

**Section J**  
**Environmental Assessment**

Enclosure A

Wetland Delineation and Exceptional Value Wetlands Analysis Report  
for the Proposed Bell Bend Nuclear Power Plant Site,  
Luzerne County, Pennsylvania

*Rev. 7*

**Wetlands Delineation and Exceptional Value  
Wetlands Analysis Report for the  
Proposed Bell Bend Nuclear Power Plant Site,  
Luzerne County, Pennsylvania**



**Submitted to:**  
AREVA NP, Inc.  
Marlborough, MA

**September 2011**

**Bell Bend Nuclear Power Plant**

**Salem Township  
Luzerne County, Pennsylvania**

**Revision 7**

**WETLANDS DELINEATION  
AND  
EXCEPTIONAL VALUE WETLANDS  
ANALYSIS REPORT**

**To satisfy:**

**Pennsylvania Department of Environmental Protection  
Chapter 105 Dam Safety and Waterway Management  
Rules and Regulations**

**and**

**U.S. Army Corps of Engineers  
Regulatory Programs  
33 CFR 320-330**

**Prepared for:**

**UNISTAR NUCLEAR DEVELOPMENT, LLC**

**September 2011**

**Wetlands Delineation and Exceptional Value Wetlands Analysis Report for the Proposed  
Bell Bend Nuclear Power Plant Site, Luzerne County, Pennsylvania**

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**RECORD OF REVISIONS**

<b>Revision</b>	<b>Date</b>	<b>Pages/Sections Changed</b>	<b>Brief Description</b>
000	October 2008	All	Initial release
001	February 2009	Title page	Title
001		Page 2	Update definition
001		Pages 8-12	5.0: text revisions
001		Pages 14 and 15	6.0: references added
001		Figure 5	Added new properties delineated wetland boundaries
001		Figure 6	New properties wetland boundaries and documentation
001		Appendix A	Added photographs 1a-1f, 29c, 43a-43d, 51c-51l
001		Appendix B	Added datasheets BBB1-4, CCC1,DDD1, FFF1-4, NNN1-2, PPP1, RRR1-2, SSS1-2, T1, TTT1-2, UUU1-2, VVV1
002	August 2009	Title page	Title
002		Table 2	Text revision
003	July 2010	Title page	Title
003		TOC	Page numbers
003		Pages 3-4	Section 1.0: updated to reflect Plot Plan Change and additional 2010 field surveys
003		Pages 5-8	Section 2.0: updated to reflect Plot Plan Change and additional 2010 field surveys
003		Page 9	Section 3.0: updated to reflect Plot Plan Change and additional 2010 field surveys
003		Page 14-19	Section 5.0: updated to reflect Plot Plan Change and additional 2010 field surveys
003		Pages 15-17	Section 6.0: references updated
003		Figure 1	Revised site boundary, added potential areas of disturbance, and moved location of BBNPP to reflect Plot Plan Change
003		Figure 2	Revised site boundary, added wetland survey area, and moved location of BBNPP to reflect Plot Plan Change
003		Figure 3	Revised site boundary, updated NWI within survey area, and moved location of BBNPP to reflect Plot Plan Change
003		Figure 4	Revised map with new soils within updated site boundary and moved location of BBNPP to reflect Plot Plan Change
003		Figure 5	Revised site boundary, added delineated wetlands within survey area, and moved location of BBNPP to

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<b>Revision</b>	<b>Date</b>	<b>Pages/Sections Changed</b>	<b>Brief Description</b>
			reflect Plot Plan Change
003		Figure 6	Revised site boundary, added delineated wetlands within survey area, and moved location of BBNPP to reflect Plot Plan Change
003		Table 1	Added new soil series
003		Table 2	Added new species to plant list and footnote
003		Appendix A	Added photographs 75-85, deleted 51c
003		Appendix B	Added datasheets AM1, AN1, AO1, AO2, AP1, AP2, AQ1, AQ2, AS1, AS2, AV1, AV2, AW1, AW2, AX1, and AX2 Deleted datasheets DPM2 and DPCCC1
003		Appendix C	Added new soil series descriptions
003		Record of Revision	Modified columns and formatting to match other source documents
004	October 2010	Figures	All Figures were revised to include the modified BBNPP Project Boundary and Figures 5 and 6 were revised to include changes to wetland boundaries associated with the preliminary jurisdictional determination walk-through during September 2010
004		References	AREVA reference 2010a, 2010b, and 2010c were updated to include the latest revision of each document
005	November 2010	Figures 5 and 6	Revised wetland boundaries to reflect the wetlands boundaries that had been determined prior to the 2 <sup>nd</sup> JD walk-through
005		Page 3	Revised text to reflect the BBNPP Project Boundary name change
005		Table 1 and 2, Figure 2	Titles were revised to reflect the BBNPP Project Boundary name change
005		References	AREVA 2010 a, b, and c references were revised to reflect most recent revision of each source
006	April 2011	Figure 2	Revised wetlands survey area
006		Figures 5 and 6	Revised wetlands boundaries to reflect the wetlands boundaries that had been determined after the 2 <sup>nd</sup> JD walk-through
007	September 2011	Title page	Title
007		TOC	Page numbers
007		Pages 4-5	Section 1.0: updated to reflect additional 2011 field surveys, minor editorial changes to text, and net relief value changed to 500 ft to reflect value in ER
007		Page 17	Section 5.0: revised description of northern cricket frog observations to indicate that it was heard but

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<b>Revision</b>	<b>Date</b>	<b>Pages/Sections Changed</b>	<b>Brief Description</b>
			never visually observed.
007		Pages 15-17, 19	Section 5.0: updated and revised to include additional agency responses, changed DCNR to PDNCR
007		Pages 16, 18-19	Section 5.0: added summary of results from Indiana Bat Roost Tree Survey
		Page 19	Section 5.0: minor text revision to summary discussion
007		Page 21	Section 6.0: added Indiana Bat Roost Tree Survey as reference (AREVA 2011d)
007		Table 2	Added new species to plant list with new footnote
007		Figure 1	Revised site boundary and potential areas of disturbance to reflect changes associated with disposal of excess cut material
007		Figure 2	Revised site boundary and wetland survey area to reflect changes associated with disposal of excess cut material
007		Figure 3	Revised site boundary and updated NWI within survey area per changes associated with disposal of excess cut material
007		Figure 4	Revised map and added soils within updated site boundary per changes associated with disposal of excess cut material
007		Figure 5	Revised site boundary and added delineated wetlands within survey area per changes associated with disposal of excess cut material
007		Figure 6	Revised site boundary and added delineated wetlands within survey area per changes associated with disposal of excess cut material
007		Appendix A	Added photographs 86- 89
007		Appendix B	Added datasheets DPBG-1, DPBG-2 and DPBG-3
007		Appendix D	Added PFBC letter of March 2011
007		References	Updated AREVA references to reflect 2011 revisions to source reports and updated corresponding text citations, updated to include recent agency correspondence letters

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## **1.0 INTRODUCTION**

### **1.1 Study Objectives**

Bell Bend Nuclear Power Plant (BBNPP) is proposed to be sited adjacent to the Susquehanna Steam Electric Station (SSES) in Salem Township, Luzerne County, Pennsylvania. The proposed BBNPP Project Boundary, herein referred to as the site, is presented in Figure 1. Normandeau Associates, Inc. (Normandeau) was contracted by AREVA NP, Inc. to delineate the jurisdictional boundaries of wetlands and other waters within and adjacent to potential areas of disturbance onsite that are regulated by the Pennsylvania Department of Environmental Protection (PADEP) and U.S. Army Corps of Engineers (USACE). Potential areas of disturbance are illustrated in Figure 1. The actual wetland survey area that bounds the potential areas of disturbance is displayed in Figure 2.

PADEP regulates nearly all development activities within "Regulated Waters of this Commonwealth", including all wetlands, rivers, streams and other waterbodies, under the Title 25 PA Code Chapter 105 Dam Safety and Waterway Management Regulations. PADEP Chapter 105 jurisdiction also extends to the floodways surrounding these areas. USACE regulates development activities in "Waters of the U.S.", including wetlands, under Section 404 of the Clean Water Act and activities in "Navigable Waters" under Section 10 of the River and Harbors Act. Regulatory approvals are usually required from these agencies for development activities involving wetlands and other waters under their jurisdiction. This report presents the findings of the delineation study and is intended to demonstrate that boundaries for wetlands and other waters were established in accordance with PADEP and USACE regulatory requirements.

To minimize encroachment on wetlands, PPL Bell Bend LLC and Unistar Nuclear Energy have determined that the BBNPP power block needed to be relocated approximately 1,000 ft to the north of its previous location. This alteration required expansion of the site to include several new parcels of property, alteration of the limit of disturbance (LOD), and relocation of certain other plant features. Consequently, field studies of the new parcels were performed to supplement the wetland survey data previously obtained and reported in the prior revision of this report. This revision includes the new data as well as previously reported information.

### **1.2 Personnel**

This wetlands delineation report for the BBNPP site is the product of efforts from many well-trained personnel. The overall effort was coordinated by Project Manager Paul Harmon and Principal Ecologist Robert Blye. Field work was coordinated by Keith Maurice and was conducted during the period of July 2007 through July 2011 by Normandeau biologists Elizabeth Garlo, Jayme Schaeffer, and Christopher Roche. Dr. James Montgomery of Ecology III, Inc. also participated in the field work and provided technical assistance. Keith Maurice prepared the report, Shelly Sherman prepared report maps and figures, and Melonie Ettinger and Brenda Strouse provided secretarial support.

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### **1.3 Description of the Site**

Potential areas of disturbance associated with BBNPP extend across 687 acres (1.1 mile<sup>2</sup>) of property adjacent to SSES (Figure 1) and are located within a larger 2,055-acre site. The terrain is variable and ranges from steeply sloping hills in the west to the relatively level floodplain of the Susquehanna Riverlands in the east. Net relief is approximately 500 feet.

Land uses consist largely of cropland, fallow farmland including an abandoned orchard and deciduous forest. Prominent hydrologic features include the Susquehanna River, Walker Run, the North Branch Canal, several former farm ponds and a beaver pond. Man-made features consist of two active gravel quarries, several outlying SSES facilities and electric transmission line corridors, and two large soil stockpiles resulting from SSES construction in the 1970s. An aerial view of the site layout is presented in Figure 2.

