

# FAX

PENNSYLVANIA GAME COMMISSION  
BUREAU OF LAND MANAGEMENT  
2001 ELMERTON AVENUE  
HARRISBURG, PA 17110-9797



WWW.PGC.STATE.PA.US

To: Jerry van Noordennen

Fax # (570) 802-8119

From: Jim Leigey

Phone # (717) 787-4250

Date: 4-11-08

Number of Pages: 2

Fax: (717) 787-6957

Remarks:

I am faxing you a copy of our response letter for the new electric generation project. A hard copy of the letter will be sent by regular mail to Rod Krich with UniStar Nuclear Energy.

Please contact me if you have any questions.



Indiana Bat Biological Evaluation and Management Plan



COMMONWEALTH OF PENNSYLVANIA  
**PENNSYLVANIA GAME COMMISSION**  
2001 ELMERTON AVENUE, HARRISBURG, PA 17110-9797

April 10, 2008

Mr. Rod Krich  
UniStar Nuclear Energy, LLC  
750 E. Pratt Street, 14<sup>th</sup> Floor  
Baltimore, MD 21202-3106

In re: PNDI Search Database Search  
UniStar Nuclear Energy, LLC, Berwick, PA NPP-1 Project  
Salem Township, Luzerne County, PA

Dear Mr. Krich:

This is in response to your fax dated December 21, 2007 regarding the potential impacts of the project on special concern species of birds or mammals recognized by the Pennsylvania Game Commission (PGC).

Our office review has determined that your project area is located in proximity to known bat hibernacula. If a new nuclear powered steam electric plant is developed on the proposed project area, bats of the following species of bats may be impacted: the Small-footed Myotis (*Myotis leibii*), the Northern Myotis (*Myotis septentrionalis*), the Little Brown (*Myotis lucifugus*), the Big Brown (*Eptesicus fuscus*), and the Pipistrelle (*Pipistrellus subflavus*). If a decision is made to develop the plant, the activities associated with the development, and subsequent operation and maintenance of the plant facilities and grounds should be coordinated with the PGC. This determination may be reconsidered if project plans change or extend beyond the present project area, or if additional information becomes available on state species.

If you have any questions, please contact me at (717) 787-4250. Please be advised that this determination is only valid for one year from the date of this letter.

Very truly yours,

A handwritten signature in dark ink, appearing to read "James R. Leigey".

James R. Leigey  
Wildlife Impact Review Coordinator  
Division of Environmental  
Planning and Habitat Protection  
Bureau of Wildlife Habitat Management

Cc: File

## ADMINISTRATIVE BUREAUS:

PERSONNEL: 717-787-7836 ADMINISTRATION: 717-787-5670 AUTOMOTIVE AND PROCURMENT: 717-787-6594  
LICENSE DIVISION: 717-787-2084 WILDLIFE MANAGEMENT: 717-787-5529 INFORMATION & EDUCATION: 717-787-6286  
WILDLIFE PROTECTION: 717-787-5740 WILDLIFE HABITAT MANAGEMENT: 717-787-6818 REAL ESTATE: 717-787-6568  
AUTOMATED TECHNOLOGY SYSTEMS: 717-787-4076

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**T. L. Harpster**  
VP-Bell Bend Project-Development

**PPL Bell Bend, LLC**  
38 Bomboy Lane, Suite 2  
Berwick, PA 18603  
Tel. 570.802.8111 FAX 570.802.8119  
[tlharpster@pplweb.com](mailto:tlharpster@pplweb.com)



September 20, 2010

Ms. Tracey Librandi Mumma  
Pennsylvania Game Commission  
Bureau of Land Management  
Division of Environmental Planning and Habitat Protection  
2001 Elmerton Avenue  
Harrisburg, PA 17110-9797

**BELL BEND NUCLEAR POWER PLANT  
LARGE PROJECT SPECIES  
OF SPECIAL CONCERN SCREEN  
SALEM TOWNSHIP, LUZERNE COUNTY, PA  
BNP-2010-207                      Docket No. 52-039**

PPL Bell Bend, LLC is conducting an environmental evaluation for a potential nuclear power plant adjacent to the Susquehanna Steam Electric Station (SSES) site in Salem Township, Luzerne County, Pennsylvania. For screening purposes, the project area boundaries as shown on Figure 1 encompass the entire footprint of possible disturbance for the construction and maintenance of a nuclear power plant under consideration for the site, as well as the existing SSES site. The existing active SSES operating unit is within this boundary but will not be altered. This letter is a follow up to a similar letter sent December 21, 2007 and your response dated April 10, 2008.

PPL Bell Bend, LLC wishes to screen the entire area as shown on Figure 1 for species of special concern under jurisdiction of the Pennsylvania Game Commission. Please provide all current and historical information concerning the occurrence of rare, threatened and endangered species, as well as any other ecological resources of special concern within the project area. In addition, please provide this information for a 0.5-mile buffer surrounding the project area. This latter screen is requested for the purpose of evaluating environmental impacts and compliance with Pennsylvania Department of Environmental Protection regulations (e.g., 25 PA Code Chapter 105.17). A PNDI search form is attached for your use.

If you have any questions or need additional information, please contact Bradley Wise at 610.774.6508 or [bawise@pplweb.com](mailto:bawise@pplweb.com).

Thank you for your assistance.

Respectfully,

A handwritten signature in black ink, appearing to read "T. Harpster", is written over the word "Respectfully,". The signature is fluid and cursive.

Terry L Harpster

TLH/dw

Enclosures    1) Site Location Map  
                    2) PNDI Review Form

cc: Ms. Stacey Imboden  
Senior Project Manager  
U.S. Nuclear Regulatory Commission  
11545 Rockville Pike  
Rockville, MD 20852

Ms. Jamie Davis  
Office of Environmental Programs (3EA30)  
U.S. Environmental Protection Agency  
1650 Arch Street  
Philadelphia, PA 19103-2029

Mr. Tom Shervinskie  
Pa Fish & Boat Commission  
450 Robinson Lane  
Bellefonte, PA 16823

Ms. Jennifer Kagel  
United States Fish & Wildlife Service  
Pennsylvania Field Office  
315 S. Allen St. #322  
State College, PA 16801

Mr. Eugene Trowbridge  
Pa Dept Environmental Resources  
Northeast Regional Office  
2 Public Square  
Wilkes-Barre, PA 18711

Ms. Amy Elliott  
U.S. Army Corps of Engineers - Baltimore District  
State College Field Office  
1631 South Atherton Street, Suite 102  
State College, PA 16801

Ms. Paula B. Ballaron  
Susquehanna River Basin Commission  
1721 North Front Street  
Harrisburg, PA 17102-0425

Mr. Thomas W. Beauduy  
Susquehanna River Basin Commission  
1721 North Front Street  
Harrisburg, PA 17102-0425

September 20, 2010

BNP-2010-207

Page 3

bcc: B. A. Wise [bawise@pplweb.com](mailto:bawise@pplweb.com)  
J. S. Fields [jsfields@pplweb.com](mailto:jsfields@pplweb.com)  
R. Sgarro [rrsgarro@pplweb.com](mailto:rrsgarro@pplweb.com)  
D. Klinch [David.Klinch@constellation.com](mailto:David.Klinch@constellation.com)

September 20, 2010

BNP-2010-207

Enclosure 1

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Enclosure 1

Site Location Map



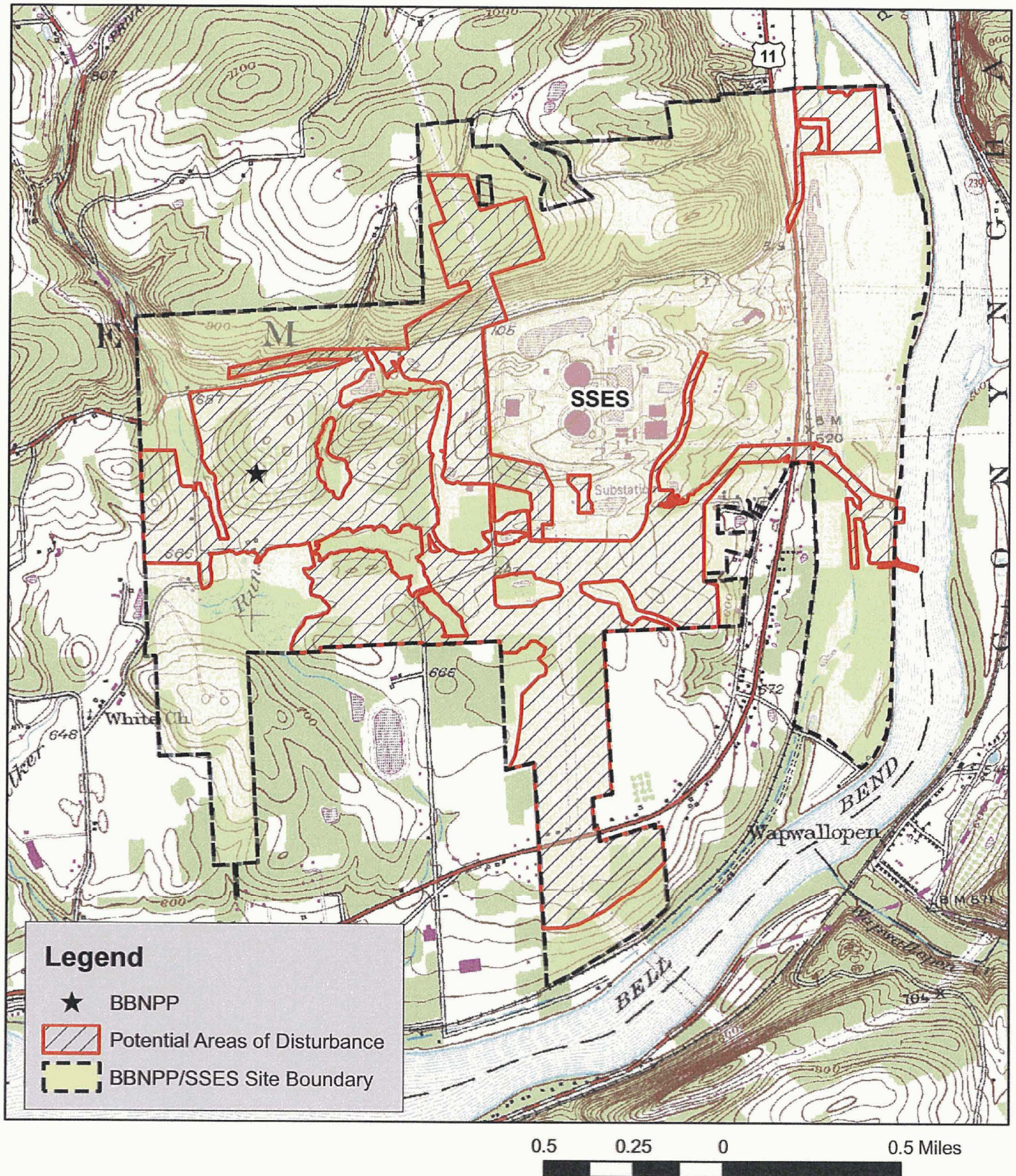


Figure 1.  
Bell Bend NPP  
Site Location Map



**NORMANDEAU ASSOCIATES**  
ENVIRONMENTAL CONSULTANTS  
400 Old Reading Pike, Bldg A, Suite 101 Stowe, PA 19464

date: 07/27/10  
prepared by: s.sherman  
project: 21766.004

rev. date:  
prepared for: b.lee  
file name: Figure1.BBNPP\_Site\_USGS



September 20, 2010

BNP-2010-207

Enclosure 2

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Enclosure 2

PNDI Review Form

**Pennsylvania Natural Diversity Inventory****Project Planning & Environmental Review Form**

This form provides site information necessary to perform an Environmental Review for special concern species and resources

listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat code or the Pennsylvania Game and Wildlife Code.

