

Ms. Kimberly Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: Appalachian Power Company
London / Marmet Project No. 1175
Winfield Project No. 1290
Application for New License
Preliminary Licensing Proposal

September 2, 2011

Dear Secretary Bose:

Appalachian Power Company (Appalachian) herein electronically files the Preliminary Licensing Proposal (PLP) for the London/Marmet Project (FERC No. 1175) and the Winfield Project (FERC No. 1290) with the Federal Energy Regulatory Commission (FERC). These Projects are located on the Kanawha River in West Virginia. The Projects have been operating for almost 30 years under their current licenses, which expire in January 2014. Appalachian is using the FERC's Integrated Licensing Process to apply for the new licenses. The PLP was prepared in accordance with Commission regulations under 18 CFR §5.16 and is due to the FERC within 150 days of the January 31, 2012 license application deadline.

By copy of this letter, stakeholders on the attached distribution list are being notified of the availability of the PLP, and will receive an electronic version on CD. An electronic copy can also be obtained from FERC's eLibrary at <http://elibrary.ferc.gov> or by visiting the Projects relicensing website at www.kanawhahydro.com.

As required by 18 CFR §5.16 (e), stakeholders who wish to provide comments on the PLP need to file a letter with FERC within 90 days of this filing, making the deadline for comments December 1, 2011. Letters should be addressed to the FERC Secretary, Kimberly Bose, and reference the FERC Project Numbers (P-1175 or P-1290).

Any questions regarding the enclosed PLP should be directed to the undersigned.

Sincerely,

A handwritten signature in cursive script, reading "Teresa P. Rogers" followed by a small flourish.

Teresa P. Rogers
Process Supervisor I
540-985-2441

Enclosure

cc: w/enc.
Distribution List - Attached

APPALACHIAN POWER COMPANY

LONDON/MARMET HYDROELECTRIC PROJECT No. 1175

WINFIELD HYDROELECTRIC PROJECT No. 1290

PRELIMINARY LICENSING PROPOSAL

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APPALACHIAN POWER COMPANY

LONDON/MARMET HYDROELECTRIC PROJECT

FERC No. 1175

WINFIELD HYDROELECTRIC PROJECT

FERC No. 1290

PRELIMINARY LICENSING PROPOSAL

SEPTEMBER 2011

PREPARED BY:



APPALACHIAN POWER COMPANY

LONDON/MARMET HYDROELECTRIC PROJECT
FERC No. 1175

WINFIELD HYDROELECTRIC PROJECT
FERC No. 1290

PRELIMINARY LICENSING PROPOSAL

SEPTEMBER 2011

PREPARED BY:



APPALACHIAN POWER COMPANY
LONDON/MARMET HYDROELECTRIC PROJECT
FERC NO. 1175
WINFIELD HYDROELECTRIC PROJECT
FERC NO. 1290
PRELIMINARY LICENSING PROPOSAL

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

ADA	American with Disabilities Act
AEP	American Electric Power Corp
APE	Area of Potential Effect
Appalachian or APC	Appalachian Power Company
CEII	Critical Energy Infrastructure Information
cfs	Cubic feet per second
CSX	A railroad transportation company located in North America
CWA	Clean Water Act
DO	Dissolved oxygen
EA	Environmental Assessment
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FERC or Commission	Federal Energy Regulatory Commission
ft	Feet
FLA	Final License Application
FWS or USFWS	United States Fish and Wildlife Service
GRNRA	Gauley River Natural Recreation Area
HPMP	Historic Properties Management Plan
Kleinschmidt	Kleinschmidt Associates
ILP	Integrated Licensing Process
mg/L	Milligrams per liter
ml	Milliliter
MW	Megawatt
MWh	Megawatt-hours
NEPA	National Environmental Policy Act
ng/L	Nanograms per liter
NGOs	Non-governmental organizations
NGVD, 1929	National Geodetic Vertical Datum, 1929
NOI	Notice of Intent

ACRONYMS AND ABBREVIATIONS *(continued)*

NPS	National Park Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PAD	Pre-Application Document
PCBs	Polychlorinated biphenyls
PLP	Preliminary Licensing Proposal
PME	Protection, mitigation and enhancement
SCORP	State Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SHPO	State Historic Preservation Officer
TMDL	Total Maximum Daily Load
USACE or Corps	United States Army Corps of Engineers
USGS	United States Geologic Service
WVDEP	WV Department of Environmental Protection
WVDNR	WV Division of Natural Resources
WMA	Wildlife Management Area

APPALACHIAN POWER COMPANY
LONDON/MARMET HYDROELECTRIC PROJECT
FERC NO. 1175
WINFIELD HYDROELECTRIC PROJECT
FERC NO. 1290
PRELIMINARY LICENSING PROPOSAL

1.0 INTRODUCTION

The London/Marmet (FERC No. 1175) and Winfield (FERC No. 1290) Projects (Projects) are existing licensed hydropower facilities owned and operated by Appalachian Power Company (Appalachian). The London/Marmet Project consists of the London Development and the Marmet Development, located at river miles 82.8 and 67.7, respectively on the Kanawha River in West Virginia. The Winfield Project consists of the Winfield Development, located downstream of the London/Marmet Project on the Kanawha River at river mile 31.1. Please see Figure 1-1, for a Project Location Map.

The London, Marmet, and Winfield Developments are each located at U.S. Army Corps of Engineers (“USACE” or “Corps”) locks and dams. However, Appalachian retains licenses to operate the hydroelectric facilities at these Developments. According to the Federal Energy Regulatory Commission (FERC or Commission) license orders, the London, Marmet, and Winfield Developments include 4.40 acres, 7.31 acres, and 8.25 acres of U.S. lands, respectively, not including the transmission line rights-of-way.

The Projects were originally licensed in the early 1930s and built in 1935. They currently operate under licenses granted in September 1983; both licenses will expire on January 31, 2014. The process selected by Appalachian for applying for a new license is the Integrated Licensing Process (ILP), as defined under FERC’s rules and regulations (18 CFR Part 5). In lieu of a draft license application, Appalachian has prepared and submits the following Preliminary Licensing Proposal (PLP) pursuant to section 5.16 of 18 C.F.R. and in concurrence with the process requirements determined under the ILP.

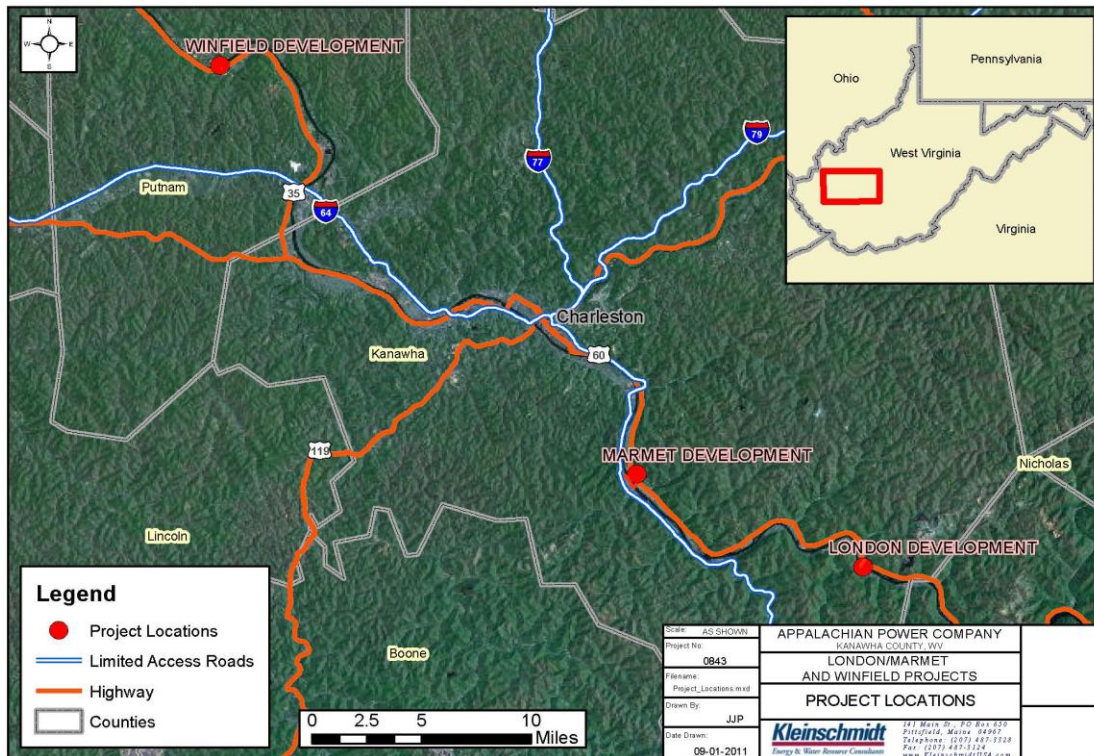


FIGURE 1-1. PROJECT LOCATIONS

1.1 PURPOSES OF THE PRELIMINARY LICENSING PROPOSAL

The purposes of the PLP, as defined by 18 CFR § 5.16 are to:

- Describe the existing and proposed facilities associated with each Project, including Projects' lands and waters;
- Describe the existing and proposed Projects' operation and maintenance plan, to include measures for protection, mitigation, and enhancement with respect to each resource affected by the Projects' proposals; and
- Provide Appalachian's draft environmental analysis of the continuing and incremental impacts of the Projects by resource area, including the results of studies conducted under the approved study plans.

1.2 REVIEW SCHEDULE

This PLP is being provided to participating agencies, tribes, NGOs, and the public for review and comment. As required by 18 CFR § 5.16(e), comments must be filed no later than **90 days** from the issuance date of the PLP.

Comments to FERC should be sent to the following:

Ms. Kimberly D. Bose, Secretary
Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

A copy of comments sent to FERC should also be sent to Appalachian at the following address:

Teresa Rogers
Appalachian Power Company
40 Franklin Road
Roanoke, VA 24011

1.3 DOCUMENT ORGANIZATION

This PLP is organized to follow the content requirements of 18 CFR § 5.16 and contains the following sections:

Section 1 – Introduction

Section 2 – Proposed Action – including a description of existing and proposed Projects’ facilities, proposed Projects’ operation, and proposed protection, mitigation, and enhancement (PME) measures

Section 3 – Summary of Pre-filing Consultation

Section 4 – Environmental Analysis

2.0 PROPOSED ACTION

The following sections serve to provide background information including descriptions of the Projects and associated facilities. Appalachian's proposal for the continued operation of the Projects is also provided, with discussion of both current Projects' operations and any proposed changes to operations. An initial description of proposed PME measures is also provided below and detailed further in the Environmental Analysis, Section 4.

2.1 PROJECT DESCRIPTION

As briefly discussed in the introduction, and as depicted in Figure 1-1 the London, Marmet, and Winfield Developments are located on the Kanawha River, at river miles 82.8, 67.7, and 31.1, respectively. The London Development is located near Handley, West Virginia, in Kanawha County; the Marmet Development is located in Marmet, West Virginia, in Kanawha County; and the Winfield Development is located in Winfield, West Virginia, in Putnam County.

2.1.1 PROJECT FACILITIES

The Project boundary for each Development includes the forebays and log booms, powerhouses, tailraces, switchyards, recreational facilities, and transmission lines. With the exception of the transmission lines, the facilities at each of the Projects are located at the opposite end of the USACE dams from the locks. The dams, locks, and reservoirs are not part of the licensed hydroelectric facilities. The Project boundaries include all of the land and facilities necessary to safely operate the Projects (Appalachian, 2008).

2.1.1.1 LONDON/MARMET PROJECT

LONDON DEVELOPMENT

The London Development consists of a powerhouse with appurtenant structures and equipment, an outdoor substation, and transmission lines connecting to Appalachian's transmission system. The dam and locks that impound the London reservoir, and the reservoir itself, are not part of the Commission-licensed Project. The dam and locks are U.S. government facilities operated by the USACE.

The intake section of the powerhouse is located downstream of the forebay area, which was excavated at the edge of the river after the dam was constructed. The intake is located immediately upstream of the powerhouse and consists of trash racks and head gates. The elevation of the intake invert is at a depth of 27 feet below the normal full-pool reservoir elevation of 614.0 ft NGVD. (Note: all elevations referenced in this document are based on the National Geodetic Vertical Datum, 1929 (NGVD)). Flow into the powerhouse is controlled by the headgates, which are operated by a motorized hoist at the walkway level. Inlet trash racks, with a 3.5-inch open space between each vertical bar, are located in front of the intakes to help keep floating debris from entering the units; the trash racks are cleaned as required.

The trash racks at the London, Marmet, and Winfield Developments are cleaned using a drag-rake type trash rake. The drag rake moves upstream approximately 25 feet. It lowers to the bottom of the river and drags along the bottom until encountering the bottom of the intake screens. The drag rake then moves up the intake screen, breaks the water surface and continues to the top of the intake screens where a limit switch causes it to stop after dumping its debris/trash into the sluiceway. The rakes and sluiceway pumps are presently operated manually as needed at London and Marmet. At Winfield, some of the rakes are operated continuously and the others are operated manually as needed; the sluiceway normally has water flowing through it. When it is safe to do so, at all three Developments, man-made trash is removed from the sluiceway and placed in a dumpster for disposal. During flood events, all debris is passed downstream.

A floating log boom is located across the forebay opening to prevent the majority of floating debris from reaching the trash racks and intakes. The debris accumulates along the log boom and in front of the dam until the USACE initiates operations to pass the debris downstream. These operations require the powerhouse to shut down temporarily. The rollers on the dam are manipulated to draw the debris across the dam to the powerhouse side of the river and then the debris is passed over the roller that contains the flap. Once the debris is passed, the units resume operation.

The London powerhouse is located on the left bank (facing downstream) of the river and houses three turbine generating units. The units include one fixed-blade propeller unit and two adjustable-blade Kaplan units. Unit 1, the fixed-blade unit, is rated at 6,600 horsepower (H.P.) (4,950 kilowatts [kW]). Unit 2 is rated at 7,600 H.P. (5,701.4 kW), and Unit 3 is rated at 7,250 H.P. (5,437.5 kW). The units each have generators rated at 6,000 kilovolt amperes (kVA) with a power factor of 0.8. The total authorized capacity of the Development is 14,400 kW based on the limiting capacity of the generators.

The draft tubes discharge into a reinforced concrete tailrace that is submerged at a normal tailwater elevation of 590.0 ft NGVD. The total hydraulic capacity of the turbines is estimated to be 10,000 cubic feet per second (cfs).

Power from the powerhouse is conducted from the generating units to step-up transformers located in an adjacent switchyard. The switchyard includes two (2) three-phase transformers with two auxiliary transformers, in addition to the necessary circuit breakers, switches, and other electrical equipment. The Development is connected to Appalachian's transmission grid by two 46-kV circuits along a 0.38-mile-long corridor, terminating at Appalachian's London switching station (Appalachian, 2008).

MARMET DEVELOPMENT

The Marmet Development consists of a powerhouse with appurtenant structures and equipment, an outdoor substation, and transmission lines connecting to Appalachian's transmission system. The dam and locks that impound the Marmet reservoir, and the reservoir itself, are not part of the Commission-licensed Project. The dam and locks are U.S. government facilities operated by the USACE.

The intake section of the powerhouse is located downstream of the forebay area, which was excavated at the edge of the river after the dam was constructed. The intake is located immediately upstream of the powerhouse and consists of trash racks and head gates. The elevation of the intake invert is at a depth of 27 feet below the normal full-pool reservoir elevation of 590.0 ft NGVD. Flow into the powerhouse is controlled by the headgates, which are operated by a motorized hoist at the walkway level. Inlet trash

racks with a 3.5-inch open space between each vertical bar are located in front of the intakes to help keep floating debris from entering the units; the trash racks are cleaned using drag-rake type trash rakes (see description earlier in this section for the London Development) as required.

A floating log boom is located across the forebay opening to prevent the majority of the floating debris from reaching the trash racks and intakes. The debris accumulates along the log boom and in front of the dam until the USACE initiates operations to pass the debris downstream. Similar to the London Development, these operations require the powerhouse to shut down temporarily. The rollers on the dam are manipulated to draw the debris across the dam to the powerhouse side of the river and then the debris is passed over the roller that contains the flap. Once the debris is passed, the units resume operation.