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### **2.0 DELINEATION METHODOLOGY**

#### **2.1 USACE 1987 Wetlands Delineation Manual**

Prior to October 2009, jurisdictional areas within the site were identified and delineated in the field solely in accordance with the U.S. Army Corps of Engineers Wetlands Delineation Manual, January 1987 (USACE Manual), which involves the use of vegetation, soils, and hydrologic conditions to define wetlands boundaries. PADEP and USACE require the use of this methodology for establishing their jurisdictional boundaries and, in most cases, the same boundary represents the jurisdictional limits of both agencies. Recent U.S. Supreme Court rulings have limited USACE regulatory jurisdiction over certain categories of streams and wetlands. However, these rulings have had no affect on PADEP's regulatory program, which maintains jurisdiction over these areas.

The USACE Manual describes three diagnostic environmental features that characterize all wetlands and which govern the delineation of wetlands boundaries:

1. Hydrophytic Vegetation: The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to create anaerobic (oxygen deficient) conditions in the upper part, which then exerts a controlling influence on the plant species present. Hydrophytic vegetation is present when the dominant plant species in a plant community are typically adapted for life in anaerobic soil conditions.
2. Hydric Soils: Soils that have formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part (NRCS, 2010a).
3. Wetlands Hydrology: Encompasses all hydrologic characteristics of areas that are periodically inundated (< 6.6 feet mean depth) or have soils saturated to the surface for sufficient duration during the growing season to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic soil conditions.

The manual provides specific field indicators that can be used to determine if the mandatory technical criteria are met for each parameter. In order for an area to be considered a wetland, at least one field indicator must be present for each parameter. Application of this methodology to the site is discussed in Section 2.3.

#### **2.2 Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region**

Effective October 2009, jurisdictional areas within the site were identified and delineated in the field in accordance with the USACE Manual and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Regional Supplement). Although identification and delineation of wetlands is still based on the USACE Manual's three-factor approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology; the Regional Supplement presents wetland indicators, delineation guidance,

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and other information that is specific to the Northcentral and Northeast Region. This Regional Supplement is designed for use with the current version of the USACE Manual. Where differences occur, the Regional Supplement takes precedence over the USACE Manual for applications in the Northcentral and Northeast Region. A summary of the specific sections of the USACE Manual replaced by the Regional Supplement are as follows:

1. Hydrophytic Vegetation Indicators: Chapter 2 of the Regional Supplement replaces Paragraph 35, all subparts, and all references to specific indicators in Part IV of the USACE Manual.
2. Hydric Soil Indicators: Chapter 3 of the Regional Supplement replaces Paragraphs 44 and 45, all subparts, and all references to specific indicators in Part IV of the USACE Manual.
3. Wetlands Hydrology Indicators: Chapter 4 of the Regional Supplement replaces Paragraph 49(b), all subparts, and all references to specific indicators in Part IV of the USACE Manual.
4. Growing Season Definition: The definition of the Growing Season in Chapter 4 and the Glossary of the Regional Supplement replaces the definition of the Growing Season in the Glossary of the USACE Manual.
5. Hydrology Standard for Highly Disturbed or Problematic Wetland Situations: Chapter 5, Wetlands that Periodically Lack Indicators of Wetland Hydrology, Procedure item 3(g) of the Regional Supplement replaces Paragraph 48, including Table 5 and the accompanying User Note in the online version of the USACE Manual.

Application of this methodology to the site is discussed in Section 2.3.

### **2.3 Delineation of the Bell Bend Nuclear Power Plant Site**

Prior to October 2009, wetlands were delineated solely following the methodology specified in the USACE Manual, Routine Wetlands Determination Subsection 2: On-site Inspection Necessary. This technique was the most appropriate for the size and environmental characteristics of the site. Effective October 2009, all wetlands were delineated following the methodology specified in the USACE Manual except where replaced by the Regional Supplement methodology. The delineation process was initiated by researching available reference materials in order to anticipate site conditions. References consulted included the Natural Resources Conservation Service (NRCS) Luzerne County Soil Survey, National Wetlands Inventory (NWI) mapping, aerial photography and other natural resources information. Examination of these references revealed which portions of the survey area would most likely be included within USACE and PADEP jurisdictions so that special attention could be focused on these areas.

The survey area was then systematically searched for wetlands and other regulated waters. During this process all plant communities within the survey area (Figure 2) were mapped and documented. Data collected for each community included dominant vegetation, hydrology, soil

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conditions and evidence of disturbance. This information was recorded on the appropriate USACE data form (Appendix B).

Prior to October 2009, vegetation data was evaluated using the U.S. Fish and Wildlife Service's (USFWS) 1988 National List of Plant Species that Occur in Wetlands Northeast (Region 1) and 1995 supplement to the list, augmented by information from various vegetation identification keys for species not found on either list. The plant lists categorizes species according to the following system of indicators:

Obligate (OBL): Always found in wetlands under natural (not planted) conditions (> 99% frequency), but may persist in nonwetlands if planted there by man or in wetlands that have been drained, filled, or otherwise transformed into nonwetlands.

Facultative Wetlands (FACW): Usually found in wetlands (67%-99% frequency), but occasionally found in nonwetlands.

Facultative (FAC): Sometimes found in wetlands (34%-66% frequency), but also occurs in nonwetlands.

Facultative Uplands (FACU): Seldom found in wetlands (1%-33% frequency) and usually occurs in nonwetlands.

Nonwetlands (UPL): Occurs in wetlands in another region, but not found (<1% frequency) in wetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the list.

Beginning October 2009, vegetation data was identified and characterized similarly except that the Regional Supplement (Chapter 2, Hydrophytic Vegetation Indicators) dropped all (+) and (-) modifiers from the indicator status (e.g., FACW+ is now considered FACW). In addition, the Regional Supplement requires that absolute percent cover for each plant and total percent cover per stratum be recorded. Vegetation data is then evaluated beginning with a rapid field test for hydrophytic vegetation (Indicator 1) to determine if there is a need to collect more detailed vegetation information. If the first indicator is not met, then a standard dominant test (Indicator 2) is performed. If this test fails, then vegetation is re-evaluated using the prevalence index (Indicator 3) or by observing plant morphological adaptations for life in wetlands (Indicator 4).

Prior to October 2009, soils were evaluated based on a detailed examination of color, mottling, consistence and other characteristics as specified in the USACE Manual (Routine Determination Method Subsection 2: On-site Inspection Necessary - Step 14). Additional guidance for interpreting soil conditions was provided by "*Field Indicators of Hydric Soils in the United States*." Munsell color charts were used to determine soil color. Typically, presence or absence of hydric soil conditions is determined within a diagnostic horizon extending from immediately below the A horizon (topsoil) to a depth of 10-inches, whichever is shallower. In plowed soils (>10-inches), hydric conditions must be present immediately below the Ap horizon (plow horizon). Beginning October 2009, soils were evaluated based on a detailed examination of color, redoximorphic features and other characteristics as specified in the Regional Supplement (Chapter 3, Hydric Soil Indicators). The soil indicators in the Regional Supplement are designed

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to help identify hydric soils in the Northcentral and Northeast Region and are a regional subset of those indicators provided by "*Field Indicators of Hydric Soils in the United States*."

Prior to October 2009, hydrology was evaluated based on topographic position and the list of indicators from the USACE Manual (Routine Determination Method Subsection 2: On-site Inspection Necessary - Step 10). Evidence of wetlands hydrology includes inundation, saturated soils, watermarks and/or sediment deposits on vegetation and drainage patterns characteristic of wetlands. Beginning October 2009, hydrology was evaluated based on topographic position and the list of Northcentral and Northeast Region-specific indicators from the Regional Supplement (Chapter 4, Wetland Hydrology Indicators).

The results of the data collection effort were used to identify wetlands and upland plant communities, and to determine the site-specific indicators of transition between these communities. The wetlands-uplands transition point corresponds to the wetlands jurisdictional boundary and a single boundary was determined that is intended to satisfy both the USACE and PADEP regulatory requirements. The wetlands boundaries were marked in the field with numbered surveyors' flags.

Prior to January 2010, wetland boundaries were located by a registered professional surveyor and, thereafter, by Normandeau personnel using a Trimble sub-meter GPS unit. The USACE Baltimore District has approved the use of sub-meter GPS units for mapping wetland boundaries. The wetland boundaries were plotted on the site topographic map and verified by Normandeau to ensure accuracy. A copy of the wetlands boundary map is enclosed (Figure 6).

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### **3.0 REVIEW OF EXISTING RESOURCE INFORMATION**

#### **3.1 Wetlands**

U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) mapping (dated 1976) shows palustrine emergent (herbaceous), scrub/shrub and forested wetlands in the western section of the site. Hydrologic regimes for the wetlands were designated as temporarily flooded, seasonally flooded/saturated and semi-permanently flooded. In addition, several farm ponds in the western end of the site were classified as palustrine waterbodies (Figure 3). Most of the wetlands and waterbodies are associated with the main stem and eastern branch of Walker Run.

NWI mapping is useful for screening sites for larger wetlands but does not necessarily detect all wetlands, or show the full extent of mapped wetlands. Map resolution varies from 1 to 5 acres depending on the scale of the source aerial photography and vegetation cover of the mapped area. Typically, wetlands boundaries are generalized and are not as accurate as ground-based delineations. In addition, most of this mapping is based on aerial photography from the 1980's or earlier and, therefore, may not always reflect current site conditions (NWI 1998).

#### **3.2 Soils**

The Natural Resources Conservation Service (NRCS) mapped the majority of the site as upland soils encompassing Chenango gravelly loam, Arnot-Rock outcrop complex, Braceville gravelly loam, Morris very stony silt loam, Oquaga and Lordstown loams, Pope soils, Wayland silt loam, Weikert and Klinesville channery silt loam, Wellsboro very stony silt loam and Wyoming gravelly loam (Figure 4). These soils are classified as somewhat poorly drained to excessively drained and have seasonal high water tables ranging from 6 inches in depth to greater than 72 inches in depth (Table 1). NRCS information indicates that Chenango and Wyoming soils are unlikely to have inclusions of hydric soil. However, the other six upland soils may potentially have inclusions of hydric soil in areas such as depressions, drainageways and bottomlands (NRCS, undated; 1981; 2010b).

