trench 1, Artifact Pattern Analysis.....	250
Table 12-14.	Site 36LU281: Trench 2, Artifact Pattern Analysis.....	251
Table 12-15.	Site 36LU281: Trench 3, Artifact Pattern Analysis.....	252
Table 12-16.	Site 36LU281: Feature 1, Artifact Pattern Analysis.....	254
Table 12-17.	Site 36LU281: Feature 3, Artifact Pattern Analysis.....	257
Table 12-18.	Site 36LU281: Artifact Pattern Analysis	258
Table 12-19.	Site 36LU281: Artifact Dating Analysis	266
Table 14-1.	Site 36LU283: Phase Ib Pattern Analysis, Historic Artifacts.....	301
Table 14-2.	Site 36LU283: Phase Ib Dating Analysis, Historic Artifacts	303
Table 14-3.	Site 36LU283: Chain-of-Title	304
Table 14-4.	Site 36LU283: Emanuel Kirkendall Tax Assessment.....	305
Table 14-5.	Site 36LU283: Samuel Hicks Tax Assessments	306
Table 14-6.	Site 36LU283: William Hicks Tax Assessments.....	307
Table 14-7.	Site 36LU283: Agricultural Schedule	307
Table 14-8.	Site 36LU283: Phase II STP Artifact Pattern Analysis.....	312
Table 14-9.	Site 36LU283: Test Unit Summary Information.....	315
Table 14-10.	Site 36LU283: Test Units 6 and 8, Artifact Pattern Analysis.....	316
Table 14-11.	Site 36LU283: Test Units 10 and 11, Artifact Pattern Analysis.....	317
Table 14-12.	Site 36LU283: Feature Summary.....	319
Table 14-13.	Site 36LU283: Feature 1 Artifact Pattern Analysis.....	323
Table 14-14.	Site 36LU283: Feature 2 Artifact Pattern Analysis.....	325
Table 14-15.	Site 36LU283: Test Units 1, 7, and 9 Artifact Pattern Analysis.....	331
Table 14-16.	Site 36LU283: Test Units 1, 7, and 9 Artifact Dating Analysis, by Soil Horizon.....	333
Table 14-17.	Site 36LU283: Feature 7 Artifact Pattern Analysis, by STP and TU.....	335
Table 14-18.	Site 36LU283: Feature 7 Artifact Dating Analysis	337
Table 14-19.	Site 36LU283: Artifact Pattern Analysis	341
Table 14-20.	Site 36LU283: Artifact Dating Analysis	348
Table 15-1.	Site 36LU284: Pattern Analysis, Historic Artifacts	379
Table 15-2.	Site 36LU284: Dating Analysis, Historic Artifacts.....	380
Table 16-1.	Site 36LU285: Phase Ib Artifact Pattern Analysis.....	390
Table 16-2.	Site 36LU285: Phase Ib Artifact Dating Analysis	391
Table 16-3.	Site 36LU285: Chain-of-Title	392
Table 16-4.	Site 36LU285: Tax Assessments on Elisha Courtright	394
Table 16-5.	Site 36LU285: Henry Thomas Tax Assessments	395

Table 16-6.	Site 36LU285: 1870 and 1880 Agricultural Schedule	396
Table 16-7.	Site 36LU285: A. Wesley Harter Tax Assessment.....	398
Table 16-8.	Site 36LU285: Phase II STP Artifact Pattern Analysis.....	400
Table 16-9.	Site 36LU285: Test Unit Summary Information.....	402
Table 16-10.	Site 36LU285: Test Unit 7 Artifact Pattern Analysis.....	403
Table 16-11.	Site 36LU285: Test Units 3, 5, and 6 (Feature 3) Artifact Pattern Analysis.....	405
Table 16-12.	Site 36LU285: Test Units 3, 5, and 6 Artifact Dating Analysis.....	407
Table 16-13.	Site 36LU285: Feature 7 Artifact Pattern Analysis.....	409
Table 16-14.	Site 36LU285: Artifact Pattern Analysis for Test Units 4 and 9, by Horizon	410
Table 16-15.	Site 36LU285: Feature 5 Artifact Dating Analysis.....	412
Table 16-16.	Site 36LU285: Test Units 1 and 2, Feature 1, CA 1 Stratum Artifact Pattern Analysis	413
Table 16-17.	Site 36LU285: Feature 1, CA1 Stratum Artifact Dating Analysis	415
Table 16-18.	Site 36LU285: Test Units 1 and 2, Feature 1, CA2 Stratum, Artifact Pattern Analysis	416
Table 16-19.	Site 36LU285: Feature 1, CA2 Stratum, Artifact Dating Analysis	418
Table 16-20.	Site 36LU285: Test Units 1 and 2, Feature 1, CA3 Stratum, Artifact Pattern Analysis	420
Table 16-21.	Site 36LU285: Feature 1, CA3 Stratum Artifact Dating Analysis	422
Table 16-22.	Site 36LU285: Test Units 1 and 2, Feature 1, Stratum IV, Artifact Pattern Analysis	424
Table 16-23.	Site 36LU285: Feature 1, CA4 Stratum, Artifact Dating Analysis	425
Table 16-24.	Site 36LU285: Test Units 8, 10, 11, and 12 Historic Artifact Pattern Analysis, by Horizon	427
Table 16-25.	Site 36LU285: Test Units 8, 10, 11, and 12, A horizon Artifact Dating Analysis.....	430
Table 16-26.	Site 36LU285: Test Units 8, 10, 11, and 12, Apb Horizon Artifact Dating Analysis.....	430
Table 16-27.	Site 36LU285: Artifact Pattern Analysis	431
Table 16-28.	Site 36LU285: Artifact Dating Analysis	436
Table 17-1.	Site 36LU286: Phase Ib Pattern Analysis	466
Table 17-2.	Site 36LU286: Chain-of-Title	468
Table 17-3.	Site 36LU286: Jeremiah and John Hess Tax Assessments	469
Table 17-4.	Site 36LU286: Agricultural Schedule	471
Table 17-5.	Site 36LU286: 1927 Pennsylvania Triennial Farm Census	473
Table 17-6.	Site 36LU286: Test Unit Summary Information.....	476
Table 17-7.	Site 36LU286: Pattern Analysis for Test Units 1, 7, 8, and 14.....	478
Table 17-8.	Site 36LU286: Dating Analysis for TUs 1, 7, 8, and 14.....	482
Table 17-9.	Site 36LU286: Pattern Analysis for TUs 2, 3, 4, and 15	483
Table 17-10.	Site 36LU286: Dating Analysis for TUs 2, 3, 4, and 15.....	486
Table 17-11.	Site 36LU286: Pattern Analysis for Test Units 5, 6, 11, and 16.....	487
Table 17-12.	Site 36LU286: Dating Analysis for TUs 5, 6, 11, and 16.....	490
Table 17-14.	Site 36LU286, Dating Analysis for TUs 9, 10, 12, and 13.....	495
Table 17-15.	Site 36LU286: Feature Summary.....	496
Table 17-16.	Site 36LU286: Phase I/II Historic Artifact Pattern Analysis.....	498

Table 17-17.	Site 36LU286: Phase I/II Dating Analysis	504
Table 18-1.	Site 36LU287: Pattern Analysis, Historic Artifacts	536
Table 18-2.	Site 36LU287: Dating Analysis, Historic Artifacts.....	536
Table 19-1.	Site 36LU288: Phase Ib, Crosstabulation of Artifact Type by Raw Material	548
Table 19-2.	Site 36LU288: Phase Ib Historic Artifact Pattern Analysis.....	549
Table 19-3.	Site 36LU288: Phase II, Stratigraphic Distribution of Prehistoric Artifacts by Testing Method.....	557
Table 19-4.	Site 36LU288: Phase II, Stratigraphic Distribution of Prehistoric Artifacts by Artifact Class	557
Table 19-5.	Site 36LU288: Phase II Test Unit Summary	558
Table 19-6.	Site 36LU288: Phase II Test Units, Stratigraphic Distribution of Prehistoric Artifacts by Artifact Class	560
Table 19-7.	Site 36LU288: Phase II Test Units, Stratigraphic Distribution of Prehistoric Artifacts.....	560
Table 19-8.	Site 36LU288: Feature 1, Crosstabulation of Artifact Class by Lithic Raw Material	563
Table 19-9.	Site 36LU288: Feature 2 Crosstabulation of Artifact Class by Lithic Raw Material	565
Table 19-10.	Site 36LU288: Phase Ib and II, Summary of Count, Weight and Mean Weight by Artifact Class	566
Table 19-11.	Site 36LU288: Phase Ib and II, Crosstabulation of Prehistoric Artifact Class by Soil Horizon	566
Table 19-12.	Site 36LU288: Buried A Horizon, Crosstabulation of Artifact Class by Testing Location	567
Table 19-13.	Site 36LU288: Phase Ib and II, Crosstabulation of Artifact Class by Lithic Raw Material Type	567
Table 19-14.	Site 36LU288: Phase Ib and II Crosstabulation of Cortex Type by Lithic Raw Material.....	568
Table 19-15.	Site 36LU288: Crosstabulation of Biface Type by Lithic Raw Material	569
Table 19-16.	Site 36LU288: Summary of Lithic Tools.....	571
Table 19-17.	Site 36LU288: Crosstabulation of Flake Type by Soil Horizon	574
Table 19-18.	Site 36LU288: Phase Ib and II Debitage, Crosstabulation of Flake Type by Lithic Raw Material.....	574
Table 19-19.	Site 36LU288: Crosstabulation of Cortex Type by Lithic Raw Material	575
Table 19-20.	Site 36LU288: Phase Ib and Phase II Historic Artifact Pattern Analysis.....	576
Table 19-21.	Site 36LU288: Phase Ib and Phase II, Dating Analysis Historic Artifacts	577
Table 19-22.	Recorded Archaeological Sites within the Floodplain near Site 36LU288.....	579
Table 20-1.	Initial Phase Ia Identified Architectural and Historical Resources.....	611
Table 20-2.	Identified Architectural and Historical Resources Requiring PHRS Forms.....	621
Table 21-1.	Summary of Phase Ib and Phase II Results	659
Table 21-2.	Identified Archaeological Sites: Phase II Summary and Recommendations	660
Table 21-3.	Architectural and Historical Resources in Project Viewshed Recommended Eligible for NRHP Listing	665

