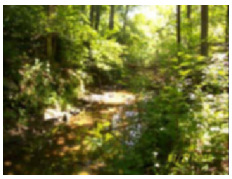
Wetland Functions and Values Assessment



PPL Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA
October 2010

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Introduction and Purpose

Wetland functions and values are the roles that a wetland performs resulting from specific characteristics of the wetland and the wetland's watershed. Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society without regard to subjective human values (The Highway Methodology Workbook Supplement). Values are the worth, merit, quality, or importance of a wetland to society based on either one or more functions and physical characteristics associated with the wetland (The Highway Methodology Workbook Supplement).

The purpose of the Functions and Values Assessment is to provide a comprehensive description of the functions and values of the wetlands delineated within the proposed Bell Bend Nuclear Power Plant (BBNPP) project boundary. There are approximately 165 acres of delineated wetlands within the BBNPP project boundary. Permanent, temporary, and secondary wetland impacts are proposed as a result of BBNPP construction. The functions and values assessment will aid in determining the wetland functions and values that will be reduced or eliminated as a result of BBNPP construction and operation, and will serve as a tool for identifying appropriate measures to mitigate those impacts.

Survey Procedure

The US Army Corps of Engineers' "The Highway Methodology Workbook Supplement: Wetland Functions and Values – A Descriptive Approach" (US Army Corps of Engineers New England District, September 1999), referred to herein as "The Highway Methodology", was used to evaluate wetland functions and values within the BBNPP project boundary (see Figure 1). This descriptive approach to wetland evaluations uses qualitative characteristics to determine if a wetland is suitable for particular functions and values. A pre-established list of considerations or qualifying criteria based on those outlined in The Highway Methodology served as guidance in determining the suitability of each function and value (refer to Appendix A). Functions and/or values may also be listed as principal if they are an important physical component of a wetland ecosystem and/or are considered of special value to society, from a local, regional, and/or national perspective. The selection of a function or value as principal was based on best professional judgment. The Highway Methodology does not contain any numerical weightings, rankings, or averaging of dissimilar wetland function which can cause bias.

The Highway Methodology evaluates 13 functions and values, listed below. Descriptions of each function and value are outlined in Appendix A.

<u>Functions</u>
Groundwater recharge
Groundwater discharge
Floodflow alteration
Fish habitat
Sediment/toxicant/pathogen retention
Nutrient removal/retention/transformation
Production export
Sediment/shoreline stabilization
Wildlife habitat

<u>Values</u>
Recreation
Educational and scientific value
Uniqueness and heritage
Visual quality and aesthetics
Endangered species habitat

Multiple site visits were necessary to accurately identify the functions and values performed within the BBNPP project boundary. Prior to field work, LandStudies reviewed existing information about the wetlands within the project area. Documents reviewed included the BBNPP Combined Operating

License Application (COLA) – Revision 1 (Unistar, 2008), the "Wetlands Delineation Report and Exceptional Value Wetlands Analysis" (Normandeau, 2010), and other ecological reports written by Normandeau Associates and LandStudies, Inc. All reports are listed in the references section. After the review of existing information the first round of field visits was performed in November and December 2009. The second round of field visits was performed in July and September 2010. The purpose of the summer 2010 field work was to understand seasonal wetland characteristics, revisit areas affected by beaver dam removal, as well as evaluate newly delineated wetlands resulting from changes to the BBNPP project boundary. "Wetland Function-Value Evaluation Forms" provided in The Highway Methodology were completed for wetland areas or group of similar wetlands during the 2009 field investigations. Completed function and value evaluation forms are provided in Appendix B. The evaluation forms include general wetland characteristics, document whether each function and value was suitable or not suitable, and reference numbers associated with the list of qualifying criteria in Appendix A.

Wetlands were grouped for evaluation based on similar characteristics including location, hydrology, and vegetation type. In most cases, the numbers used identify each wetland area correspond to the numbering system used in the US Army Corps of Engineers Preliminary Jurisdictional Determination Application Document (Normandeau, February 2010). However, in some situations, the labeling of wetland areas was modified specifically for this report by LandStudies to better represent areas exhibiting similar functions and values.