Just as at the London Development, the Marmet powerhouse is located on the left bank (facing downstream) of the river and houses three turbine generating units. The units include one fixed-blade propeller unit and two adjustable-blade Kaplan units. Unit 1, the fixed-blade unit, is rated at 6,600 H.P. (4,950 kW). Unit 2 is rated at 7,600 H.P. (5,701.4 kW), and Unit 3 is rated at 7,250 H.P. (5,437.5 kW). All three units have generators rated at 6,000 kVA with a power factor of 0.8. The total authorized capacity of the Development is 14,400 kW based on the limiting capacity of the generators.

The draft tubes discharge into a reinforced concrete tailrace that is submerged at a normal tailwater elevation of 566.0 ft NGVD. The total hydraulic capacity of the turbines is estimated to be 10,000 cfs.

Power from the powerhouse is conducted from the generating units to step-up transformers located in an adjacent switchyard. The switchyard includes two (2) three-phase transformers with two auxiliary transformers, in addition to the necessary circuit breakers, switches, and other electrical equipment. The Development is connected to Appalachian's transmission grid by two 46-kV circuits along a 0.78-mile-long corridor, terminating at Appalachian's Belle switching station (Appalachian, 2008).

2.1.1.2 WINFIELD PROJECT

The Winfield Development consists of a powerhouse with appurtenant structures and equipment, an outdoor substation, and transmission lines connecting to Appalachian's transmission system. The dam and locks that impound the Winfield reservoir, and the reservoir itself, are not part of the Commission-licensed Project. The dam and locks are U.S. government facilities operated by the USACE.

The intake section of the powerhouse is located downstream of the forebay area, which was excavated at the edge of the river after the dam was constructed. The intake is located immediately upstream of the powerhouse and consists of trash racks and head gates. The elevation of the intake invert is at a depth of 27 feet below the normal full-pool reservoir elevation of 566.0 ft NGVD. Flow into the powerhouse is controlled by the headgates, which are operated by a motorized hoist at the walkway level. Inlet trash racks with a 3.5-inch open space between each vertical bar are located in front of the intakes to help keep floating debris from entering the units; the trash racks are cleaned using drag-rake type trash rakes (see description earlier in this section for the London Development) as required.

A floating log boom located across the forebay opening prevents the majority of floating debris from reaching the trash racks and intakes. In the same manner described for the London and Marmet Developments, debris at Winfield dam accumulates along the log boom and in front of the dam until the USACE initiates operations to pass the debris downstream. These operations require the powerhouse to shut down temporarily. The rollers on the dam are manipulated to draw the debris across the dam to the powerhouse side of the river and then the debris is passed over the roller closest to the powerhouse which contains the flap. Once the debris is passed, the units resume operation.

The Winfield powerhouse is located on the left bank (facing downstream) of the river and houses two adjustable-blade Kaplan units and one propeller turbine generating unit. The turbines of the Kaplan units are each rated at 9,200 H.P. (6,900 kW). The propeller unit has a rating of 9,150 H.P. (6,862.5 kW). All three units have generators with ratings of 6,150 kVA at a power factor

of 0.8. The total authorized capacity of the Development is 14,760 kW based on the limiting capacity of the generators.

The draft tubes discharge into a reinforced concrete tailrace that is submerged at a normal tailwater elevation of 538.0 ft NGVD. The total hydraulic capacity of the turbines is estimated to be 10,600 cfs.

Power from the powerhouse is conducted from the generating units to step-up transformers located in an adjacent switchyard. The switchyard includes one (1) three-phase transformer with two auxiliary transformers, in addition to the necessary circuit breakers, switches, and other electrical equipment. Based on the current Project boundary, the Development is connected to Appalachian's transmission grid by a 69-kV circuit approximately 3.7 miles long connecting the Project to Appalachian's Bancroft switching station and a 69-kV circuit approximately 5.7 miles long connecting the Project to Appalachian's Teays switching station (Appalachian, 2008).

2.2 PROJECT LANDS AND WATERS

Figure 2-1 shows the relative location and normal full pool elevation for each of the reservoirs formed by the London, Marmet, and Winfield dams.¹

2.2.1 LONDON/MARMET PROJECT

LONDON DEVELOPMENT

The London reservoir extends from the dam upstream approximately 9.4 miles to the base of Kanawha Falls. The reservoir has a surface area of 910 acres at the normal full pool elevation of 614.0 ft NGVD and approximately 21 miles of shoreline (including backwater into tributaries, excluding islands). The storage capacity of the reservoir is estimated to be 19,000 acre-feet. Due to barge traffic on the river, the USACE maintains a navigational channel at least 9 feet deep through the reservoir from the dam upstream to the limit of navigability at river mile 90.57 (Appalachian, 2008).

¹. The reservoirs are not part of the hydroelectric projects and are not within the project boundaries.

MARMET DEVELOPMENT

The Marmet reservoir extends from the dam upstream approximately 15.2 miles to the base of London dam. The reservoir has a surface area of 1,420 acres at the normal full pool elevation of 590.0 ft NGVD and approximately 36 miles of shoreline (including backwater into tributaries, excluding islands). The storage capacity of the reservoir is estimated to be 12,000 acre-feet. Due to barge traffic on the river, the USACE maintains a navigational channel at least 9 feet deep through the reservoir (Appalachian, 2008).

2.2.2 WINFIELD PROJECT

The Winfield reservoir extends from the dam upstream approximately 35.7 miles to the base of Marmet dam. The reservoir has a surface area of 3,738 acres at the normal full pool elevation of 566.0 ft NGVD and approximately 139 miles of shoreline (including backwater into tributaries, excluding islands). The storage capacity of the reservoir is estimated to be 59,600 acre-feet. Due to barge traffic on the river, the USACE maintains a navigational channel at least 9 feet deep through the reservoir (Appalachian, 2008).

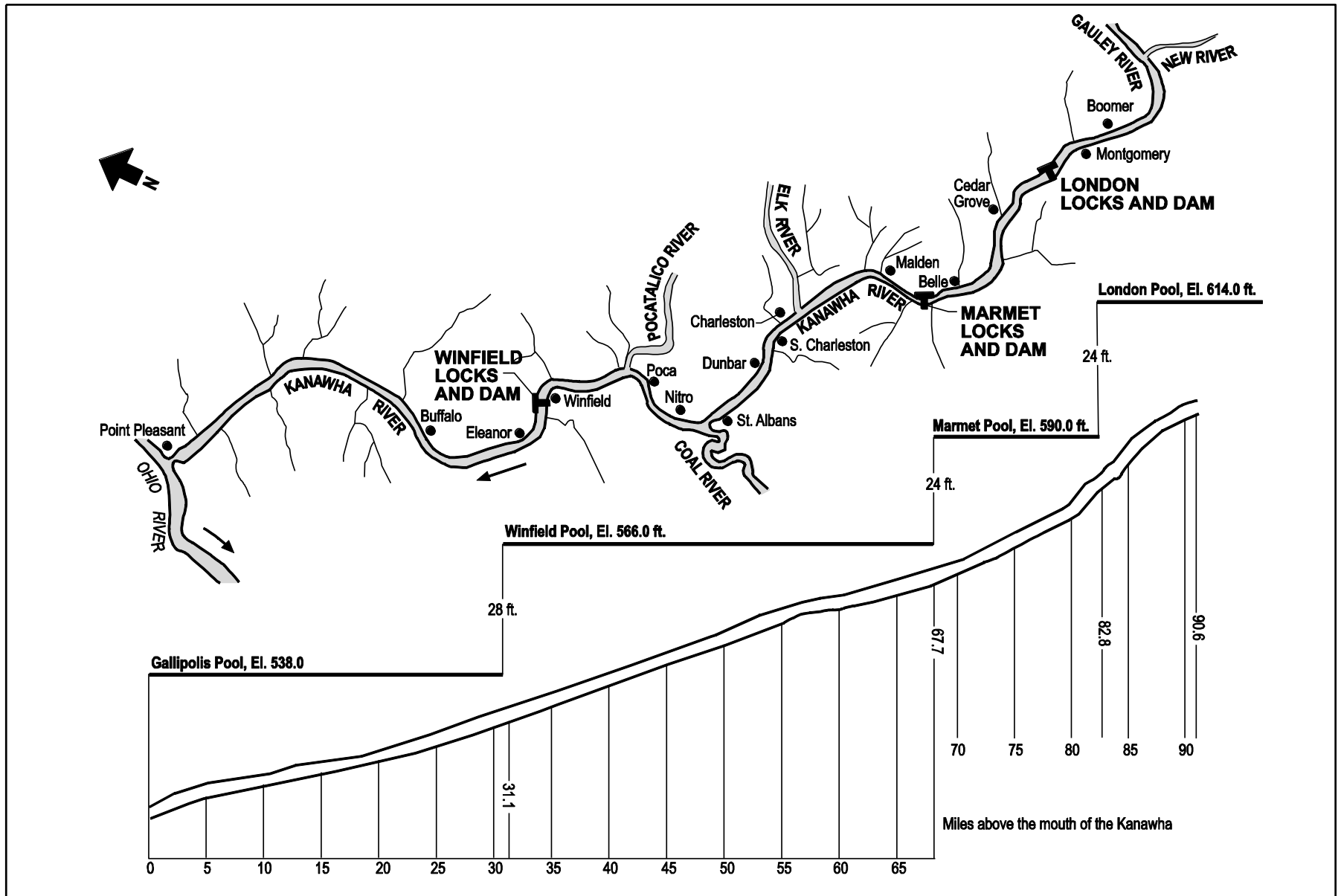


FIGURE 2-1. KANAWHA RIVER PROFILE. ALL ELEVATIONS REFERENCE NGVD, 1929. (SOURCE: APPALACHIAN, 2008)

2.3 EXISTING PROJECT OPERATION

Operation of the hydroelectric facilities is keyed off the operations of the USACE's locks at each dam. The hydro facility operators are in frequent contact with the lockmaster for each facility to ensure coordination of hydro generation and lock operations. In general, as long as the stream flow is less than the full discharge of the turbines (approximately 10,000 cfs), maintenance of the pool elevations within the allowable limits for navigation is the responsibility of Appalachian's power system personnel and plant operators. When stream flow exceeds the maximum turbine discharge, the responsibility for control of the pool elevations passes to the USACE's personnel at the dam. Also, from time to time, the USACE may request Appalachian's plant operators to maintain such water elevations as required for special navigational purposes (Appalachian, 2008).

2.3.1 LONDON/MARMET PROJECT

The allowable fluctuation of the London pool is three feet from elevation 614.0 feet to elevation 611.0 ft NGVD, with a maximum drawdown rate of 0.5 feet per hour.

The allowable fluctuation of the Marmet pool for navigational purposes is 0.3 feet from elevation 589.7 ft NGVD to elevation 590.0 ft NGVD, with a maximum drawdown rate of 0.5 feet per hour. Due to the limited storage capability of the Marmet impoundment, operation of the Marmet hydro facilities must mimic the operation of the London hydro facilities. The Marmet facility begins its peaking operations a few minutes prior to the start of peaking at the London plant. This is done to provide some room in the Marmet pool for the increased discharge from the London plant.

2.3.2 WINFIELD PROJECT

The allowable fluctuation of the Winfield pool for navigational purposes is 0.2 feet from elevation 565.8 ft NGVD to elevation 566.0 ft NGVD, with a maximum drawdown rate of 0.5 feet per hour. Due to the limited storage capability of the Winfield impoundment, operation of the Winfield hydro facility must mimic the operation of the London and Marmet hydro facilities. The Winfield facility begins peak output about one hour after the London plant begins the drawdown of the London pool. This lag allows for water travel time between the two plants.

The Winfield plant continues to peak until about one hour after the London plant reduces load to refill the London pool (Appalachian, 2008).

2.4 PROPOSED PROJECT OPERATION

Appalachian is not proposing any changes to the current operational scenarios described above for either the Marmet or Winfield Developments. Within the current London license, Appalachian may fluctuate the London pool levels up to three feet. Appalachian, in discussion with resource agencies and the USACE, is proposing through this PLP that a run-of-release operational scenario be adopted for the Development. Appalachian will be working with the Corps to establish a new agreement that reduces the maximum allowable pool fluctuation. This would be beneficial to both commercial and recreational navigation in addition to enhancing aquatic habitat.

2.5 PROPOSED ENVIRONMENTAL MEASURES

As discussed further in the Environmental Analysis section of this PLP, the following details a list of Appalachian proposed PME measures for natural, cultural, and recreational resources within the Project areas. These proposed measures are the result of studies initiated and completed in consultation with agencies and stakeholders through this relicensing process.

Due to the fact that some study results have just recently become available, it was not feasible for stakeholders to thoroughly review and consider these results with regard to PME measures. As such, Appalachian will continue to work with the interested stakeholders to finalize Management Plans for these measures, if warranted, and will submit these plans as part of the Final License Application (FLA).

LONDON SITE ACCESS – Appalachian is working with resource agencies and interested stakeholders to re-establish access to the London tailrace fishing site. As such, Appalachian has undertaken the London Development Tailrace Fishing Access Feasibility Study to further address access options at the London Development, as well as available access alternatives within the vicinity of the London Development. The objective of this study is to identify, analyze, and compare alternatives for providing public access to the London tailrace fishing

access and to identify the preferred means to re-establish access to the London tailrace fishing access. Options include: 1) providing an at-grade crossing for the public and 2) replacing the bridge. Additionally, in light of the complications associated with establishing a Right-of-Way with CSX, other options are being evaluated. They are: 1) establishing a new fishing access area at Appalachian owned property near Cabin Creek and 2) enhancing the existing facilities at the Marmet Development. The final report, and associated discussions, will be included within the FLA.

LONDON OPERATIONAL ENHANCEMENTS – In discussions with resource agencies, it was determined that, although the FERC license for the London Development allows up to three feet of pool fluctuation for operation, a run-of-release mode of operation would be preferable for the enhancement of Project resources. As such, Appalachian will be working with the USACE to determine an acceptable run-of-release operational scenario.

RECREATIONAL ENHANCEMENTS AT THE MARMET AND WINFIELD DEVELOPMENTS – A Recreation Assessment and Angler Use Study was performed at the Projects in late 2010. Results indicated that restrooms and trash receptacles were the most suggested improvements at both the Marmet and Winfield angling access sites. As such, Appalachian proposes to install portable restrooms and trash receptacles at both sites to accommodate existing and future use.

CULTURAL RESOURCES – Appalachian proposes to implement a Historic Properties Management Plan (HPMP) to be developed in consultation with the West Virginia State Historic Preservation Office (WV SHPO) and other interested stakeholders.

3.0 PRE-FILING CONSULTATION SUMMARY

3.1 STAKEHOLDER CONSULTATION

FEDERAL AGENCIES:

1. Advisory Council on Historic Preservation – Eastern Office of Project Review
2. Bureau of Land Management
3. Environmental Protection Agency, Division 3
4. Federal Emergency Management Agency
5. Federal Energy Regulatory Commission
6. NOAA Fisheries
7. U.S. Army Corps of Engineers
8. U.S. Bureau of Indian Affairs
9. U.S. Coast Guard, Eighth District
10. U.S. Department of Agriculture-U.S. Forest Service
11. U.S. Department of Energy
12. U.S. Department of the Interior – U.S. Fish & Wildlife Service
13. U.S. Department of the Interior – U.S. National Park Service
14. U.S. House of Representatives
15. U.S. Senate

STATE AGENCIES:

1. Intergovernmental Review Community and Industrial Development
2. Pennsylvania Department of Environmental Protection
3. Pennsylvania Fish & Boat Commission
4. State of West Virginia Geological & Economic Survey
5. WV Department of Commerce, Division of Energy
6. WV Department of Commerce, Division of Natural Resources
7. WV Department of Culture and History, Historic Preservation Unit
8. WV Department of Environmental Protection
9. WV Department of Natural Resources - Division of State Parks and Forest
10. WV Department of Natural Resources, Division of Natural Resources
11. WV Public Service Commission
12. WV State Historic Preservation Office

LOCAL GOVERNMENTS:

1. City of Charleston
2. City of Dunbar
3. City of Hurricane
4. City of Marmet
5. City of Nitro
6. City of South Charleston
7. City of St. Albans
8. Fayette County
9. Putnam County
10. Town of Handley
11. Town of Winfield

NON-GOVERNMENTAL ORGANIZATIONS:

1. American Rivers
2. Appalachian Mountain Club
3. Appalachian Trail Conservancy
4. Ducks Unlimited
5. Endangered Species Coalition
6. Hydropower Reform Coalition
7. Izaak Walton League of America
8. National Parks Conservation Association
9. National Wildlife Federation
10. River Conservancy
11. Sierra Club
12. The Conservation Foundation
13. The Nature Conservancy
14. West Virginia Rivers Coalition
15. Wildlife Habitat Council

The Notice of Intent (NOI) and the Pre-Application Document (PAD) for the London/Marmet and Winfield Projects was issued to stakeholders and filed with the FERC by Appalachian on August 14, 2008. Subsequently, the FERC issued the Scoping Document 1 (SD1) on October

14, 2008 and held public scoping meetings on November 12, 2008. A site visit to the Projects' facilities was also held on November 12, 2008. Based on the results of these meetings, the FERC determined that preparation of a Scoping Document 2 was not warranted, as comments received during the comment period and the scoping meetings raised no new issues. More information on key relicensing milestones is summarized in the following timeline. Included below are dates for the development and filing of draft and revised study plans, the issuance of study reports, and the associated workgroup meetings.