List of Photographs

Photograph 1-1.	Overview of Project Setting from East Side of River (Council Cup) showing SSES and Surrounding Fields and Woodlands, Facing Northwest	1
Photograph 1-2.	Overview of Project Area, West Alternative showing Cultivated Fields and Woodlands, Facing East.....	2
Photograph 1-3.	Overview of Project Area, West Alternative showing Fallow Field (Wetland) and Woodlands, Facing East.....	2
Photograph 1-4.	Overview of Project Area, Area 7 showing Cultivated Field, Facing Northeast	2
Photograph 3-1.	North Branch of the Pennsylvania Canal, Locks Located at Berwick, Unknown Date, Unknown Photographer.....	37
Photograph 3-2.	North Branch of the Pennsylvania Canal, showing Canal Boats in Dry Canal Prism, Circa 1900, Beach Haven.....	50
Photograph 6-1.	View of Pedestrian Ground Survey in Area 6, Section 5, Facing East.....	78
Photograph 6-2.	View of Surface Collection in West Alternative, Section 7, Facing North.....	78
Photograph 6-3.	View of Shovel Testing in West Alternative, Section 31 (Site 10), Facing Southeast.....	79
Photograph 6-4.	View of Shovel Testing in Woodlands, West Alternative, Facing North	79
Photograph 6-5.	Overview of Area 6 (Section 1) showing Open Field on Low Terrace/Floodplain Subject to Deep Testing, Facing South.....	80
Photograph 6-6.	Overview of Broad Upland Fields in West Alternative (Sections 9 and 10), Facing Northeast	83
Photograph 6-7.	Overview of Cultivated Fields in West Alternative (Sections 3-6), Facing West.....	84
Photograph 6-8.	Confers Lane Parcel showing Paved Access Road and Woodlands, Facing Southeast.....	85
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.....	85
Photograph 6-10.	Deep Testing in Area 6, Section 1, showing Mechanical Excavation of Trench, Facing South	87
Photograph 6-11.	Deep Testing in Area 6, Section 1, showing Upper Fill Deposit Exposed in Profile of Trench, Facing South.....	87
Photograph 6-12.	Deep Testing in Area 6, Section 1, showing Drill Rig Excavating a Soil Coring in Base of Trench, Facing North	87
Photograph 6-13.	Site 36LU288: Area 6, Section 1, Mechanically Excavated Piles of Soil from TU 7 Column Sample	88
Photograph 6-14.	View of Area 7 (Section 1) showing Cultivated Field on Low Terrace/Floodplain, Facing Northeast	89
Photograph 6-15.	View of North Branch Pennsylvania Canal in Area 7 showing Dry Canal Prism, Facing Southwest.....	90
Photograph 6-16.	Switchyard 2 showing Shovel Testing in Transmission Line Corridor, Facing Southwest.....	90
Photograph 6-17.	Overview of Project Area in Cornfield, Lot 100, Facing North.....	91

Technical Report: BBNPP Phase I and Phase II Cultural Resource Investigations

Photograph 6-18.	Overview of Project Area in Fallow Field, Lot 4, Facing South	91
Photograph 6-19.	Hand-Clearing of Densely-Planted Corn in Lot 100, Facing North	94
Photograph 6-20.	Machine-Clearing of Transect through Cornfield in Lot 100, Facing North	94
Photograph 6-21.	Lot 4, Section 1, showing Overgrown Fallow Field, Facing Northeast.....	95
Photograph 6-22.	Lot 4, View of Hummel Farmstead (155059/GAI-05) from North Market Street, Facing North	95
Photograph 6-23.	Lot 4, Stone Arch Bridge (155054/GAI-06), Facing Northeast.....	95
Photograph 6-24.	Lot 64 showing Disturbed Area of Topsoil Removal in Foreground and Section 1 Cornfield in Distance, Facing East	96
Photograph 6-25.	Lot 64 showing Disturbed Area of Recent Topsoil Removal and Rock Quarry in Distance, Facing West.....	96
Photograph 6-26.	Lot 93F, Section 1, showing Overgrown Fallow Field within Existing Transmission Corridor, Facing South	97
Photograph 6-27.	Lot 95, Section 1, showing Shovel Testing in Cleared Transect through Cornfield, Woodland in Distance, Facing West.....	98
Photograph 6-28.	Lot 95, Section 2, showing Shovel Testing in Fallow Field, Facing South	98
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	98
Photograph 6-30.	Lot 96, Section 1, showing GAI-24 (Abandoned Dwelling and Garage), Facing North	99
Photograph 6-31.	Lot 97/97C, showing Residence, Facing East.....	99
Photograph 6-32.	Lot 100, Section 1, Shovel Test Transect in Cornfield, Facing North	100
Photograph 6-33.	Lot 100, View of Quarry at Eastern Edge of Section 2, Facing Southwest.....	100
Photograph 6-34.	Isolated Finds—Diagnostic Projectile Points	104
Photograph 9-1.	View of Site 36LU278 showing Pedestrian Ground Survey of Cultivated Field, Facing Southwest	121
Photograph 10-1.	Overview of Site 36LU279, Facing Southeast.....	127
Photograph 10-2.	Site 37LU279: French Gun Flint Found during Phase Ib Surface Collecting Activities.....	128
Photograph 10-3.	Site 36LU279: Test Unit 4, South Profile. Note Plow Scars at Ap/B Interface.....	140
Photograph 10-4.	Site 36LU279: Test Unit 6, South Profile. Note Plow Scars at Ap/B Interface.....	142
Photograph 10-5.	Site 36LU279: Test Unit 1, South Profile. Note Water along South Wall of Unit.	143
Photograph 10-6.	Site 36LU279: Trench Excavation in Progress.....	144
Photograph 10-7.	Site 36LU279: Representative Ceramic Sample.....	146
Photograph 11-1.	Overview of Site 36LU280, Facing Northeast.	169
Photograph 11-2.	Surface Collection Activities at Site 36LU280, Facing Northeast.....	178
Photograph 11-3.	Site 36LU280: Test Unit 2, South Profile, Facing South	182
Photograph 11-4.	Site 36LU280: Test Unit 4, South Profile, Facing South	185
Photograph 11-5.	Site 36LU280: Backhoe Beginning Trench Excavations, Facing East.....	186
Photograph 11-6.	Site 36LU280: Trench 1 Excavation. Facing East.....	186