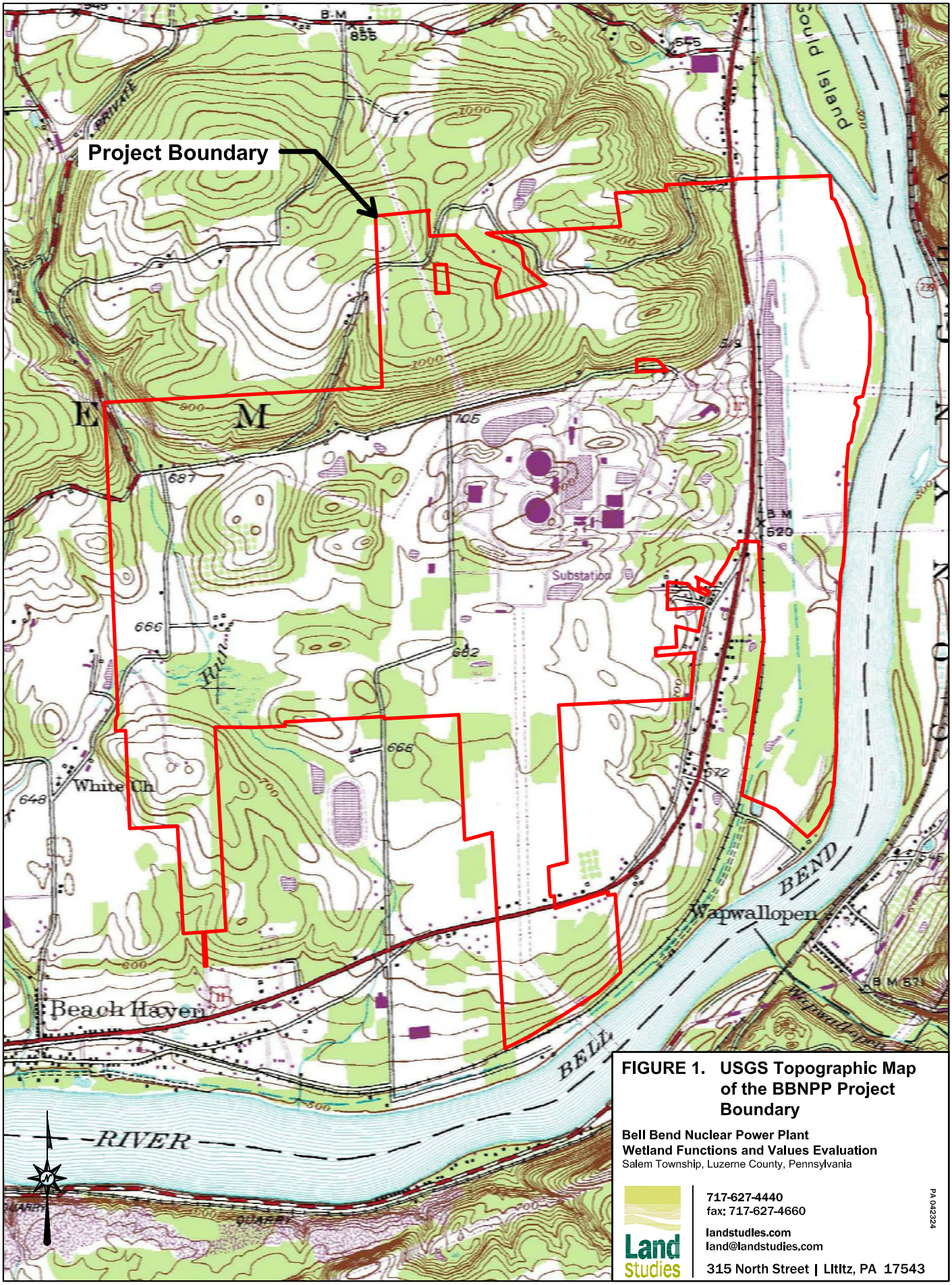

FIGURE 1. USGS Topographic Map of the BBNPP Project Boundary

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Study Area Description

Geology

The BBNPP study area is part of the Appalachian Mountain section of the Valley and Ridge physiographic province, which is characterized by a distinctive series of linear ridges and valleys that are the result of differential erosion of folded sedimentary rocks with varying degrees of resistance to weathering and erosion. Valleys are composed of less resistant rocks such as limestone and shales, whereas ridges and uplands are composed of more resistant rocks, particularly sandstone. The Susquehanna River has incised into and crosses these ridges as it flows generally from north to south, and its numerous tributaries form a trellis drainage network pattern as they flow along the valleys with less resistant rocks.

The underlying bedrock consists of layered sedimentary rocks that are Devonian in age (~416 to 359 million years old). The vast majority of the BBNPP project boundary is underlain by dark-gray silty claystone of the Mahantango Formation (Dmh). Some of the northern-most portions of the BBNPP project boundary are underlain by dark-gray to grayish-black clay shale of the Harrel Formation (Dh) and dark-gray sandstone, siltstone, and shale of the Trimmers Rock Formation (Dtr). Source materials within Walker Run may includes any of these formations as well as gray and bluish-gray sandstone, greenish-gray and grayish-red siltstone, grayish-red claystone, and greenish-gray shale from the Irish Valley Member (Dci) of the Catskill Formation.

During the past 2 million years (approximate), the landscape has been modified by cyclical erosion and deposition associated with advancing and retreating ice sheets, up to several kilometers thick in places, that flowed southward from the northern polar regions. The most recent ice advance, known as the Wisconsinan, occurred about 45,000 to 15,000 years ago. The most recent part of this advance is referred to in this region as the Woodfordian, which is responsible for creating the most prominent glacial features in the BBNPP study area and the surrounding region. These features include a northwest-southeast trending Woodfordian terminal moraine complex that consists of boulder, poorly sorted sediment, and Woodfordian glaciofluvial (including