2008

8/14/2008	Appalachian files NOI and PAD with the FERC and issues notice to the public
10/14/2008	FERC issues SD1
11/12/2008	Public Scoping Meetings and Site Visit

2009

1/23/2009	Appalachian Issues Proposed Study Plan
6/2/2009	FERC Study Plan Determination
9/30/2009	Study Kick-off Meeting

2010

5/26/2010	Appalachian submits its revised Study Plans
6/28/2010	Appalachian submits Initial Study Report
7/8/2010	Appalachian holds Initial Study Report Meeting
7/23/2010	Appalachian issues Initial Study Report Meeting Summary

2011

6/28/2011	Appalachian issues Updated Study Report
7/13/2011	Appalachian holds Updated Study Report Meeting
7/28/2011	Appalachian issues Updated Study Report Meeting Summary

4.0 ENVIRONMENTAL ANALYSIS

4.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Kanawha River originates at the North Fork and South Fork of the New River in the mountainous northwestern corner of North Carolina (Figure 4-1). After the New River is formed by the confluence of the North and South forks in Ashe County, North Carolina, it flows into Virginia where it is joined by the Little River, and then into West Virginia where it is joined by the Bluestone and Greenbrier rivers. A few miles northwest of Fayetteville, West Virginia, the New River merges with the Gauley River to form the Kanawha River. The Kanawha River is a tributary to the Ohio River, which is in turn a tributary to the Mississippi River. From the origins of the South Fork New River in Watauga County, North Carolina, to the confluence of the Kanawha and Ohio rivers at Point Pleasant, West Virginia, the New/Kanawha River is 450 miles long. The New River enters Virginia 335 miles upstream of the Ohio River and enters West Virginia 188 miles upstream of the Ohio River. In southern West Virginia, the New River is re-regulated by the USACE's Bluestone Dam, near the town of Hinton. Bluestone Dam is the only dedicated flood control project on the entire 450 miles of the New/Kanawha River (Appalachian, 2008).

The drainage basin for the Kanawha River includes portions of West Virginia, Virginia, and North Carolina. Three significant tributaries enter the Kanawha River between the Marmet and Winfield dams: the Elk, Coal, and Pocatalico Rivers. The total drainage areas upstream of the London, Marmet, and Winfield dams are 8,490; 8,816; and 11,813 square miles, respectively. The average daily flow at the London, Marmet and Winfield dams estimated by DTA (2005) were 12,432; 12,880; and 17,259 cfs, respectively (Appalachian, 2008).

The Projects are located in the mountainous Appalachian Plateau physiographic province of West Virginia. The area surrounding the Projects generally experiences mild winters and warm humid summers with an average annual temperature of 55°F. Average winter and summer temperatures measure 44°F, and 66°F, respectively. Rainfall amounts within the Project areas average approximately 42 inches and snowfall averages 25 to 40 inches annually (WVExp, 2011).

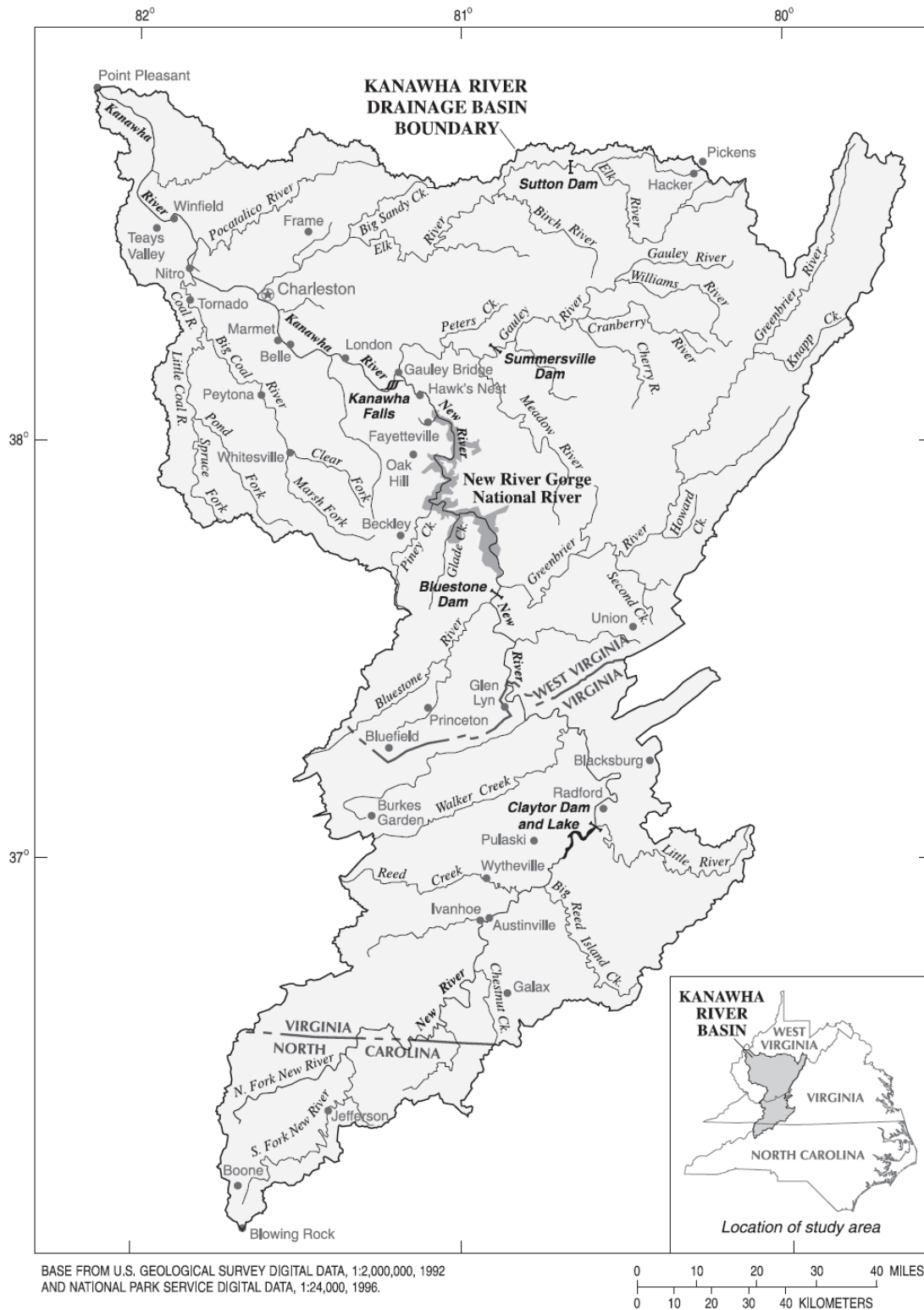


FIGURE 4-1. STREAMS, TOWNS, AND OTHER SELECTED FEATURES OF THE KANAWHA RIVER BASIN. (SOURCE: APPALACHIAN, 2008)

4.2 CUMULATIVE EFFECTS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR Section 1508.7), a cumulative effect is an impact on the environment resulting from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities. As identified within SD1, resources that could be cumulatively affected by the proposed relicensing of the London/Marmet and Winfield Projects include water and fishery resources.

4.2.1 GEOGRAPHIC SCOPE

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effect on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

As identified within SD1, the geographic scope for water resources would be the Kanawha River from the Project boundary of the London/Marmet Project, downstream to stream reaches affected by operational flow releases associated with the Winfield Project.

For fishery resources, SD1 identifies the geographic scope as encompassing the Kanawha River from the upstream end of the London Development boundary, and extending downstream to river reaches affected by releases from waters below the Winfield Development.

4.2.2 TEMPORAL SCOPE

The temporal scope of the cumulative effects analysis includes a discussion of past, present, and future actions and their respective effects on each resource that could be cumulatively affected. Based on the potential term of any new licenses issued for the Projects, the temporal scope will look 30-50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion will be limited, by necessity, to the amount of available information for each resource.

4.3 PROPOSED ACTION AND ACTION ALTERNATIVES

4.3.1 GEOLOGY AND SOILS

4.3.1.1 AFFECTED ENVIRONMENT

TOPOGRAPHY

LONDON/MARMET AND WINFIELD PROJECTS

The landscape of the area is one of rugged hills and mountains with deep valleys cut by rivers and streams flowing into the Kanawha River Valley. Tops of hills and mountains are composed of more resistant sedimentary rocks, while the slopes and valleys are the result of weathering and erosion of less resistant geological structures.

GEOLOGY

LONDON/MARMET AND WINFIELD PROJECTS

Based on Natural Resources Conservation Service (NRCS) soil survey data for Fayette, Kanawha, and Putnam counties (NRCS, 2008a; 2008b) and the 1981 license applications (KVPC, 1981a; 1981b), the sedimentary bedrock of West Virginia is lying on a crystalline basement of Precambrian rocks, 10,000 to 30,000 feet deep. The upper sedimentary layers of the region, having undergone little deformation since deposition, present the picture of an almost level plateau that has been eroded to leave the current severe hill and valley topography. Hilltops in the local area are approximately the same height, representing the original plateau. The eastern part of the Kanawha Valley is very mountainous with steep slopes. However, the western portion becomes less mountainous with more gentle slopes and broader valleys.

The local rock is of the coal-forming Pennsylvania System and represents predominantly non-marine sedimentation, although a few beds are of marine origin. The rocks themselves are sandstones, siltstones, fine micaceous sandstone, and shales. Extensive layers of bituminous coal are found throughout the region. There is little seismological activity in the area, although a large fault zone crosses the area.

SOILS

LONDON/MARMET AND WINFIELD PROJECTS

Based on NRCS soil data for Fayette, Kanawha, and Putnam counties (NRCS, 2008a; 2008b) and the 1981 license applications (KVPC, 1981a; 1981b), the soils in the area are generally shallow but well-drained on ridge tops and on hillsides. Soils may be moderately deep in the floodplains, but are normally wet and consist of clay. Two major soil associations--Gilpin-Upshur-Vandalia and Clymer-Dekalb--predominate, and together they cover approximately 80 percent of the general Project areas. The Urban land-Kanawha complex accounts for most of the soils adjacent to the Kanawha River (NRCS, 2008a). The Kanawha soils are nearly level and gently sloping. They are well drained and are on high flood plains and terraces. The Kanawha soils are formed from alluvial material washed from lime-influenced and acid soils on uplands. Urban land is land covered by streets, parking lots, buildings, and other urban structures. Given the extensive development along the Kanawha River Valley, much of the land immediately adjacent to the river is classified as urban land and sub-classified by the associated soil types of the area, such as Kanawha soils. The erosion hazard of these soils is slight or moderate.

4.3.1.2 ENVIRONMENTAL EFFECTS

PROPOSED ACTION

LONDON/MARMET AND WINFIELD PROJECTS

Appalachian has not proposed any changes to the Marmet or Winfield Developments; therefore no environmental effects are anticipated for the geologic or soil resources of these Developments. As part of the proposed action, Appalachian proposes to reduce the allowable fluctuation of the London pool to less than the currently allowed three feet. Subsequently, if there are in fact any existing effects on geologic and soil resources in the London Project area, they may be ameliorated by these proposed changes.

NO ACTION ALTERNATIVE

LONDON/MARMET AND WINFIELD PROJECTS

Under the no active alternative the London/Marmet and Winfield Projects would continue to operate under the same conditions their existing license allows. The London Development would continue to have an allowable pool fluctuation of three feet. Such fluctuations expose an increased area to wind and boat driven waves. If such exposure occurred on a regular basis, erosion of shoreline areas could result.

4.3.1.3 UNAVOIDABLE ADVERSE EFFECTS

Appalachian knows of no information suggesting that the Projects or their operations adversely affect any geological or soil resources within the Project boundaries.

4.3.1.4 REFERENCES

US Army Corps of Engineers (Corps). 1993. Kanawha River navigation study, Marmet lock replacement draft feasibility report. U.S. Army Corps of Engineers Huntington District Huntington, WV. August 1993.

Kanawha Valley Power Company (KVPC). 1981a. Application for new license for major project -- existing dam. London/Marmet Project, FERC Project No. 1175. KVPA, Charleston, WV, January 1981.

Kanawha Valley Power Company (KVPC). . 1981b. Application for new license for major project -- existing dam. Winfield Project, FERC Project No. 1290. KVPA, Charleston, WV, January 1981.

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 2008a. Soil Data Mart web page, Putnam Soil Survey. Soildatamart.nrcs.usda.gov/Manuscripts/WV079/0/Putnam.pdf, accessed on March 31, 2008. Natural Resources Conservation Service.

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). . 2008b. Web Soil Survey web page. Websoilsurvey.nrcs.usda.gov/appl/WebSoilSurvey, accessed on March 31, 2008. Natural Resources Conservation Service.

4.3.2 WATER RESOURCES

4.3.2.1 AFFECTED ENVIRONMENT

WATER QUANTITY

The New River is 750 miles long and originates in North Carolina, flowing north through Virginia and into West Virginia (see Figure 4-2). At the confluence of the Gauley River and the New River, the name of the main channel changes to the Kanawha River. The Kanawha River flows northwest and drains into the Ohio River at Point Pleasant, West Virginia. Major tributaries are the Bluestone River, Greenbrier River, Elk River, and Coal River. The two Projects consist of a series of three dams with combined navigational lock and hydroelectric facilities on the Kanawha River.

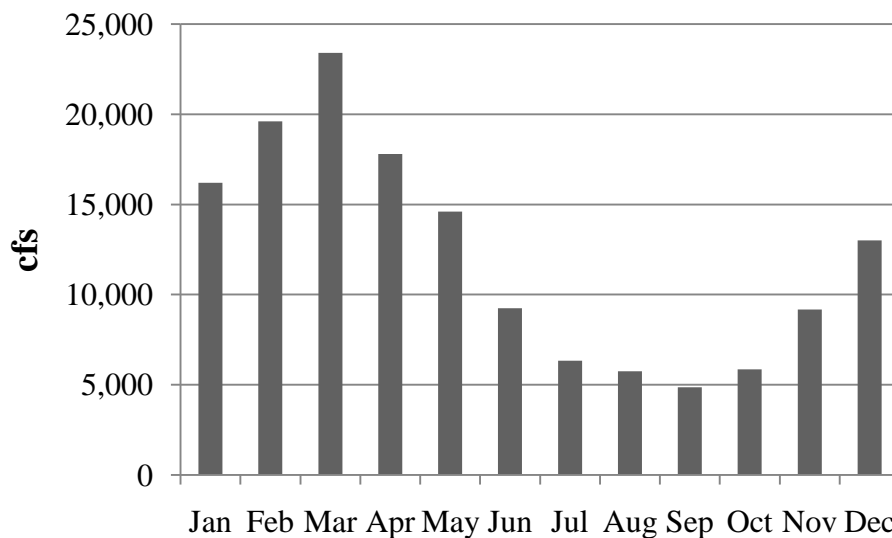


FIGURE 4-2. MEAN MONTHLY FLOWS AT KANAWHA FALLS (DATA FROM 10/1938 TO 9/2010).

The Projects' inflows have been measured since 1877 at the USGS gauge at Kanawha Falls (No. 131930000), 12 miles upstream from the London Development. The mean monthly flows range from 4,870 cfs in September to 23,400 cfs in March (Figure 4-2). From 1939 to 2010, the average annual flow is 12,114 cfs. Three significant tributaries enter the Kanawha River between the Marmet and Winfield dams: the Elk, Coal, and Pocatalico Rivers. WVDEP (2006) lists 12 facilities on the Kanawha River that divert a total of 99 cfs and discharge a total of 38 cfs to the Kanawha River. During average

low flow conditions in September, this net loss from water usage represents 1.25 percent of the total flow.