Hydric soils mapped onsite consist of Atherton silt loam, Holly silt loam, Rexford loam and Wayland silt loam which are classified as somewhat poorly drained to very poorly drained. Consequently, the range for seasonal high water tables in these soils extends from the soil surface to a depth of 18-inches. Atherton and Rexford soils were largely mapped in association with Walker Run and its network of small tributaries in the western section of the site. Rexford soil is also mapped in association with a small stream in the eastern section of the site and in headwaters areas in the southern end of the site. Holly and Wayland soil is mapped exclusively in the Riverlands along the Susquehanna River floodplain (NRCS, 1981; 2010b). NRCS soil series descriptions are provided in Appendix C.

#### **3.3 Hydrology**

NWI and NRCS mapping indicates that wetlands, waterbodies and poorly drained soils are largely associated with headwaters areas and small streams that drain the site. West of Confers Lane, the site drains to the Susquehanna River via Walker Run. East of Confers Lane, the site drains through two small-unnamed streams. One stream flows into the southern end of Lake Took-A-While and the other flows into the northern end of the reconstructed North Branch Canal.

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Lake Took-A-While also drains into the North Branch Canal, which then drains through an outlet channel into the Susquehanna River.

PADEP's Chapter 93 Water Quality Standards (Chapter 93) designates Walker Run as having the protected water use of Cold Water Fishes (CWF). A CWF classification is intended to provide for the maintenance and propagation of fish species including the family Salmonidae and additional flora and fauna indigenous to cold water habitats. Chapter 93 designates the Susquehanna River in the vicinity of the site as having the protected use of Warm Water Fishes (WWF). A WWF classification is intended to provide for the maintenance and propagation of fish species and additional flora and fauna indigenous to warm water habitats (PADEP, 2006a).

### **4.0 RESULTS OF THE FIELD INVESTIGATION**

The wetlands delineation determined that the survey area was primarily upland habitat composed of cropland, and old-field, shrub and deciduous forest communities. Wetlands consisted of palustrine emergent (herbaceous), scrub/shrub and forest communities (Figure 5). Many wetlands were composed of multiple vegetation communities and several contained large areas of open water. Wetlands distribution was generally consistent with NWI wetlands and NRCS soils mapping. The vegetation, soils and hydrologic conditions of uplands and wetlands habitats observed during the field delineation are summarized in the following sections.

#### **4.1 UPLAND PLANT COMMUNITIES**

##### **Old-Field**

Old-field vegetation cover was composed of a largely upland-preferring assemblage of grasses and herbaceous plants. During 2007, old-field vegetation extended over much of the fallow farmland in the western section of the site. However, during 2008 some of this habitat was returned to agricultural use for the production of corn. Dominant species included daisy fleabane (*Erigeron annuus*, FACU), Canada thistle (*Cirsium arvense*, FACU), wrinkled goldenrod (*Solidago rugosa*, FAC), flat-top fragrant goldenrod (*Euthamia graminifolia*, FAC), Canada goldenrod (*Solidago canadensis*, FACU), giant foxtail grass (*Setaria faberi*, UPL), white heath aster (*Aster pilosus*, UPL), lamb's quarters (*Chenopodium album*, FACU+), red clover (*Trifolium pretense*, FACU-) and common ragweed (*Ambrosia artemisiifolia*, FACU). A list of common plant species observed onsite is presented in Table 2.

##### **Upland Scrub/Shrub**

Upland shrub habitat was found mostly along transmission line corridors and in several abandoned farm fields located around the site that were undergoing secondary succession. This community consisted primarily of bush honeysuckle (*Lonicera tatarica*, FACU), multiflora rose (*Rosa multiflora*, FACU), Allegheny blackberry (*Rubus allegheniensis*, FACU-), and Russian olive (*Elaeagnus angustifolia*, FACU).

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### **Upland Deciduous Forest**

Upland deciduous forest covered a large portion of the site to the west of Route 11. Common overstory species included northern red oak (*Quercus rubra*, FACU-), white oak (*Quercus alba*, FACU-), black cherry (*Prunus serotina*, FACU), white ash (*Fraxinus americana*, FACU), shagbark hickory (*Carya ovata*, FACU-), bitternut hickory (*Carya cordiformis*, FACU+), sweet birch (*Betula lenta*, FACU), black walnut (*Juglans nigra*, FACU), black locust (*Robinia pseudoacacia*, FACU-), yellow poplar (*Liriodendron tulipifera*, FACU) and red maple (*Acer rubrum*, FAC).

Upland forest understories were composed predominantly of spicebush (*Lindera benzoin*, FACW), round-leaved greenbrier (*Smilax rotundifolia*, FAC), Virginia creeper (*Parthenocissus quinquefolia*, FACU) and saplings of overstory species. The groundcover included may-apple (*Podophyllum peltatum*, FACU), garlic mustard (*Allaria petiolata*, FACU), hayscented fern (*Dennstedtia punctilobula*, UPL), tree clubmoss (*Lycopodium obscurum*, FACU), partridge berry (*Mitchella repens*, FACU), ground cedar (*Lycopodium tristachyum*, UPL) and stilt grass (*Eulalia viminea*, FAC).

### **Hydrology and Soils**

Numerous borings were taken in upland soils during the delineation fieldwork and to formally document soil conditions at upland data points. Typical soil matrix colors at the diagnostic horizon ranged from brown (10YR 4/3) to light yellowish brown (10YR 6/4), indicating an absence of hydric conditions. In addition, mottling was usually absent indicating that the soils were reasonably well drained. Saturated soils and high water tables were observed in some upland areas during wetter parts of the year. However, high soil matrix chromas and a general absence of soil mottling indicated that these observations reflected hydrologic conditions that were short-term in nature.

## **4.2 WETLANDS PLANT COMMUNITIES**

### **Palustrine Emergent**

Palustrine emergent wetlands were located throughout the site. A diverse group of herbaceous hydrophytic plants was present including soft rush (*Juncus effusus*, FACW+), sedges (*Carex spp.*, FAC – OBL), arrow-leaf tearthumb (*Polygonum sagittatum*, OBL), common boneset (*Eupatorium perfoliatum*, FACW+), giant goldenrod (*Solidago gigantea*, FACW), seedbox (*Ludwigia alternifolia*, FACW+), nutsedges (*Cyperus spp.*, FAC-OBL), blue vervain (*Verbena hastata*, FACW+), New York ironweed (*Vernonia noveboracensis*, FACW+), swamp aster (*Aster puniceus*, OBL), cut-leaf coneflower (*Rudbeckia laciniata*, FACW), broad-leaved cattail (*Typha latifolia*, OBL), reed canary grass (*Phalaris arundinacea*, FACW+) and purple loosestrife (*Lythrum salicaria*, FACW+).

### **Palustrine Scrub/Shrub**

Several large palustrine scrub/shrub wetlands were located in the western part of the site. In addition, hydrophytic shrubs were a component of many wetlands across the site. Spicebush was overwhelmingly the most abundant wetlands-preferring shrub onsite. Other frequently occurring

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wetlands shrubs were highbush blueberry (*Vaccinium corymbosum*, FACW-), meadowsweet (*Spiraea latifolia*, FAC+), alders (*Alnus spp.*, FAC-OBL), silky dogwood (*Cornus ammomum*, FACW), arrow-wood (*Viburnum dentatum*, FAC) and grey dogwood (*Cornus racemosa*, FAC).

### **Palustrine Forested**

Palustrine forested wetlands were the principal wetlands type onsite and large contiguous blocks of this habitat extended across the western section. Trees commonly found in forested wetlands habitat included red maple, silver maple (*Acer saccharinum*, FACW) black gum (*Nyssa sylvatica*, FAC), pin oak (*Quercus palustris*, FACW) and river birch (*Betula nigra*, FACW+). In addition, upland-preferring species such as white ash and yellow poplar were present on upland microsites scattered throughout some forested wetlands.

Understories of forested wetlands were comprised largely of spicebush, highbush blueberry, arrow-wood and winterberry (*Ilex verticellata*, FACW+). Skunk cabbage (*Symplocarpus foetidus*, OBL) predominated in the groundcover along with sedges, jewelweed (*Impatiens capensis*, FACW), sensitive fern (*Onoclea sensibilis*, FACW), clearweed (*Pilea pumila*, FACW), cinnamon fern (*Osmunda cinnamomea*, FACW), stout woodreed grass (*Cinna arundinacea*, FACW+), and swamp dewberry (*Rubus hispidus*, FACW).

### **Hydrology and Soils**

Wetlands habitat typically occurred in low-lying poorly drained lands adjacent to Walker Run and its tributaries, in headwaters areas, and along the other small streams that drain the site. A few isolated wetlands were also present. Indicators of wetlands hydrology observed during the delineation field work included prolonged inundation, saturated soils, sediment deposits on vegetation, water-stained leaves and oxidized rhizospheres associated with living roots within 12-inches of the soil surface. In addition, many wetlands were associated with multiple actively flowing groundwater seeps and exhibited a characteristic braided drainage pattern. Trees with buttressed trunks and surface roots were also common in forested wetlands.

Numerous borings were taken in wetlands soils during the delineation fieldwork and to formally document soil conditions at wetlands data points. Coal overwash was detected in some of the soils examined in the Susquehanna Riverlands. Typical soil matrix colors at the diagnostic horizon ranged from gray (6/N) to very dark grayish brown (10YR 3/2) with mottling, indicating hydric conditions.

## **4.3 WETLANDS BOUNDARIES**

Wetlands boundaries were usually associated with gradual to steep increases in slope and a distinct change from low chroma hydric soil matrix colors to the much brighter matrix colors of upland soils. In addition, wetlands were distinguished by the generally strong evidence of requisite hydrology, particularly the abundance of groundwater seeps.

Vegetation indicators were not always as definitive as soil and hydrology indicators. There was considerable vegetation overlap between wetlands and uplands, particularly in forest understories and overstories. As a rule, red maple and spicebush were abundant in both forested wetlands and upland deciduous forests. However, in upland forests spicebush tended to be less common in the

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understory, and upland preferring species as well as red maple predominated in the overstory. Boundaries between palustrine emergent wetlands and old field habitat were typically more distinct and characterized by a transition from hydrophytic cover to largely upland-preferring herbaceous plant communities dominated by Canada goldenrod, daisy fleabane and/or Canada thistle.

Many wetlands were bounded in part by manmade structures, especially in the Susquehanna Riverlands to the east of Route 11. These structures included roads, trails, SSES facilities and soil stockpiles created during SSES construction. Also, some farmlands in the western part of the site were tilled up to or within a few feet of wetlands.

Wetlands boundaries were documented by photographs (Appendix A) and data sheets (Appendix B). Wetlands boundaries, data points, and photograph locations are shown in Figure 6.