kame) terraces along the Susquehanna River that consist of stratified sands and gravels. "Kame terraces are frequently found along the side of a glacial valley and are the deposits of meltwater streams flowing between the ice and the adjacent valley side. These kame terraces tend to look like long flat benches, with a lot of pits on the surface made by kettles. They tend to slope downvalley with gradients similar to the glacier surface along which they formed, and can sometimes be found paired on opposite sides of a valley" (definition provided by www.wikipedia.org). The terminal (end) and ground moraines deposited at the front of and beneath the ice sheet, respectively, are much coarser than the outwash sediments, and also are marked by kettles. Kettles are depressions on the ground surface that resulted from melting of ice blocks within the glacial deposits during deglaciation. After deglaciation, which ended approximately 10,000 yrs ago, the landscape of the BBNPP project boundary was mantled with fresh glacial and near-glacial deposits, which consisted of kame terrace sediments that were deposited along the sides of river valleys adjacent to ice margins, and of various types of till

and outwash that formed at the leading edge of the Woodfordian ice sheet. Drainage was poor as a result of the near-glacial and glacial deposits, which typically consist of sediment that ranges from clay- to boulder-size, and resulted in widespread swampy conditions as streams adjusted to deglacial conditions.

Soils

The following soil description is an excerpt from the "Wetland Delineation and Exceptional Value Wetland Analysis" (Normandeau, 2010). It provides a summary of the soils found within the BBNPP project boundary. Detailed soil descriptions and soil maps are also provided in this report.

> "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. 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. 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.
>
> 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."

Atherton soils have a seasonally high water table near or at the soil surface. These nearly level soils are found primarily in depression in glacial outwash terraces, older stream terraces, and kame-kettle land formations. Atherton soils are poorly or very poorly drained with low runoff potential and ponding water (Soil Survey of Luzerne County, 1981).