LONDON/MARMET PROJECT

LONDON DEVELOPMENT

The London Development is located at river mile 82.8 near Handley, West Virginia, in Fayette and Kanawha counties. The total drainage area of the London Dam is 8,490 square miles with an estimated average daily flow of 12,432 cfs (DTA, 2005). The London reservoir extends from the dam upstream approximately 9.4 miles, near the base of Kanawha Falls. The reservoir has a surface area of 910 acres at the normal full pool elevation of 614.0 ft NGVD and approximately 21 miles of shoreline (including backwater into tributaries, excluding islands). The storage capacity of the reservoir is estimated to be 19,000 acre-feet. Due to barge traffic on the river, the USACE maintains a navigational channel at least 9 feet deep through the reservoir from the dam upstream to the limit of navigability at river mile 90.57 (Corps, 2008a).

MARMET DEVELOPMENT

The Marmet Development is located at river mile 67.7 in Marmet, West Virginia, in Kanawha County. The total drainage area of the Marmet Dam is 8,816 square miles with an estimated average daily flow (DTA, 2005) of 12,880 cfs. The Marmet reservoir extends from the dam upstream approximately 15.2 miles, to the base of London Dam. The reservoir has a surface area of 1,420 acres at the normal full pool elevation of 590.0 ft NGVD and approximately 36 miles of shoreline (including backwater into tributaries, excluding islands). The storage capacity of the reservoir is estimated to be 12,000 acre-feet. Due to barge traffic on the river, the USACE maintains a navigational channel at least 9 feet deep through the reservoir (Corps, 2008b).

WINFIELD PROJECT

The Winfield Development is located at river mile 31.1 in Winfield, West Virginia, in Kanawha and Putnam counties. The total drainage area of the London Dam is 11,813 square miles with an estimated average daily flow (DTA, 2005) of 17,259 cfs. The

Winfield reservoir extends from the dam upstream approximately 35.7 miles, to the base of Marmet Dam. The reservoir has a surface area of 3,738 acres at the normal full pool elevation of 566.0 ft NGVD and approximately 139 miles of shoreline (including backwater into tributaries, excluding islands). The storage capacity of the reservoir is estimated to be 59,600 acre-feet. Due to barge traffic on the river, the USACE maintains a navigational channel at least 9 feet deep through the reservoir.

WATER QUALITY

Water quality in rivers in the coal region of the Appalachian Plateaus Physiographic Province generally improved between about 1980 and 1998 with respect to pH, total iron, total manganese, and sedimentation (Paybins *et al.*, 2000). These improvements were among the regulatory goals of the Surface Mining Control and Reclamation Act of 1977. In addition, the generally low population and low intensity of agriculture and urban land uses throughout the Kanawha–New River Basin are reflected in low concentrations of nutrients and pesticides in the streams and rivers.

The only major industrial area in the basin is along the terrace of the Kanawha River, within about 20 miles of Charleston. Industrial practices that polluted the Kanawha River during the 1950s and 1960s have changed, thus reducing pollutant discharges into the river. However bed sediment and fish remain contaminated with dioxin and other industrial chemicals. In addition, numerous volatile organic compounds have routinely been detected at low concentrations in the Kanawha River downstream from the Charleston metropolitan area (Paybins *et al.*, 2000).

The entire Kanawha River mainstem is listed as impaired due to elevated concentrations of Polychlorinated Biphenyls (PCBs) in fish tissue. All areas between the Winfield and Marmet Locks and Dams are listed for mercury impairment and the Lower Kanawha River downstream from the Elk River is listed for dioxin and fecal coliform. Total maximum daily load (TMDL) for dioxin was completed in 2000 for the Lower Kanawha River; TMDLs for mercury and fecal coliform are projected to be completed by 2015, and the TMDL for PCBs is projected to be completed by 2020 (WVDEP, 2006). Table 4-1 summarizes current fish consumption advisories for the

Kanawha River, and Table 4-2 shows applicable water quality standards for dissolved oxygen, water temperature, and other listed parameters.

In May 2011, a Water Quality Study was completed by Normandeau Associates as part of the relicensing process. The objectives of the study were to assemble and review existing water quality data; characterize the dissolved oxygen (DO) and temperature within and downstream of the Projects; collect additional DO and temperature data during low flow/high temperature conditions; identify Project operation impacts on water quality; and describe mitigation measures that enhance DO concentrations, if necessary. The sources of existing water quality data were the USACE, West Virginia Department of Environmental Protection (WVDEP), the Ohio River Valley Water Sanitation Commission, and the USGS. The additional water quality data was collected from June 15 to October 17, 2009. The report documented the following conclusions:

- DO levels throughout the Project have been in compliance with State of West Virginia water quality standards since 1995. The few non-compliant DO levels measured were very sporadic and likely associated with monitoring issues rather than actual environmental conditions.
- Data collected during low flow/high temperature conditions in 2009 exhibited DO levels greater than or equal to 6.2 mg/l within the London/Marmet Project and greater than or equal to 5.6 mg/l within the Winfield Project.
- During the same sampling campaign, there was little vertical or horizontal stratification in temperature, DO, conductivity, or pH measurements.
- The changes in water quality parameters appeared to be unrelated to Project operations. The general trends upstream to downstream were:
 - Temperature increased;
 - DO levels decreased;
 - Specific Conductivity increased; and
 - pH decreased
- The study provided an appropriate characterization of existing water quality and probable Project impacts during low flow/high temperature conditions.
- During high flow conditions, water quality parameters generally improved. Conversely, during low flow conditions, changes mimicking operational flow alterations had little effect on water quality.
- The study provided no evidence that Project operations had an impact on water quality and DO enhancement was deemed unnecessary.

**TABLE 4-1. 2011 FISH CONSUMPTION ADVISORIES FOR THE KANAWHA RIVER.
(WVDHHR, 2011)**

LOCATION	SPECIES	LIMIT	CONTAMINANTS
Kanawha River downstream of I-64 bridge in Dunbar including: all backwaters, Armour Creek, Heizer Creek, Manila Creek, and Pocatalico River	Flathead catfish, all sizes; channel catfish, all sizes; carp; hybrid striped bass; suckers	Do not eat	Dioxin, mercury, PCBs
	All other species	1 meal per month	
Kanawha River upstream of I-64 bridge in Dunbar	Channel catfish less than 17 inches	2 meals per month	PCBs, mercury

TABLE 4-2. SELECTED WATER QUALITY STANDARDS APPLICABLE TO THE MAINSTEM KANAWHA RIVER. VALUES SHOWN ARE MAXIMUM LIMITS WITH THE EXCEPTION OF DISSOLVED OXYGEN. (WVDEP, 2008)

PARAMETER	USE DESIGNATION				
	AQUATIC LIFE (WARMWATER AND WETLANDS)		HUMAN HEALTH		ALL OTHER USES
	ACUTE	CHRONIC	WATER SUPPLY	CONTACT RECREATION	
Dissolved oxygen (mg/l)	≥5.0		≥5.0	≥5.0	≥5.0
Dissolved oxygen, Kanawha River RM 0 to RM 72 (mg/l)	≥4.0				
Fecal coliform (number per 100 ml)					
a. Monthly geometric mean of ≥ 5 samples			a. 200	a. 200	
b. Percent of samples exceeding 400			b. 10	b. 10	
Mercury, total organism body burden of methylmercury for any aquatic species (ug/g)			0.5	0.5	
Total mercury in any unfiltered water sample (ug/l)	2.4		0.14	0.15	
Methylmercury in water column (ug/l)		.012			
PCB (ng/l)		14.0	0.044	0.045	0.045
Dioxin (2,3,7,8-TCDD)(pg/l)			0.013	0.014	0.014
Temperature, Kanawha River mainstem (°F)					
a. rise above natural temperature	a. 5				
b. maximum	b. 90				

4.3.2.2 ENVIRONMENTAL EFFECTS

EFFECTS OF THE PROPOSED PROJECT OPERATION ON WATER QUALITY AND QUANTITY

There is some concern from stakeholders that passage of water through the Projects' turbines may provide less aeration than water passed over the USACE's dam spillways. However, results from the Water Quality Study indicate that there is no evidence that operation of the Projects has any impact on water quality. Furthermore, as Appalachian is proposing to operate the London Development in run-of-release mode, there should be no adverse impacts to water quantity as a result of the proposed action.

PROPOSED ACTION

Appalachian Power is applying for new licenses to continue operation and maintenance of the London/Marmet and Winfield Hydroelectric Projects. The Projects coordinate with the USACE's navigational locks to determine the extent of hydropower operations. Each Development has a hydraulic capacity of approximately 10,000 cfs. When the river flow is less than 10,000 cfs, Appalachian operates based on the allowable limits for navigation. When the river flow is greater than 10,000 cfs, the USACE assumes control of reservoir elevations. Through this licensing process, Appalachian is proposing changes in operation at the London Development. Within the existing license, the maximum drawdown rate of the London pool is 0.5 feet per hour to a maximum drawdown of 3.0 feet. Appalachian is proposing to operate the facility in run-of-release mode in coordination with the USACE.

NO-ACTION ALTERNATIVE

Under the no-action alternative, the two Projects would continue to operate based on the current Project licenses. No implementation of new environmental PME would occur. However, effects on water quality due to continued operation of the Projects would not be expected and compliance with the state standards would continue to be achieved.

4.3.2.3 UNAVOIDABLE ADVERSE EFFECTS

Based on the water quality report completed as part of this relicensing effort, operation of the two Projects has no measurable impact on the water quality of the Kanawha River. The general upstream to downstream trends measured and reviewed in the Water Quality Study were likely related to tributary and wastewater discharge influences and not Project operations. The DO concentration immediately upstream from the facilities had essentially the same concentration as immediately downstream of the facilities suggesting that the operations have no impact on DO levels. There was no evidence of water quality impact from fluctuations in water level from facility operations.

4.3.2.4 CUMULATIVE EFFECTS

A cumulative effect is an impact on the environment resulting from the incremental impacts of the action with other past, present, and future actions, regardless of the entity undertaking the other actions (NEPA 40 CFR Section 1508.7). Taken individually, each action may have an insignificant impact, but taken as a collective, the impacts of the actions can have a significant effect on the environment.

WATER QUALITY

The SD1 issued for the Projects indicates water resources as potentially being a cumulatively affected resource. However, none of the Developments have a measurable impact on the water quality of the Kanawha River. This is further ensured through the National Pollutant Discharge Elimination System (NPDES) permits applicable to each of the Developments. NPDES permits are authorized under the Clean Water Act and regulate the discharge of pollutants into surface waters. The WVDEP monitors the facilities to ensure that permit limits are not exceeded. Subsequently, as Appalachian is currently operating the Developments to uphold the requirements of their respective NPDES permits, measurable cumulative impacts to water quality relating to the Projects' operations are not anticipated.

There are legacy contaminants in the fish and sediments that have contributed to consumption advisories; however, the operation of the hydropower facilities has no

discernible impact on the legacy contamination. Recently, the river has received less pollution from the watershed than during previous more industrial eras. As such, the water quality has improved in the recent decades. Assuming this trend continues, no cumulative effects from Project operations are anticipated.

WATER QUANTITY

None of the Developments have a consumptive use of water. The hydropower facility operations are already controlled by the navigational locks. Therefore, no cumulative water quantity effects are anticipated for these Projects.

4.3.2.5 REFERENCES

- U.S. Army Corps of Engineers (Corps). 2008a. London Locks and Dam
<http://corpslakes.usace.army.mil/visitors/projects.cfm?Id=H100786>, accessed on August 5, 2011. U.S. Army Corps of Engineers.
- U.S. Army Corps of Engineers (Corps). . 2008b. Marmet Locks and Dam
<http://corpslakes.usace.mil/visitors/projects.cfm?Id=H100785>, accessed on August 5, 2011. U.S. Army Corps of Engineers.
- U.S. Army Corps of Engineers (Corps). . 2008c. Winfield Locks and Dam
<http://corpslakes.usace.army.mil/visitors/projects.cfm?Id=H100784>, accessed on August 5, 2011. U.S. Army Corps of Engineers.
- Devine, Tarbell & Associates (DTA). 2005. Kanawha River System; London, Marmet and Winfield upgrade study. Prepared for American Electric Power. May 2005.
- Paybins, K.S., Messinger, T., Eychaner, J.H., Chambers, D.B., and Kozar, M.D. 2000. *Water Quality in the Kanawha–New River Basin West Virginia, Virginia, and North Carolina, 1996–98*: U.S. Geological Survey Circular 1204, 32 pp.;
<http://pubs.water.usgs.gov/circ1204>, accessed on August 7, 2011.
- West Virginia Department of Environmental Protection (WVDEP). 2006. Implementation of the Water Resources Protection Act, West Virginia Code, Article 22-26, Final Report. Submitted to the Joint Committee on Government and Finance West Virginia Legislature December 29, 2006.
- West Virginia Department of Environmental Protection (WVDEP). . 2011. Ambient sampling data website: <http://apps.dep.wv.gov/dwwm/wqdataac/>, accessed on August 5, 2011.

West Virginia Department of Health and Human Resources (WVDHHR). 2011. WV Fish Consumption Advisories website. <http://www.wvdhhr.org/fish/current.asp>, accessed on August 8, 2011.

4.3.3 FISH AND AQUATIC RESOURCES

4.3.3.1 AFFECTED ENVIRONMENT

FISHERY HABITAT

LONDON/MARMET AND WINFIELD PROJECTS

The Kanawha River in the vicinity of the London, Marmet, and Winfield Developments is located in an industrial/urban setting and is classified as a large river. As evidenced by the presence of the locks, the river serves as a means of commercial navigation. The impoundments created by the London, Marmet, and Winfield Dams provide a homogeneous, low value habitat type that is relatively abundant in the Kanawha River. These reservoirs are not considered high quality habitat; however littoral zones bordering the navigational channels do provide some type of quality habitat for the aquatic resources found within each impoundment (Corps, 1993).

Each impoundment differs in size and acreage. The London impoundment extends upstream for 9.4 miles and has a total surface area of 910 acres at full pond with approximately 21 miles of shoreline, excluding any islands. The Marmet impoundment extends upstream 15.2 miles to the base of the London Dam. The total surface area of this reservoir is 1,420 acres and it has 36 miles of shoreline, excluding any islands. The Winfield impoundment extends upstream 35.7 miles to the base of the Marmet dam and is the largest of the three impoundments. The reservoir has a surface area of 3,738 acres and 139 miles of shoreline, excluding the islands.

The Projects' tailwaters provide for a dynamic and productive fishery below the dams consisting of coarse substrate, swift currents, and relatively shallow depths. The tailwaters represent a valuable remnant of pre-impoundment conditions.

As discussed within *Water Resources*, the entire Kanawha River mainstem is listed as impaired due to elevated concentrations of PCBs in fish tissue. All areas between the

Winfield and Marmet Locks and Dams are listed for mercury impairment and the Lower Kanawha River downstream from the Elk River is listed for dioxin and fecal coliform. Fish consumption advisories are in effect for the entire Kanawha River.

FISH COMMUNITIES

LONDON/MARMET AND WINFIELD PROJECT

In the vicinity of the London, Marmet and Winfield Developments, the fishery is dominated by redhorse, hogsucker, gizzard shad, bluegill, longnose gar, white bass, and channel catfish (Corps, 1993). Creel survey data collected in 1987 in the Marmet and Winfield tailwaters indicate that channel catfish, white bass, freshwater drum, and crappie comprised 73 percent of all fish caught during the 7-month survey period (Leckie, 1987). Creel survey data collected by Kleinschmidt in 2010 suggest that freshwater drum, hybrid striped bass, catfish, and smallmouth bass were the top species caught and released (KA, 2011). Sampling conducted in the Marmet pool in 2002 and 2003 resulted in the collection of 35 species of fish, dominated by Catostomids, Cyprinids and Centrarchids (AEP, 2004). A fish impingement study conducted in the Marmet pool at American Electric Power's (AEP) Kanawha Generating Station (approximately 10.5 miles upstream from the Marmet Development in Glasgow, WV) from October 2005 to December 2006 documented the presences of 28 fish species, dominated by bluegill and gizzard shad which comprised 81 percent of all fish caught during the 1-year long survey (EA, 2007).