Photograph 11-7.	Site 36LU280: Trench 3 Overview, Facing East. Note Trench 2 on right	188
Photograph 11-8.	Site 36LU280: Test Unit 3, Feature 1 (Pipe and Pipe Trench) Planview, Facing North	189
Photograph 11-9.	Site 36LU280: Feature 3, Planview, Facing North	189
Photograph 11-10.	Site 36LU280: Feature 4 East Profile, Facing West.....	190
Photograph 11-11.	Site 36LU280: Feature 5 in Trench 2 before Excavation, Facing North.....	191
Photograph 11-12.	Site 36LU280: Feature 5 Excavated Section, North Profile, Facing North	192
Photograph 11-13.	Site 36LU280: Feature 6, West Profile, Facing West.....	192
Photograph 11-14.	Site 36LU280: Feature 7, East Profile, Facing East.....	193
Photograph 11-15.	Site 36LU280: Untyped Point Base (FS 102).....	194
Photograph 11-16.	Site 36LU280: Representative Sample of Decorative Table Glass Artifacts	196
Photograph 11-17.	Site 36LU280: Representative Sample of Ceramics.....	197
Photograph 11-18.	Site 36LU280: Lysol Bottle (FS 110) with Manufacturer's Mark, Produced by Whitall -Tatum Co. from 1920 to 1935.....	198
Photograph 11-19.	Site 36LU280: Oven Serve Makers Mark, Manufactured by Homer Laughlin China Company between 1933 and 1959	199
Photograph 12-1.	View of Site 36LU281 in Cultivated Field South of Confers Lane, Facing Southwest.....	227
Photograph 12-2.	Site 36LU281: Crew Conducting Surface Collection, Facing Southeast.....	237
Photograph 12-3.	Site 36LU281: Upper Landform along Confers Road, Facing Southeast	242
Photograph 12-4.	Site 36LU281: Slope Leading to Lower Landform, Facing South	242
Photograph 12-5.	Site 36LU281: TU 1 North Profile, Facing North	243
Photograph 12-6.	Site 36LU281: TU2, West Profile, Facing West	243
Photograph 12-7.	Site 36LU281: Test Unit 4, West Profile, Facing West.....	245
Photograph 12-8.	Site 36LU281: Test Unit 3, Planview of Feature 1 before Excavation, Facing North	246
Photograph 12-9.	Site 36LU281: Test Unit 7 showing Plow Scars, Facing North	249
Photograph 12-10.	Site 36LU281: Test Unit 8, East Profile, Facing East.....	249
Photograph 12-11.	Site 36LU281: Crew Shovel Scraping B Horizon Surface Exposed at Base of Trench, Facing East	250
Photograph 12-12.	Site 36LU281: Trench 2 Planview Facing West.....	251
Photograph 12-13.	Site 36LU281: Overview of Trench 3 showing Feature 1 (Dark Soil) Near Center of Trench, Facing West.....	252
Photograph 12-14.	Site 36LU281: Crew Documenting Feature 1 in Trench 3, Facing Northeast	253
Photograph 12-15.	Site 36LU281: Overview of 3x3 ft Excavated Sample of Feature 1's Cellar Hole, Facing North.....	254
Photograph 12-16.	Site 36LU281: Planview of Feature 3 after Excavation, Facing North	257
Photograph 12-17.	Site 36LU281: Representative Artifact Sample	258
Photograph 12-18.	Site 36LU281: Back of Two Brass Buttons	262
Photograph 12-19.	Site 36LU281: Lamp Chimney Glass Sample	262
Photograph 12-20.	Site 36LU281: Representative Sample of Ceramics.....	263
Photograph 12-21.	Site 36LU281: Saucer with Mikado Pattern (FS 203 & 220).....	264
Photograph 12-22.	Site 36LU281: Sherd with Ardennes Pattern Name (FS 166).....	264

Technical Report: BBNPP Phase I and Phase II Cultural Resource Investigations

Photograph 12-23.	Site 36LU281: Ceramic Maker's Marks	264
Photograph 12-24.	Site 36LU281: Sample of Common Canning Jar Lid Liners Brands	265
Photograph 13-1.	View of Site 36LU282 Vicinity in Cultivated Field, Facing West.....	293
Photograph 14-1.	Overview of Site 36LU283 from Confers Lane, showing Locus 1 in Area of Trees to Right, and Locus 2 at Bend in Road in Distance, Facing West	299
Photograph 14-2.	Site 36LU283: Locus 1, showing Feature 1 (Barn Foundation), Facing East.....	300
Photograph 14-3.	Site 36LU283: Locus 2, showing Shovel Testing in Area of Feature 2 (House Foundation), Facing West.....	300
Photograph 14-5.	Site 36LU283: Part of Obituary found for William Sink Jr., Dated Oct. 22, 1983 (The Press) (FS 273).....	311
Photograph 14-6.	Site 36LU283: Feature 2, Detail of West Foundation Wall Construction, Facing West.....	320
Photograph 14-7.	Site 36LU283: Feature 2, Base of Concrete Silo, View to Southeast. Note Piers and East Foundation Wall in Background, Facing East.....	320
Photograph 14-8.	Site 36LU283: Feature 2, West Foundation Wall Illustrating Concrete Foundation Attachment for Silo on Right, Facing West.....	321
Photograph 14-9.	Site 36LU283: Feature 2, North Foundation Wall Detail showing Dovetail of Both Construction Methods, Facing North	321
Photograph 14-10.	Site 36LU283: Feature 2, Entrance Gap in East Foundation Wall, Facing Northeast	322
Photograph 14-11.	Site 36LU283: Feature 2 Overview of Concrete Piers and North and East Foundation Walls, Facing East.....	322
Photograph 14-12.	Site 36LU283: Feature 2, West Profile of Test Units 3 and 4, Facing West	324
Photograph 14-13.	Site 36LU283: Feature 2, West Profile of Test Units 3 and 4, Facing West	324
Photograph 14-14.	Site 36LU283: Feature 2, Test Unit 5, North Wall, Facing North	325
Photograph 14-15.	Site 36LU283: Feature 3 Planview, Facing South.....	328
Photograph 14-16.	Site 36LU283: Feature 4 Interior.	328
Photograph 14-17.	Site 36LU283: Feature 4 Wood Access Cover.....	329
Photograph 14-18.	Site 36LU283: Test Unit 7, Feature 5c Profile, Facing North	329
Photograph 14-19.	Site 36LU283: Test Unit 1, Planview at top of Feature 5a, Facing North.....	330
Photograph 14-20.	Site 36LU283: Test Unit 9, Planview of Feature 5c, Facing East	330
Photograph 14-21.	Site 36LU283: Feature 9 Cross Section, Facing East.....	339
Photograph 14-22.	Site 36LU283: Miscellaneous Artifact Sample	340
Photograph 14-23.	Site 36LU283: Prehistoric Late Stage Biface Recovered from Test Unit 5.....	340
Photograph 14-24.	Site 36LU283: Toy Sample.....	344
Photograph 14-25.	Site 36LU283: Button Variety	345
Photograph 14-26.	Site 36LU283: Kitchen Glass Sample	346
Photograph 14-27.	Site 36LU283: Ceramic Sample	347
Photograph 14-28.	Site 36LU283: Sample of Ceramic Maker's Marks.....	347
Photograph 15-1.	Site 36LU284 showing Shovel Testing in Woodlands in Vicinity of Feature 1 (Surface Depression), Facing Northeast.....	377

Photograph 15-2.	Site 36LU284 showing Feature 2 (Well/Cistern) in Clearing, Facing North	378
Photograph 16-1.	Site 36LU285 showing Possible Surface Depression at Eastern End Adjacent to Beach Grove Road, Facing Northeast	389
Photograph 16-2.	Site 36LU285 showing Northern Site Limits Adjacent to Beach Grove Road, Facing East	389
Photograph 16-3.	Site 36LU285: Test Unit 7, West Profile	403
Photograph 16-4.	Site 36LU285: Test Unit 3 Excavation within Rectangular Depression.....	404
Photograph 16-5.	Site 36LU285: Tree-lined Northeast Site Limits, Facing West	404
Photograph 16-6.	Site 36LU285: Test Unit 5 Feature 7 before Excavation, Facing West.....	408
Photograph 16-7.	Site 36LU285: Test Unit 5, Feature 7, Northeast Profile, Facing Northeast	408
Photograph 16-8.	Site 36LU285: Excavation of Test Units 4 and 9, Facing Northeast	409
Photograph 16-9.	Site 36LU285: Test Unit 4 North Profile, Facing North.....	409
Photograph 16-10.	Site 36LU285: Plan View of Feature 5 Excavation in Test Units 4 and 9, Facing North	412
Photograph 16-11.	Site 36LU285: Test Unit 2, North Profile, Facing North.....	413
Photograph 16-12.	Site 36LU285: Test Unit 8 Plan View, Facing North.....	426
Photograph 16-13.	Site 36LU285: Plan View of Feature 4 Complex, Facing East.....	427
Photograph 16-14.	Site 36LU285: Sample of Buttons, Buckles, and Beads	435
Photograph 16-15.	Site 36LU285: Sample of Ceramics	436
Photograph 17-1.	Site 36LU286 showing House Prior to Demolition, Facing West	463
Photograph 17-2.	Site 36LU286 showing an Overview of the Farm Prior to Demolition of the Structures, Facing South	463
Photograph 17-3.	Site 36LU286: Overview of North End, showing Gravel Lane through Site Area, Facing West	464
Photograph 17-4.	Site 36LU286 showing Brush Clearing in Area of Former Structure 1 during Phase Ib Survey, Work Trailer in Background, Facing East	464
Photograph 17-5.	Site 36LU286 showing Area of Former Structure 2, Facing Northwest	464
Photograph 17-6.	Site 36LU286 showing the Pond Area of the Site Downslope of the Linear Rise, Facing Southwest.....	465
Photograph 17-7.	Site 36LU286: Test Unit 1, North Wall Profile, Facing North	478
Photograph 17-8.	Site 36LU286: Feature 1 Profile in Test Unit 1, Facing West.....	480
Photograph 17-9.	Site 36LU286: Test Unit 14, North Wall Profile, Facing North	481
Photograph 17-10.	Site 36LU286: Test Unit 2, South Wall Profile, Facing South	484
Photograph 17-11.	Site 36LU286: Test Unit 3, North Wall Profile, Facing North	485
Photograph 17-12.	Site 36LU286: Test Unit 11, North Wall Profile, Facing North	489
Photograph 17-13.	Site 36LU286: Features 4 and 5 in Test Unit 16, Facing North	489
Photograph 17-16.	Site 36LU286: Test Unit 12, North Wall Profile, showing Feature 2, Facing North	494
Photograph 17-17.	Site 36LU286: Close-up of Feature 2 in Test Unit 12, Facing West	494
Photograph 17-18.	Site 36LU286: Prehistoric Projectile Points.....	501
Photograph 17-19.	Site 36LU286: Selected Glass Artifacts	501
Photograph 17-20.	Site 36LU286: Selected Redware, Yellowware, Stoneware, and Ironstone Ceramic Kitchen Artifacts	502
Photograph 17-21.	Site 36LU286: Selected Whiteware Ceramic Kitchen Artifacts.....	502