Rexford soils are deep, somewhat poorly drained and poorly drained soils located in smooth low-lying concave depressions on glacial outwash terraces. This soil commonly has a fragipan at 15 to 24 inches which slows the downward movement of water. The seasonal high water table is 6 inches to 1 foot (Soil Survey of Luzerne County, 1981).

Holly soils consist of deep very poorly and poorly drained soils formed in the loamy alluvium on floodplains. Permeability is moderate or moderately slow. The seasonal high water table is within a depth of 6 inches of the soil surface (Soil Survey of Luzerne County, 1981).

Wayland soils consist of poorly drained and very poorly drained nearly level soils formed in recent alluvium and located in low areas or slackwater areas on floodplains. The water table is often within 6 inches of the surface and sometimes causes ponding (Soil Survey of Luzerne County, 1981).

Wetlands and Surface Water Bodies

Wetlands within the BBNPP project boundary are associated with two distinct watersheds; Walker Run and the North Branch of the Susquehanna River (NBSR). Confers Lane serves as the divide between the two watersheds within the site.

The majority of wetlands delineated within the Walker Run watershed are contiguous to Walker Run or one of its tributaries. Wetlands are also located adjacent to tributaries to the Susquehanna River. Isolated wetlands, not hydrologically connected to a surface water body are present in both watersheds. These wetlands are primarily topographic depressions. Some wetlands that are contiguous with other wetlands or water bodies may appear isolated on the map because the wetland delineation ended at the BBNPP project boundary. A summary of surface water features is provided below. Multiple studies were completed by LandStudies and Normandeau to evaluate these surface water bodies. These studies were intended to assess baseline conditions within the surface water bodies of the site and included fish and macroinvertebrate surveys, habitat assessment, geomorphic assessment, substrate embeddedness, water quality testing, and pressure transducer measurements. These studies are listed in the reference section. Surface water features are shown on Figure 3 – Wetland Identification Map.

Walker Run is a perennial stream that is listed as a Cold Water Fishery (CWF) by PADEP Chapter 93 Water Quality Standards. It flows southward toward NBSR and west of the BBNPP footprint. Walker Run supports reproducing brown trout populations and has been designated as a wild trout stream by the PFBC; therefore all wetlands in or along the floodplain of Walker Run are exceptional value wetlands (25 Pa. Code § 105.17). Multiple springs, rainfall, and snowmelt influence the stream flow. Walker Run has a drainage area of about 4.1 mi^2 to the Susquehanna River.

The Unnamed Tributary to Walker Run (also referred to as the Eastern Tributary or Tributary 1) flows along the eastern and southern site boundaries of the proposed BBNPP footprint and discharges into Walker Run on the southwest side of the site. The unnamed tributary has a drainage area of about 0.68 mi^2 and an approximate length of 2.1 miles.

Tributary 2 originates in Wetland 11 or the “teardrop wetland” and flows south into the Unnamed Tributary to Walker Run. It is piped beneath agricultural fields for approximately 560 feet between Wetland 11 and Wetland 12.3.

Tributary 3 (also referred to as the Unnamed Tributary to Lake Took-A-While) is located south of the BBNPP site; it flows into the NBSR via Lake Took-A-While and the North Branch Canal (NBC). Its drainage area is not part of the Walker Run watershed.

Five ponds exist within the BBNPP project boundary. Johnson Pond and the Farm Pond are spring fed. The Farm Pond outlets into Walker Run and Johnson Pond outlets to the Unnamed Tributary to Walker Run. The Beaver Pond is on the Unnamed Tributary to Walker Run and was created by a beaver dam along an access road. Unnamed Ponds 1 and 2 are isolated ponds east of Confers Lane.

The NBSR flows from north to south past the Susquehanna Steam Electric Station (SSES), makes a broad 90 degree turn to the west, and flows to the south of the BBNPP site before reaching Berwick, PA. The proposed BBNPP CWS Makeup Water Intake Structure site is approximately 22 miles downstream of Wilkes-Barre, PA and 5 miles upstream of Berwick, PA. The NBSR ultimately receives all surface water and groundwater that drains from the BBNPP site.