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### **5.0 EXCEPTIONAL VALUE WETLANDS ANALYSIS**

This section evaluates wetlands onsite against the PADEP Chapter 105 Dam Safety and Waterway Management Regulations criteria defining Exceptional Value Wetlands. According to Title 25 Pa. Code 105.17, Exceptional Value Wetlands are wetlands that exhibit one or more of the following characteristics:

- 1. Wetlands which serve as habitat for fauna or flora listed as "threatened" or "endangered" under the Endangered Species Act of 1973, the Wild Resource Conservation Act, 30 Pa. C.S. (relating to the Fish and Boat Code), or 34 Pa. C.S. (relating to the Game and Wildlife Code).*

Information concerning the presence of species of special concern within a 0.5-mile radius of an area encompassing the site, PPL-owned lands to the north and the Susquehanna Riverlands was requested via correspondence submitted December 21, 2007 and September 20, 2010 to the U. S. Fish and Wildlife Service (USFWS), Pennsylvania Department of Conservation and Natural Resources (PDCNR), Pennsylvania Game Commission (PGC) and Pennsylvania Fish and Boat Commission (PFBC). These requests were intended to cover all categories of Federal and state tracked species of flora and fauna, as well as other ecological resources of special concern. Responses from the agencies to the letters are presented in Appendix D and the findings of studies conducted to address their concerns are summarized in the following sections. Responses to the 2010 correspondence were received from the three state agencies but not from USFWS. The USFWS response will be incorporated into Appendix D upon receipt. Please note that classification systems for species of special concern vary by jurisdictional agency. The more important species rankings are defined at the Pennsylvania Natural Heritage Program Internet site (PNHP, 2010).

#### **U. S. Fish and Wildlife Service**

USFWS has jurisdiction over species of flora and fauna designated as listed, proposed or candidate under the Federal Endangered Species Act. The agency's reply indicated that the site was within the range of the federally endangered Indiana bat (*Myotis sodalis*). Furthermore, based on life history information cited in the response letter, the site contains suitable habitat for foraging and roosting by Indiana bats during the spring through fall. No other Federal threatened, endangered or other species of special concern were indicated as potentially occurring within the study area.

Comprehensive field studies were undertaken during the period of July 2007 through June 2010 to document the occurrence and distribution of terrestrial and aquatic fauna onsite. Taxonomic groups covered by these surveys encompassed mammals, birds, fish, reptiles, amphibians and freshwater mussels. No Federal proposed, candidate, or listed threatened or endangered species were detected (AREVA, 2011c).

At the request of the USFWS, the terrestrial fauna studies included a survey for Indiana bats. This investigation was conducted by Dr. Karen Campbell, an USFWS-approved Indiana bat surveyor, between June 7 and July 11, 2008 following the USFWS Bat Mist Netting Guidelines. Study techniques included mist net sampling, acoustic (echolocation) monitoring using hand-held AnaBat ultrasonic detectors, and a survey for cave and mine openings that could indicate the

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potential presence of hibernacula onsite. No Indiana bats were collected by the mist net surveys and none were detected by acoustic monitoring. In addition, no potential hibernacula were identified. However, forested areas throughout much of the site provide potential roosting and maternity den sites for Indiana bats in the form of large trees with shaggy, platy or exfoliating bark, crevices and/or cavities (AREVA, 2011c). In October 2010 and July 2011, Indiana bat roost tree surveys were conducted in the forested areas proposed to be cleared during construction activities. Some of the surveyed interior forest and many of the forest edges provided densities of potential roost trees (PRTs) suitable for Indiana bat roosting habitat with forested wetlands providing higher quality roosting habitat than forested uplands on the site (AREVA, 2011d).

USFWS recommended the implementation of tree-cutting guidelines to protect Indiana bats potentially using forests onsite for roosting and maternity dens. The agency advised that any necessary tree-cutting take place during November 16 to March 31, when the bats are hibernating. Furthermore, cutting or physical disturbance of suitable trees (live or dead) between April 1 and November 15, if necessary, should be limited to those with a diameter at breast height (dbh) of less than 5 inches (AREVA, 2011c). The Project team has initiated consultation with USFWS with respect to the project's impacts to Indiana bat.

### **Pennsylvania Game Commission**

PGC has jurisdiction over birds and mammals designated as special concern in Pennsylvania. The agency's 2008 response letter indicated that the site is located in the vicinity of known bat hibernacula and is concerned with potential impacts to five bat species encompassing the eastern small-footed myotis (*Myotis leibii*), northern myotis, also known as the northern long-eared myotis, (*Myotis septentrionalis*), little brown (*Myotis lucifugas*), big brown (*Eptesicus fuscus*) and the pipistrelle (*Pipistrellus subflavus*). The eastern small-footed myotis is listed as threatened in Pennsylvania and the northern myotis is classified as Pennsylvania candidate rare. However, the little brown and big brown are classified as common in Pennsylvania, while the pipistrelle was previously listed as a species of concern but is now considered secure (PBS, 2010). The agency's 2010 response letter indicated that Indiana bat, a state and federally endangered species, may potentially be impacted by the project. No other species were listed in this letter as potentially being impacted by the project.

Although no Indiana bats were collected during the mist net survey described above, 4 northern myotis, 8 little brown bats, and 4 big brown bats were captured, tagged and released. Results of acoustic monitoring were consistent with the echolocation signatures for big brown bats and the *Myotis* species captured during mist netting. Small-footed myotis and pipistrelle were not detected by either survey method (AREVA, 2011c).

The little brown and big brown specimens included reproductively active females, and adult or juvenile males, while the northern myotis specimens were all adult males. These findings suggest that northern myotis use of the site may be limited to roosting only, while the other two bat species utilize the site for both roosting and maternity dens (AREVA, 2011c). USFWS tree-cutting guidelines for Indiana bats, noted above, would provide similar protection to these other three bat species when utilizing forests onsite for roosting and maternity dens.

As noted above, the bat mist net study was a component of the terrestrial fauna studies conducted onsite July 2007 through June 2010. No other state level birds or mammals of special concern

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were detected during these studies with the exception of the peregrine falcon (*Falco peregrinus*). In 2007 and 2008, a pair of peregrine falcons (Pennsylvania endangered) nested and successfully raised young on a cliff site along the Susquehanna River approximately 2 miles from the site. Despite the nearby nest, only one observation of a peregrine falcon was made over the site during the 41 field-days of the terrestrial fauna surveys. Therefore, most peregrine falcon activity associated with this nest site likely takes place closer to the river (AREVA, 2011c).

### **Pennsylvania Department of Conservation and Natural Resources**

PDCNR has jurisdiction over rare plants, natural communities, terrestrial invertebrates and certain geological features in Pennsylvania. PDCNR replied that there were no known occurrences of plants or geological features of state concern within the site. However, in the 2008 response letter the agency listed four butterfly species of concern known to occur in the project vicinity including the northern pearly-eye (*Enodia anthedon*), Baltimore checkerspot (*Euphydras phaeton*), mulberry wing (*Polites massasoit*) and long dash (*Polites mystic*). In the 2010 response letter the agency revised the initial list to include only Baltimore checkerspot and mulberry wing as species of concern known to occur in the project vicinity. Long dash and northern pearly-eye have been removed from the Pennsylvania Natural Heritage Program (PNHP) tracked species list due to a recent revision of state ranks (AREVA, 2011c).

Butterfly surveys were conducted onsite during June and July 2008 by an experienced entomologist (Daniel Bogar) to determine the presence or absence of species of special concern. No northern pearly-eye, mulberry wing or Baltimore checkerspot butterflies were detected during the study; however, one long dash was collected. In addition, black dash (*Euphyes conspiciua*), a new butterfly species of special concern for Luzerne County, was collected and observed during the survey (AREVA, 2011c). The black dash is no longer a species of special concern and has been removed from the PNHP list of tracked species.

The PNHP classifies mulberry wing as vulnerable (S2) and the Baltimore checkerspot as imperiled (S3) (PNHP, 2011). Wetlands onsite potentially provide suitable habitat for these butterflies based on habitat descriptions provided by PDCNR and information researched by Normandeau concerning life histories, and breeding/foraging preferences of these species (AREVA, 2011c; USGS, 2010). PDCNR requested that attempts be made to minimize impacts to potential habitat for these butterflies within the site. Current development plans largely avoid all wetlands habitat and, therefore, comply with PDCNR requests.

### **Pennsylvania Fish and Boat Commission**

PFBC has jurisdiction over fishes, reptiles, amphibians, aquatic invertebrates and freshwater mussels designated as special concern in Pennsylvania. The agency's 2008 reply indicated that three species classified as "special concern" were known from the vicinity of the site and comprised the eastern hognose snake (*Heterodon platyrhinos*), yellow lampmussel (*Lampsilis cariosa*) and green floater (*Lasmigona subviridis*). In the 2010 response letter the agency revised the initial list to include northern cricket frog (*Acris crepitans crepitans*), a state endangered species, and no longer listed the eastern hognose snake. In addition, the status of yellow lampmussel and green floater was changed from special concern to rare.

As noted above, comprehensive field studies were undertaken during the period of July 2007

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through June 2010 to document the occurrence and distribution of terrestrial and aquatic fauna onsite. Taxa surveyed included fishes, reptiles, amphibians and freshwater mussels. No Federally listed threatened or endangered species were observed; however, the northern cricket frog, a state listed endangered species, was heard vocalizing within the project area (AREVA, 2010; 2011a; 2011c). Note that the presence of the northern cricket frog was limited to two separate auditory observations of the species and no individuals of the species were observed visually. A 2011 letter from the PFBC indicated that adverse impacts to northern cricket frog were not anticipated as a result of the project. One state listed candidate fish species, brook stickleback (*Culaea inconstans*), was collected during the aquatic survey (AREVA, 2011a). No previous occurrences of the brook stickleback are known from the Susquehanna River or adjacent waterbodies in the vicinity of BBNPP and it is probable that the single brook stickleback was introduced through human action (i.e. bait bucket or aquarium fish). In addition, these surveys also detected the presence of four other reptiles designated by the PFBC as "Species of Special Concern" (PFBC 2010a). Species observed consisted of the eastern ribbon snake (*Thamnophis sauritus*), wood turtle (*Glyptemys insculpta*), map turtle (*Graptemys geographica*), and eastern box turtle (*Terrapene carolina carolina*) (AREVA, 2011c). To varying degrees, wetlands onsite would provide habitat for all of these species (Shaffer 1999).