**Applicant Information**

Name: PPL Bell Bend, LLC

Address: 38 Bomboy Lane, Suite 2, Berwick, PA 18603

Phone Number: 570.802.8100

Fax Number: 570.802.8119

**Contact Person Information - if different from applicant**

Name: Bradley A. Wise, Environmental Permitting Supervisor, PPL Bell Bend LLC

Address: Two North Ninth Street (GENPL4), Allentown, PA 18101-1179

Phone Number: (610) 774-6508

Fax Number: (610) 774-2618

**Project Information**

Project Name: Bell Bend Nuclear Power Plant Project

Project Locations: Lat N 41d 5m 20.7s Lon W 76d 9m 4.5s

Municipality: Salem Township County: Luzerne

☒ Attach a copy of a U.S.G.S 7 1/2 Minute Quadrangle Map with Project Boundaries clearly marked.

U.S.G.S. Quad Name: Berwick, PA

**Project Description**

**Proposed Project Activity** (including All earth disturbance areas and current conditions)

The Bell Bend Nuclear Power Plant Project involves development of a combined license application (COLA) to the U.S. Nuclear Regulatory Commission (NRC) for potential construction and operation of a new nuclear powered steam electric plant adjacent to the Susquehanna Steam Electric Station. In the event a decision is made to develop the plant, associated activities would involve land clearing, grubbing, grading/excavation, and construction of plant and support facilities and structures; landscaping; and subsequent operation and maintenance of plant facilities and grounds. Land use of areas potentially disturbed consists predominately of active/former farmland and forest, to roadways, and natural vegetation (e.g., shrub-scrub).

Total Acres of Property: 1,700

Acreage to be Impacted: 700 acres (**approximately**)

1. Will the entire project occur in or on an existing building parking lot, driveway, road, maintained road shoulder, street, runway, paved area, railroad bed, or maintained lawn? Yes No X
2. Are there any waterways or waterbodies (intermittent or perennial rivers, streams, creeks, tributaries, lakes or ponds) in or near the project area, or on the land parcel? If so, how many feet away is the project? Yes X feet 0
3. Are wetlands located in or within 300 feet of the project area? Yes X No If No, is this the result of a wetland delineation?

If you have a "PNDI Project Environmental Review Receipt" with potential impacts, please send a receipt copy, this completed form, and a USGS Quad Map to the agency/agencies noted on the receipt. If you are unable to generate a PNDI Receipt because you do not have Internet access, complete this form, attach USGS Quad Map, and send them to your local DEP or County Conservation District. For review of a "Large Project," please send form and map to all the agencies listed below. See page 2 for more information.

Dept. of Conservation and Natural Resources  
Bureau of Forestry, Ecological Services Section  
400 Market St., PO Box 8552  
Harrisburg, PA 17105  
fax: 717-771-0271  
PA Game Commission  
Bureau of Land Management  
2001 Elmerton Avenue  
Harrisburg, PA 17110-9797  
fax: 717-787-6957

PA Fish and Boat Commission  
Natural Diversity Section  
450 Robinson Lane  
Bellefonte, PA 16828  
fax: 814-359-5175  
US Fish and Wildlife Service  
Endangered Species Biologist  
315 South Allen St., Suite 322  
State College, PA 16801  
no faxes please



COMMONWEALTH OF PENNSYLVANIA  
**Pennsylvania Game Commission**

2001 ELMERTON AVENUE  
HARRISBURG, PA 17110-9797

*"To manage all wild birds, mammals and their habitats  
for current and future generations."*

**ADMINISTRATIVE BUREAUS:**

ADMINISTRATION.....717-787-5670  
HUMAN RESOURCES.....717-787-7898  
FISCAL MANAGEMENT.....717-787-7314  
CONTRACTS AND  
PROCUREMENT.....717-787-6584  
LICENSING.....717-787-2084  
OFFICE SERVICES.....717-787-2118  
WILDLIFE MANAGEMENT.....717-787-5528  
INFORMATION & EDUCATION.....717-787-8286  
WILDLIFE PROTECTION.....717-787-6528  
WILDLIFE HABITAT  
MANAGEMENT.....717-787-6818  
REAL ESTATE DIVISION.....717-787-6558  
AUTOMATED TECHNOLOGY  
SERVICES.....717-787-4078

[www.pgc.state.pa.us](http://www.pgc.state.pa.us)

BUREAU OF WILDLIFE  
HABITAT MANAGEMENT  
717-787-6818

December 28, 2010

Large Project Review

RECEIVED DEC 28 2010

Mr. Bradley A. Wise  
PPL Bell Bend, LLC  
Two North Ninth Street (GENGL4)  
Allentown, Pennsylvania 18101-1179

Re: Bell Bend Nuclear Power Plant Project – Proposed Electrical Plant  
Salem Township, Luzerne County, Pennsylvania

Dear Mr. Wise,

Thank you for submitting the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number Bell Bend Nuclear Power Plant Project for review. The Pennsylvania Game Commission (PGC) screened this project for potential impacts to species and resources of concern under PGC responsibility, which includes birds and mammals only.

**Potential Impact Anticipated**

PNDI records indicate species or resources of concern are located in the vicinity of the project. The PGC has received and thoroughly reviewed the information that you provided to this office, as well as PNDI data, and has determined that potential impacts to the following endangered species may be associated with your project:

Scientific Name	Common Name	PA Status	Federal Status
<i>Myotis sodalis</i>	Indiana Bat	ENDANGERED	ENDANGERED

**Next Steps**

Indiana bats are a federally listed endangered species under the jurisdiction of the U.S. Fish and Wildlife Service. As a result, our agency defers comments on potential impacts to Indiana bats to the U.S. Fish and Wildlife Service.

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily



imply actual conditions on site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map). If the proposed work has not changed and no additional information concerning listed species is found, the project will be cleared for PNDI requirements under this agency for an additional year.

This finding applies to impacts to birds and mammals only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure that the U.S. Fish and Wildlife Service, the PA Department of Conservation and Natural Resources, and/or the PA Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at [www.naturalheritage.state.pa.us](http://www.naturalheritage.state.pa.us).

Sincerely,



Olivia A. Braun  
Environmental Planner  
Division of Environmental Planning & Habitat Protection  
Bureau of Wildlife Habitat Management  
Phone: 717-787-4250, Extension 3128  
Fax: 717-787-6957  
e-Mail: [OBraun@state.pa.us](mailto:OBraun@state.pa.us)

A PNHP Partner



Pennsylvania Natural Heritage Program

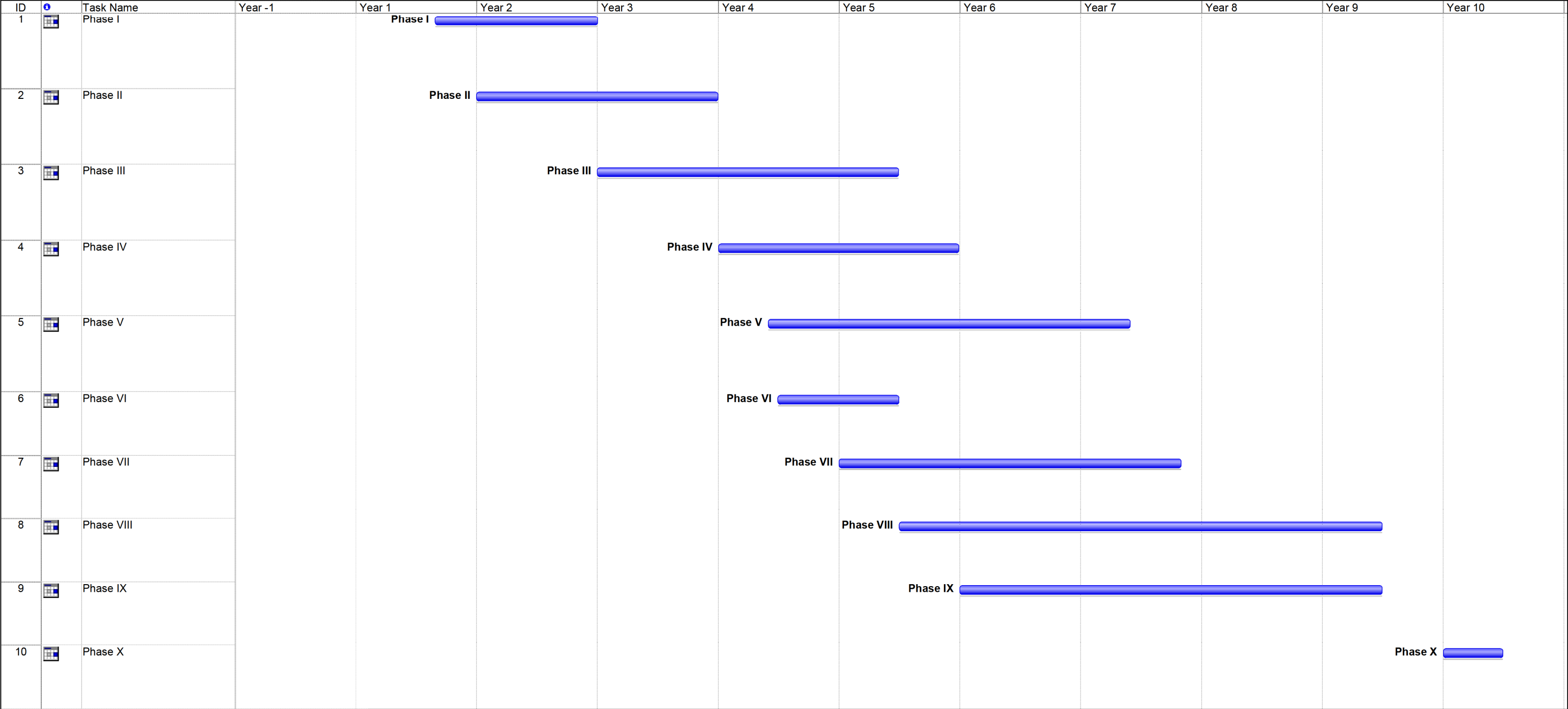
OAB/oab

cc: Pamela Shellenberger, U.S. Fish & Wildlife Service  
Librandi Mumma, PGC  
DuBrock, PGC  
Brauning, PGC  
Butchkoski, PGC  
Turner, PGC  
Terry L. Harpster, PPL  
File

## **Appendix B**

# **Schedule and Maps of Construction**

## **Phases 1 through 10**



Project: Construction Phase Timing  
Date: Tue 7/17/12

Task

Split

Progress

Milestone

Summary

Project Summary

External Tasks

External Milestone

Deadline

139 of 276

Page 1

Phase I – 230 kV Transmission Line Relocation

Phase II – Begin Bridge Construction and clear and grub areas including west of N. Market St, Main Access Rd. and South Laydown

Phase III – Clear and grub majority of site including Power Block, Batch Plant area, and Bell Bend GIS Switchyard as well as construction of bridges

Phase IV – Start of Power Block and ESWEMS excavation and grading and installation of sanitary sewer, potable water, etc.