In recent years, West Virginia Division of Natural Resources (WVDNR) has initiated programs to restore populations of paddlefish and lake sturgeon to the Kanawha River, and has begun stocking a river-adapted strain of walleye from the New River.

WVDNR records indicate that in one or more years between 2003 and 2007 the agency also stocked sauger in London reservoir; blue catfish, largemouth bass, muskellunge, paddlefish, sauger, shovelnose sturgeon, and walleye in the Winfield reservoir (letter from K. Bledsoe, Fishery Biologist, WVDNR, Charleston, WV, to Teresa Rogers, Appalachian, Roanoke, VA dated June 30, 2008).

The compilation of the efforts described above have resulted in documenting 49 fish species representing 15 families in the vicinity of the London, Marmet, and Winfield Developments. A list of these species is provided in Table 4-3.

FRESHWATER MUSSEL COMMUNITY

Freshwater water mussel surveys were conducted in 2002 between RM 77.8 and 78.7 and yielded a total of 29 live or freshly dead mussels and 10 relic/sub-fossils representing 18 native mussel species. Four of the 18 species, including the federally listed pink mucket, were collected as relic/sub-fossil specimens only. Nine of the collected species are listed as threaten or endangered by the state of West Virginia.

Two exotic species, the Asian clam and the zebra mussel, were also present.

A second mussel survey was conducted in 2005 in the Winfield pool between river miles 38 and 39, which yielded 16 live unionist and 2 freshly dead shells representing three different species: the mapleleaf, pink heelsplitter, and the white heelsplitter (EnvironScience, 2006).

TABLE 4-3. LIST OF FISH SPECIES DOCUMENTED IN THE VICINITY OF THE LONDON/MARMET AND WINFIELD HYDROELECTRIC PROJECTS

FAMILY (GENUS SPECIES)	SPECIES (COMMON NAME)
<i>Petromyzontidae</i>	
<i>Ichthyomyzon bdellium</i>	Ohio Lamprey
<i>Acipenseridae</i>	
<i>Scaphirhynchus albus</i>	Shovelnose Sturgeon
<i>Polyodontidae</i>	
<i>Polyodon spathula</i>	Paddlefish
<i>Lepisosteidae</i>	
<i>Lepisosteus osseus</i>	Longnose Gar
<i>Hiodontidae</i>	
<i>Hiodon tergisus</i>	Mooneye
<i>Clupeidae</i>	
<i>Alosa chrysochloris</i>	Skipjack Herring
<i>Dorosoma cepedianum</i>	Gizzard shad
<i>Cyprinidae</i>	
<i>Cyprinella spiloptera</i>	Spotfin shiner
<i>Cyprinus carpio</i>	Common carp
<i>Erimystax dissimilis</i>	Streamline Chub
<i>Hybopsis amblops</i>	Bigeye Chub
<i>Notropis atherinoides</i>	Emerald shiner
<i>Notropis hudsonius</i>	Spottail Shiner
<i>Notropis rubellus</i>	Rosyface Shiner
<i>Notropis volucellus</i>	Mimic shiner
<i>Notropis wickliffi</i>	Channel Shiner
<i>Pimephales notatus</i>	Bluntnose minnow
<i>Catostomidae</i>	
<i>Carpionodes carpio</i>	River Carpsucker
<i>Carpionodes cyprinus</i>	Quillback
<i>Carpionodes velifer</i>	Highfin Carpsucker
<i>Ictiobus bubalus</i>	Smallmouth Buffalo
<i>Ictiobus niger</i>	Black Buffalo
<i>Moxostoma anisurum</i>	Silver Redhorse
<i>Moxostoma carinatum</i>	River Redhorse
<i>Moxostoma duquesnei</i>	Black Redhorse
<i>Moxostoma erythrurum</i>	Golden redhorse
<i>Moxostoma macrolepidotum</i>	Shorthead Redhorse
<i>Ictaluridae</i>	
<i>Ictalurus furcatus</i>	Blue Catfish
<i>Ictalurus punctatus</i>	Channel Catfish
<i>Pylodictis olivaris</i>	Flathead Catfish
<i>Atherinidae</i>	
<i>Labidesthes sicculus</i>	Brook Silverside

FAMILY (GENUS SPECIES)	SPECIES (COMMON NAME)
<i>Esocidae</i>	
<i>Esox masquinongy</i>	Muskellunge
<i>Percichthyidae</i>	
<i>Morone chrysops</i>	White Bass
<i>Morone saxatilis x Morone chrysops</i>	Hybrid Striped Bass
<i>Centrarchidae</i>	
<i>Ambloplites rupestris</i>	Rock Bass
<i>Lepomis cyanellus</i>	Green Sunfish
<i>Lepomis macrochirus</i>	Bluegill
<i>Lepomis megalotis</i>	Longear Sunfish
<i>Micropterus dolomieu</i>	Smallmouth Bass
<i>Micropterus punctulatus</i>	Spotted Bass
<i>Micropterus salmoides</i>	Largemouth Bass
<i>Pomoxis annularis</i>	White Crappie
<i>Percidae</i>	
<i>Percina caprodes</i>	Logperch
<i>Percina copelandi</i>	Channel Darter
<i>Percina maculata</i>	Blackside Darter
<i>Sander canadensis</i>	Sauger
<i>Sander vitreus</i>	Walleye
<i>Sander vitreus x Sander canadense</i>	Saugeye
<i>Sciaenidae</i>	
<i>Aplodinotus grunniens</i>	Freshwater Drum

TABLE 4-4. MUSSEL SPECIES COLLECTED IN THE KANAWHA RIVER DURING SURVEYS CONDUCTED BETWEEN RM 77.8 AND 78.7. (SOURCE: ENVIROSCIENCE, 2002)

NO.	SCIENTIFIC NAME	COMMON NAME	CONDITION	WEST VIRGINIA STATE STATUS ^a	FEDERAL STATUS
1	<i>Actinonaias ligamentina</i> (Lamarck, 1819)	mucket	Live	S3	Unlisted
2	<i>Amblema plicata</i> (Say, 1817)	threeridge	Live	S3	Unlisted
3	<i>Cumberlandia monodonta</i> (Say, 1929) ^b	spectaclecase	Live	S1	Species of Concern
4	<i>Elliption crassidens</i> (Lamarck, 1819)	elephantear	Relic	S2	Unlisted
5	<i>Fusconaia subrotunda</i> (I. Lea, 1831)	longsolid	Relic/Sub-Fossil	S3	Unlisted
6	<i>Lampsilis abrupta</i> (Say, 1817)	pink mucket	Relic/Sub-Fossil	S1	Endangered
7	<i>Lampsilis cardium</i> (Say, 1817)	plain pocketbook	Live	S2	Unlisted
8	<i>Lamigona costata</i> (Rafinesque, 1820)	fluted shell	Live	S3	Unlisted
9	<i>Laptodea fragilis</i> (Rafinesque, 1820)	fragile papershell	Live	S2	Unlisted
10	<i>Ligumia recta</i> (Lamarck, 1819)	black sandshell	Live	S2	Unlisted
11	<i>Pleurobema sintoxia</i> (Rafinesques, 1820)	round pigtoe	Live	S2	Unlisted
12	<i>Obliquaria reflexa</i> (Rafinesque, 1820)	threehorn wartyback	Live	S3	Unlisted
13	<i>Potamilus alatus</i> (Say, 1817)	pink heelsplitter	Live	S3	Unlisted
14	<i>Ptychobranchus fasciolaris</i> (Rafinesque, 1820)	kidneyshell	Fresh Dead	S3	Unlisted
15	<i>Pyganodon grandis</i> (Say, 1817)	giant floater	Fresh Dead	S3	Unlisted
16	<i>Quadrula p.</i> (I. Lea, 1831)	pimpleback	Live	S3	Unlisted
17	<i>Quadrula quadrula</i> (Rafinesque, 1820)	mapleleaf	Live	S2	Unlisted
18	<i>Villosa iris</i> (I. Lea, 1829)	rainbow	Relic	S2	Unlisted

Notes: Nomenclature follows Turgeon et al., 1998

^a A description of West Virginia's species ranking system can be viewed at <http://www.dnr.state.wv.us/wwwildlife/introduction.pdf>. In general, the rankings are as follows: S1 – extremely rare and imperiled; S2 – very rare and imperiled; S3 – somewhat vulnerable to extirpation; S4 – common and secure; S5 – very common and secure.

^b The spectaclecasae is in the family Margaritiferidqe. All other members are members of the family Unionaidae.

4.3.3.2 ENVIRONMENTAL EFFECTS

EFFECTS OF CURRENT PROJECT OPERATION ON FISH MOVEMENT AND PASSAGE SURVIVAL AT ALL THREE DEVELOPMENTS

Fluctuating water levels, allowed under the current license, in the London, Marmet, and Winfield reservoirs is 3.0 feet, 0.3 feet, and 0.2 feet, respectively while the rate at which the reservoirs can be lowered is limited to a maximum of 0.5 feet per hour. Under current license conditions, changes in reservoir levels may cause some minor adverse effects on shoreline-spawning fish species and on littoral habitat at certain times of the year. Entrainment of fish into the turbines at each of the Developments may cause some mortality to fish due to mechanical injuries caused during turbine passage.

A Desktop Fish Entrainment Study was conducted and the total number of fish estimated to be entrained at the London and Marmet Developments during a dry and wet year was 3,709,962 and 5,450,463 fish, respectively. Estimated entrainment at the Winfield Development during a dry and wet year was 4,285,646 and 5,937,335 fish, respectively.

Turbine survival was also estimated for all three Projects. Turbine survival was high for all Projects and ranged from 96.5 percent to 98.5 percent for fish > 8 inches, 89.1 percent to 96.3 percent for fish between 8 and 15 inches, and 84.4 percent to 91.7 percent for fish larger than 15 inches. The results suggest that fish entrained into the London, Marmet, and Winfield units have a low probability of blade strike and that survival is quite high for most small and medium size fish likely to be entrained.

PROPOSED ACTION

Appalachian is not proposing any changes in the way the Marmet or Winfield Developments are operated, and no adverse effects are expected within the aquatic community in either the reservoir or the tailrace. Appalachian proposes to continue operations as required in the current license for these Developments. However, through this licensing process, Appalachian is proposing changes in operation at the London Development from peaking to run-of-release in coordination with the USACE. As

discussed above, changes in reservoir levels may cause some minor adverse effects on shoreline spawning fish species and on littoral habitat at certain times of the year. Run-of-release operations would limit reservoir fluctuations to less than the currently allowed 3.0 feet and may in fact ameliorate any minor adverse effects to spawning species and littoral habitat occurring under the current license conditions.

Under the proposed action, entrainment and entrainment mortality would continue to occur at some level. The magnitude of entrainment in a given year would likely be strongly influenced by environmental conditions such as river flow and other factors that influence spawning success and ultimately year-class strength. While all species are potentially subject to entrainment, the vast majority of entrainment and entrainment mortality is expected to consist of gizzard shad. This species is a very prolific forage species that is not anticipated to be affected by entrainment. Further, the majority of the entrainment estimate consists of small fish (< 8 inches) and primarily young –of-the-year. Natural populations are structured such that losses of fish in this age group likely don't affect the fish community. Effects would only be expected if losses were of a magnitude that hindered recruitment to the older lifestages. There is no evidence that such losses occur at the London, Marmet, or Winfield Developments.

NO-ACTION ALTERNATIVE

Under a no-action alternative the Marmet, and Winfield Development would continue to operate under the same conditions those described in their current licenses. The London Development would continue to operate with the allowable 3.0-foot pool level fluctuation. Fluctuations of this magnitude, depending on the frequency and timing could affect littoral zone habitat. As such, species that rely on this habitat type especially for spawning and rearing purposes could be affected.

Effects on entrainment and entrainment mortality under the no-action alternative would be the same as the proposed action described above.

4.3.3.3 UNAVOIDABLE ADVERSE EFFECTS

Entrainment and turbine mortality will continue to occur at the Projects. The number and type of organisms that could be affected will be largely dependent on environmental conditions. Some littoral zone habitat will be affected during generation times when the pools are minimally lowered but because suitable habitat is limited, it is unlikely that the effects are measureable. Further, the water level fluctuations are largely dictated by the USACE to aid in commercial navigation rather than Project operations.

4.3.3.4 CUMULATIVE EFFECTS

EFFECTS OF CURRENT PROJECT OPERATION ON FISH MOVEMENT AND PASSAGE SURVIVAL AT ALL THREE DEVELOPMENTS

The effects of fish passage survival are described under the proposed action. Upstream fish passage is not present at the three Developments. It is likely that resident species are passed upstream through the lock system; however diadromous fish species that require passage are not present.

4.3.3.5 REFERENCES

- American Electric Power (AEP). 2004 report on Biological studies supporting continuation of the CWA Section 316(a) thermal discharge variance at Appalachian Power Company's Kanawha River Plant (WV/NPDES Permit No. WV0001066). 65pp. plus appendices.
- U.S. Army Corps of Engineers (Corps). 1993. Kanawha River navigation study, Marmet lock replacement draft feasibility study
- EA Engineering, Science, and Technology, Inc. (EA). August 2007. Impingement Mortality and Entrainment Characterization Study Report at the Kanawha River Plant, Glasgow, WV.
- EnvironScience, Inc. and Nutting, Inc. 2006. Unionid mussel and habitat survey of the Kanawha River miles 38.0 – 39.0 near American Electric's Amos Power Plan. Prepared for: American electric Power, Columbus, Ohio. 22pp, plus appendices.
- Kleinschmidt Associates (KA) 2011. Recreation Assessment and Angler use Creel Survey Draft Report. Prepared for Appalachian Power Company.
- Leckie, J.D. 1987. A creel survey of Marmet and Winfield dam tailwaters of Kanawha river. West Virginia Division of Natural Resources, Division of Wildlife resources, Charleston, WV. 8pp.

4.3.4 TERRESTRIAL RESOURCES

4.3.4.1 AFFECTED ENVIRONMENT

The Project areas lie within the Central Hardwood Forest region (KVPC, 1981). The land within the Project boundaries of all three Developments is essentially developed industrial land. The Project boundaries include a small portion of the Kanawha River within the forebay and tailrace of each Project. The Projects' transmission lines include additional properties within the Project boundaries that contain some additional low quality, urbanized habitat.

WETLANDS

LONDON/MARMET PROJECT

Other than the identification of the Kanawha River as a riverine resource, there are no wetlands mapped in the National Wetland Inventory (NWI) for the London or Marmet Developments (USFWS, 2007). During the Transmission Line Study, investigators found a pipe that diverts a small spring seep flowing off a slope under the London Development substation to a receiving unmapped wetland on the downhill side of the substation. This wetland is located adjacent to the London Development's primary transmission line. Some dumping of residential waste has occurred in this wetland. No wetlands or streams were found within the Marmet Development Project boundary. The NWI maps also indicate that other wetlands are within a mile of the London and Marmet Developments. However, the lack of wetlands along the Kanawha River is due to the steep river banks, flood control, and rip-rap used for bank stabilization, which is not conducive to wetland habitat development.

WINFIELD PROJECT

The Winfield Project boundary is very limited. The NWI maps for the Project only include the Kanawha River as a riverine resource within the Project boundary. In general, the land within the Winfield Project boundary is primarily industrial in nature and does not support wetlands. Additional wetlands are located within 2 miles of the Winfield Project. These wetlands likely serve as an important stop-over area for migrating birds, with more than 100 documented species of shore birds, wading birds

and songbirds observed at the site (email from B. Sargent, WVDNR Natural Heritage Program, Elkins, WV, to F. Winchell, Louis Berger Group, Needham, MA, April 21, 2008).

AQUATIC BED HABITAT

Aquatic habitat is limited to the tailrace and forebay of each of the Developments. The USACE regulates the reservoirs for navigation and lock and dam operations. As a result, the shorelines within the Project boundaries are rip-rapped with steep slopes. This does not provide opportunities for submerged aquatic vegetation to grow along the shoreline. In addition, the industrial nature of the Kanawha River likely limits the amount of submerged aquatic vegetation within the Project vicinity of each of the Developments.