Additionally, aquatic ecological surveys conducted during 2007 in the Susquehanna River confirmed the presence of the yellow lampmussel and green floater in the vicinity of the proposed BBNPP intake and discharge structures (AREVA, 2010). The PNHP classifies yellow lampmussel as vulnerable (S3) to apparently secure (S4) and the green floater as imperiled (S2) (PNHP, 2011).

### **Summary**

Jurisdictional Federal and state natural resource management agencies were contacted regarding the potential presence of species of special concern within 0.5-miles radius of an area encompassing the site, PPL-owned lands to the north and the Susquehanna Riverlands. Responses from these agencies indicated that potential occurrences of Federally-listed threatened or endangered species were limited to the Indiana bat, only. In addition, the only potential occurrence of a state-listed threatened or endangered species was the northern cricket frog. However, seven special concern taxa that are still currently tracked by state agencies were noted as potentially occurring onsite. These species consisted of two bats, eastern small-footed myotis and northern myotis; two butterflies, Baltimore checkerspot and mulberry wing; one snake, eastern hognose snake; and two mussels, yellow lampmussel and green floater.

Comprehensive field studies of aquatic and terrestrial fauna, including an Indiana bat mist net survey and an Indiana bat roost tree survey, were conducted throughout the site during the period of July 2007 through July 2011. These studies did not detect any Federally-listed threatened or endangered species, or other Federal species of special concern. However, some of the interior forest and many of the forest edges surveyed during the Indiana bat roost tree survey provided densities of potential roost trees (PRTs) suitable for Indiana bat roosting habitat with forested wetlands providing higher quality roosting habitat than forested uplands on the site (AREVA, 2011d). No Pennsylvania-listed threatened species were detected and occurrences of state-listed endangered species were limited to a single peregrine falcon observation and two auditory observations of the northern cricket frog. The peregrine falcon nest is located along the Susquehanna River approximately 2-miles from the site.

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A total of seven other state-tracked species were documented onsite during these studies and included one bat, northern myotis (candidate rare); and two mussels, yellow lampmussel (vulnerable to apparently secure), and green floater (imperiled). Four reptiles designated as species of special concern were also observed and consisted of the eastern ribbon snake, wood turtle, map turtle, and eastern box turtle. Northern myotis was the only species of special concern that was both observed onsite and reported by the jurisdictional agencies as potentially occurring in the vicinity of the BBNPP site. Various measures are available to protect rare species during site construction.

In conclusion, site wetlands do not qualify as Exceptional Value under this criterion since they do not provide habitat for Federal or state-listed threatened or endangered species. Even though PRT densities in some of the surveyed forested areas were suitable for Indiana bat roosting habitat, there are no known occurrences of Indiana bat in the wetland or upland areas on the site. Additionally, the northern cricket frog was heard during a 2007 field survey but was not visually confirmed as being present onsite.

***2. Wetlands that are hydrologically connected to or located within 1/2-mile of wetlands identified in question 1 and that maintain the habitat of the threatened or endangered species within the wetlands identified above.***

Information concerning the presence of species of special concern within a 0.5-mile radius of an area encompassing the site, PPL-owned lands to the north and the Susquehanna Riverlands was requested from jurisdictional natural resource management agencies and is summarized above. Site wetlands do not qualify as Exceptional Value under this criterion.

***3. Wetlands that are located in or along the floodplain of the reach of a wild trout stream or waters listed as Exceptional Value under Chapter 93 (relating to water quality standards) and the floodplain of streams tributary thereto, or wetlands within the corridor or a watercourse or body of water that has been designated as a National wild or scenic river in accordance with the Wild and Scenic Rivers Act of 1968 or designated as wild or scenic under the Pennsylvania Scenic Rivers Act.***

Wetlands onsite are not located in or along the floodplain of an Exceptional Value water, or within the corridor of a watercourse or body of water that has been designated as a wild or scenic river at the state or Federal level. Walker Run and the Susquehanna River are not designated as Exceptional Value in PADEP's Chapter 93 Water Quality Standards. They are classified as having the protected uses of Cold Water Fishes (CWF) and Warm Water Fishes (WWF), respectively (PADEP, 2006a). In addition, neither watercourse is designated as wild or scenic at either the state or federal level (PDCNR 2010).

Walker Run is not designated by PFBC as a Class A Wild Trout Stream but is included in the agency's May 2010 list of "Pennsylvania Stream Sections that Support Wild Trout" from its headwaters down to the confluence with the North Branch of the Susquehanna River. In April and July 2008, Normandeau collected small numbers of brown trout (*Salmo trutta*) in Walker Run at stations located onsite, as well as stations located upstream and downstream of the site. The size range of the specimens indicated the presence of a naturally reproducing brown trout population and this was confirmed by a subsequent PFBC fisheries survey of the stream. As a

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result, Walker Run was designated by PFBC as a Wild Trout Stream from its headwaters down to the confluence with the North Branch of the Susquehanna River on December 19, 2009.

Therefore, 25 PA Code 105.17 condition 3 "Wetlands that are located in or along the floodplain of the reach of a wild trout stream" is met and the wetlands associated with Walker Run and its eastern tributary are Exceptional Value wetlands.

***4. Wetlands located along an existing public or private drinking water supply, including both surface water and groundwater sources, which maintain the quality or quantity of the drinking water supply.***

Walker Run is not used as a public or private drinking water supply. Although the Susquehanna River may be used as a water supply in some regions, the river is not used for this purpose in the vicinity of the site. Site wetlands do not qualify as Exceptional Value under this criterion.

***5. Wetlands located in areas designated by the Department as "natural" or "wild" areas within state forest or park lands, wetlands located in areas designated as Federal wilderness areas under the Wilderness Act or the Federal Eastern Wilderness Act of 1975 or wetlands located in areas designated as National Natural Landmarks by the Secretary of the Interior under the Historic Sites Act of 1935.***

The site is wholly-owned by PPL and none of the above state or Federal designations are applicable. Site wetlands do not qualify as Exceptional Value under this criterion.

### **SUMMARY**

In summary, BBNPP site wetlands do meet Exceptional Value Wetlands criterion 3. BBNPP site wetlands associated with Walker Run and its eastern tributary meet the Chapter 105.17 criteria for Exceptional Value wetlands since it has been determined by the PFBC that Walker Run meets the criteria for classification as a stream section that supports naturally reproducing wild trout.

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## **TABLES**

Table 1. Soils Mapped in the BBNPP Project Boundary<sup>1</sup>.

Name	Drainage Class	Hydric Status
Atherton silt loam	Poorly to very poorly	Hydric
Arnot-Rock outcrop complex, steep	Well	Not hydric
Braceville gravelly loam	Moderately well	Not hydric <sup>2</sup>
Chenango gravelly loam	Well	Not hydric
Holly silt loam	Poorly	Hydric
Morris very stony silt loam	Somewhat poorly and poorly	Not hydric <sup>2</sup>
Oquaga & Lordstown channery silt loams	Well	Not hydric <sup>2</sup>
Oquaga & Lordstown extremely stony loams	Well	Not hydric <sup>2</sup>
Pope soils	Well	Not hydric <sup>2</sup>
Rexford loam	Somewhat poorly and poorly	Hydric
Wayland silt loam	Poorly and very poorly	Hydric
Weikert & Klinesville channery silt loam	Well	Not hydric <sup>2</sup>
Wellsboro very stony silt loam	Moderately well and somewhat poorly	Not hydric <sup>2</sup>
Wyoming gravelly loam	Somewhat excessively	Not hydric

<sup>1</sup> Sources: Penn State Cooperative Extension. 2010. SoilMap Version 2.

<sup>2</sup> May have inclusions of hydric soil in seepage areas, bottomlands, depressions and/or drainageways.

Table 2. Common plants identified in the BBNPP Project Boundary.

Scientific Name <sup>3,4</sup>	Common Name	Indicator Status <sup>1, 2</sup>
<u>Trees and Saplings</u>		
<i>Acer saccharinum</i>	silver maple	FACW
<i>Acer rubrum</i>	red maple	FAC
<i>Ailanthus altissima</i>	tree-of-heaven	FACU-
<i>Betula alleghaniensis</i>	yellow birch	FAC
<i>Betula lenta</i>	sweet birch	FACU
<i>Betula nigra</i>	river birch	FACW
<i>Betula populifolia</i>	gray birch	FAC
<i>Carya cordiformis</i>	bitternut hickory	FACU+
<i>Carya ovata</i>	shagbark hickory	FACU-
<i>Carya tomentosa</i>	mockernut hickory	UPL
<i>Celtis occidentalis</i>	hackberry	FACU
<i>Cornus florida</i>	flowering dogwood	FACU-
<i>Fagus grandifolia</i>	American beech	FACU
<i>Fraxinus americana</i>	white ash	FACU
<i>Fraxinus pennsylvanica</i>	green ash	FACW
<i>Juglans nigra</i>	black walnut	FACU
<i>Juniperus virginiana</i>	eastern red cedar	FACU
<i>Liriodendron tulipifera</i>	yellow poplar	FACU
<i>Malus</i> spp.	apple	UPL
<i>Nyssa sylvatica</i>	black gum	FAC
<i>Pinus resinosa</i>	red pine	FACU
<i>Pinus strobus</i>	eastern white pine	FACU
<i>Pinus sylvestris</i>	Scots pine	UPL
<i>Platanus occidentalis</i>	American sycamore	FACW-
<i>Populus deltoides</i>	eastern cottonwood	FAC
<i>Populus tremuloides</i>	quaking aspen	FACU
<i>Prunus serotina</i>	black cherry	FACU
<i>Quercus alba</i>	white oak	FACU-
<i>Quercus bicolor</i>	swamp white oak	FACW+
<i>Quercus palustris</i>	pin oak	FACW
<i>Quercus rubra</i>	northern red oak	FACU-
<i>Quercus velutina</i>	black oak	UPL
<i>Robinia pseudoacacia</i>	black locust	FACU-
<i>Sassafras albidum</i>	sassafras	FACU-
<i>Tilia americana</i>	American basswood	FACU
<i>Tsuga canadensis</i>	eastern hemlock	FACU
<i>Ulmus rubra</i>	slippery elm	FAC
<u>Woody Vines</u>		
<i>Lonicera japonica</i>	Japanese honeysuckle	FAC-
<i>Parthenocissus quinquefolia</i>	Virginia creeper	FACU
<i>Rubus flagellaris</i>	northern dewberry	UPL
<i>Smilax glauca</i>	cat greenbrier	FACU