Phase V – Clear and grade area for Susquehanna 500 kV Switchyard #2 and then construct the switchyard.

Phase VI – Continue clearing and implementation of Stormwater management and E&S features.

Phase VII – Clear area needed in order to install the cofferdam, dredge pond, and Bell Bend Intake Structure and then install each of them.

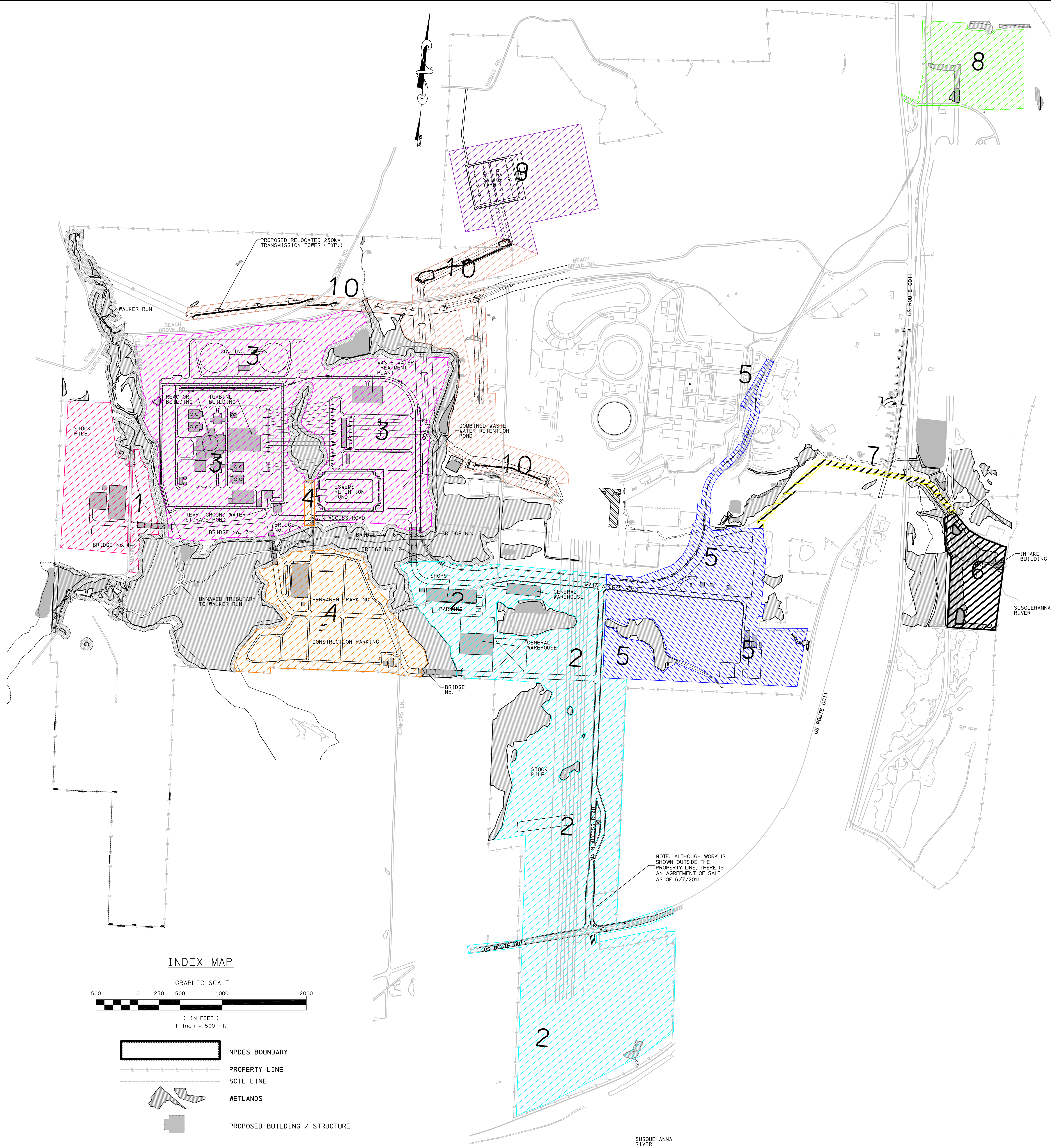
Phase VIII – Finish installation of underground utility lines (Circulating water, etc.).

Phase IX – Begin and finish construction of Power Block structures.

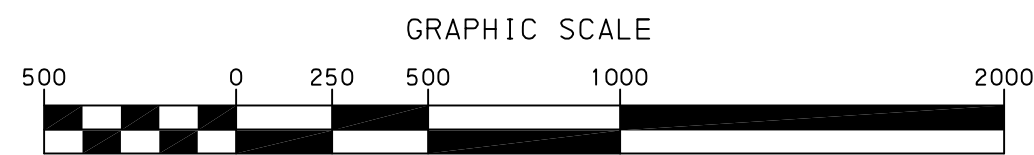
Phase X – Provide mitigation at Confers Lane, and Walker Run.

Note – prior to “Year 3” most activities are pre-construction/site preparation activities but are included in the sequence of construction plans.





INDEX MAP



- NPDES BOUNDARY
- PROPERTY LINE
- SOIL LINE
- WETLANDS
- PROPOSED BUILDING / STRUCTURE

DRAWING LIST

CS9000	CONSTRUCTION AREA MAP
CS9001	PHASE 1 MAP
CS9002	PHASE 2 MAP
CS9003	PHASE 3 MAP
CS9004	PHASE 4 MAP
CS9005	PHASE 5 MAP
CS9006	PHASE 6 MAP
CS9007	PHASE 7 MAP
CS9008	PHASE 8 MAP
CS9009	PHASE 9 MAP
CS9010	PHASE 10 MAP

Pennoni Associates Inc.

100 N. Wilkes-Barre Boulevard  
Wilkes-Barre, PA 18702 (570) 824-2200

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SCALE 1"=500'	DRAWING NO. <b>CS9000</b>
DRAWN BY LGB	
DATE 9/15/2011	
APPROVED JFM	

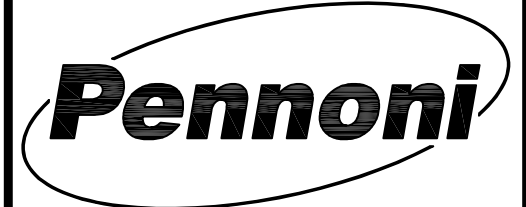
JOB NO. PPLS0902	
SHEET 1 OF 11	

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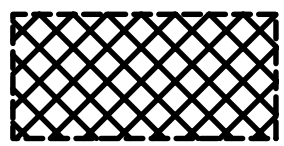
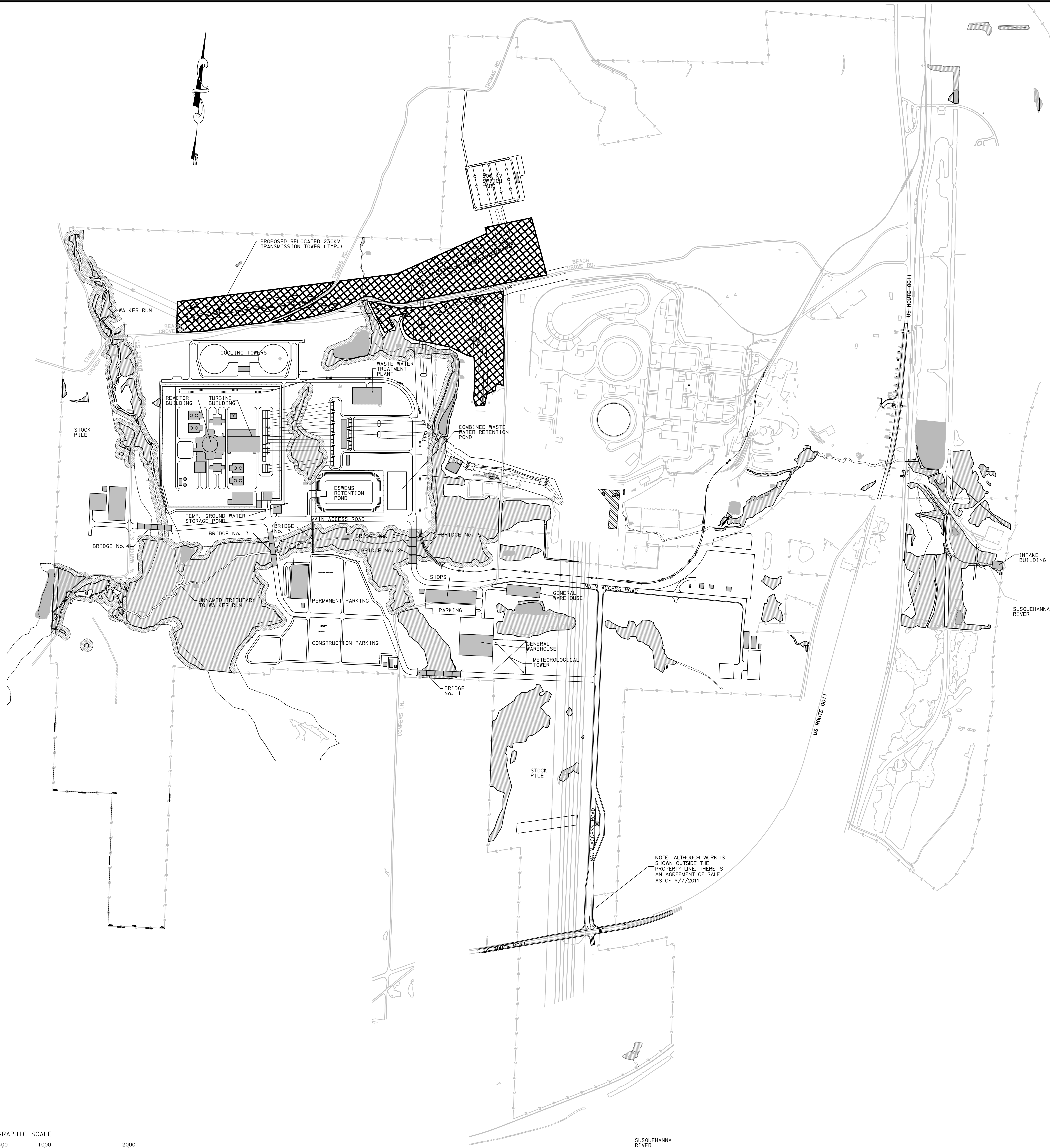
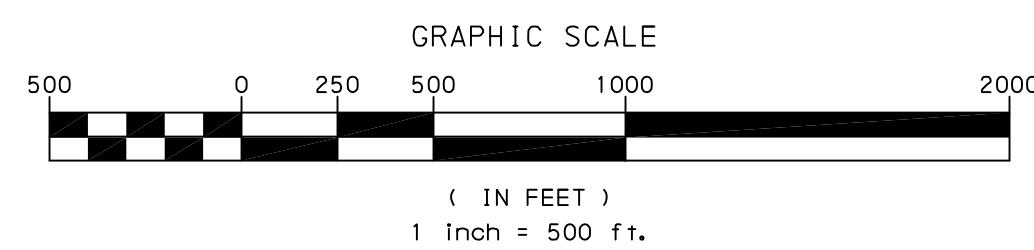
BELL BEND NUCLEAR POWER PLANT  
CONSTRUCTION AREA MAP  
PPL BELL BEND, LLC  
38 BOMBAY LANE, SUITE 2  
BERWICK, PA 18603