Photograph 17-22.	Site 36LU286: Selected Pearlware Kitchen Ceramic Artifacts	503
Photograph 17-23.	Site 36LU286: Selected Small Find Artifacts.....	503
Photograph 18-1.	Site 36LU287 showing Shovel Testing in Woodlands, Facing North.....	535
Photograph 19-1.	Site 36LU288: Overview of Phase II Plowed Field, from Southwest Corner of Site, Facing North.....	545
Photograph 19-2.	Site 36LU288: Overview of Phase II Plowed Field, from Northeast Corner of Site, Facing Southwest.....	546
Photograph 19-3.	Site 36LU288: Phase Ib Shovel Testing in Southwest Corner of Site, showing Corn Crop, Facing Northeast	546
Photograph 19-4.	Site 36LU288: Phase Ib Diagnostic Projectile Points.....	548
Photograph 19-5.	Site 36LU288: View of Phase II Controlled Surface Collection, Facing Northeast	550
Photograph 19-6.	Site 36LU288: View of Northern Portion of Site, Facing East.....	550
Photograph 19-7.	Site 36LU288: View of Test Unit Excavation, Facing Southwest.....	551
Photograph 19-8.	Site 36LU288: View of Test Unit Excavation, Facing Northwest.....	551
Photograph 19-9.	Site 36LU288: Overview from Northeast Corner of Site showing Test Unit Block Excavation (TUs 11, 14, 15 and 16), Facing South.....	552
Photograph 19-10.	Site 36LU288: Trench 2 (Northwest Portion of Site) showing Exposed Subsoil, Facing North	552
Photograph 19-11.	Site 36LU288: Trench 8 (Northeast Portion of Site) showing Exposed Subsoil, Facing South.....	553
Photograph 19-12.	Site 36LU288: Overview of Plowzone Stripping in Northwest Portion of Site, showing Trenches 1-4, Facing Northeast	553
Photograph 19-13.	Site 36LU288: Eastern Portion of Field showing Shallow Northwest/Southeast-Oriented Swale, Facing Southeast	554
Photograph 19-14.	Site 36LU288: Overview from Northwest Corner of Site showing Shallow Northwest/Southeast-Oriented Swale, Facing Southeast	554
Photograph 19-15.	Site 36LU288: TUs 11 and 15, North Wall Profile showing Buried A (Ab) Horizon, Facing North.....	556
Photograph 19-16.	Site 36LU288: Feature 1 Planview as Exposed in the Southeast Corner of TU 11 (Approximately 80 cm Below Ground Surface) and in TUs 14, 15 and 16 (Approximately 66 cm Below Ground Surface), with String Marking Outline of Feature, Facing South.....	561
Photograph 19-17.	Site 36LU288: Feature 1, Planview of Partially Excavated Northern Half showing Fire-Cracked Rocks, Facing South	562
Photograph 19-18.	Site 36LU288: Feature 1, South Profile, Facing South	562
Photograph 19-19.	Site 36LU288: Feature 1, Planview of Excavated Feature, Facing South	563
Photograph 19-20.	Site 36LU288: Feature 2, Planview in Base of Trench 6, Facing West	564
Photograph 19-21.	Site 36LU288: Feature 2, West Profile, Facing West.....	564
Photograph 19-22.	Site 36LU288: Feature 2, Planview of Excavated Feature in Base of Trench and Profile of Western Edge of Feature in West Wall of Trench 6, Facing West.....	564
Photograph 19-23.	Site 36LU288: Sample of Projectile Points.....	570
Photograph 19-24.	Site 36LU288: Sample of Bifaces—Late-Stage Biface (FS 25), Middle-Stage Biface (FS 52)	572

Photograph 19-25. Site 36LU288: Notched Flakes (FS 75 and FS 159).....	572
Photograph 19-26. Site 36LU288: Utilized Flakes	573
Photograph 19-27. Site 36LU288: Freehand Core (FS 37)	573
Photograph 20-1. North Branch Pennsylvania Canal, Area 6, Facing North	623
Photograph 20-2. West Bank of North Branch Pennsylvania Canal, Area 7, Facing Northwest.....	623
Photograph 20-3. Union Reformed and Lutheran Church (Old River Church and Burying Ground), Front and Side Elevation, Facing Northeast	627
Photograph 20-4. Union Reformed, Lutheran Church Interior, and Restored Pulpit (left)	628
Photograph 20-5. Detail of the South Frontispiece, United Reformed & Lutheran Church.....	629
Photograph 20-6. Woodcrest, Main Dwelling, Front and Side Elevation, Facing Southeast	631
Photograph 20-7. Woodcrest, Secondary Dwelling, Front Elevation, Facing East	631
Photograph 20-8. Woodcrest Farmstead, Summer Kitchen, Facing Southeast	632
Photograph 20-9. Woodcrest Barn, Front and Side Elevation, Facing Northwest	632
Photograph 20-10. Woodcrest, Outbuilding, Side and Front Elevations, Facing Northwest	633
Photograph 20-11. Stone Arch Bridge, Facing Northeast.....	637
Photograph 20-12. North Market Street Bridge, Facing Southwest	641
Photograph 20-13. Red Brick Studios, Facing North	645
Photograph 20-14. Red Brick Studios, showing Smokehouse/Summer Kitchen and Modern Garage, Facing Northeast	645
Photograph 20-15. Wapwallopen Historic District, Orchard and Houses Along Main Street, Facing Northwest.....	649
Photograph 20-16. Wapwallopen Historic District, Orchard and Rear Elevations of Houses Fronting River Street, Facing Northwest	649
Photograph 20-17. Wapwallopen Historic District, Representative Streetscape, Houses Fronting River Street, Facing South	650
Photograph 20-18. Wapwallopen, 1939 Aerial Photograph	653
Photograph 20-19. Wapwallopen, 1959 Aerial Photograph	653
Photograph 20-20. Wapwallopen, 1969 Aerial Photograph	654
Photograph 20-21. Wapwallopen, 1999 Aerial Photograph	654

Chapter 1. Introduction and Project Overview

Project Summary

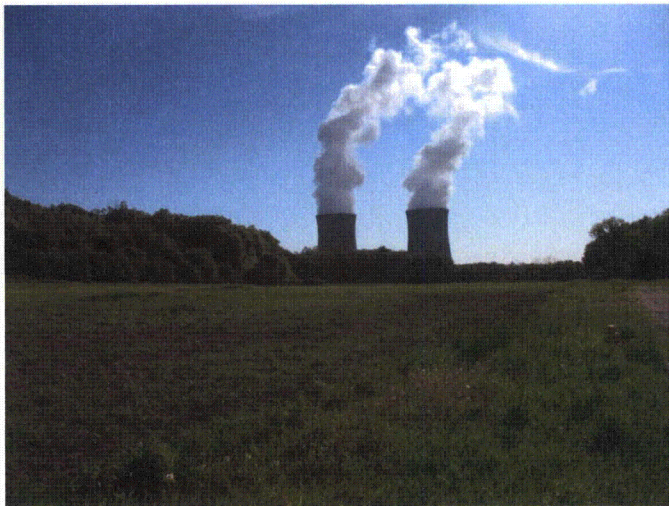
GAI Consultants, Inc. (GAI) conducted Phase I and Phase II cultural resources investigations of the proposed Bell Bend Nuclear Power Plant (BBNPP), Luzerne County, Pennsylvania, between June 2007 and November 2009. This work was performed on behalf of UniStar Nuclear Energy, LLC (UniStar), under contracts 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 ² /m ²)	# 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
Subtotal Phase Ib	902	114 ac	5,726	11 trenches, 8 units	--	--	11	25	11 surveyed resources 2 NRHP-eligible resources
Phase II (7 sites)	N/A	4 sites 12 ac	1,169	--	80	29,658 ft ² / 2755 m ²	--	--	---
Total Phase Ib and II	902	114 ac	6,895	11 trenches, 8 units	80	29,658 ft²/ 2755 m²	11	25	11 surveyed resources 2 NRHP-eligible resources

*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.