Table 2. (Continued)

Scientific Name <sup>3,4</sup>	Common Name	Indicator Status <sup>1, 2</sup>
<u>Woody Vines</u>		
<i>Smilax rotundifolia</i>	common greenbrier	FAC
<i>Toxicodendron radicans</i>	poison ivy	FAC
<i>Vitis labrusca</i>	fox grape	FACU
<u>Shrubs</u>		
<i>Alnus</i> spp.	alders	FAC-OBL
<i>Alnus serrulata</i>	smooth alder	OBL
<i>Cornus amomum</i>	silky dogwood	FACW
<i>Cornus racemosa</i>	swamp dogwood	FAC
<i>Elaeagnus angustifolia</i>	Russian olive	FACU
<i>Hamamelis virginianus</i>	American witch-hazel	FAC-
<i>Ilex verticillata</i>	winterberry	FACW+
<i>Kalmia latifolia</i>	mountain laurel	FACU
<i>Ligustrum obtusifolium</i>	privet	FACU
<i>Lindera benzoin</i>	northern spicebush	FACW-
<i>Lonicera tatarica</i>	tartarian honeysuckle	FACU
<i>Rhus typhina</i>	staghorn sumac	FACU
<i>Rosa multiflora</i>	multiflora rose	FACU
<i>Rubus allegheniensis</i>	Allegheny blackberry	FACU-
<i>Rubus occidentalis</i>	black raspberry	UPL
<i>Sambucus canadensis</i>	American elder	FACW-
<i>Salix discolor</i>	pussy willow	FACW
<i>Salix nigra</i>	black willow	FACW+
<i>Spiraea latifolia</i>	broad-leaf meadow-sweet	FAC+
<i>Vaccinium corymbosum</i>	highbush blueberry	FACW-
<i>Viburnum cassinoides</i>	withe-rod	FACW
<i>Viburnum dentatum</i>	arrow-wood	FAC
<i>Viburnum prunifolium</i>	black-haw	FACU
<u>Herbs</u>		
<i>Achillea millefolium</i>	common yarrow	FACU
<i>Acorus calamus</i>	sweetflag	OBL
<i>Agropyron repens</i>	quack grass	FACU-
<i>Agrostis gigantea</i>	redtop	FACW
<i>Alisma subcordatum</i>	subcordate water-plantain	OBL
<i>Alliaria petiolata</i>	garlic mustard	FACU-
<i>Allium vineale</i>	field garlic	FACU-
<i>Ambrosia artemisiifolia</i>	common ragweed	FACU
<i>Anthoxanthum odoratum</i>	sweet vernal grass	FACU
<i>Apocynum cannabinum</i>	clasping leaf dogbane	FACU
<i>Arctium minus</i>	common burdock	UPL
<i>Arisaema triphyllum</i>	swamp jack-in-the-pulpit	FACW-

Table 2. (Continued)

Scientific Name <sup>3,4</sup>	Common Name	Indicator Status <sup>1, 2</sup>
<u>Herbs</u>		
<i>Artemisia vulgaris</i>	mugwort	UPL
<i>Asclepias incarnata</i>	swamp milkweed	OBL
<i>Asclepias syriaca</i>	common milkweed	FACU-
<i>Aster pilosus</i>	white heath aster	UPL
<i>Aster puniceus</i>	swamp aster	OBL
<i>Aster simplex</i>	panicked aster	FACW
<i>Barbarea vulgaris</i>	winter-cress	FACU
<i>Bidens</i> spp.	beggar-ticks	FACW-OBL
<i>Boehmeria cylindrica</i>	false nettle	FACW+
<i>Bromus inermis</i>	smooth brome grass	UPL
<i>Carex</i> spp.	sedges	FAC-OBL
<i>Carex lurida</i>	shallow sedge	OBL
<i>Carex stricta</i>	uptight sedge	OBL
<i>Chenopodium album</i>	lamb's quarters	FACU+
<i>Cicuta bulbifera</i>	water hemlock	OBL
<i>Cinna arundinacea</i>	stout wood-reedgrass	FACW+
<i>Cirsium arvense</i>	Canada thistle	FACU
<i>Cirsium vulgare</i>	bull thistle	FACU-
<i>Claytonia virginica</i>	spring beauty	FACU
<i>Conyza canadensis</i>	horseweed	UPL
<i>Coronilla varia</i>	crown-vetch	UPL
<i>Cyperus</i> spp.	nutsedges	FACW
<i>Dactylis glomerata</i>	orchard grass	FACU
<i>Daucus carota</i>	Queen Anne's lace	FACU
<i>Dennstaedtia punctilobula</i>	hayscented fern	UPL
<i>Dichanthelium clandestinum</i>	deer-tongue witchgrass	FAC+
<i>Digitaria sanguinalis</i>	common crabgrass	FACU-
<i>Dipsacus sylvestris</i>	teasel	FACU-
<i>Dryopteris spinulosa</i>	spinulose wood-fern	FAC+
<i>Eleocharis</i> spp.	spikerushes	FACW-OBL
<i>Erechtites hieraciifolia</i>	American burn	FACU
<i>Erigeron annuus</i>	daisy fleabane	FACU
<i>Erigeron philadelphicus</i>	Philadelphia fleabane	FACU
<i>Erythronium americanum</i>	dogtooth violet	FAC
<i>Eulalia viminea</i>	Nepal microstegium	FAC
<i>Eupatoriadelphus</i> spp.	Joe-Pye-weed	FAC-FACW
<i>Eupatorium perfoliatum</i>	common boneset	FACW+
<i>Euthamia graminifolia</i>	flat-top fragrant goldenrod	FAC
<i>Fragaria virginianum</i>	Virginia strawberry	FACU
<i>Fragaria virginianum</i>	Virginia strawberry	FACU
<i>Galium mollugo</i>	wild madder	FACU
<i>Geum canadense</i>	white avens	FACU
<i>Glyceria striata</i>	fowl manna grass	OBL
<i>Hesperis matronalis</i>	dames rocket	FACU-

Table 2. (Continued)

Scientific Name <sup>3,4</sup>	Common Name	Indicator Status <sup>1, 2</sup>
<u>Herbs</u>		
<i>Holcus lanatus</i>	common velvet grass	FACU
<i>Hypericum perforatum</i>	St. John's wort	FACU
<i>Impatiens capensis</i>	jewelweed	FACW
<i>Juncus effusus</i>	soft rush	FACW+
<i>Juncus tenuis</i>	path rush	FAC-
<i>Lamium purpureum</i>	purple dead nettle	UPL
<i>Leersia oryzoides</i>	rice cutgrass	OBL
<i>Lemna</i> spp.	duckweeds	OBL
<i>Leucanthemum vulgare</i>	oxeye daisy	UPL
<i>Lilium canadense</i>	Canada lily	FAC+
<i>Lotus corniculatus</i>	birds-foot trefoil	FACU-
<i>Ludwigia alternifolia</i>	seedbox	FACW+
<i>Ludwigia palustris</i>	marsh seedbox	OBL
<i>Lycopodium obscurum</i>	tree clubmoss	FACU
<i>Lycopodium tristachyum</i>	ground cedar	UPL
<i>Lycopus</i> spp.	bugleweeds	OBL
<i>Lysimachia ciliata</i>	fringed loosestrife	FACW
<i>Lysimachia nummularia</i>	moneywort	OBL
<i>Lythrum salicaria</i>	purple loosestrife	FACW+
<i>Maianthemum canadense</i>	false lily-of-the-valley	FAC-
<i>Mentha</i> spp.	mints	FACU-OBL
<i>Mitchella repens</i>	partridge-berry	FACU
<i>Oenothera biennis</i>	common evening-primrose	FACU-
<i>Onoclea sensibilis</i>	sensitive fern	FACW
<i>Osmunda cinnamomea</i>	cinnamon fern	FACW
<i>Oxalis</i> spp.	wood-sorrel	FACU-UPL
<i>Panicum dichotomiflorum</i>	fall panic grass	FACW-
<i>Phalaris arundinacea</i>	Reed canary grass	FACW+
<i>Phleum pratense</i>	timothy grass	FACU
<i>Phragmites australis</i>	common reed	FACW
<i>Phytolacca americana</i>	common pokeweed	FACU+
<i>Plantago lanceolata</i>	English plantain	UPL
<i>Plantago major</i>	common plantain	FACU
<i>Pilea pumila</i>	clearweed	FACW
<i>Poa pratensis</i>	Kentucky bluegrass	FACU
<i>Poa trivialis</i>	rough bluegrass	FACW
<i>Podophyllum peltatum</i>	may-apple	FACU
<i>Polygonum arifolium</i>	halberd-leaf tearthumb	OBL
<i>Polygonum cespitosum</i>	cespitose knotweed	FACU-
<i>Polygonum hydropiperoides</i>	swamp smartweed	OBL
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	FACW
<i>Polygonum perfoliatum</i>	mile-a-minute	FAC
<i>Polygonum perfoliatum</i>	mile-a-minute	FAC
<i>Polygonum sagittatum</i>	arrow-leaved tearthumb	OBL

Table 2. (Continued)

Scientific Name <sup>3,4</sup>	Common Name	Indicator Status <sup>1, 2</sup>
<u>Herbs</u>		
<i>Polygonum virginianum</i>	Virginia knotweed	FAC
<i>Potentilla canadense</i>	dwarf cinquefoil	UPL
<i>Potentilla simplex</i>	old field cinquefoil	FACU-
<i>Prunella vulgaris</i>	heal-all	FACU+
<i>Ranunculus acris</i>	common buttercup	FAC+
<i>Rubus hispidus</i>	bristly blackberry	FACW
<i>Rudbeckia hirta</i>	black-eyed Susan	FACU-
<i>Rudbeckia laciniata</i>	cut-leaf coneflower	FACW
<i>Rumex crispus</i>	curly dock	FACU
<i>Sagittaria latifolia</i>	broad-leaf arrow-head	OBL
<i>Saponaria officinalis</i>	bouncing-bet	FACU-
<i>Schizachrium scoparium</i>	little bluestem	FACU-
<i>Scirpus cyperinus</i>	wool-grass	FACW+
<i>Scirpus</i> spp.	bulrushes	FACW-OBL
<i>Setaria faberi</i>	Japanese bristle grass	UPL
<i>Setaria glauca</i>	yellow bristle grass	FAC
<i>Smilacina racemosa</i>	feather false-Solomon's-seal	FACU
<i>Solanum carolinense</i>	Carolina nightshade	UPL
<i>Solidago canadensis</i>	Canada goldenrod	FACU
<i>Solidago gigantea</i>	giant goldenrod	FACW
<i>Solidago rugosa</i>	wrinkled goldenrod	FAC
<i>Sparganium</i> spp.	burreeds	OBL
<i>Symplocarpus foetidus</i>	skunk-cabbage	OBL
<i>Taraxacum officinale</i>	common dandelion	FACU-
<i>Thelypteris noveboracensis</i>	New York fern	FAC
<i>Tridens flavus</i>	purple-top tridens	FACU
<i>Trifolium pratense</i>	red clover	FACU-
<i>Typha latifolia</i>	broad-leaved cattail	OBL
<i>Urtica dioica</i>	stinging nettle	FACU
<i>Uvularia sessilifolia</i>	sessile-leaf bellwort	FACU-
<i>Verbascum blattaria</i>	moth mullein	UPL
<i>Verbascum thapsus</i>	common mullein	UPL
<i>Verbena hastata</i>	blue vervain	FACW+
<i>Vernonia noveboracensis</i>	New York ironweed	FACW+