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER. ANY DISCREPANCIES MUST BE CORRECTED BEFORE PROCEEDING WITH THE WORK.			

DATE	NO.	REVISIONS	BY
9/15/11	1	EXCESS EARTHWORK REDUCTION AND LCB COMMENTS	LGB
11/12/10	0	INITIAL SUBMISSION	LGB







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	SHEET 2 OF 11

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DATE 9/15/2011	
APPROVED JFM	

# BELL BEND NUCLEAR POWER PLANT

SALEM TOWNSHIP, PENNSYLVANIA

PHASE 1 MAP

PPL BELL BEND, LLC

38 BOMBOY LANE, SUITE 2

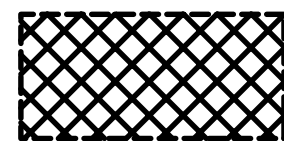
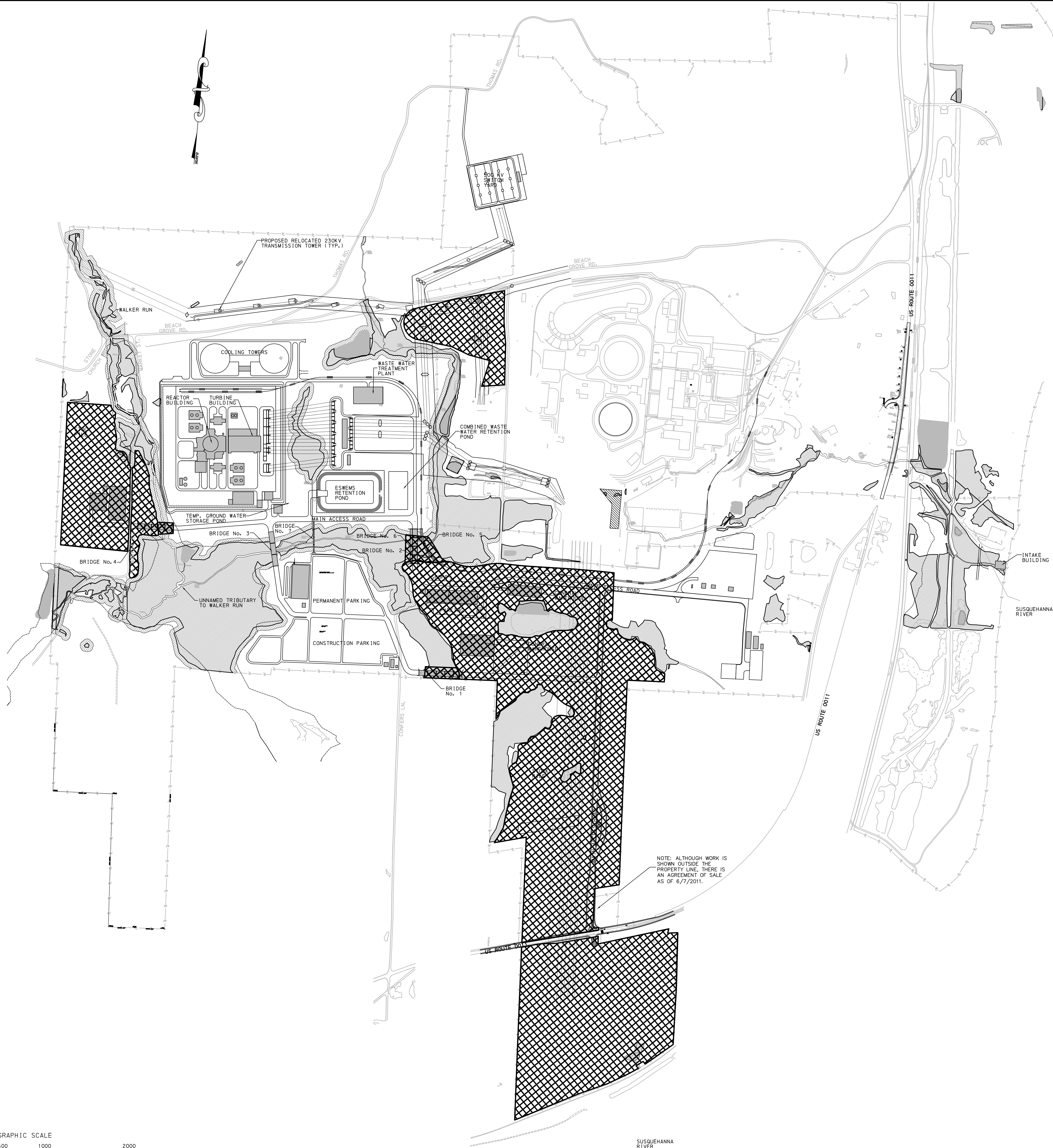
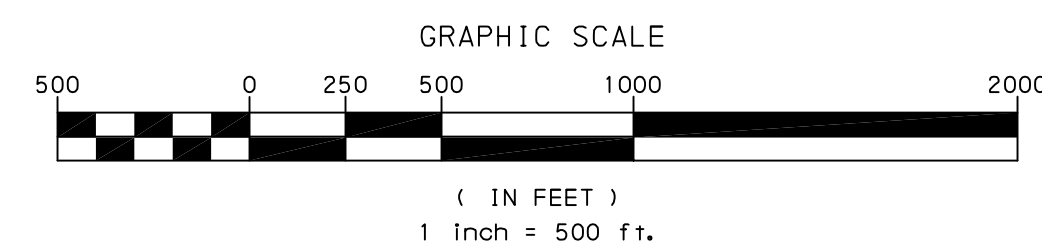
BERWICK, PA 18603

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK

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11/11/12	0	INITIAL SUBMISSION	LGB







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	SHEET      3 OF 11

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BELL BEND NUCLEAR POWER PLANT

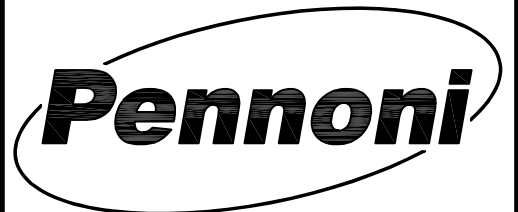
SALEM TOWNSHIP, PENNSYLVANIA

PHASE 2 MAP

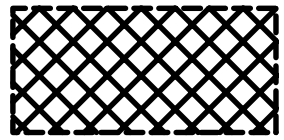
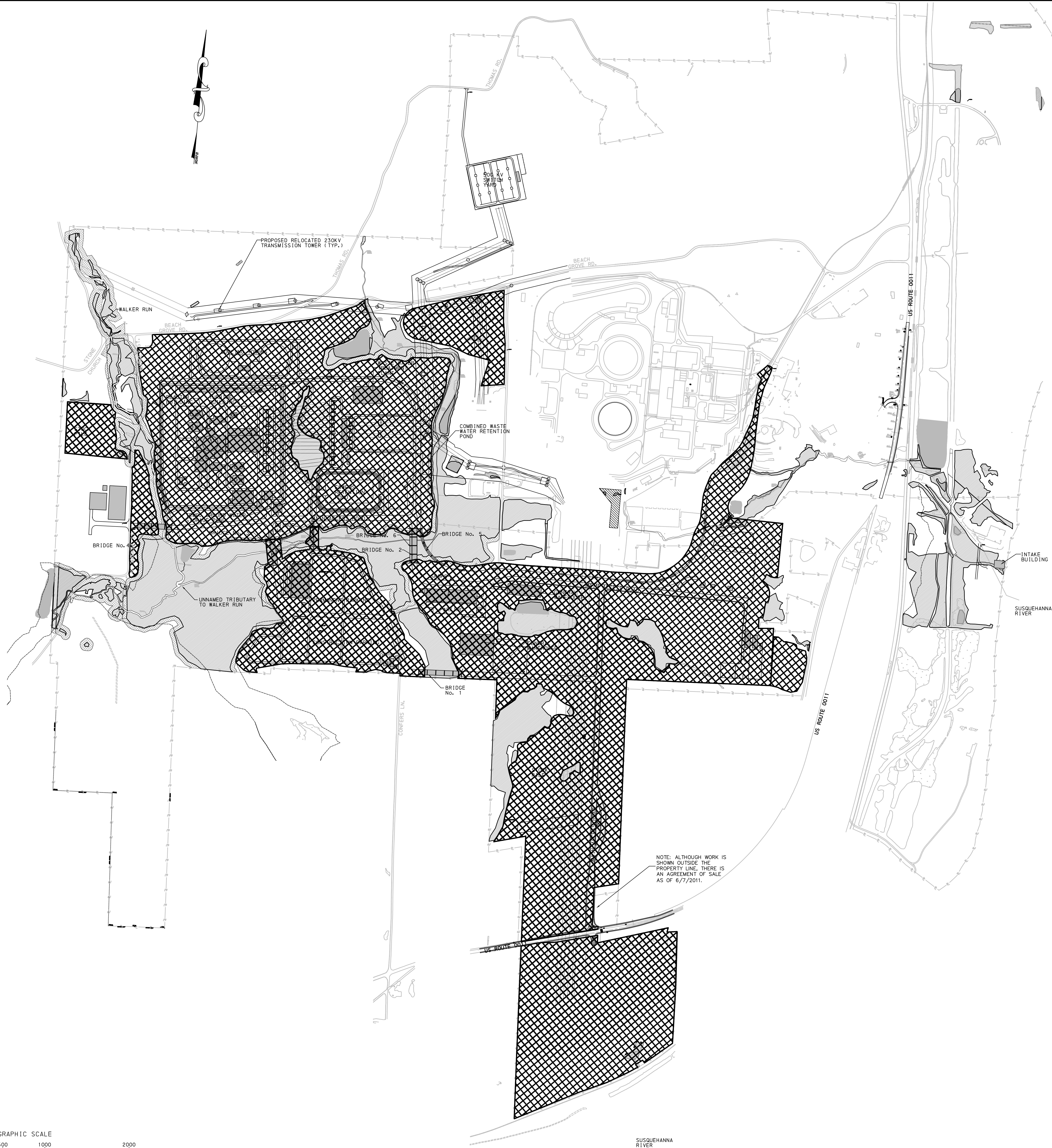
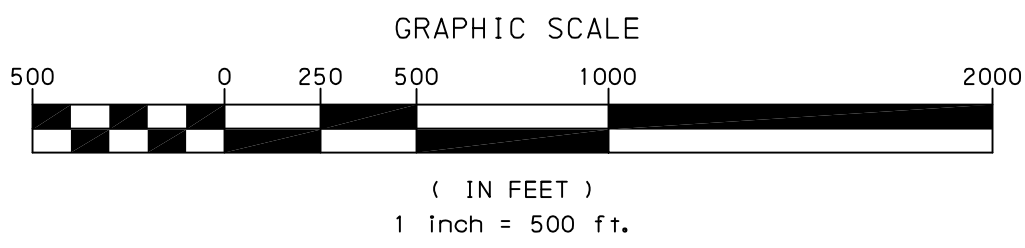
PPL BELL BEND, LLC  
38 BOMBOY LANE, SUITE 2  
BERWICK, PA 18603

**ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK**

8/15/11	1	EXCESS EARTHWORK REDUCTION AND LCD COMMENTS	LGB
11/12/10	0	INITIAL SUBMISSION	LGB
DATE	NO.	REVISIONS	BY







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JOB NO. PPLS0902	
SHEET 4 OF 11	
SCALE 1"=500'	DRAWING NO. <b>CS9003</b>
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DATE 9/15/2011	
APPROVED JFM	

BELL BEND NUCLEAR POWER PLANT

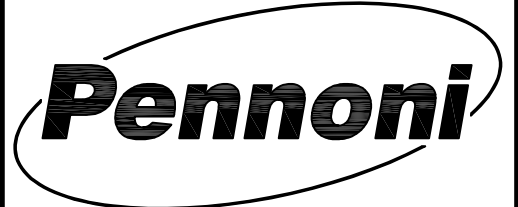
PHASE 3 MAP

PPL BELL BEND, LLC  
38 BOMBAY LANE, SUITE 2  
BERWICK, PA 18603

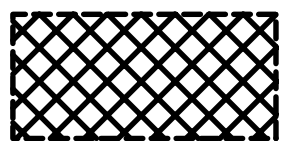
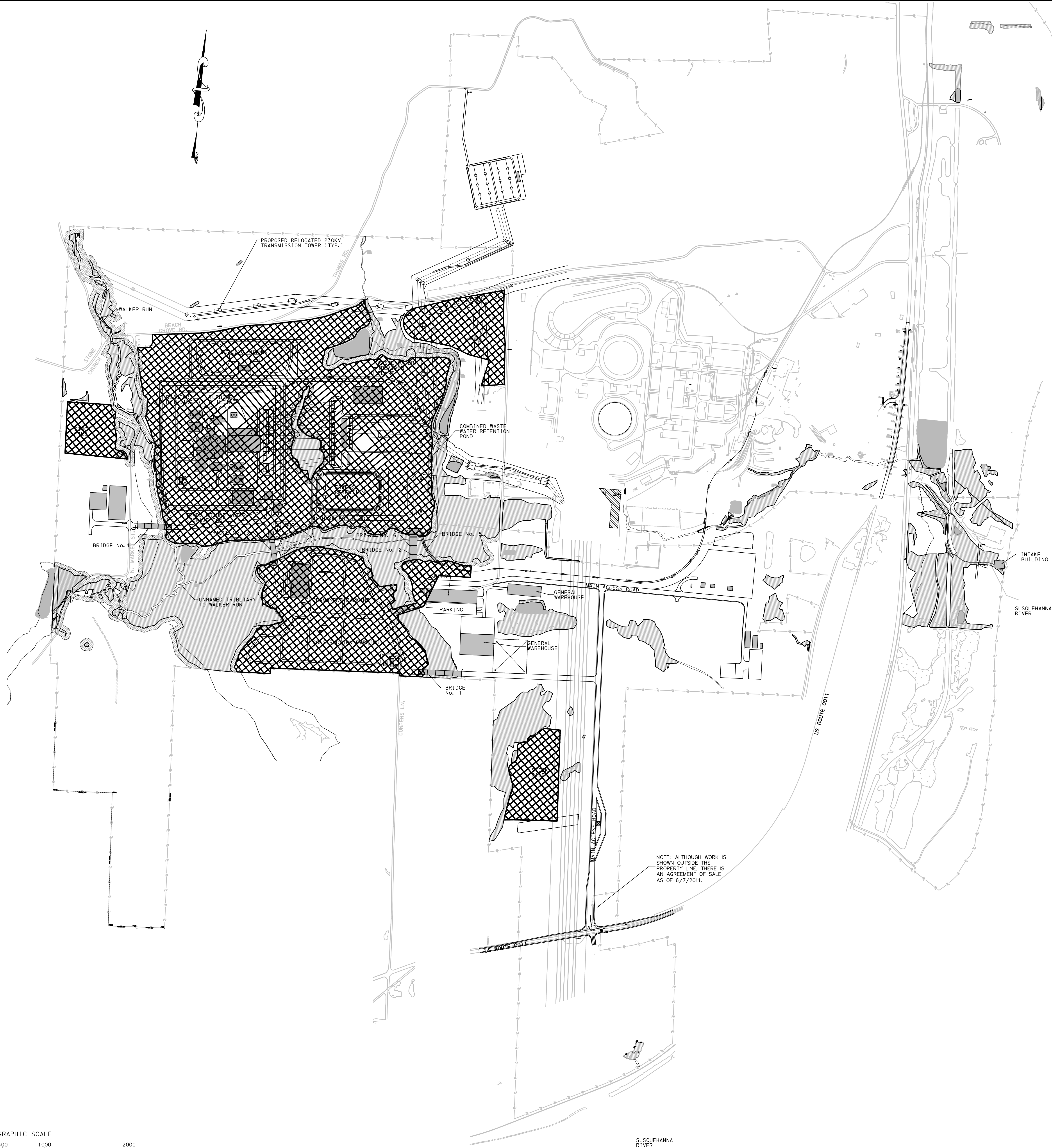
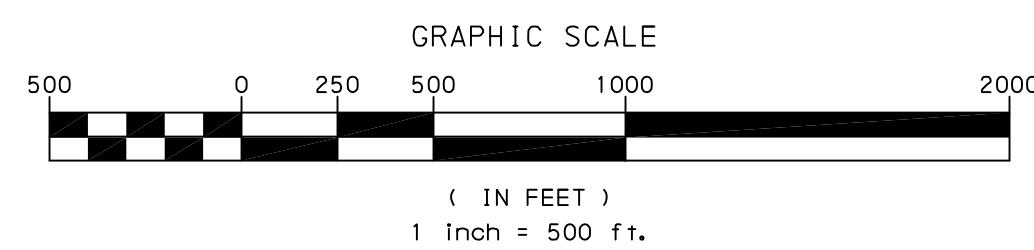
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JFM	

BELL BEND NUCLEAR POWER PLANT

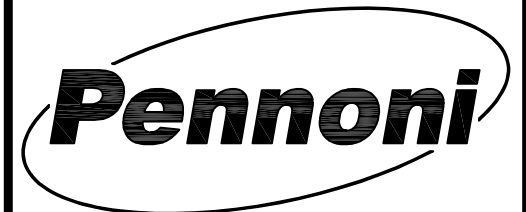
SALEM TOWNSHIP, PENNSYLVANIA

PHASE 4 MAP

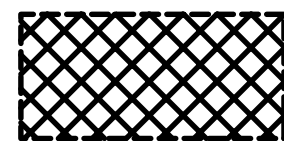
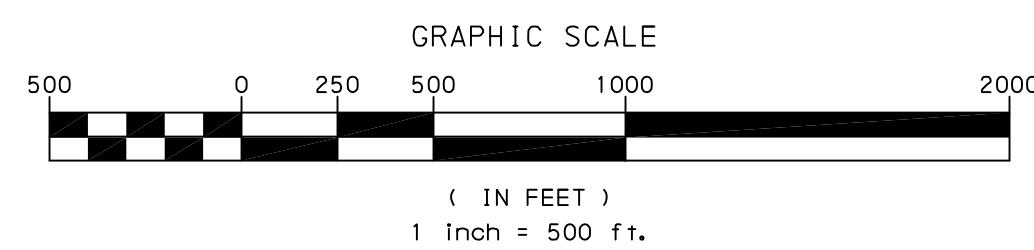
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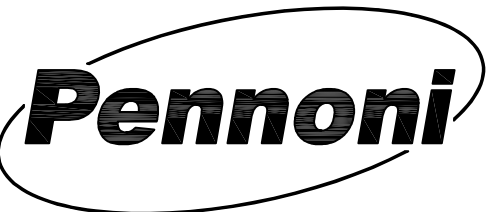
SALEM TOWNSHIP, PENNSYLVANIA