EXOTIC/INVASIVE BOTANICAL SPECIES

LONDON/MARMET PROJECT

London Development

Kudzu (*Pueraria montana*), tree of heaven (*Ailanthus altissima*), and Japanese stilt grass (*Microstegium vimineum*) grow along the primary transmission line for the London Development. These invasive species are wide spread throughout the river valley. The disturbed, industrial nature of the surrounding landscape has allowed fast growing invasive species to establish.

Marmet Development

Similar to the London Development, the invasive species Japanese honeysuckle (*Lonicera japonica*) was found near the Marmet station where one of the primary transmission lines terminates.

WINFIELD PROJECT

The Winfield Project area is limited primarily by the structures and facilities of the powerhouse, transmission line, and adjacent substation. These areas do not contain

much native or invasive vegetation. The property surrounding the facilities is mowed lawn, surrounded by residential and commercial development. No invasive species were identified at the Project.

WILDLIFE

LONDON/MARMET PROJECT

London Development

Soils within the London Development indicate that much of the Project is within urban developed land. Similarly, the wildlife species would likely be limited to generalist species. The Project's primary transmission line terminates at the London station, located at the edge of the unincorporated town of London. Very little undisturbed habitat can be found at the London station, the primary transmission line, and the London powerhouse.

The undisturbed habitat adjacent to the Project area is mixed mesophytic forest. These types of forests are upland deciduous forests dominated by trees that prefer moist, fertile soils, usually at lower elevations. Tree species that typically dominate this habitat include sugar maple (*Acer saccharinum*), basswood (*Tilia americana*), buckeye (*Aesculus sp.*), white ash (*Fraxinus americana*), tulip poplar (*Liriodendron tulipifera*), umbrella magnolia (*Magnolia tripetala*), slippery elm (*Ulmus rubra*), beech (*Fagus grandifolia*), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), and black birch (*Betula nigra*). This habitat often has a thick understory of herbaceous plants (WVDNR, 2010).

The mesophytic forests are typically home to a diversity of wildlife; however, near the London Development this habitat is fragmented by roads, buildings, and disturbed lands. These edges may occasionally have transient species representative of the forests but would more likely contain species generalists such as raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), and cowbirds (*Molothrus ater*). During a Transmission Line Study conducted as a part of the relicensing process, osprey (*Pandion haliaetus*), turkey vulture (*Cathartes aura*),

and great blue heron (*Area herodias*) were observed along the Kanawha River near the London Development. Cedar waxwing (*Bombycilla cedrorum*), American goldfinch (*Carduelis tristis*), and tree swallows (*Tachycineta bicolor*) were further observed near the tree line of the primary transmission line. The shell of an eastern box turtle (*Terrapene carolina carolina*) was also found near the London Station during field investigations.

Field observation found the habitat within the primary transmission line contains vegetation indicative of disturbance. The primary transmission line initially runs along the south bank of the Kanawha River. This bank is steeply sloped and covered in rip-rap for bank stabilization. At the top of the bank and directly underneath the primary transmission line is an area of mowed grass and clover. A small maintenance road bisects the grass from an early successional forest to the south of the primary transmission line. The wooded area is dominated by 20 to 30 foot tall deciduous trees including tulip poplar, sycamore (*Plantanus occidentalis*), silver maple (*Acer saccharinum*), and white ash. The dominant understory includes daisy fleabane (*Erigeron annuus*), dandelion (*Taraxacum officinale*), Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*) (Table 4-5).

On the north side of the river the primary transmission line extends over a residential area into the wooded slope adjacent to the unincorporated town of London. The substation is located about 200 feet into the wooded area in a small clearing. The dominant vegetation on the north side of the river contains similar trees species as seen on the south side of the river; however, the trees adjacent to the primary transmission line are mostly greater than 70 feet tall.

TABLE 4-5. PLANT SPECIES FOUND WITHIN THE PROJECT BOUNDARY AND ADJACENT TO THE LONDON DEVELOPMENT

COMMON NAME	SCIENTIFIC NAME
American Elderberry	<i>Sambucus nigra</i>
Beggar's Tick	<i>Bidens frondosa</i>
Butterfly Bush	<i>Buddleja sp.</i>
Common Milk Weed	<i>Asclepias syriaca</i>
Common Mullein	<i>Verbascum thapsus</i>
Common Name	<i>Scientific Name</i>
Daisy Fleabane	<i>Erigeron annuus</i>
Dandelion	<i>Taraxacum officinale</i>
Dwarf St. John's wort	<i>Hypericum mutilum</i>
Flowering Dogwood	<i>Cornus florida</i>
Grape sp.	<i>Vitus Sp.</i>
Hercules Club	<i>Zanthoxylum clava-herculis</i>
Japanese Honeysuckle	<i>Lonicera japonica</i>
Japanese Knotweed	<i>Polygonum cuspidatum</i>
Japanese Stiltgrass	<i>Microstegium vimineum</i>
Kentucky Blue Grass	<i>Poa pratensis</i>
Kudzu	<i>Pueraria montana</i>
Multiflora Rose	<i>Rosa multiflora</i>
Northern Catalpa	<i>Catalpa speciosa</i>
Plaintain	<i>Plaintain sp.</i>
Poison Ivy	<i>Toxicodendron radicans</i>
Queen Anne's Lace	<i>Daucus carota</i>
Ragweed	<i>Ambrosia sp.</i>
River Birch	<i>Betula nigra</i>
Raspberry sp.	<i>Rubus sp.</i>
Silver Maple	<i>Acer saccharinum</i>
Slippery Elm	<i>Ulmus rubra</i>
Spotted Knapweed	<i>Centaurea stoebe</i>
Spotted St. John's wort	<i>Hypericum maculatum</i>
Spreading Dogbane	<i>Apocynum androsaemifolium</i>
Sweet Gum	<i>Liquidambar straciflua</i>
Sycamore	<i>Plantanus occidentalis</i>
Thin Leaved Sunflower	<i>Helianthus decapetalus</i>
Tree of Heaven	<i>Ailanthus altissima</i>
Tulip Poplar	<i>Liriodendron tulipifera</i>
Umbrella Sedge	<i>Fuirena umbellata</i>
Virginia Creeper	<i>Parthenocissus quinquefolia</i>
White Ash	<i>Fraxinus americana</i>
White Clover	<i>Trifolium repens</i>
Winged Sumac	<i>Rhus copallinum</i>
Wood Sorrel	<i>Oxalis sp.</i>
Yarrow	<i>Achillea ageratifolia</i>

Marmet Development

The USDA classifies the soils near the Marmet Development as disturbed by urban development. Similarly, wildlife species are likely limited to generalist species. The Belle and Marmet stations are located in residential neighborhoods and industrial complexes. Urbanized development surrounds the Marmet Development and primary transmission line.

The Marmet primary transmission line is mostly located on the western bank of the Kanawha River. The transmission corridor extends south approximately 3,500 feet through a residential neighborhood and then crosses the river. The transmission line is surrounded by industrial complex and residential housing on the eastern side of the river. One transmission line terminates in the Belle station on the eastern side of the river and the other re-crosses the river and terminates at the Marmet station on the western side of the river. The Marmet station is adjacent to a residential neighborhood to the north and a wooded section to the south.

During the Transmission Line Study, investigators observed common yellow throat (*Geothlypis trichas*), northern mockingbird (*Mimus polyglottos*), and American robin (*Turdus migratorius*) in a small patch of scrub habitat adjacent to the Marmet station. The primary vegetation in the habitat was poke weed (*Phytolacca dodecandra*) and riverbank grape (*Vitis riparia*) in the understory, with scarlet oak (*Quercus coccinea*), black walnut (*Juglans nigra*), boxelder (*Acer negundo*), and silver maple making up the majority of the tree canopy (Table 4-6).

TABLE 4-6. MARMET TRANSMISSION LINE SPECIES LIST

COMMON NAME	SCIENTIFIC NAME
American Holly	<i>Ilex opaca</i>
Black Cherry	<i>Prunus serotina</i>
Black Locust	<i>Robinia pseudoacacia</i>
Black Walnut	<i>Juglans nigra</i>
Boxelder	<i>Acer negundo</i>
Common Dodder	<i>Cuscuta gronovii</i>
Crown Vetch	<i>Coronilla varia</i>
Deer Tongue Grass	<i>Dichanthelium clandestinum</i>
Goldenrod	<i>Solidago sp.</i>
Hedge Bindweed	<i>Covolvulus sepium</i>
Japanese Honeysuckle	<i>Lonicera japonica</i>
Kentucky Blue Grass	<i>Poa pratensis</i>
Poison Ivy	<i>Toxicodendron radicans</i>
Poke Weed	<i>Phytolacca dodecandra</i>
Ragweed	<i>Ambrosia sp.</i>
Red Clover	<i>Trifolium pratense</i>
Riverbank Grape	<i>Vitis riparia</i>
Sassafras	<i>sassafras albidum</i>
Scarlet Oak	<i>Quercus coccinea</i>
Silk Tree	<i>Albizia julibrissin</i>
Silver Maple	<i>Acer saccharinum</i>
Slippery Elm	<i>Ulmus rubra</i>
Spiderwort	<i>Tradescantia sp.</i>
Staghorn Sumac	<i>Rhus typhina</i>
Sycamore	<i>Platanus occidentalis</i>
Tulip Poplar	<i>Liriodendron tulipifera</i>
Weeping Willow	<i>Salix sepulcralis</i>
White Clover	<i>Trifolium repens</i>

WINFIELD PROJECT

The Winfield Development primary transmission line ends at the immediately adjacent Winfield station. The ground in the Winfield station is covered in gravel with no vegetation. The Winfield station is surrounded by roads, parking lots, and mowed lawn. The terrestrial habitat in the Project area would only provide habitat for a few generalist species that are capable of living in an urbanized setting. This would include species such as raccoon and opossum.

A sign located at the Winfield Locks and Dam (on the opposite end of the dam from the Winfield powerhouse) indicates there is a bird sanctuary located nearby; the sign lists 73 species of birds that occur in the area, including great blue heron, wood duck, red-tailed hawk, greater and lesser yellowlegs, least sandpiper, downy woodpecker, tree swallow, eastern bluebird, cedar waxwing, and the yellow warbler (AEP, 2008). The Winfield Project would not likely provide habitat for these species of birds.

4.3.4.2 ENVIRONMENTAL EFFECTS

PROPOSED ACTION

LONDON/MARMET PROJECT

Most areas within the Project boundaries of the London and Marmet Developments are disturbed. Large areas are paved or gravel. Other portions of the property are also mowed to maintain a lawn. The Project's primary transmission lines are the only locations where trees or shrubs are growing. Appalachian maintains the Project's primary transmission line corridors for the London and Marmet Developments approximately every 4 years (*pers. com.* Scott Klinebriel, Appalachian forester August 23, 2010). The primary means for maintenance includes cutting trees, pulling stumps, and mowing vegetation. Appalachian has not needed to use herbicide for transmission line maintenance and field observations did not indicate the recent use of herbicide. In 2011 however, Appalachian did apply herbicide treatment to the upper rip-rapped sections of shoreline. Appalachian may not complete all the maintenance of the transmission line corridors because residential and industrial property owners use and maintain the line corridor on their respective properties. This appears to be mostly mowing and trimming of understory vegetation.

The London and Marmet Developments provide very little habitat within a matrix of urban development. The habitat that is available is consistent with an urbanized plant and wildlife community. This includes the presence of invasive species that are common within, adjacent, and regionally. The mechanical maintenance of the property does not promote or discourage the existing plant and wildlife community. The habitat is too disturbed and fragmented to provide any more valuable habitat than is currently

found at the site. The continued maintenance of the property would likely not significantly affect the existing habitat.

WINFIELD PROJECT

Most areas within the Project boundary of the Winfield Project are developed. Large areas are paved or gravel. Other portions of the property are also mowed to maintain a lawn. The primary transmission line corridor for the Winfield Project does not include vegetation maintenance. This line terminates within the adjacent Winfield station that does not contain vegetation. The ground in the Winfield station is covered with gravel and does not promote growth of vegetation. However, as discussed above, there is the occasional need to apply herbicide treatment within the Project boundary. This was most recently performed at the Winfield Development in 2011 and mainly included the upper areas of rip-rap.

The Winfield Project is very small and provides little to no terrestrial habitat within a matrix of urban development. The habitat that is available is urban. This includes mowed lawn, parking, and sidewalks. The site does not appear to contain invasive species; however, mowing likely suppresses the visible signs of their presence. The mechanical maintenance of the property does not affect wildlife or plant communities because the lawn was specifically planted to be mowed. The habitat does not provide valuable habitat because there is no plant structure. The continued maintenance of the property would likely not affect the existing habitat.

NO-ACTION ALTERNATIVE

LONDON/MARMET PROJECT

The no-action alternative and proposed action are the same. Therefore, the no-action alternative would result in the same conditions as described above in the proposed action alternative.

WINFIELD PROJECT

The no-action alternative and proposed action are the same. Therefore, the no-action alternative would result in the same conditions as described above in the proposed action alternative.

4.3.4.3 UNAVOIDABLE ADVERSE EFFECTS

No significant adverse effects have been identified. The low-quality habitat will be maintained by the current mechanical practices that are used to manage the property. Therefore, the habitat would remain the same.

4.3.4.4 REFERENCES

American Electric Power, Inc. (AEP). 2008. Pre Application Document (PAD). pp. 148.

Kanawha Valley Power Company (KVPC). 1981. Application for new license for major project -- existing dam. London/Marmet Project, FERC Project No. 1175. KVPA, Charleston, WV, January 1981.

U.S. Fish and Wildlife Service (USFWS). 2007. National Wetlands Inventory. Wetlands and Deepwater Habitats of the Conterminous United States. Version 1.0.
<http://wetlandsfws.er.usgs.gov/NWI/>. Washington, DC.

4.3.5 RARE, THREATENED, AND ENDANGERED SPECIES

4.3.5.1 AFFECTED ENVIRONMENT

FISH

PADDLEFISH (*POLYODON SPATHULA*)

Paddlefish are targeted for restoration in the large rivers of West Virginia including the Kanawha. As reported in the Habitat Suitability Index Model, the paddlefish is primarily a large river species and travels extensively throughout a variety of riverine habitats (Hubert *et al.*, 1984). Much of the original range has been reduced due to habitat alterations which include: 1) destruction of spawning areas; 2) blockage of movements by dams; 3) channelization and elimination of backwater areas; 4) dewatering of streams; and 5) pollution (Carlson and Bonislowsky, 1981).

Paddlefish are primarily planktivores and typically feed near the surface and often

consume immature insects in addition to plankton. The rostrum or paddle for which the species is known is a large sensory organ used to determine plankton concentrations. Feeding generally occurs in lentic or low flow areas such as backwaters with abundant plankton populations. Spawning however occurs in upstream areas and adults are routinely observed below large dams during the spring spawning run. Current restoration efforts include stocking of juvenile paddlefish in the Ohio and Kanawha rivers. As a result of these efforts, paddlefish are now frequently encountered by biologists within areas such as the Winfield pool of the Kanawha River (O'Bara, 2007).

SHOVELNOSE STURGEON (*SCAPHIRHYNCHUS ALBUS*)

In an effort to enhance the shovelnose sturgeon population, a restoration program was initiated in 2005. WVDNR collects adult shovelnose sturgeon from the Wabash River and transport them to the Palestine State Fish Hatchery, where they are spawned. The fry are ultimately released into the Kanawha River just downstream of Kanawha Falls and the Little Kanawha River. More than 20,000 shovelnose sturgeons were stocked into these rivers in 2007. This species is adapted to bottom habitats of large rivers with swift, turbid, free-flowing water, over sandy bottoms or near rocky points or bars, where they feed primarily on aquatic invertebrates (Wildhaber *et al.*, 2007). They frequently concentrate in areas downstream from dams or at the mouths of tributaries.

MUSSELS

Three endangered species of mussels, the pink mucket pearly (*Lampsilis abrupta*), northern riffleshell (*Epioblasma torulosa rangiana*), and fanshell (*Cyprogenia stegaria*), are known to occur in the Kanawha River (email from B. Sargent, WVDNR Natural Heritage Program, Elkins, WV, to F. Winchell, Louis Berger Group, Needham, MA, April 21, 2008). In addition, WVDNR reports that the agency has an old record of another endangered mussel, the tubercled-blossom pearly mussel (*Epioblasma torulosa torulosa*), which was never verified. The spectaclecase (*Cumberlandia monodonta*), which is a candidate for listing as an endangered species, was historically found in the Kanawha River. The fanshell has been documented at Kanawha Falls; the riffleshell and tubercled-blossom pearly were reported at a location opposite Falls View, and the

spectaclecase was at river mile 78.2 (email from B. Sargent, WVDNR Natural Heritage Program, Elkins, WV, to F. Winchell, Louis Berger Group, Needham, MA, April 21, 2008). All of these locations are within the section of the river that is backwatered by London Dam, although Kanawha Falls is at the upstream end of the impounded area.