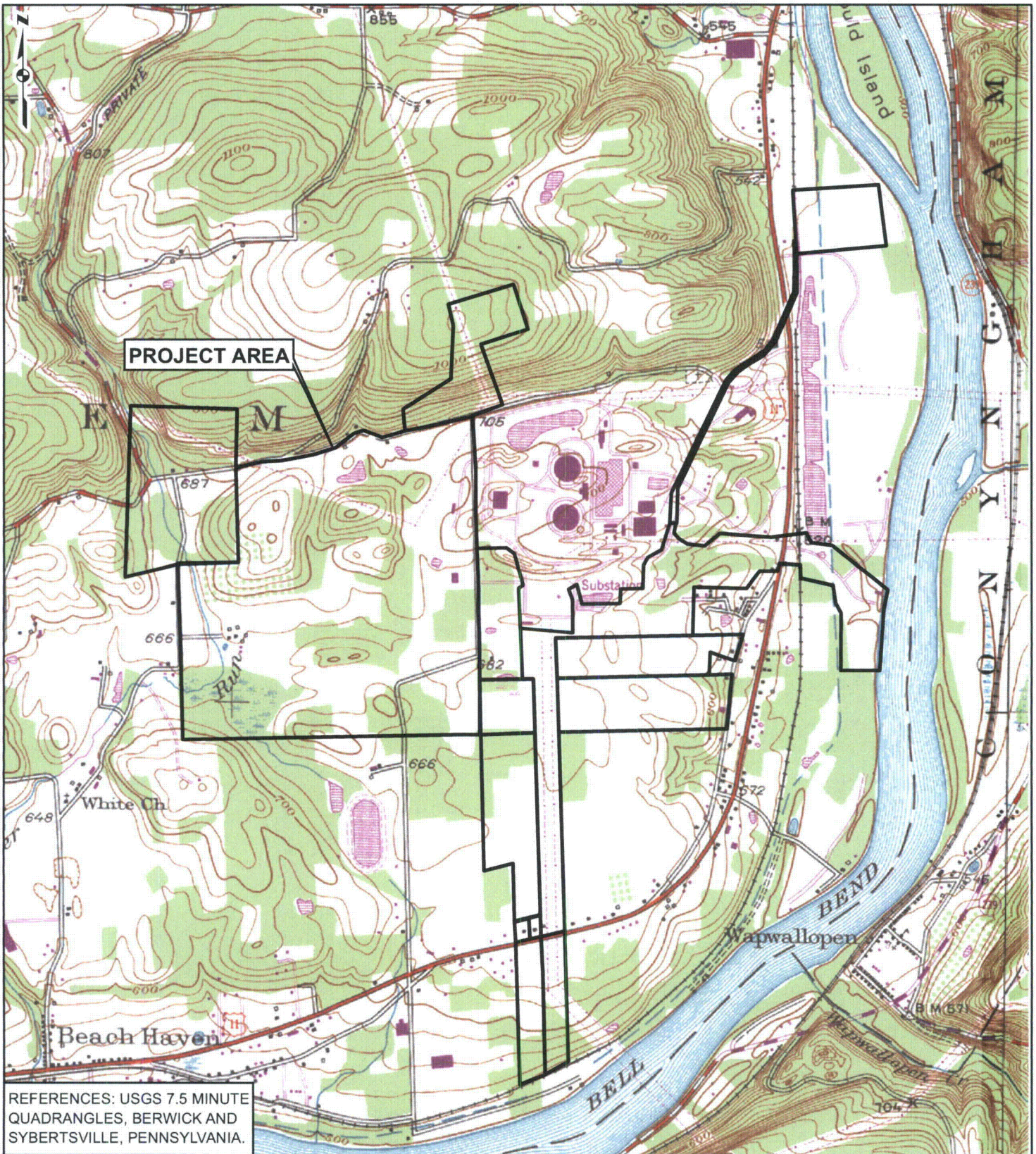
Terry J. Newell (Archaeologist) supervised both Phase I and II archaeological fieldwork with a crew that included Doug Jeffries (Senior Technician), Christine Lasser (Senior Technician),

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.

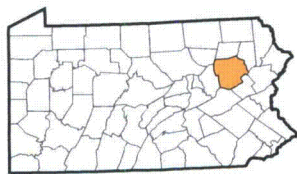
For Phase I studies, conducted for AREVA, Lannis Selz (AREVA) was the project manager and Peter Gluckler (AREVA) was the technical manager for the project. During Phase Ib field investigations, Chuck Thompson and Lyndsay Stutzman (Kleinfelder) served as UniStar's/PPL's field coordinators at BBNPP and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

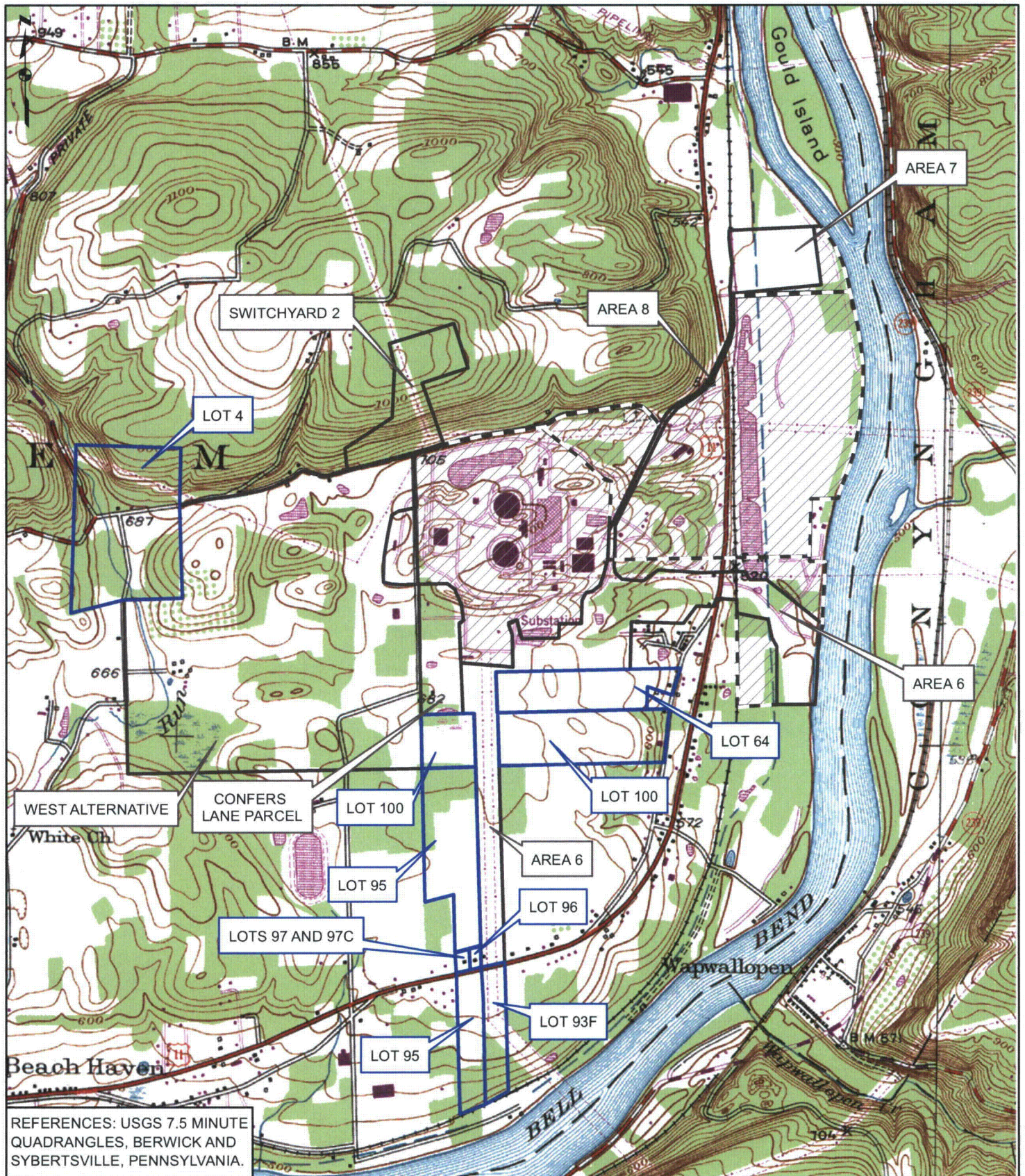


**FIGURE 1-1
PROJECT LOCATION**

 **BELL BEND NUCLEAR POWER PLANT**
UNISTAR NUCLEAR DEVELOPMENT, LLC.

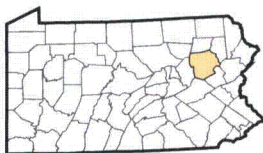
DRAWN BY: AJW
CHECKED: BAM

DATE: 05/26/2010
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
UNISTAR NUCLEAR DEVELOPMENT, LLC.**
gai consultants

DRAWN BY: AJW
CHECKED: BAM

DATE: 05/10/2010
APPROVED: BAM

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).