PHASE 5 MAP

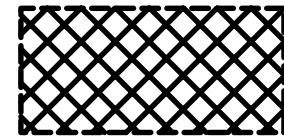
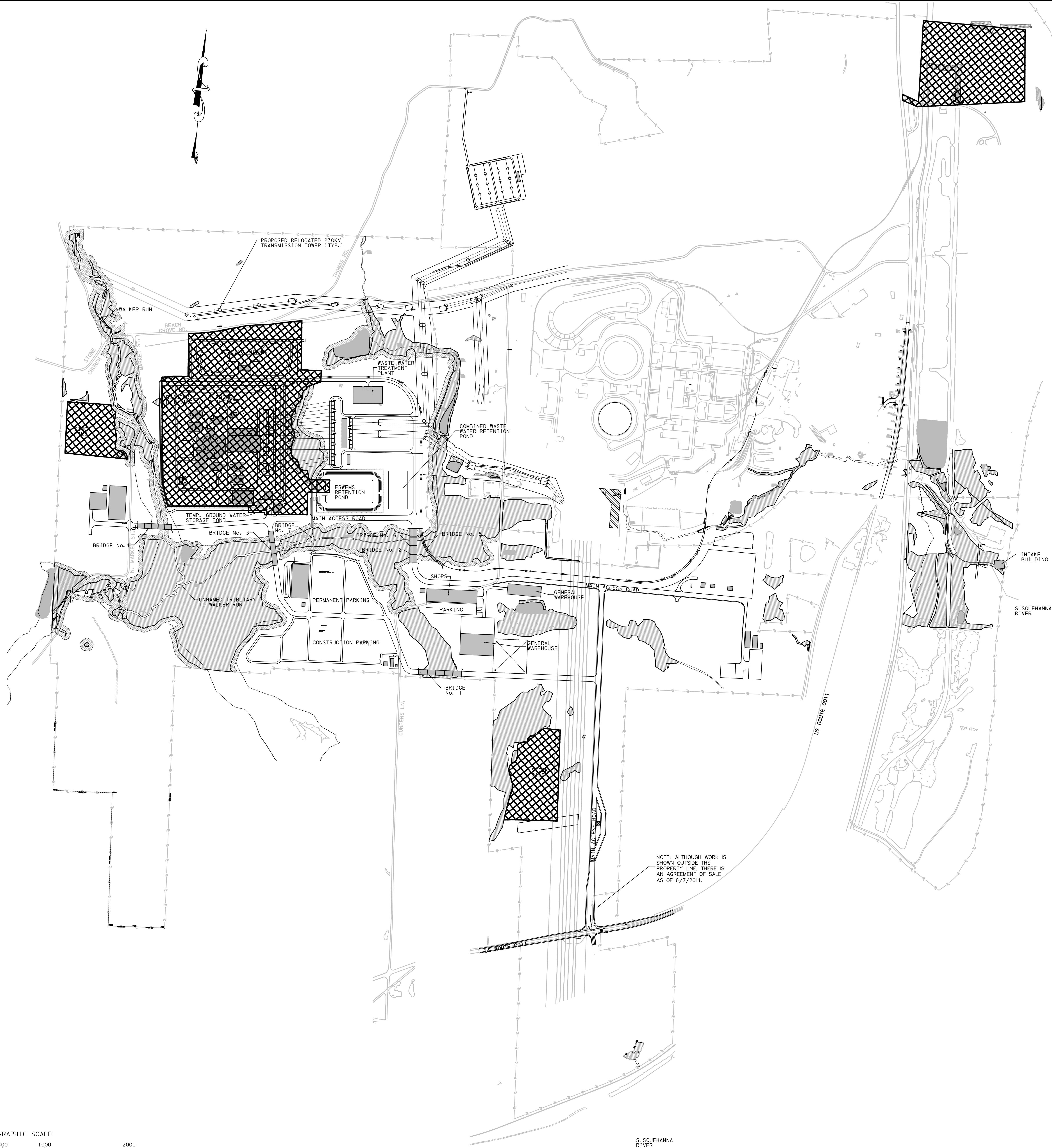
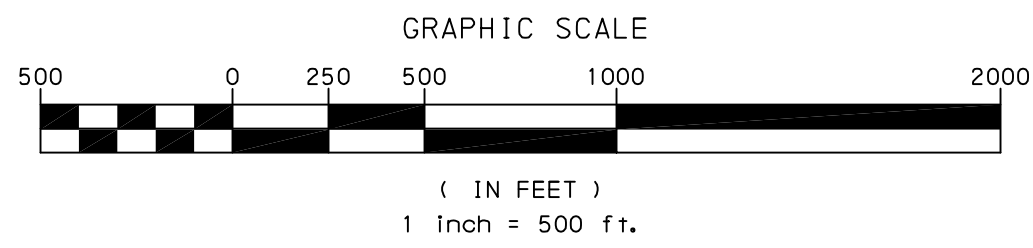
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DRAWING NO.

CS9006

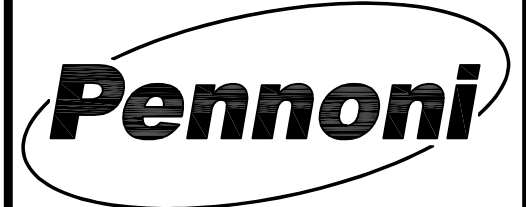
BELL BEND NUCLEAR POWER PLANT

PHASE 6 MAP

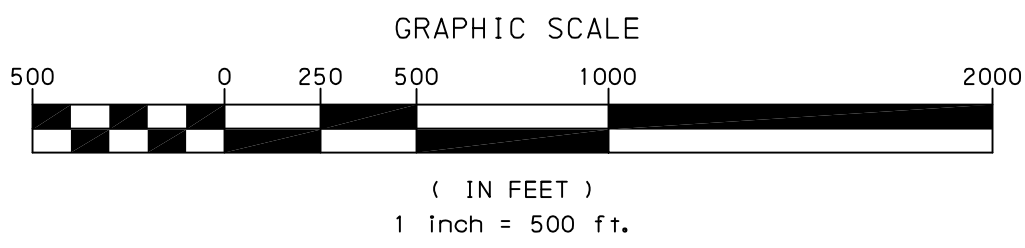
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AND OWNER. ANY DISCREPANCIES MUST BE RESOLVED BEFORE  
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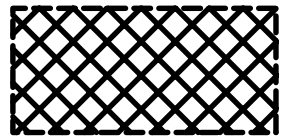
DATE	NO.	REVISIONS	BY
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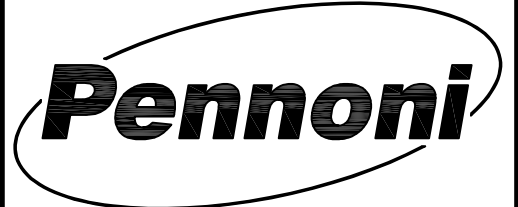
BELL BEND NUCLEAR POWER PLANT

PHASE 7 MAP

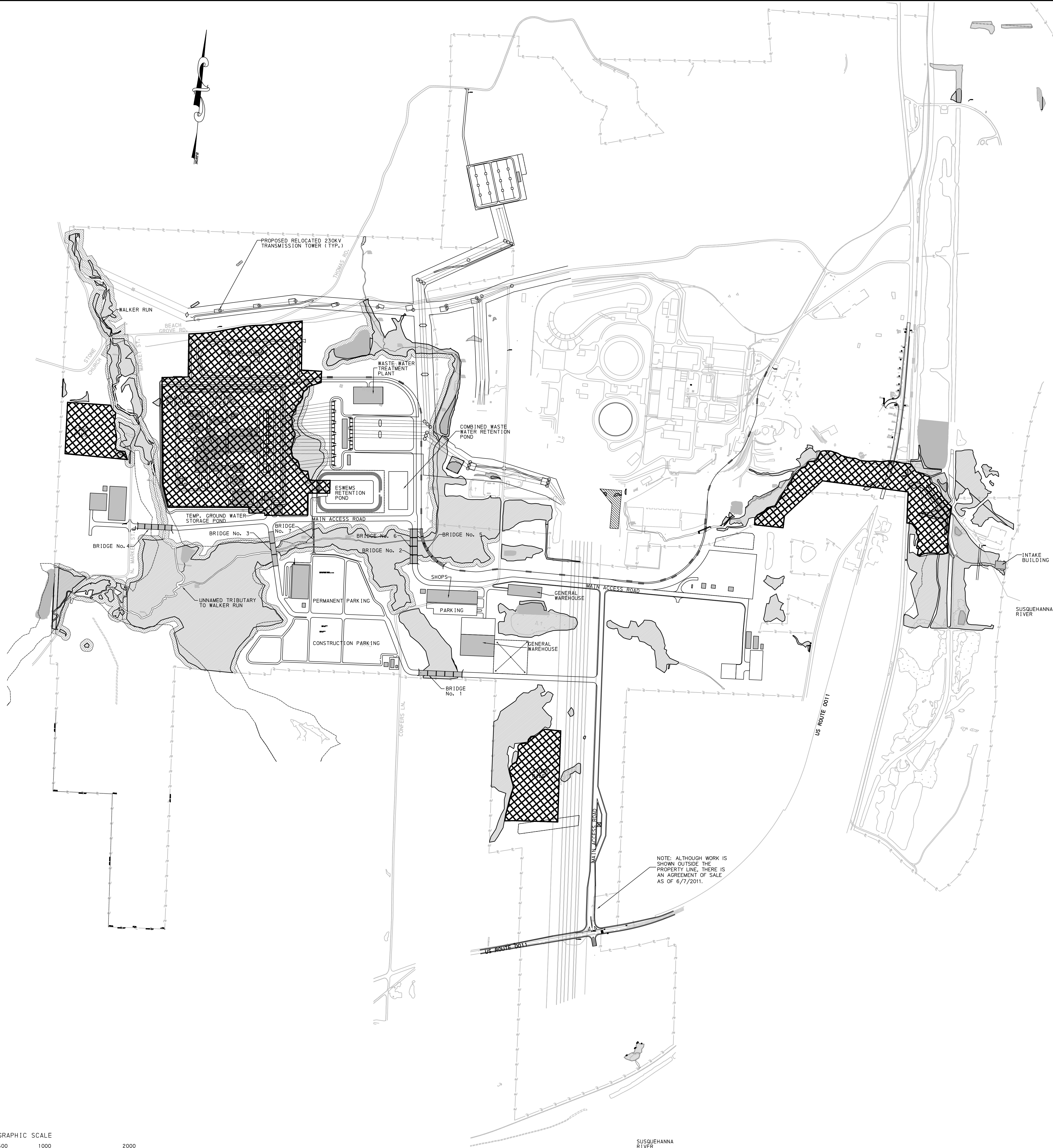
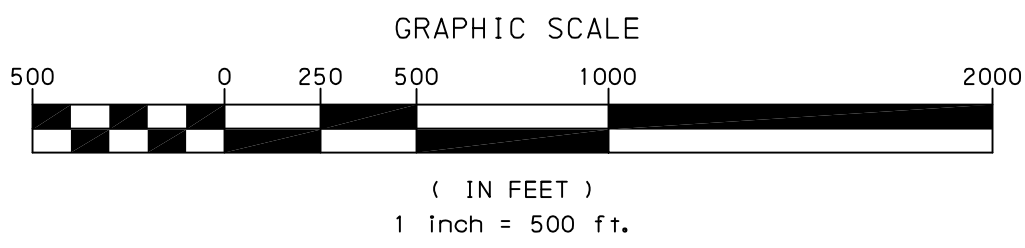
PPL BELL BEND, LLC  
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BELL BEND NUCLEAR POWER PLANT

PHASE 8 MAP

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38 BOMBAY LANE, SUITE 2  
BERWICK, PA 18603