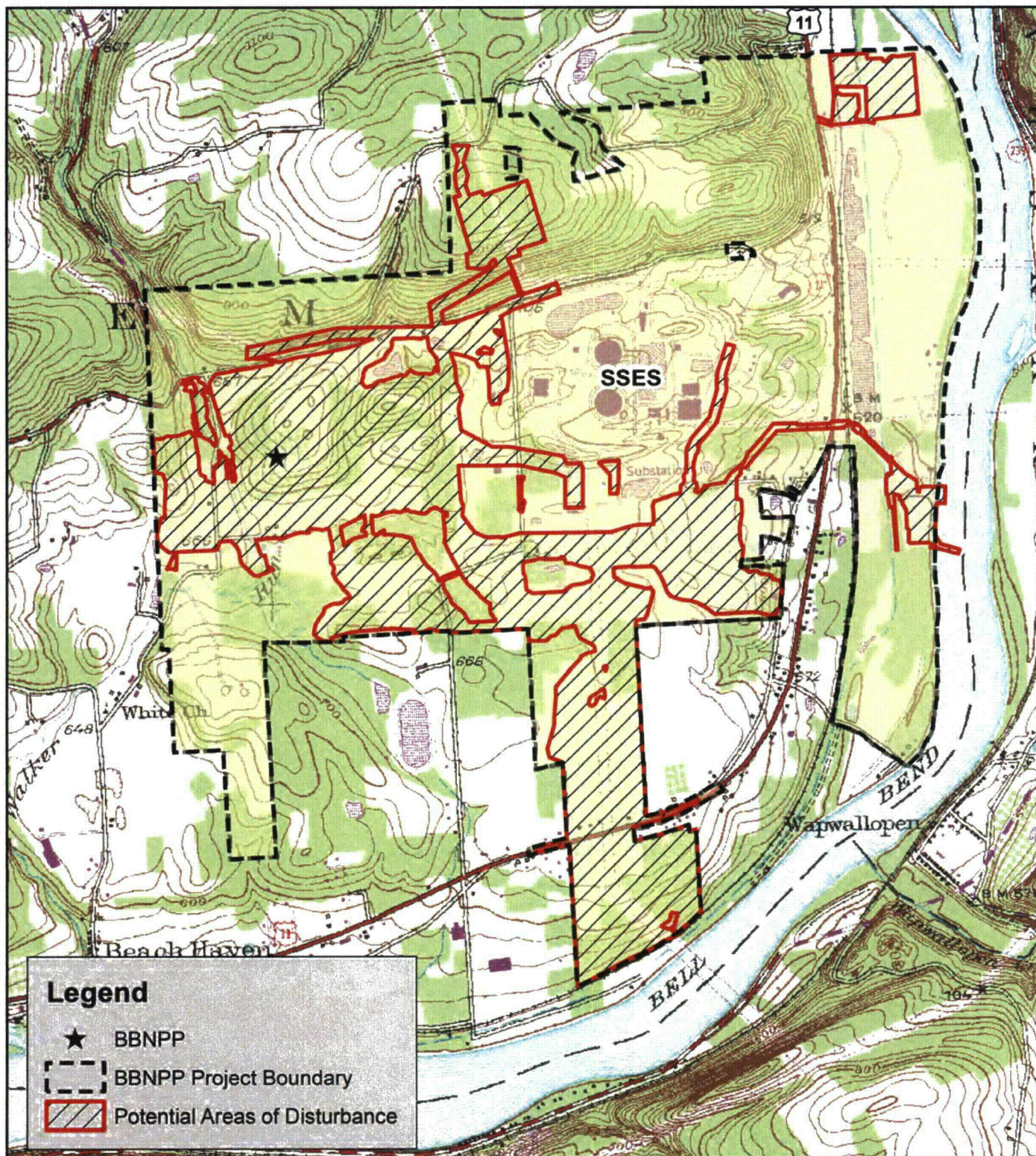
<sup>1</sup>National List of Plant Species that Occur in Wetlands 1996 National Summary: Northeast (Region 1).

<sup>2</sup>All Modifiers of (+) and (-) Have been Dropped from Indicator Status for Wetland Delineations Conducted Under the USACE Regional Supplements.

<sup>3</sup>Additional species observed only during the 2010 surveys are indicated in blue font.

<sup>4</sup>Additional species observed only during the 2011 surveys are indicated in red font.

## FIGURES



0.5 0.25 0 0.5 Miles

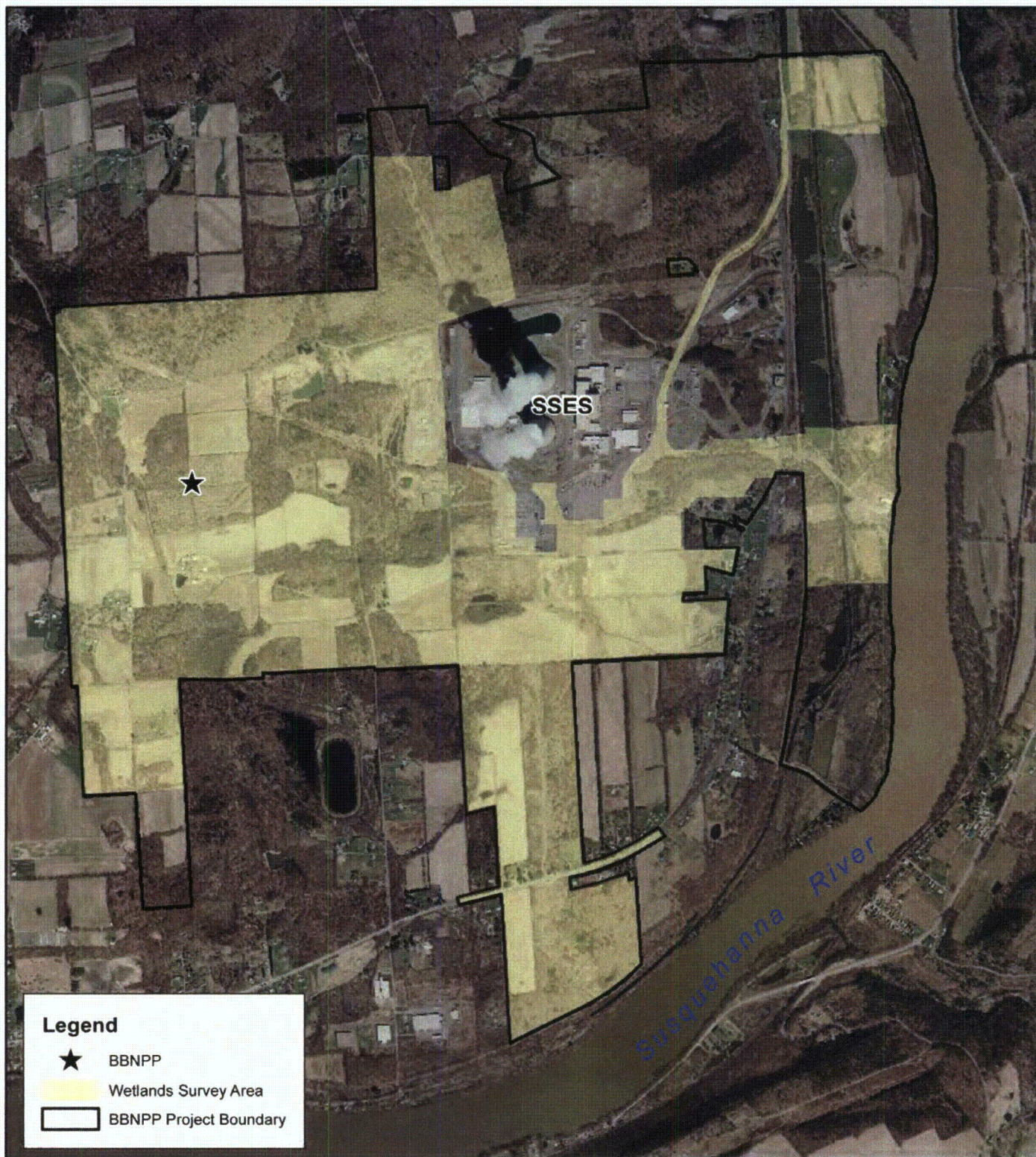
Figure 1.  
**Bell Bend NPP  
Site Location Map**



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date: 07/27/10  
prepared by: s.sherman  
project: 22474.000

rev. date: 09/30/10, 09/06/11  
prepared for: b.lee  
file name: Figure1.BBNPP\_Site\_USGS



**Legend**

- ★ BBNPP
- Wetlands Survey Area
- BBNPP Project Boundary

Note:  
Aerial Photography from PAMAP Program, PA DCNR,  
Bureau of Topographic and Geologic Survey, 2005