PINK MUCKET PEARLY (*LAMPSILIS ABRUPTA*)

The pink mucket pearly prefers areas of mud and sand in shallow riffles free of silt. The pink mucket pearly has been documented at river mile 88.5 and at Kanawha Falls (river mile 95.5). Other populations have been discovered in the Ohio River after an absence of 75 years. These discoveries indicate that water quality has improved. The pink mucket reproductive cycle is similar to that of other mussels where the male releases sperm into the current and the female siphons the sperm to fertilize the eggs. Larvae are released into the water column and find a host fish to attach to until they grow to juveniles. Juveniles detach from the host fish and settle on the river bottom to grow. Habitat degradation has contributed to the low populations of mussels and can also be influenced by poor water quality caused by industrial runoff as well as pollution from chemicals and toxins. The USFWS issued a recovery plan for pink mucket pearly in 1985. At the time of the recovery plan no critical habitat was designated for this species (USFWS, 2011).

NORTHERN RIFFLESHELL (*EPIOBLASMA TORULOSA RANGIANA*)

The northern riffle shell is known to occur in the Kanawha River (email from B. Sargent, WVDNR Natural Heritage Program, Elkins, WV, to F. Winchell, Louis Berger Group, Needham, MA, April 21, 2008) and has been listed as endangered. This mussel tends to prefer firmly packed sand and gravel and requires a stable substrate with sufficient populations of host fish to complete the reproduction process. The USFWS issued a recovery plan for the northern riffleshell in 1994; however, no critical habitat has been identified (USFWS, 2011).

FANSHELL (*CYPROGENIA STEGARIA*)

The fanshell has been documented at Kanawha Falls and is known to occur in the Kanawha River (email from B. Sargent, WVDNR Natural Heritage Program, Elkins, WV, to F. Winchell, Louis Berger Group, Needham, MA, April 21, 2008) and is listed as endangered. The fanshell like other mussels buries itself in sand or gravel and prefers river with swift current and deep water. The fanshell has a unique way of attracting host fish; it releases the larvae in spiral form resembling a worm. When the worm look alike is approached by a predatory fish, the larvae attach themselves to the gills of the fish. The USFWS issued a recovery plan for the fanshell in 1991 but at the time no critical habitat was identified (USFWS, 2011).

TUBERCLED-BLOSSOM PEARLY MUSSEL (*EPIOBLASMA TORULOSA TORULOSA*)

The turbercled-blossom pearly mussel prefer large rivers consisting of sand and gravel bottoms with swift currents. The USFWS states that the last individual collected was a freshly dead below Kanawha Falls in 1969 and no sightings have been documented since. The USFWS issued a recovery plan for the turbercled-blossom pearly mussel in 1985 but no critical habitat was identified (USFWS, 2011).

SPECTACLECASE (*CUMBERLANDIA MONODONTA*)

The spectaclecase prefers the backwater of large rivers. The life history of the spectaclecase is similar to the other mussel species, feeding on plankton and releasing larvae to disperse on the gills of fish. The spectaclecase was not known to occur in the Kanawha River until a very old live specimen was discovered near Glasgow, Kanawaha County in 2002. This site is approximately 20 miles downstream of Kanawha Falls, within the Marmet Reservoir. There is likely no longer a viable spectaclecase population in the Kanawha River (USFWS, 2002).

PLANTS

The SD1 identifies the federally endangered running buffalo clover, *Trifolium stoloniferum* and the federally threatened Virginia spiraea, *Spiraea virginiana* as species that may potentially occur in the Project area. Mr. P.J. Harmon from the

WVDNR did not expect to find rare, threatened, endangered or special status plants at the Project because the location of the Projects are highly disturbed and urbanized (*Pers. comm.* P.J. Harmon, WVDNR Botanist, July 13, 2010). On July 14, 2010, Kleinschmidt completed a field survey of the property for each Project boundary and found that the habitat was highly disturbed and surrounded by residential, commercial, or industrial development. Kleinschmidt did not find running buffalo clover or Virginia spiraea in the Project boundaries. Based on the quality of the habitat, Kleinschmidt did not expect to find these species on the property.

BATS

INDIANA BAT (*MYOTIS SODALIS*)

The Indiana bat is a small federally endangered bat that hibernates in caves and mines, and congregates in maternal colonies in upland and riparian forests, pastures, and open wetlands. Female Indiana bats congregate in these maternity colonies during early May to late June to bear and raise their pups. Indiana bat roost in dead standing trees with loose bark (DeGraaf and Yamasaki, 2001). In West Virginia, reproductive females have been documented using basswood, sugar maple, northern red oak, and scarlet oak (Beverly 2004, Beverly and Gumber, 2003, Sanders Environmental Inc. 2004). Roosting males have been documented using shagbark hickory, sugar maple, American beech, white oak (*Quercus alba*), tulip tree, black cherry (*Prunus serotina*), red maple (*Acer rubrum*), northern red oak, chestnut oak (*Quercus montana*), white ash, and slippery elm (Beverly and Gumber, 2005).

Their habitat typically consists of riparian, bottomland, or upland forest, as well as old fields or pastures with scattered trees. These bats hibernate in limestone caves and abandoned mineshafts (hibernacula) from October through April. From April through August, Indiana bats inhabit floodplain, riparian, and upland forests for roosting and foraging habitat (DeGraaf and Yamasaki, 2001). In West Virginia, Indiana bat hibernacula are limited to the eastern portion of the state (Beverly and Gumbert, 2005). There are no known Indiana bat hibernacula, maternity, or roosting sites within the transmission line corridors of London/Marmet or Winfield Projects (*pers. com.*, Joel

Beverly, Apogee Environmental Consultants, Inc.; Barbara Sargent, WVDNR; Jim Zelenak, USFWS; personal communication). The closest known Indiana bat reproductive sites are located near the Marmet Development, approximately 8 to 9 miles south from the city of Marmet in Boone County (*pers. com.*, Joel Beverly). Additionally, there have been unproductive sites (male Indiana bats) documented in nearby Fayette County (London Development) which borders Kanawha County to the southeast.

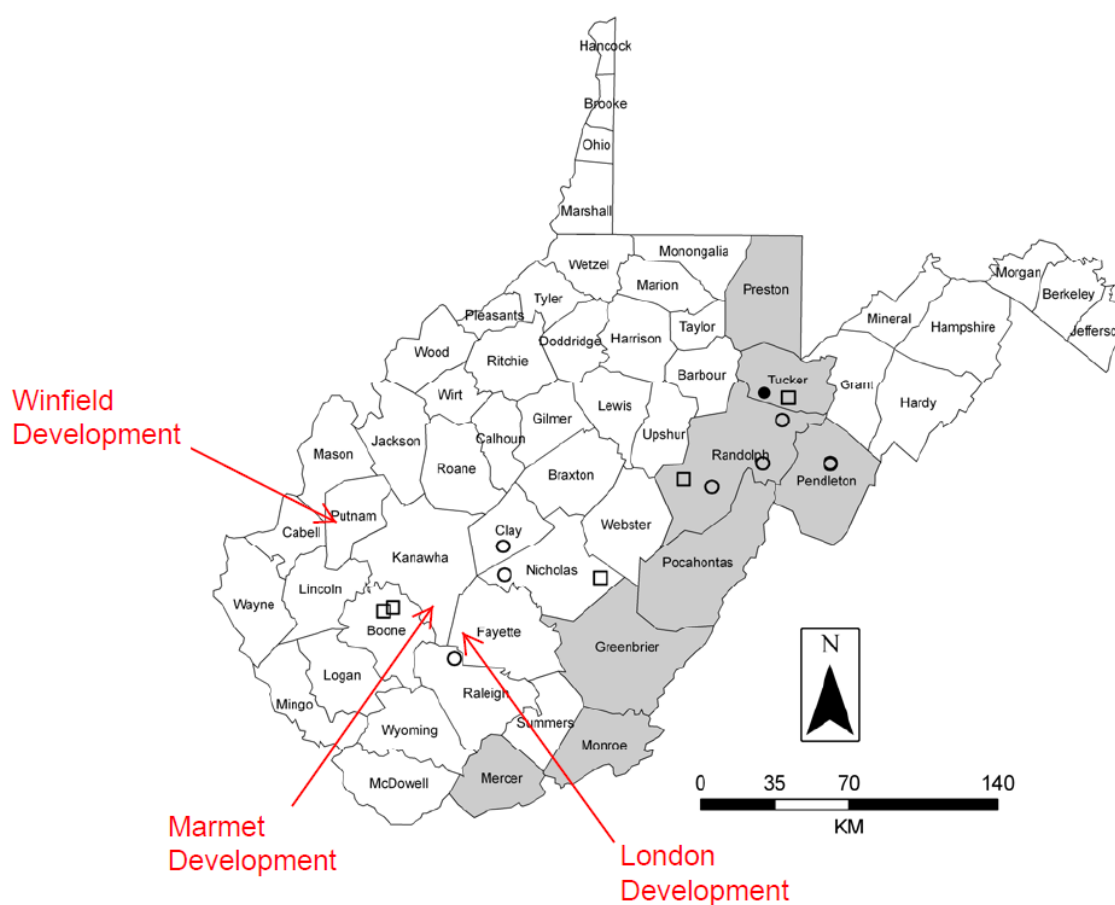


FIGURE 4-3. DISTRIBUTION OF SUMMER REPRODUCTIVE AND NON-REPRODUCTIVE INDIANA BAT RECORDS²

² Reproductive records are shown as squares and non-reproductive records are shown as circles. The solid circle indicates Fernow Experimental Forest, where nine male Indiana bats have been captured at or near a hibernacula (Big Springs Cave). Shading indicates counties with Indiana bat hibernacula. Note: locations are approximate (Modified from Beverly and Gumbert, 2005).

OTHER WEST VIRGINIA RARE BAT SPECIES

On July 23, 2010 Appalachian held an Initial Study Plan Update meeting. During the meeting, the WVDNR requested that Appalachian investigate the potential for state listed rare bat species and any other federally listed bat species occurring near the Developments. In West Virginia, there are four bats that are classified as rare and two federally endangered bats including the Indiana bat (Table 4-7).

TABLE 4-7. WEST VIRGINIA STATE RARE BAT SPECIES AND FEDERALLY ENDANGERED BAT SPECIES

SCIENTIFIC NAME	COMMON NAME	STATE	FEDERAL
<i>Corynorhinus rafinesquii</i>	Eastern big-eared bat	S1	
<i>Townsendii virginianus</i>	Virginia big-eared bat	S2	Endangered
<i>Lasionycteris noctivagans</i>	Silver-haired bat	S2	
<i>Myotis leibii</i>	Eastern small-footed bat	S1	
<i>Myotis sodalis</i>	Indiana bat	S1	Endangered
<i>Nycticeius humeralis</i>	Evening bat	S1	

Source: <http://www.wvdnr.gov/Wildlife/documents/Animals2007.pdf>

S1: Five or fewer documented occurrences, or very few remaining individuals within the state. Extremely rare and critically imperiled; or because of some factor(s) making it especially vulnerable to extirpation.

S2: Six to 20 documented occurrences, or few remaining individuals within the state. Very rare and imperiled; or because of some factor(s) making it vulnerable to extirpation.

On July 27, 2010, Kleinschmidt scientists followed up with Barbara Sargent to determine the likelihood of any state listed rare bats using Project lands. Barbara determined that no state listed rare bat species use the Project lands for roost sites, hibernacula, or maternity sites. Again, the nature of the urbanized land around the Projects would likely not make the property conducive to bat habitat.

4.3.5.2 ENVIRONMENTAL EFFECTS

PROPOSED ACTION

Mussels

The aquatic habitat within the Project boundaries is limited to the forebay and the tailrace. The forebay is located in a reservoir where the USACE manages the water levels for navigational purposes. The reservoirs provide a homogeneous, low value habitat type that is relatively abundant in the Kanawha River. The Projects' tailwaters provide coarse substrate, swift currents, and relatively shallow depths that represent a valuable remnant of pre-impoundment conditions (Corps, 1993). The only significant viable mussel bed known in the Kanawha River is below Kanawha Falls, approximately 12 miles upstream of the London Development (USFWS, 2002). The current habitat conditions found within the Kanawha River likely inhibit the use of other parts of the river for mussel habitat. The current location of these mussels is at the extreme upstream end of the London reservoir, far from the London Development. Currently the London Development maintains the water levels according to the navigational requirements of the USACE which allows for a pool levels to be reduced up to 3 feet. However, Appalachian is working with the USACE to establish a new agreement which would reduce the amount of allowable fluctuation. There is no evidence of effects on mussels under the current water level regime and therefore the proposed Project operations, which will ultimately increase the amount of persistent, wetted area, are unlikely to affect rare, threatened, or endangered mussel species in the future. The Marmet and Winfield Developments are downstream of the London Development and therefore would also not affect the mussel populations at Kanawha Falls.

Fish

As the populations of paddlefish and shovelnose sturgeon increase, the species may be found upstream and downstream of the Developments. Both species may find spawning habitat within the tailrace of the Developments.

Entrainment or turbine mortality may also occur, but based on the 2010 Entrainment Study the mortality will be minor. Based on the review of fish swimming abilities,

juvenile life stages are clearly the most vulnerable to involuntary entrainment (Kleinschmidt, 2010). However, larger juveniles of most species should be capable of escaping the observed predominant intake velocities (1.7 to 3 ft/s) by mid to late summer. The adult lifestage for these species are not likely to be affected by entrainment. The entrainment study found that the entrainment likelihood of paddlefish and shovelnose sturgeon was relatively low (Tables 4-8 and 4-9; Kleinschmidt, 2010). Of the paddlefish and shovelnose sturgeon that are entrained, fewer still would actually result in mortality (Tables 4-10 and 4-11). Therefore, this low level of entrainment mortality is not likely to adversely affect the population of paddlefish and shovelnose sturgeon.