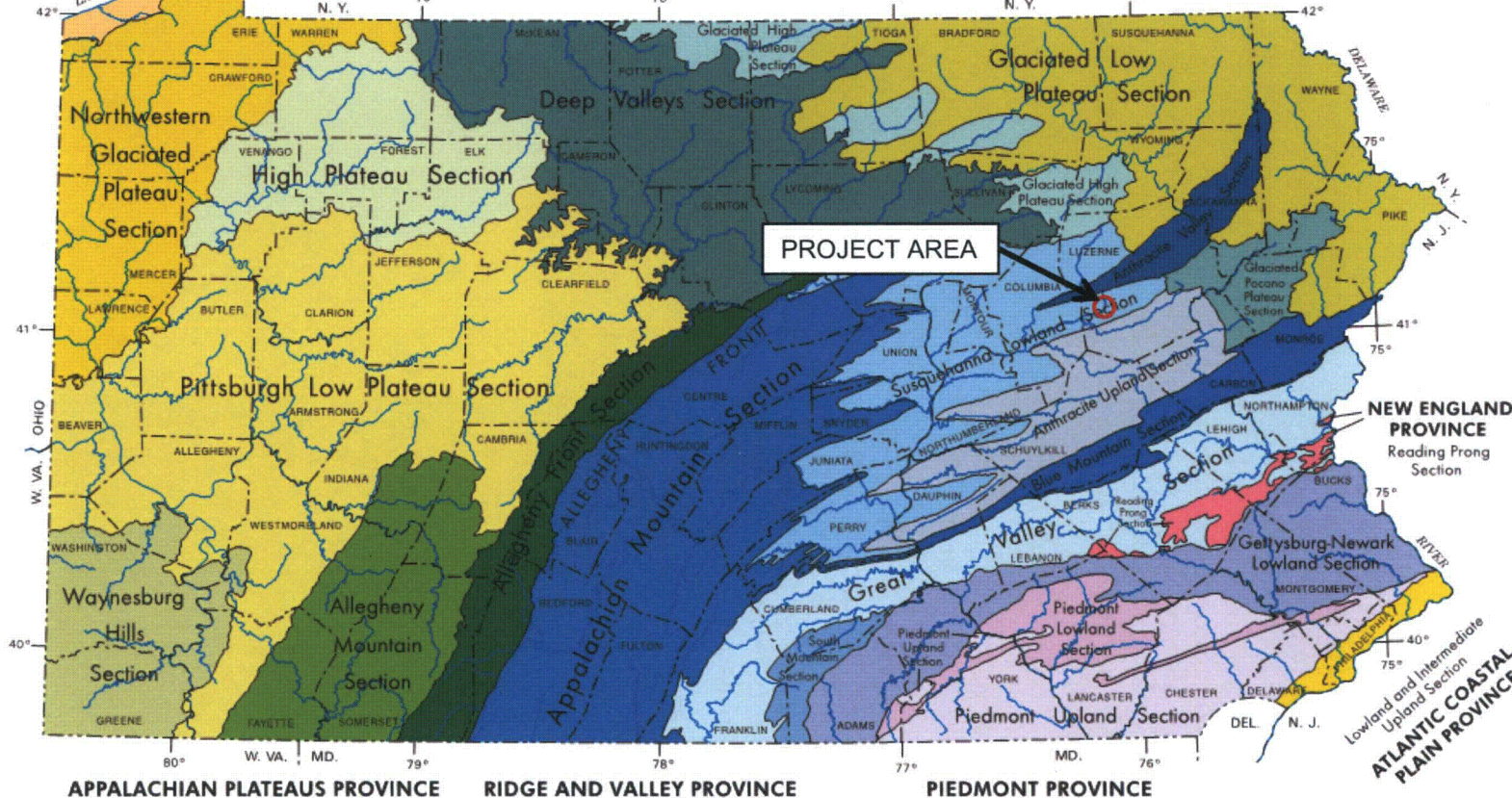
Paleoenvironment

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 PLATEAUS PROVINCE

RIDGE AND VALLEY PROVINCE

- APPALACHIAN MTN SECTION
- SUSQUEHANNA LOWLAND SECTION
- ANTHRACITE VALLEY SECTION
- ANTHRACITE UPLAND SECTION
- BLUE MTN SECTION
- GREAT VALLEY SECTION
- SOUTH MTN SECTION

NEW ENGLAND PROVINCE

- READING PRONG SECTION

PIEDMONT PROVINCE

- GETTYSBURG-NEWARK LOWLAND SECTION
- PIEDMONT LOWLAND SECTION
- PIEDMONT UPLAND SECTION

ATLANTIC COASTAL PLAIN PROVINCE

- LOWLAND AND INTERMEDIATE UPLAND SECTION

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

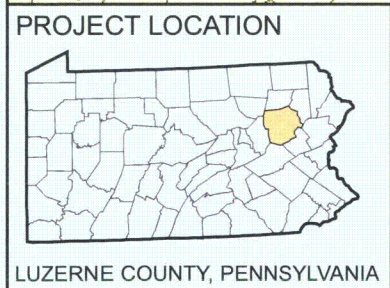
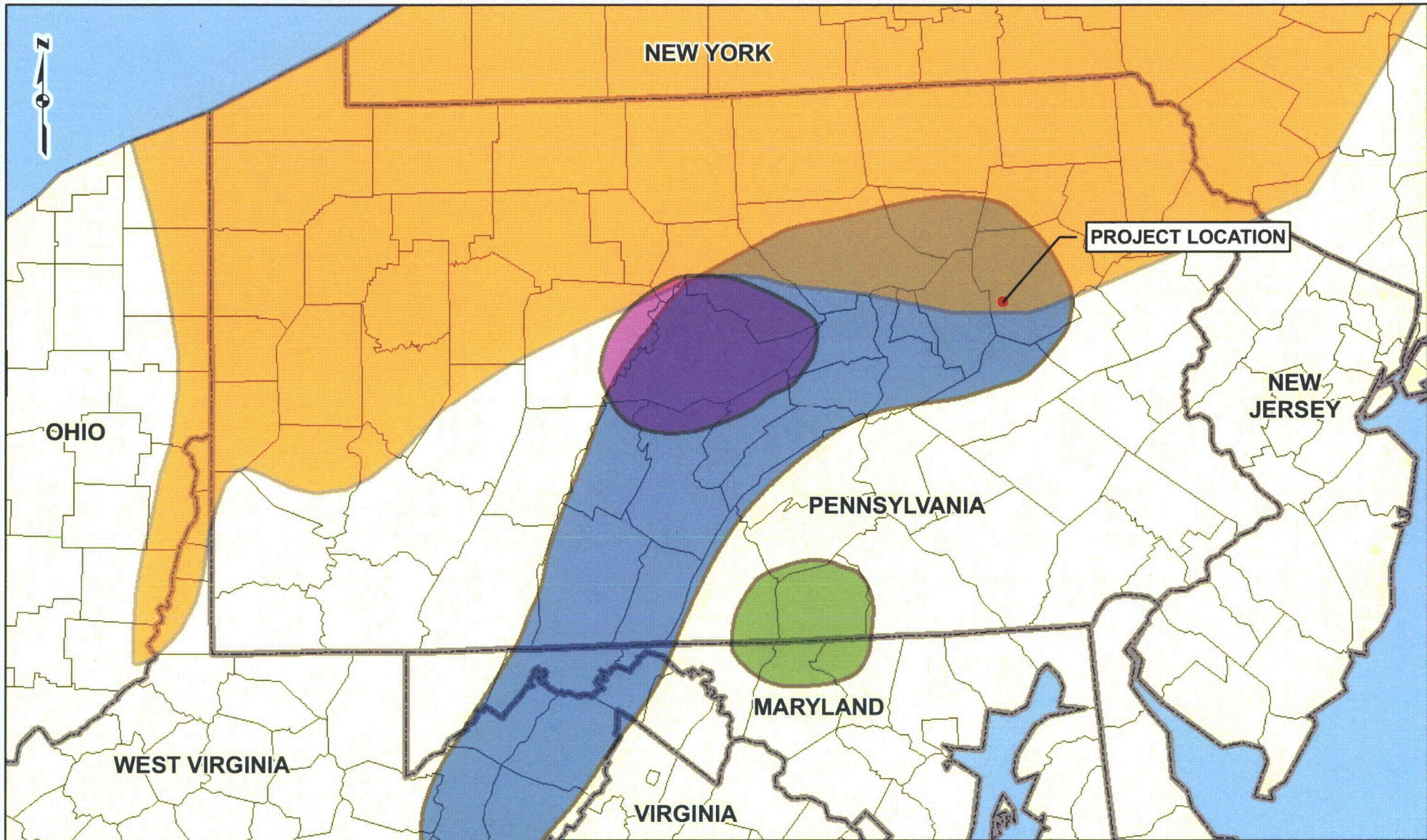
PROJECT AREA



**BELL BEND NUCLEAR POWER PLANT
UNISTAR NUCLEAR DEVELOPMENT, LLC.**

DRWN: AJW
CHECKED: BAM

DATE: 04/09/2010
APPROVED: BAM



REFERENCE:
ESRI STREET MAP, 2008.