A canal network is located within the BBNPP project boundary at Susquehanna Riverlands, east of Route 11. The NBC was historically used within the region for transportation. Two unnamed tributaries feed the canal. One enters at the northern end of the reconstructed section of the NBC and the other flows into Lake Took-A-While which also provides flow to the canal. The North Branch Canal Outfall (NBCO) channel is a manmade channel formed by overflow and seepage from the canal that discharges into the NBSR.

Land Use

The following primary land uses are present within the BBNPP/SSES project boundary include forest (36.7%), agriculture or old field/former agriculture (28.2%), developed (18.6%), wetlands (8.3%), upland scrub/shrub (5.3%), and water (3.0%) (Normandeau, 2010). A significant change of cropland to fallow fields occurred between the 2009 and 2010 growing season. This land use change affected the suitability of multiple wetlands to perform the sediment/toxicant retention and nutrient removal and retention functions. The conversion to fallow land decreases the potential sources of nutrient and sediments within the wetland's watershed.

Susquehanna Riverlands

Susquehanna Riverlands is a recreational and educational facility owned and operated by PPL located east of Route 11. It encompasses 1,200 acres on both the east and west sides of the Susquehanna River. In addition to diverse ecological habitats, an important historical site is located within the Susquehanna Riverlands. A portion of the Riverlands property is located within the BBNPP project boundary.

Restored and unimproved sections of the historical NBC are located within the BBNPP project boundary. According to the PPL Corporation website, the NBC stretched from Pittston to

Northumberland, a distance of 72.5 miles. In use during the period from 1830 to 1900, the canal was 40 feet wide at the top and 4-6 feet deep. The canal boats were 80 feet long and could haul up to 120 tons of cargo, which might include coal, flour, grain or lumber. These were drawn by teams of mules which traveled the tow paths that now form a portion a walking trail.

The Susquehanna Riverlands has also been identified as an Important Bird Area (IBA) by the Pennsylvania Audubon Society. The IBA program was developed to locate important bird habitat using objective scientific criteria. The IBA designation can then be used by residents, planners, and state and local officials when making land planning and use decisions.

"A Guide to Critical Bird Habitat in Pennsylvania" provides the following information about the 2,500 acre IBA. The Susquehanna Riverlands has many diverse habitat types including cultivated fields, lawns, picnic and other outdoor recreation area, wetlands including marshes, riparian forests and swamps. The NBC provides excellent waterfowl habitat. Densities of some forest-interior or canopy species are fairly high due to extensive forested areas. Oak/hickory forests support good populations of scarlet tanager, ovenbird, worm eating warbler, pin warbler, red eyed vireo, and rose breasted grosbeak. Riparian forests support yellow throated vireo, warbling vireo, and American redstart. Thicket species include golden winged warbler, yellow breasted chat, blue winged warbler and brown thrasher. A total of 217 Bird species have been reported on site and 126 Species have been documented as breeding at the site (A Guide to Critical Bird Habitat in Pennsylvania, Crossley 1999).

The majority of wetlands supporting the values in the functions and values assessment are located within the Riverlands property. The remainder of the BBNPP site has restricted access and therefore the wetlands support few values.

Walker Run Watershed

Reproducing Brown Trout Populations and Exceptional Value Wetlands

Brown trout populations exist within Walker Run. Numerous fish sampling studies (Normandeau 2010, LandStudies 2009, PFBC 2009) revealed that these trout populations are reproducing and therefore Walker Run meets the criteria identified as a wild trout stream in 25 Pa. Code § 57.119(b). Unnamed tributaries to Walker Run are also included in the wild trout stream classification. According to 25 Pa. Code § 105.17, wetlands located in or along the floodplain of a wild trout stream are considered exceptional value wetlands (EV). Therefore most of the wetlands within the Walker Run watershed are considered exceptional value (isolated wetlands are exempt from EV status). Stream habitat evaluations were also performed on Walker Run and its unnamed tributaries. In general, upstream of Beach Grove Road, stream habitat is optimal to near optimal due to adequate shade, low substrate embeddedness, and sufficient riffle areas. The reach downstream of Beach Grove Road has marginal habitat quality attributed to greater substrate embeddedness, greater sediment deposition, fewer riffle areas, channelization, poor bank stability and vegetative protection. Many of these streams and wetland areas were altered by historical land use practices including farming and logging. In addition, topographic alterations due to infrastructure construction altered surface water flow paths and divided wetlands. These land use practices caused stream