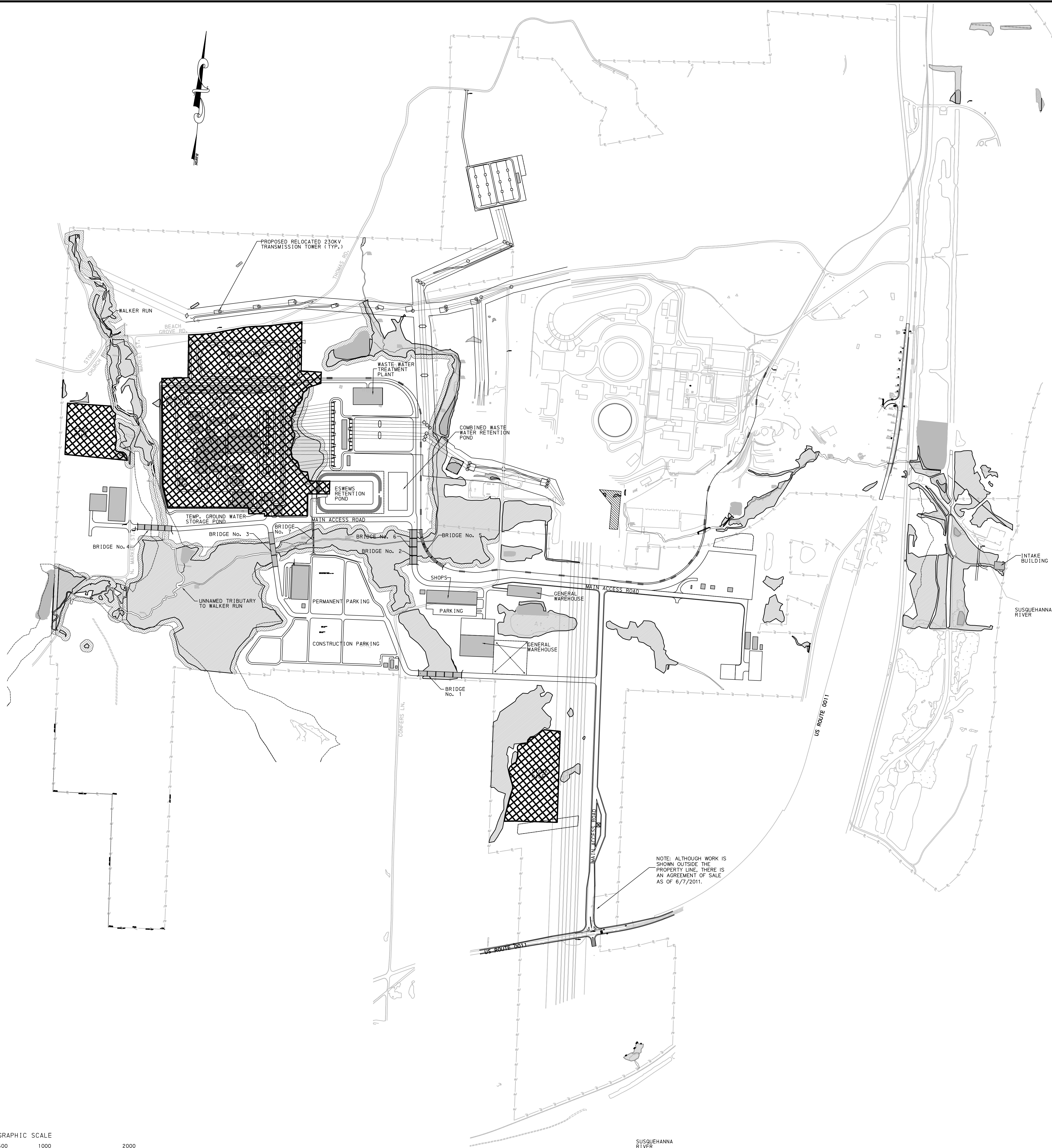
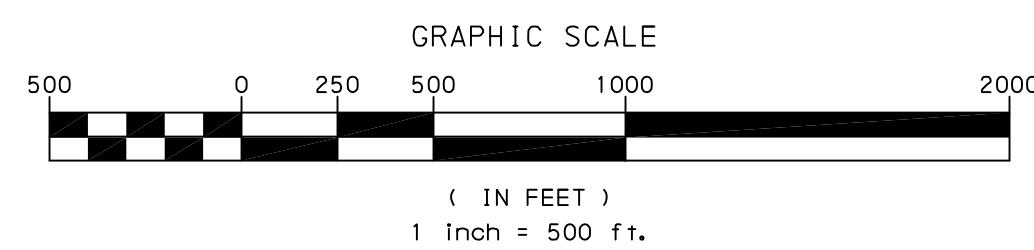
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DATE 9/15/2011	
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BELL BEND NUCLEAR POWER PLANT

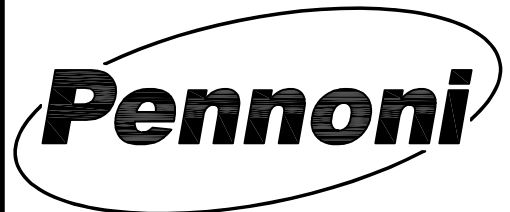
SALEM TOWNSHIP, PENNSYLVANIA

PHASE 9 MAP

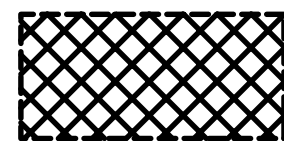
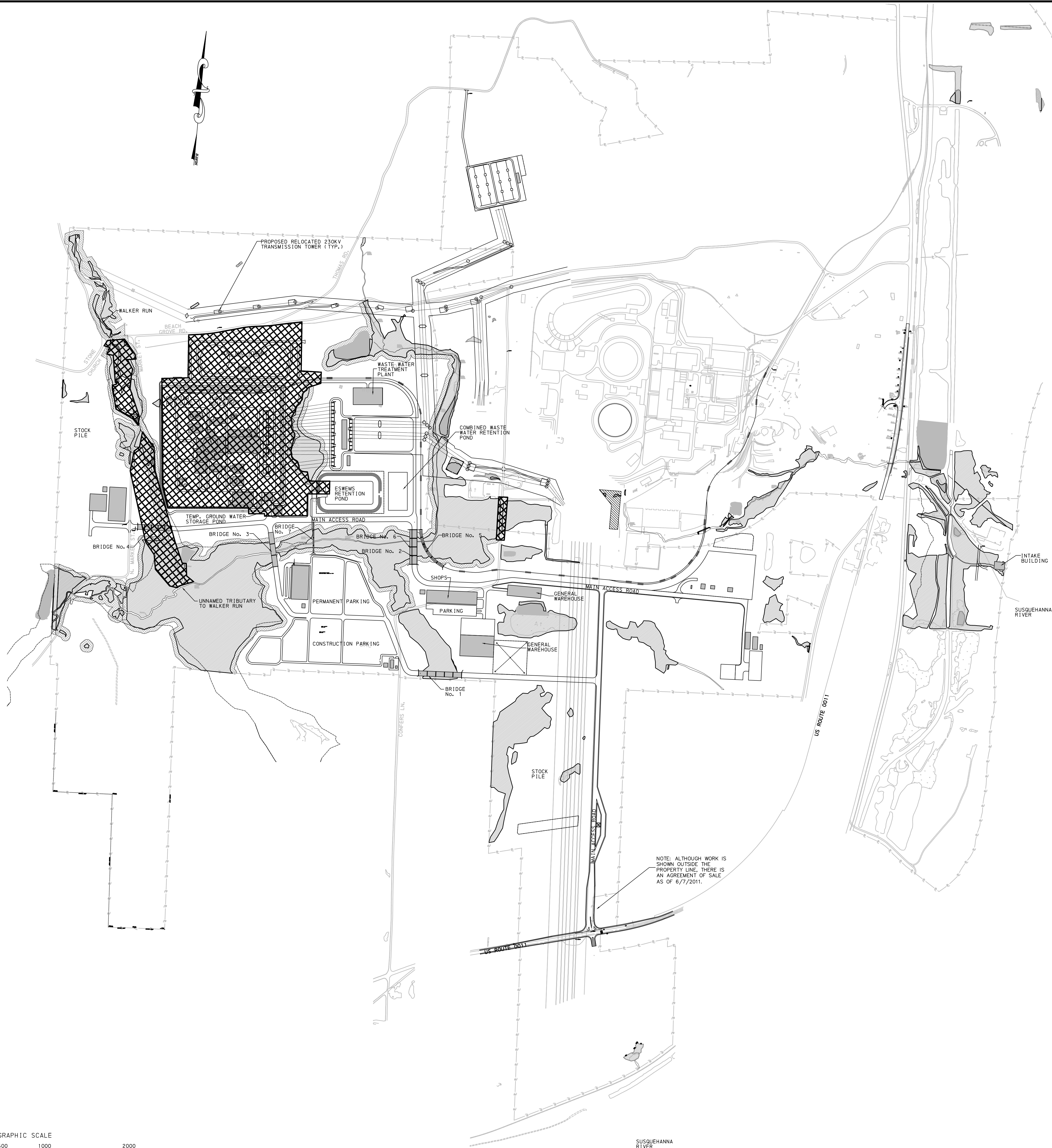
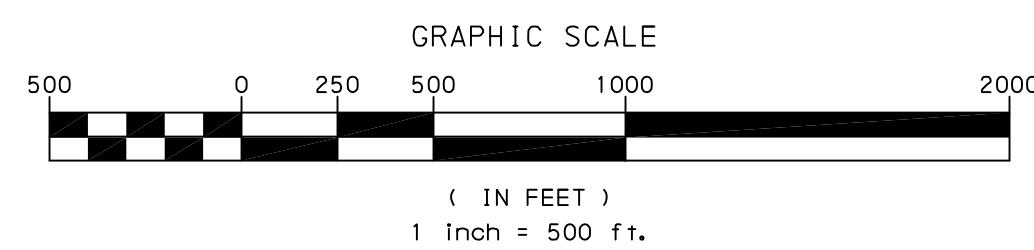
PPL BELL BEND, LLC  
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# BELL BEND NUCLEAR POWER PLANT

SALEM TOWNSHIP, PENNSYLVANIA

## PHASE 10 MAP

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38 BOMBOY LANE, SUITE 2  
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## **Appendix C**

## **BBNPP Indiana Bat Mist Net Study**

**Report on Bell Bend Nuclear Power Plant Indiana Bat Mist Net Survey**

Normandeau Project No. 21159.013

**Protocol:**

This survey was conducted from 6/7/08 to 7/11/08, comprising a total of 8 sampling nights as outlined below. A combination of mist nets were used on each of the sampling nights, including:

- 3 3-tier nets 9m (30') in height, at 6m (20') or 9m (30') widths
- 1 2-tier net 6m (20') in height, at 6m (20') or 9m (30') widths