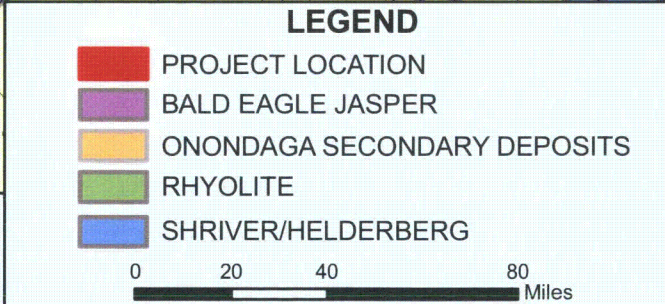



FIGURE 2-3
REGIONAL LITHIC RAW MATERIAL SOURCES

BELL BEND NUCLEAR POWER PLANT
UNISTAR NUCLEAR DEVELOPMENT, LLC.



gai consultants

DRAWN BY: AJW DATE: 04/29/2010
CHECKED: BAM APPROVED: BAM

(Intentionally blank)

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.

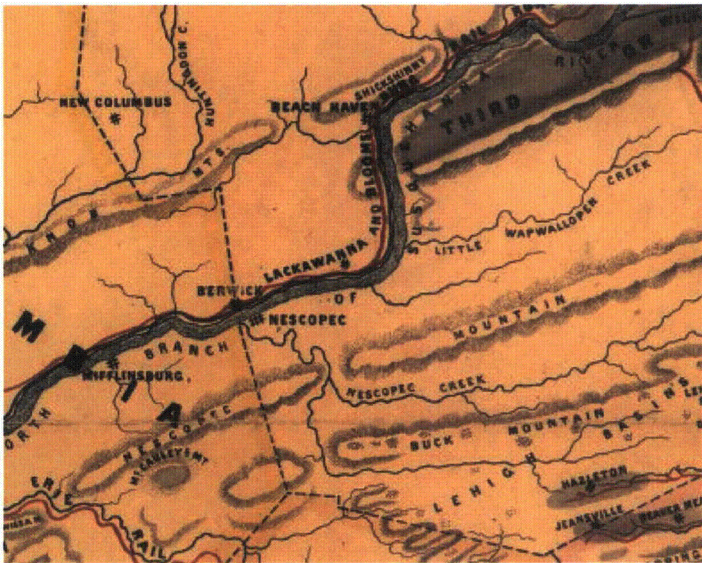
However, the prominence of the canal as a means of transportation was short-lived, for in 1846 the completion of the Lehigh and Susquehanna Railroad, which connected the anthracite fields of the Wyoming Valley to the Lehigh River, proved to be a quicker and more efficient means of transportation. This 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.

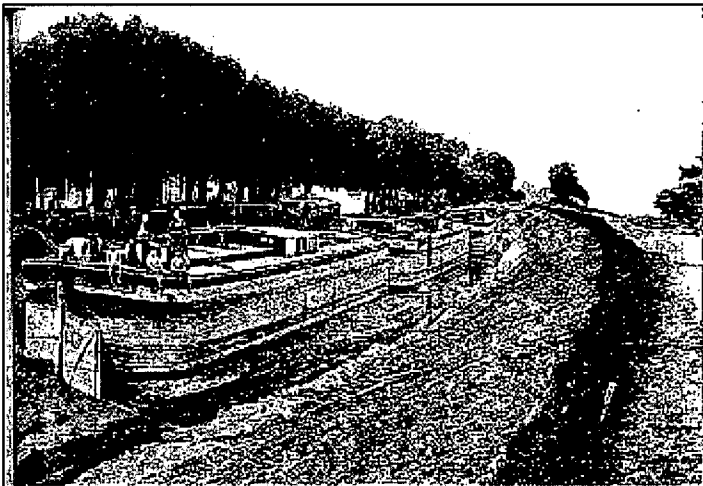
As recorded in the agricultural schedule of the 1850, 1870, and 1880 Federal Census, Luzerne County witnessed a steady increase in the production of corn, sweet potatoes, and honey and beeswax. The increase in the production of corn was the most significant, with 290,122 bushels produced in the 1849 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.

(intentionally blank)

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
Total	0	1	2	6	0	7	22	29

^{*}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

Technical Report: BBNPP Phase I and Phase II Cultural Resource Investigations

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.

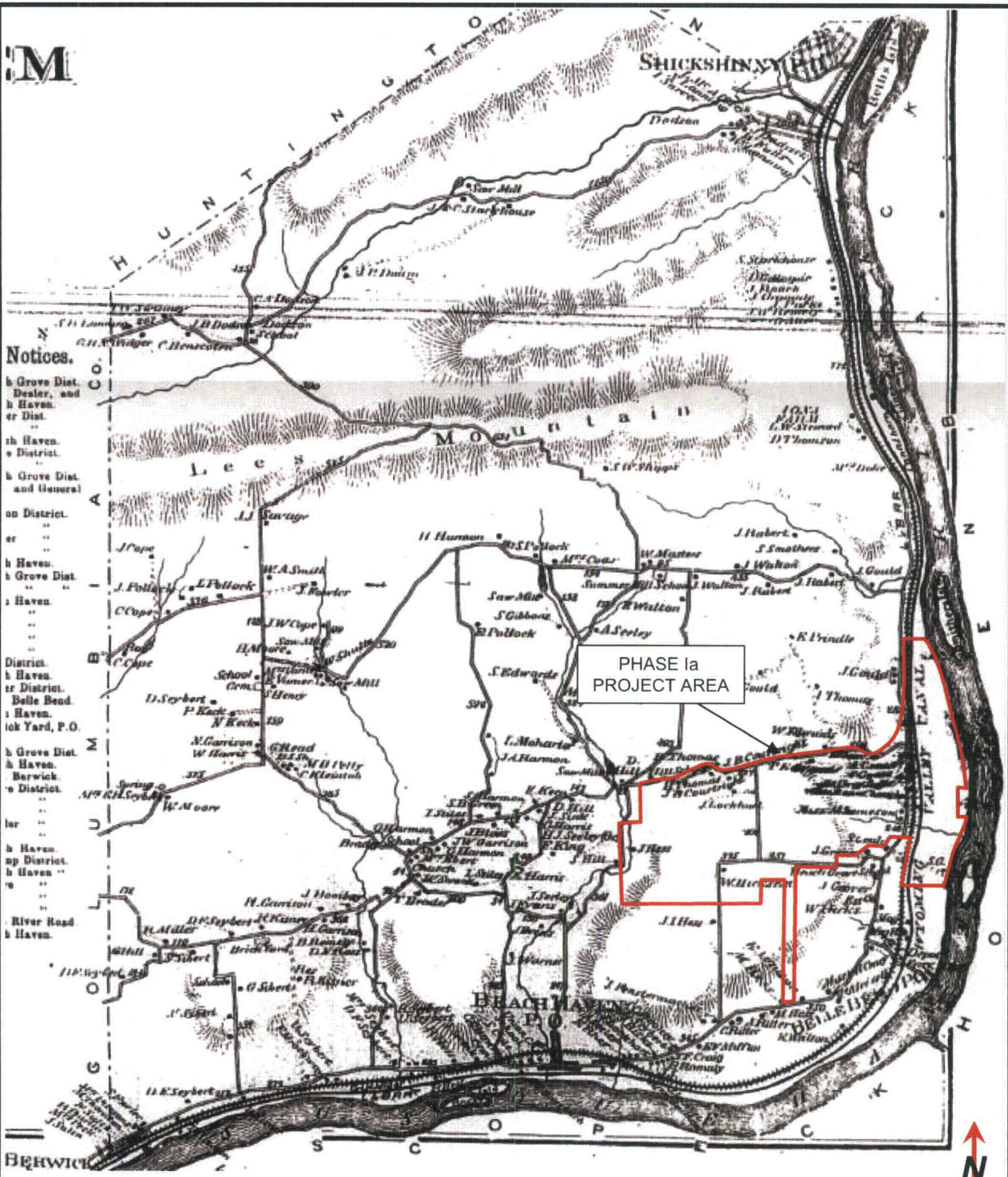
Figure 4-1. Previously Recorded Cultural Resources in Project Vicinity

B size

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


(back of Figure 4-1)

Side 2 of REDACTED Figure 4-1.