channelization, stream erosion, and sediment deposition in the stream valleys creating some of the poor habitat characteristics and substrate embeddedness problems documented in the aquatic studies. A 1939 aerial photograph of the BBNPP project boundary is shown in Figure 2.

Beaver Dam Removal

Significant beaver activity was occurring near the confluence of Walker Run and the Unnamed Tributary to Walker Run within the BBNPP project boundary. A beaver dam was located immediately downstream of the confluence. The beaver dam caused significant backwater in both Walker Run and the unnamed tributary contributing to inundation of some of the wetlands. Inundation increased with closer proximity to the beaver dam. These inundated conditions and increased groundwater levels were evident during the November 2009 field investigations. The beavers were relocated in spring 2010 and in April 2010 the beaver dam was removed. The dam removal significantly affected the hydrologic conditions in wetlands 10.1, 10.2, and 10.3. The area was re-assessed during the July 2010 field investigations to account for any functions and values changes resulting from the beaver dam removal. The functions and values described in the report are based on the current condition, with no dam present.

Another beaver dam was located along an existing access road, which created an open water area described in this report as the "Beaver Pond" (12B) within Wetland 12.2. In September 2010, this beaver dam was removed and the pond was drained in order to replace the culvert pipe under the access road. A weir structure will be installed to re-establish the open-water that had existed behind the beaver dam.

Other Considerations

Threatened and Endangered Species

A federally listed endangered species, the Indiana Bat, is USFWS concern within the BBNPP project boundary. Indiana Bats were not found on-site during bat studies completed by Normandeau (A Field Survey of Terrestrial Fauna, Normandeau 2010); however, multiple bat hibernacula are known to exist near the proposed BBNPP site. Suitable spring, summer, and fall Indiana Bat habitat, including stands of shagbark hickory, has been indentified within the property boundary. This assessment does not evaluate or identify potential Indiana Bat habitat.

Cultural Resources

Cultural resources are associated with the Uniqueness/Heritage wetland value, which was evaluated based on visual assessments during the winter 2009 and summer 2010 field work and not on the detailed cultural resource studies. Cultural resource studies within the BBNPP Project Boundary were completed by GAI Consultants, Inc. (refer to GAI report for detailed cultural resource location information).

SCALE: 1" = 2000'

LEGEND

- Current Stream Location (approximate)
- BBNPP Project Boundary (approximate)

FIGURE 2. Aerial Photograph - 1939

SOURCE: www.pennpilot.psu.edu

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Functions and Values Assessment

Characteristics of each evaluated wetland or group of wetlands relating to the 13 functions and values are summarized in this section. Wetlands are identified by the wetland numbers provided in figure 3 and based on Normandeau Associate's numbering system for the ACOE Jurisdictional Determination. Table 1 provides a concise comparison of each wetland and its associated functions and values. Photos of each wetland are provided in Appendix C.

Wetlands within the Walker Run watershed are described first followed by the North Branch Susquehanna River (NBSR) watershed.

Wetlands determined "not suitable" for a function or value may exhibit some of the qualifying characteristics listed in Appendix A. Functions and values were considered not suitable or not principal for one of the following reasons; (1) the wetland exhibits a minimal number of qualifiers; (2) the wetland exhibits weak qualifiers of the function or value; (3) wetland characteristics indicate the function or value is not occurring or (4) professional judgment based on a comparison of a wetland's characteristics to other evaluated wetlands.