2,000 1,000 0 2,000 Feet

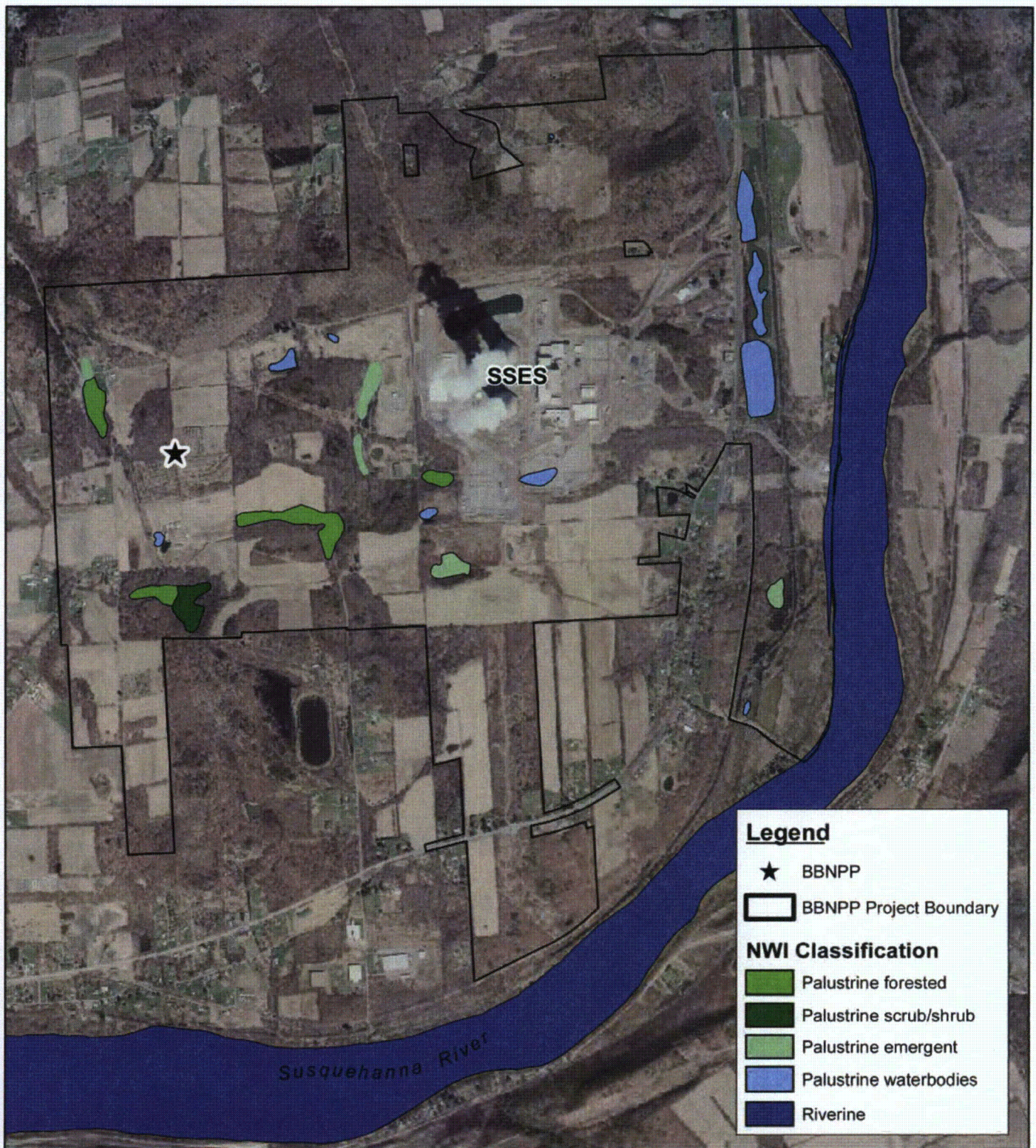
**Figure 2.**  
**Location of the Wetlands Survey Area**  
**within the BBNPP Project Boundary**



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prepared by: s.sherman  
project: 22474.000

rev. date: 10/01/10, 09/07/11  
prepared for: b. lees  
file name: Figure2.BBNPP\_Site\_Aerial



Note:  
Aerial Photography from PAMAP Program, PA DCNR,  
Bureau of Topographic and Geologic Survey, 2005  
USFWS NWI Berwick, PA Quad, 1976

2,000 1,000 0 2,000 Feet

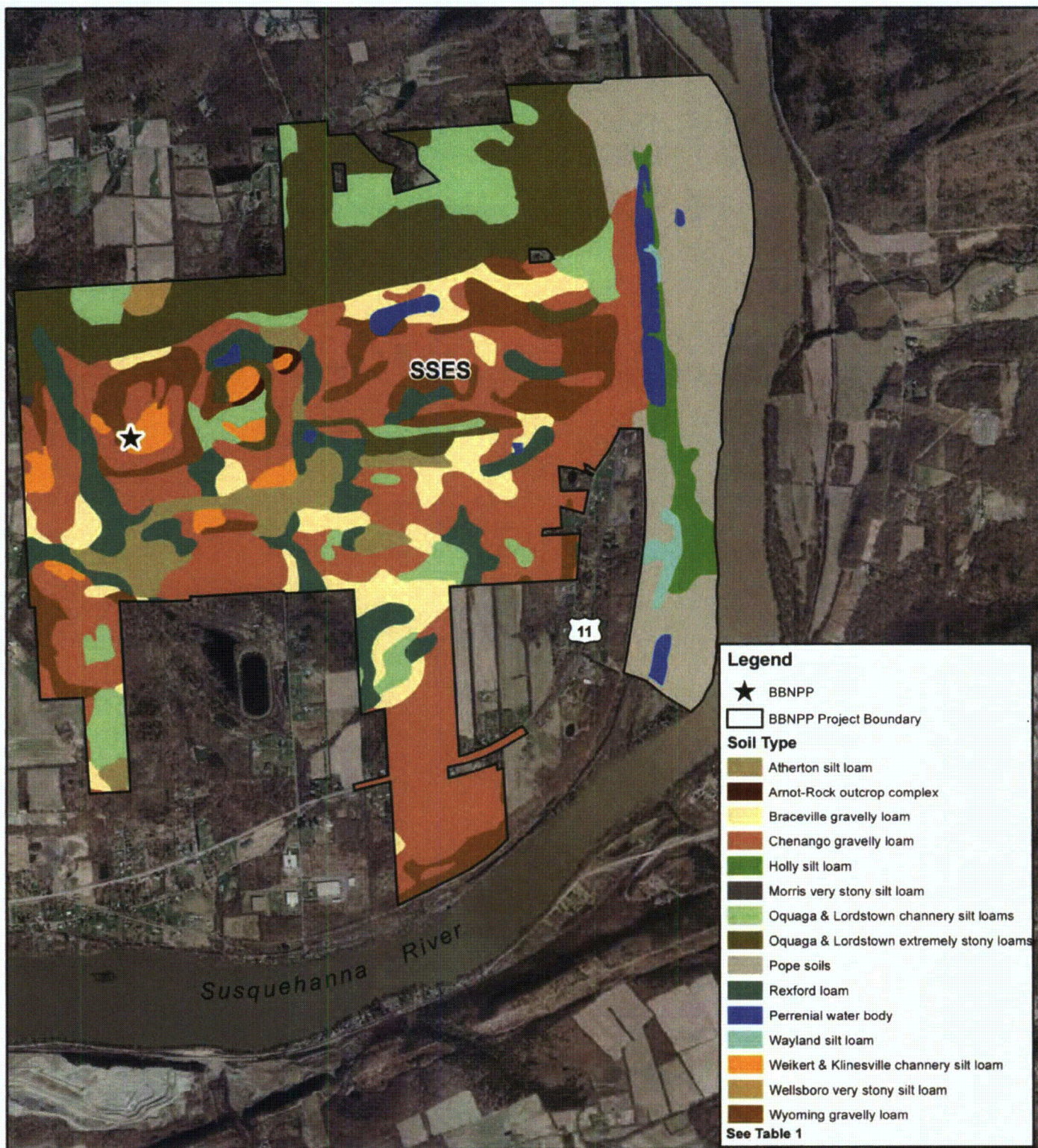
Figure 3.  
**Bell Bend NPP**  
**National Wetlands Inventory Map**



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date: 07/27/10  
prepared by: s.sherman  
project: 22474.000

rev. date: 10/01/10, 09/06/11  
prepared for: b.lees  
file name: Figure3.BBNPP\_Site\_NWI



Note:  
Aerial Photography from PAMAP Program, PA DCNR,  
Bureau of Topographic and Geologic Survey, 2005  
SoilDataMart.nrcs.usda.gov

2,600 1,300 0 2,600 Feet

**Figure 4.  
Bell Bend NPP  
Soil Survey Map**



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date: 07/27/10  
prepared by: s.sherman  
project: 22474.000

rev. date: 09/30/10, 09/06/11  
checked by: b. lees  
file name: Figure4.BBNPP Site Soils



**Legend**

★ BBNPP

□ BBNPP Project Boundary

**Wetland Type**

■ Wetlands

■ Stream Channel

■ Waterbodies

Note:  
Aerial Photography from PAMAP Program, PA DCNR,  
Bureau of Topographic and Geologic Survey, 2005

Wetlands delineated by Normandeau Associates, Inc.  
and surveyed by Peters Consultants, Inc.

Beginning January 2010, all wetland coordinates were located  
by Normandeau Associates, Inc. with a sub-meter GPS unit.

This figure illustrates wetlands delineated within the wetlands  
survey area as shown in Figure 2. The survey area captures  
potential areas of disturbance within the BBNPP Project  
Boundary displayed in Figure 1. Presence of wetlands  
outside of the survey area have not been determined.

0.3 0.15 0 0.3 Miles

**Figure 5.  
Bell Bend NPP  
Wetlands Map**



date: 07/28/10  
prepared by: s.sherman  
project: 21786.004

**NORMANDEAU ASSOCIATES  
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rev. date: 10/01/10, 11/12/10  
checked by: k.maurice  
file name: Figure5.BBNPP\_Wetlands



#### Legend

- ★ BBNPP
- Data Points
- Photograph Location and Orientation
- BBNPP Project Boundary
- Wetland Type**
- Wetlands
- Stream Channel
- Waterbodies

Note:  
Aerial Photography from PAMAP Program, PA, DCNR,  
Bureau of Topographic and Geologic Survey, 2005

Wetlands delineated by Normandeau Associates, Inc.  
and surveyed by Peters Consultants, Inc.

Beginning January 2010, all wetland coordinates were located  
by Normandeau Associates, Inc. with a sub-meter GPS unit

This figure illustrates wetlands delineated within the wetlands  
survey area as shown in Figure 2. The survey area captures  
potential areas of disturbance within the BBNPP Project  
Boundary displayed in Figure 1. Presence of wetlands  
outside of the survey area have not been determined.

0.25 0.125 0 0.25 Miles



Figure 6.  
Bell Bend NPP  
Wetlands Boundary Map

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file name: Figure6 BBNPP Wetlands.dwg