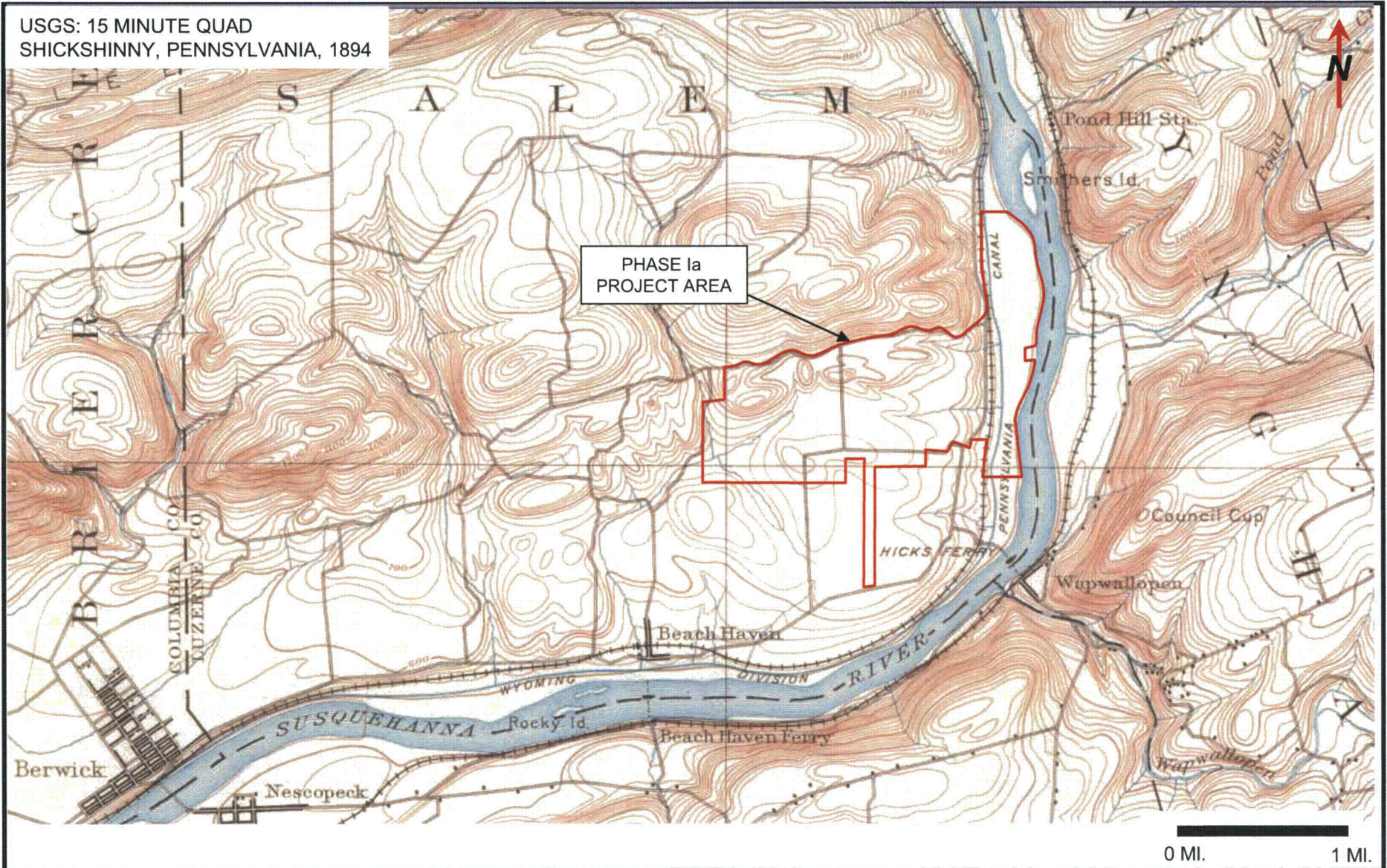


Atlas of Luzerne County Pennsylvania by D.G. Beers, published by A. Pomeroy & Co., Philadelphia, 1873



 gai consultants	FIGURE 4-2. PHASE Ia PROJECT AREA AND VICINITY, SALEM TOWNSHIP 1873	DWN SJS CHKD BAM
	BERWICK NPP-1 UNISTAR NUCLEAR DEVELOPMENT, LLC.	APPD. DATE 2/14/08
		SCALE As noted
		DRAWING NUMBER C080204.00

USGS: 15 MINUTE QUAD
SHICKSHINNY, PENNSYLVANIA, 1894

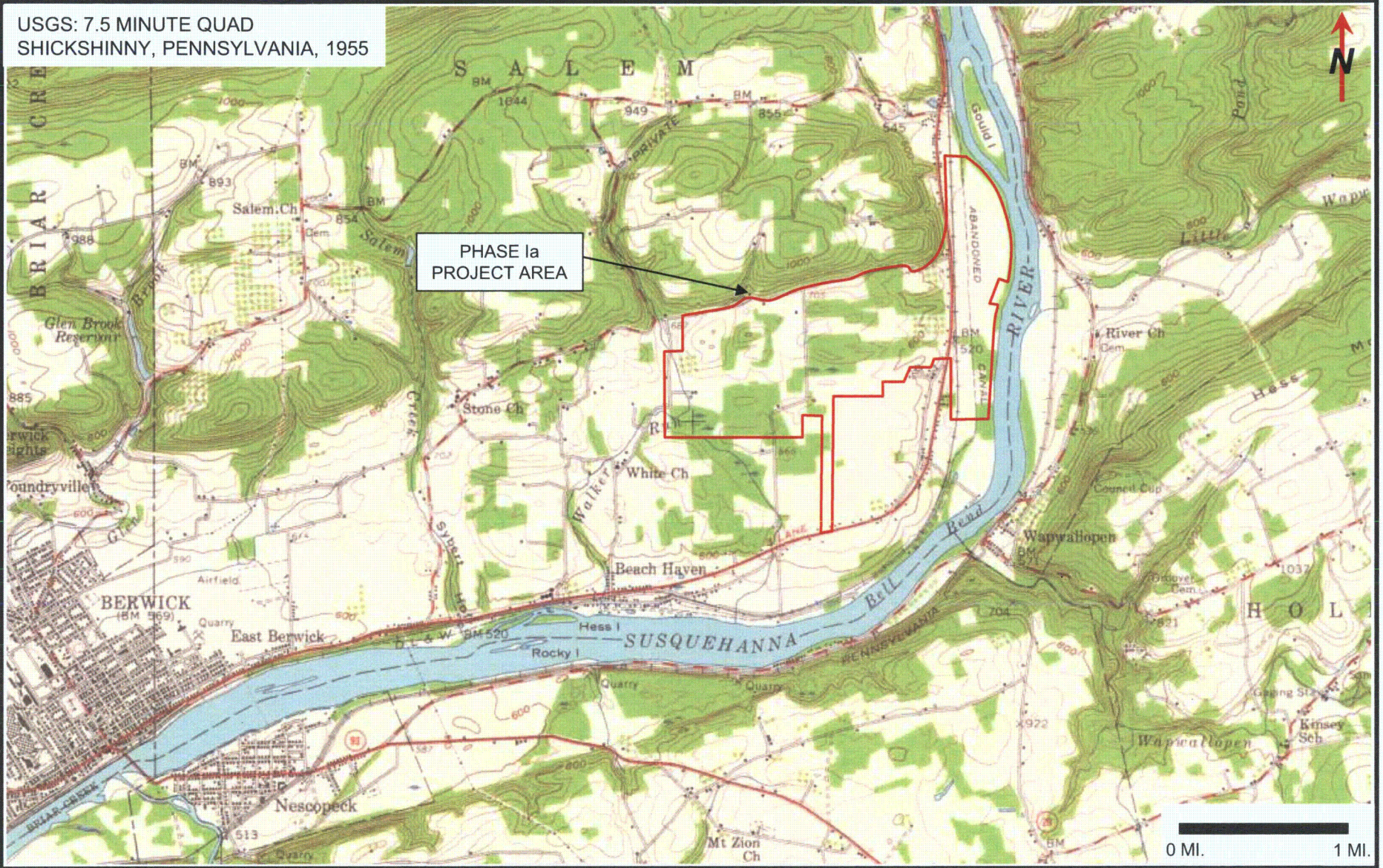


DWN SJS	CHKD BAM
APPD.	DATE 2/14/08
SCALE As noted	
DRAWING NUMBER	CO80204.00

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

BERWICK NPP-1 UNISTAR NUCLEAR DEVELOPMENT, LLC.

USGS: 7.5 MINUTE QUAD
SHICKSHINNY, PENNSYLVANIA, 1955



DWN	SJS	CHKD	BAM
APPD.		DATE	2/14/08
SCALE	As noted		
DRAWING NUMBER	CO80204.00		

FIGURE 4-4. PHASE Ia PROJECT AREA AND VICINITY, 1955
BERWICK NPP-1 UNISTAR NUCLEAR DEVELOPMENT, LLC.

(intentionally blank)