Four (4) nets were set on all nights, for a total of 32 net-nights overall. Sampling was conducted at two main areas: along the road in W-7 and along the edge of the Beaver Pond adjacent to W-8, as shown on the following map. By the USFWS definition of two nets/site, two sites were sampled in W-7 for 5 nights, and two sites were sampled at the Beaver Pond at W-8/W-9, for 3 nights. Given low activity at net #4 in F-6, based upon no captures and very low acoustic indication of bat flight activity, net #4 in F-6 was replaced by net #5 in F-4 for 3 sampling nights. A total of 9 specific net sites were used, with the specific locations sampled on the nights indicated below:

<b>Dates</b>	<b>Net#</b>
6/7/08	<b>1</b>
6/8/08	<b>2</b>
	<b>3</b>
	<b>4</b>
6/26/08	<b>1</b>
7/01/08	<b>2</b>
7/02/08	<b>3</b>
	<b>5</b>
7/8/08	<b>6</b>
7/10/08	<b>7</b>
7/11/08	<b>8</b>
	<b>9</b>

An effort was made to place nets following potential travel corridors along the road in W-7 and along the edge of the Beaver Pond (W-8/W-9), although bat activity was monitored acoustically at a number of other sites to gain a sense of overall activity. Many areas on the property are open and so not suitable for netting (e.g F-3, F-4, O-1, F-5, F-8, F-6), although acoustic monitoring also detected low levels of activity. The dense vegetation in other areas (e.g. W-7, W-8, W-9) restricted the ability to set nets, but it is expected that bat flight activity would also be low in these congested locations. There are no permanent or seasonal waterways in this part of the property, which made it difficult to predict potential foraging sites. There is a small pond adjacent to the trailer in F-3, and a larger pond in F-6, and although there is bat activity over these ponds, it is not possible to capture bats in such open locations. Acoustic monitoring of bat activity was conducted both at net sites, at the ponds, and along transects across the property, to both provide information about bat activity and to guide the placement of nets in areas more likely to result in captures.

**Captures:**

A total of sixteen (16) bats representing three (3) species were captured during the survey:

<b>Species</b>	<b>Sex</b>	<b>Number of bats</b>	<b>Reproductive Status</b>
Big Brown Bat ( <i>Eptesicus fuscus</i> )	F	2	lactating
Big Brown Bat ( <i>Eptesicus fuscus</i> )	M	1	juvenile
Big Brown Bat ( <i>Eptesicus fuscus</i> )	F	1	juvenile
Little Brown Bat ( <i>Myotis lucifugus</i> )	M	3	adult
Little Brown Bat ( <i>Myotis lucifugus</i> )	F	1	pregnant
Little Brown Bat ( <i>Myotis lucifugus</i> )	F	4	lactating
Northern Long-eared Bat ( <i>Myotis septentrionalis</i> )	M	4	adult

Specific details showing date of capture and net locations are shown in Appendix 2.

Each of the captured bats was tagged with a permanent, aluminum wrist-band for future identification, and this number will be included in a separate report to be filed with PA Game Commission.

**Acoustic monitoring:**

Bat activity was monitored acoustically using hand-held AnaBat ultrasonic detectors (Titley Electronics). These instruments have a detection frequency range of 10 – 200 kHz, and sufficient sensitivity to monitor bat echolocation calls flying along the netting corridors as well as above the tree canopy. Acoustic monitoring occurred at 20-minute intervals at each of the net sites throughout each sampling night. Additionally, bat activity was monitored at the beginning and end of each sampling night along transects perpendicular to the ridge away from each net site. The activity at the ponds was monitored separately, to gain a better appreciation for overall bat activity on the property.

The capture data reflects the generally low level of bat activity detected in the areas sampled, which was fairly uniform at each of the net sites as well as along transects through the surrounding area. Bat activity was uniformly low along the road in W-7, starting a less than 1 bat pass per minute at dusk as the nets were set, and dropping off through the survey period each night to less than 4 – 5 passes per hour after midnight. Generally, activity was a bit higher by the Beaver Pond, starting at 4 – 5 bat passes per minute at dusk, dropping to 1-2 passes per minute around midnight and falling off afterwards to less than one pass per minute. Temperatures were typically hot and humid at dusk throughout the survey period (daytime averages over 85°F), and remained elevated throughout the sampling each night, except for 7/10/08 when the temperature at midnight had dropped to 54°F. There were no captures that night.

Most of the activity was recorded from bats flying below canopy level, lower than the 3-tier (9m) mist nets, so the acoustic monitoring represents a reasonable estimate of bat activity along the corridors sampled that resulted in the captures reported. The echolocation signals detected were consistent with *E. fuscus* as well as the *Myotis* species captured, but it is not possible to reliably distinguish between all *Myotis* species using acoustic methods. There was no indication of higher-flying species (like *L. borealis* or *L. cinereus*) which can readily be discriminated by their echolocation signatures.

### Recommendations:

The capture of reproductively active (pregnant and lactating) females and juvenile bats suggests that this area supports maternity roosts of some bat species during the summer months. Although big brown bats (*E. fuscus*) and little brown bats (*M. lucifugus*) preferentially roost in human structures such as barns and attics, particularly when forming maternity colonies (Barbour and Davis, 1969), these bats can also form maternity roosts in tree cavities (Brigham, 1991; Fenton and Barclay, 1980). The capture of only adult male *Myotis septentrionalis*, which are tree-roosting species (Barbour and Davis, 1969), provides additional evidence for the existence of roost sites in the area surveyed, but not maternity colonies of females and young. While little brown bats tend to forage along the edges of wooded areas, *M. septentrionalis* is also known to forage in more cluttered forested areas, below the canopy but above the understory shrub layer (LaVal *et al.*, 1977). Both little brown bats and big brown bats have been shown to forage preferentially in riparian areas (Kurta, 1982), as have endangered Indiana Bats (Murray and Kurta, 2004). The absence of significant bodies of water on this property, and the low level of bat activity detected over the ponds present on the property, suggests that even resident bats might seek other areas over which to forage.

The primary objective of this survey was to determine the extent of Indiana bat (*Myotis sodalis*) activity in this area, with particular attention to summer habitat for roosting and reproduction. Despite suitable habitat for both roosting and foraging, there were no Indiana Bats (*Myotis sodalis*) captured during this survey. While we might expect capture rates of Indiana bats to be low, as other studies (e.g. Callahan *et al.*, 1997; Kurta *et al.*, 1996) have shown that the bats roost singly or in small groups in hollow trees or underneath loose bark during the summer, there was potential for capture of Indiana Bats moving through the habitat if these bats were present in any reasonable number, as would be expected of resident bats.

The members of a maternity colony of Indiana bats typically roost in 10-20 trees each summer (Callahan *et al.*, 1997; Kurta *et al.*, 1996). Although some colonies restrict roosting to an area of only a few hectares, other Indiana bats use trees that are 8-9 km apart (Kurta *et al.*, 1996). Radio-tracking studies of the Indiana Bat (Murray and Kurta, 2004) show that these bats do not fly over open fields but travel along wooded corridors, even though such behavior may increase commuting distance by over 50%. Given this variability, it is difficult to predict the movements of bats within any one colony, but the failure to capture any Indiana Bats despite suitable roosting and foraging areas does not provide evidence for their presence on the site.

Based upon these results, particularly the failure to capture any *M. sodalis*, it would seem that the clearing of trees proposed for the development of the Bell Bend Nuclear Power Plant project is unlikely to have a direct impact on the roosting or foraging activity of Indiana Bats in this area. There is so little wooded habitat on the property, that it seems likely that other areas surrounding the site would provide more adequate roosting and foraging habitat for tree-roosting species, including the Indiana Bat. The presence of trees of the appropriate size and species in which bats might roost does not preclude the potential for roost colonies of several species (see Barbour and Davis, 1969), including those species captured in this study, as well as the Indiana Bat, despite the absence of captures. Development of this property should proceed with this potential in mind, by conserving candidate roost trees whenever possible and removing

these trees when necessary during times outside the normal breeding season. Bats returning from hibernation typically resume residence in maternity roosts by late April, and most reproductive colonies have disbanded by late August, and so limiting the disturbance of the habitat to periods outside this breeding season will minimize the disruption of resident colonies.

**Appendix 1: Details of bat captures**

<i>Capture date</i>	<i>Net #</i>	<i>Species</i>	<i>Sex</i>	<i>Number of bats</i>	<i>Reproductive Status</i>
6/7/08	2	<i>M. lucifugus</i>	F	1	pregnant
	3	<i>M. lucifugus</i>	M	1	adult
	3	<i>M. septentrionalis</i>	M	1	adult
6/8/08	1	<i>M. septentrionalis</i>	M	1	adult
6/26/08	2	<i>M. lucifugus</i>	M	1	adult
7/1/08	2	<i>E. fuscus</i>	F	1	lactating
7/2/08	1	<i>E. fuscus</i>	F	1	lactating
	2	<i>M. septentrionalis</i>	M	1	adult
7/8/08	7	<i>E. fuscus</i>	M	1	juvenile
	7	<i>E. fuscus</i>	F	1	juvenile
	7	<i>M. lucifugus</i>	M	1	adult
	9	<i>M. lucifugus</i>	F	1	lactating
7/11/08	7	<i>M. lucifugus</i>	F	1	lactating
	7	<i>M. septentrionalis</i>	M	1	adult
	7	<i>M. lucifugus</i>	F	2	lactating

**LITERATURE CITED:**

- Barbour, R.W. and W.H. Davis. 1969. Bats of America. The University Press of Kentucky, Lexington. 286 pp.
- Brigham, R.M. 1991. Flexibility in foraging and roosting behaviour by the big brown bat (*Eptesicus fuscus*). Can. J. Zool. 69:117-121.
- Callahan, E.V., R.D. Drobney and R.L. Clawson. 1997. Selection of summer roosting sites by Indiana bats (*Myotis sodalis*) in Missouri. J. Mammal. 78:818-825.
- Fenton, M.B. and R.M.R. Barclay. 1980. *Myotis lucifugus*. Mammal. Species 142:1-8.
- Kurta, A. 1982. Flight patterns of *Eptesicus fuscus* and *Myotis lucifugus* over a stream. J. Mammal. 63(2): 335-337
- Kurta A., K.J. Williams and R. Mies. 1996. Ecological, behavioral, and thermal observations of a peripheral population of Indiana bats (*Myotis sodalis*). Pp. 102-117 in Bats and forests. (R.M.R. Barclay and R.M. Brigham, eds.). Research Branch, Ministry of Forests, Province of British Columbia, Victoria, British Columbia, Canada.
- LaVal, R.K., R.L. Clawson, M.L. LaVal and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. J. Mammal. 58(4):592-599.
- Murray, S.W. and A. Kurta. 2004. Nocturnal activity of the endangered Indiana bat (*Myotis sodalis*). Journal of Zoology 262:197-206.



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