TABLE 4-8. ESTIMATED ENTRAINMENT FOR LONDON AND MARMET PROJECT FISH SPECIES OF INTEREST. ANNUAL ENTRAINMENT FOR EACH SPECIES SHOULD BE DOUBLED TO INCLUDE ESTIMATES FOR BOTH LONDON AND MARMET

DRY YEAR SPECIES/SURROGATES	SMALL FISH (<8 INCHES)	MEDIUM FISH (8-15 INCHES)	LARGE FISH (> 15 INCHES)
	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT
Paddlefish*	190	260	10
Shovelnose Sturgeon*	190	260	10

*Lake sturgeon used as a surrogate

WET YEAR SPECIES/SURROGATES	SMALL FISH (<8 INCHES)	MEDIUM FISH (8-15 INCHES)	LARGE FISH (> 15 INCHES)
	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT
Paddlefish*	270	390	20
Shovelnose Sturgeon*	270	390	20

*Lake sturgeon used as a surrogate

TABLE 4-9. ESTIMATED ENTRAINMENT FOR THE WINFIELD PROJECT FISH SPECIES OF INTEREST

DRY YEAR SPECIES/SURROGATES	SMALL FISH (<8 INCHES)	MEDIUM FISH (8-15 INCHES)	LARGE FISH (> 15 INCHES)
	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT
Paddlefish*	210	300	20
Shovelnose Sturgeon*	210	300	20

*Lake sturgeon used as a surrogate

WET YEAR SPECIES/SURROGATES	SMALL FISH (<8 INCHES)	MEDIUM FISH (8-15 INCHES)	LARGE FISH (> 15 INCHES)
	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT	ESTIMATED ENTRAINMENT
Paddlefish*	300	420	20
Shovelnose Sturgeon*	300	420	20

*Lake sturgeon used as a surrogate

TABLE 4-10. ESTIMATED ANNUAL MORTALITY DUE TO TURBINE PASSAGE FOR THE LONDON AND MARMET PROJECT FISH SPECIES OF INTEREST. ESTIMATED ANNUAL MORTALITY FOR EACH SPECIES SHOULD BE DOUBLED TO INCLUDE ESTIMATES FOR BOTH THE LONDON AND MARMET PROJECTS COMBINED

**MORTALITY RATES SPECIFIC TO THE WINFIELD PROJECT BASED ON THE FRANKE MODEL
(FRANKE *ET AL.* 1997)**

SPECIES/SURROGATES	SMALL FISH (<8 INCHES)		MEDIUM FISH (8-15 INCHES)		LARGE FISH (> 15 INCHES)	
	MORTALITY RATE = 2.62%		MORTALITY RATE = 6.29%		MORTALITY RATE = 12.24%	
	DRY YEAR	WET YEAR	DRY YEAR	WET YEAR	DRY YEAR	WET YEAR
Paddlefish*	5	7	16	25	1	2
Shovelnose Sturgeon*	5	7	16	25	1	2

* Lake sturgeon used as a surrogate

TABLE 4-11. ESTIMATED ANNUAL MORTALITY DUE TO TURBINE PASSAGE FOR THE WINFIELD PROJECT FISH SPECIES OF INTEREST

MORTALITY RATES SPECIFIC TO THE WINFIELD PROJECT BASED ON THE FRANKE MODEL (FRANKE *ET AL.* 1997)

SPECIES/SURROGATES	SMALL FISH (<8 INCHES)		MEDIUM FISH (8-15 INCHES)		LARGE FISH (> 15 INCHES)	
	MORTALITY RATE = 2.10%		MORTALITY RATE = 5.82%		MORTALITY RATE = 9.72%	
	DRY YEAR	WET YEAR	DRY YEAR	WET YEAR	DRY YEAR	WET YEAR
Paddlefish*	4	6	17	24	2	2
Shovelnose Sturgeon*	4	6	17	24	2	2

* Lake sturgeon used as a surrogate

Plants

No rare plants were found within the Project boundaries during surveys completed by Kleinschmidt on July 14, 2010. In addition, Kleinschmidt and the WVDNR do not expect that rare plant species would grow within the Projects because of the disturbed and urbanized environment found within and adjacent to the Project boundaries (*Pers. comm.* P.J. Harmon, WVDNR Botanist, July 13, 2010). Therefore, the continued maintenance and operation of the Projects would not likely affect rare plants.

Bats

Based on habitat surveys the investigators would not expect Indiana bat to use the Marmet Development for habitat because few trees are available for roosting and all available trees are in close proximity to regular human activity. Some habitat may be available at the London Development because forests are available adjacent to the Development. However, the urbanized nature of the London/Marmet Project does not make this habitat ideal for undisturbed foraging. No trees are available at the Winfield Project for Indiana bat roosting and therefore foraging is not likely. Similarly, the other rare bat species found in West Virginia would not find habitat within the Projects. Therefore, maintenance and operations of the Projects would not likely affect bat species.

NO-ACTION ALTERNATIVE

Mussels

The only significant viable mussel bed known in the Kanawha River is below Kanawha Falls (USFWS, 2002). The current habitat conditions found within the Kanawha River likely inhibit the use of other parts of the river for mussel habitat. The current location of these mussels is at the extreme upstream end of the London reservoir, far from the London Development. Since the USACE will continue to operate the London Development, the water levels in the impoundment will continue to be maintained for navigational purposes. Therefore the no-action alternative would not likely affect rare mussel species above the London Development. The Marmet and Winfield Developments are downstream of the London Development and therefore would also not affect the mussel populations at Kanawha Falls.

Fish

The no-action alternative would allow for water level fluctuations of up to 3 feet in the London pool. This in-turn would create variable discharges from the Development as the pool is drawdown and then refilled. This could potentially affect the tailrace spawning habitat which may exist. Currently, spawning habitat for shovelnose sturgeon and paddlefish is expected to be limited to tailrace areas. However, spawning of these species has not been confirmed and restoration efforts are based on stocking efforts. Therefore, while possible, it is unlikely that variable discharge rates will negatively affect these species.

The potential for entrainment mortality of a small number of juvenile fish of these species would remain as with the proposed action.

Plants

No rare plants were found within the Project boundaries during surveys completed by Kleinschmidt on July 14, 2010. In addition, Kleinschmidt and the WVDNR do not expect that rare plant species would grow within the Project because of the disturbed and urbanized environment found within and adjacent to the Project boundaries (*Pers. comm.* P.J. Harmon, WVDNR Botanist, July 13, 2010). Therefore, the no-action

alternative would not likely affect rare plants and the effects would be identical to the proposed action.

Bats

Based on habitat surveys, the investigators would not expect Indiana bat to use the Marmet Development for habitat because few trees are available for roosting and all available trees are in close proximity to regular human activity. Some habitat may be available at the London Development because forests are available adjacent to the Development. However, the urbanized nature of the Projects does not make this habitat ideal for undisturbed foraging. No trees are available at the Winfield Project for Indiana bat roosting and therefore foraging is not likely. Similarly, the other rare bat species found in West Virginia would not find habitat within the Projects. Therefore, the no-action alternative would not likely affect bat species and the expected effects would be the same as those for the proposed action.

4.3.5.3 UNAVOIDABLE ADVERSE EFFECTS

The only unavoidable adverse effect caused by the Projects would likely be the low level of entrainment mortality. All other rare species are not likely to occur in the Project boundaries or are unaffected by the maintenance and operation of the Projects.

4.3.5.4 REFERENCES

American Electric Power, Inc. (AEP). 2008. Pre Application Document (PAD). pp. 148.

U.S. Army Corps of Engineers (Corps). 1993. Kanawha River navigation study, Marmet lock replacement draft feasibility report. U.S. Army Corps of Engineers Huntington District Huntington, WV. August 1993.

Beverly, J. and M.W. Gumbert. 2005. Indiana bats in West Virginia, a review. [Online] URL: http://docs.google.com/viewer?a=v&q=cache:1s-B9g1aI3cJ:www.mcrc.org/PDF/Forums/Bat%2520Indiana/4-2.pdf+Beverly,+J.+and+M.W.+Gumbert,+2005.+Indiana+bats+in+West+Virginia,+a+review&hl=en&gl=us&pid=bl&srcid=ADGEESgKDII0T7ismhHWe6bkmWakFgSILgIC5vRLhoq1rXFTpP3JL8BEjbXcS95W0cvpJJwuNvgnbTkZkLn63aX2sB5OvY90K_A7Wj_uD7-F6ZTOcTfhUjrDTtxwvef-hsI-4_BxfrF&sig=AHIEtbQNqMDNypLcnid1H9agDsP9EiEsLg

- Beverly, J. 2004. A summer survey for the federally endangered Indiana bat (*Myotis sodalis*) near known maternity trees, Boone County, West Virginia. Final Report submitted to USFWS and Black Castle Mining Company, Uneeda, West Virginia. 34 pp.
- Beverly, J. and M.W. Gumbert. 2003. A summer survey for the federally endangered Indiana bat (*Myotis sodalis*) at two proposed surface mines and an amendment in Boone County, West Virginia. Final Report submitted to USFWS and Black Castle Mining Company, Uneeda, West Virginia. 18 pp.
- Carlson, D. M., and P.S. Bonislawsky. 1981. The paddlefish (*Polyodon spathula*) fisheries of the Midwestern United States. Fisheries 6(2):17-27.
- DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England. Lebanon, NH.
- Franke, G.F., D.R., Webb, R.K., Fisher Jr., D. Mathur, P.N., Hopping, P.A., March, M.R., Headrick, I.T., Laczko, Y., Ventikos, and R. Sotiropoulos. 1997. Development of environmentally advanced hydropower turbine system design concepts. Prepared for U.S. Department of Energy, Idaho Operations Office, Contract DE-AC07-94ID13223.
- Hubert, W.A., S.H. Anderson, P.D. Southall, and J.H. Crance. 1984. Habitat suitability index models and instream flow suitability curves: Paddlefish. U.S. Fish Wildlife Service. FWS/OBS-82/10.80. 32 pp.
- Kleinschmidt Associates (KA). 2010. Entrainment Study Report. Prepared for AEP. Pp 66.
- Kanawha Valley Power Company KVPC. 1981. Application for new license for major project - existing dam. London/Marmet Project, FERC Project No. 1175. KVPA, Charleston, WV, January 1981.
- O'Bara, Chris. 2007. Restoring West Virginia's Riverine Fishes. West Virginia Wildlife. Winter Issue. Pp. 10-12.
- Sanders Environmental Inc. 2004. Report on Indiana bat (*Myotis sodalis*) sampling at fifty-five sites on the Monongahela National Forest, WV, Summer 2004. Final Report submitted to USDA Forest Service, Monongahela National Forest. Elkins, WV. 9 pp + append.
- U.S. Fish and Wildlife Service (USFWS). 2011. Freshwater mussels: Endangered, Threatened, Proposed, and Candidates in the Upper Midwest. <http://www.fws.gov/midwest/endangered/clams/>. Last updated 2011.
- U.S. Fish and Wildlife Service (USFWS). 2002. Status Assessment Report for the spectaclecase, *Cumberlandia monodonta*, occurring in the Mississippi River system (U.S. Fish and Wildlife Service Regions 3, 4, 5, and 6). Pp. 66.
- U.S. Fish and Wildlife Service (USFWS). 2007. Indiana bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. USFWS, Fort Snelling, MN. 258 pp.

West Virginia Division of Natural Resources (WVDNR). 2010. West Virginia Wildlife Conservation Action Plan. [Online] URL: <http://www.wvdnr.gov/Wildlife/PDFFiles/wwwcap.pdf>. Accessed on April 16, 2010.

Wildhaber, M.L., DeLonay, A.J., Papoulias, D.M., Galat, D.L., Jacobson, R.B., Simpkins, D.G., Braaten, P.J., Korschgen, C.E., and Mac, M.J. 2007. A conceptual life-history model for pallid and shovelnose sturgeon. U.S. Geological Survey Circular 1315. Pp. 18.

4.3.6 RECREATION, AESTHETICS, AND LAND USE

4.3.6.1 AFFECTED ENVIRONMENT

The Projects' vicinity consists of Kanawha, Fayette, and Putnam counties, West Virginia. Land use within the Kanawha River Basin is primarily forested (approximately 81 percent) and agriculture (approximately 16 percent), with the remaining lands uses including urban and developed areas and barren land (primarily mines and quarries) (Messigner and Hughes, 2000). Most of the urban development in the Projects' vicinity is concentrated near the city of Charleston, West Virginia. Agricultural areas in the Project vicinity are mostly limited to the Green Brier Valley south of the London/Marmet Project. The Projects support three tailwater angling access facilities that provide vantage points from which to view the Kanawha River. The visual characteristics of the area are mostly rural and the Projects include views of primarily residential, commercial, and industrial development along the river corridor in the foreground and middle ground and more distant views of steep forested mountains.

The following sections are divided into *Regional Recreation Opportunities* and *Project Vicinity Recreational Opportunities*. The first section provides detail on the recreational opportunities within 60 miles of each Development, which encompasses much of southwest West Virginia and parts of eastern Ohio. The geographic scope of the second section is more refined and focuses on the recreation opportunities with 20 miles of each Development.

REGIONAL RECREATION OPPORTUNITIES

Several state parks and forests, wildlife management areas (WMA), and the Monongahela National and Wayne National Forests are within a 60-mile radius of the London/Marmet and Winfield Projects (Figure 4-4). These recreation areas provide opportunities for fishing, boating and swimming, as well as such land-based opportunities as hunting, hiking, camping and picnicking. A complete inventory of

recreation areas in the region is provided in Appendix A. Those recreation areas in the Projects' vicinity (within a 20-mile radius of the three Developments) are discussed in further detail below.

National Parks and National Forests

While there are no national parks within 60 miles of the Projects, Monongahela National Forest (Forest) covers over 919,000 acres in 10 counties in the northeastern part of West Virginia and borders the state of Virginia. The western boundary of the Forest is approximately 45 miles east of the London Development. The Forest is home to 23 campgrounds, 17 picnic areas, and over 500 miles of a multi-use backwoods road and trail system used for hiking, mountain biking, cross-country skiing and snowshoeing, and horseback riding. Lakes within the Forest are small impoundments, such as Lake Sherwood, Spruce Knob Lake, and Lake Buffalo, limited to electric motor boats. Angling for bass, bluegill, catfish, and trout is available on these lakes plus on more than 600 miles of coldwater streams that are inhabited year-round by native brook trout, and on approximately 350 miles of stream available for seasonal trout fishing. Hunting is available on forestlands for deer, waterfowl and game bird, and small game (USFS, 2011a).

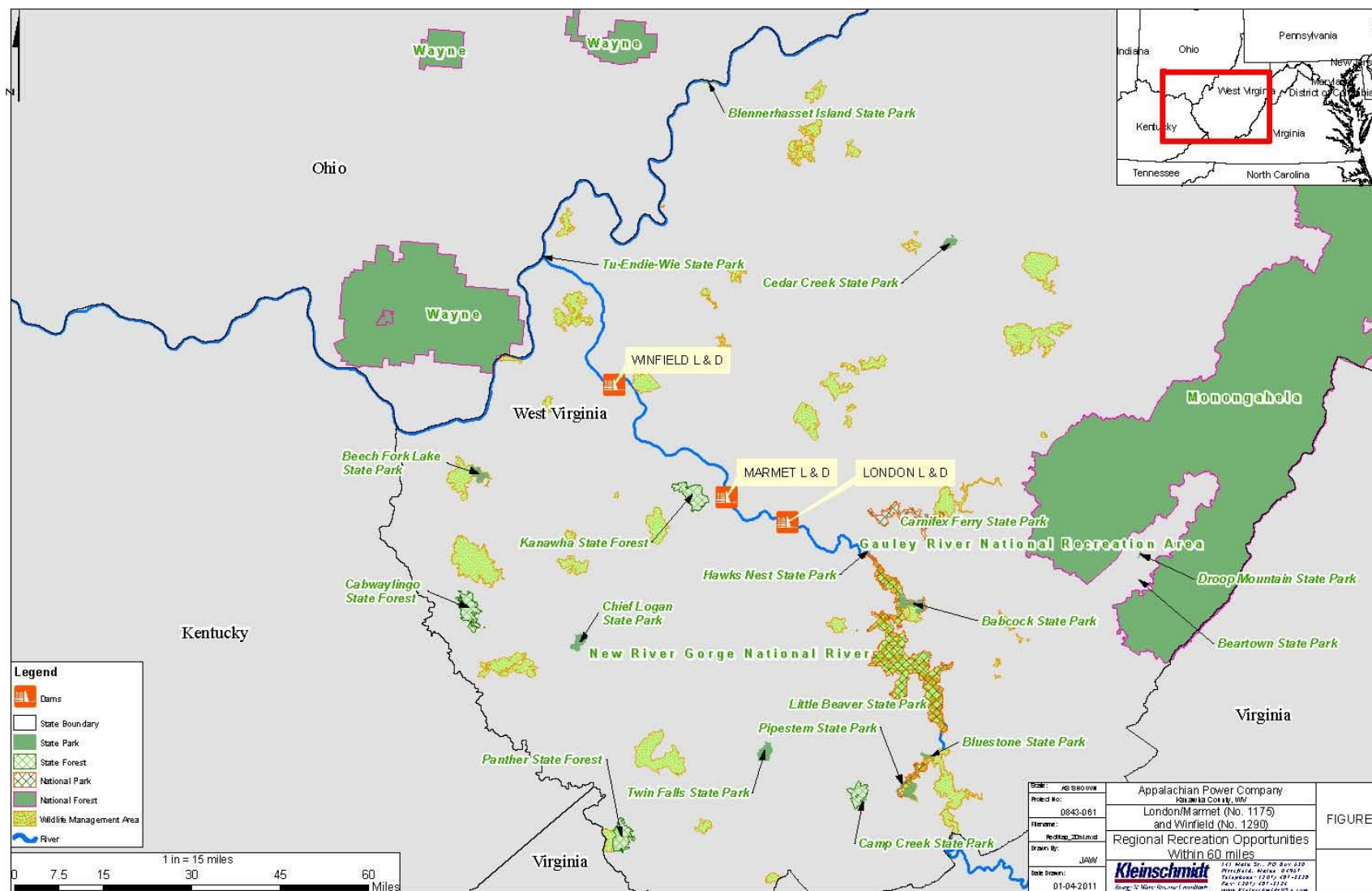


FIGURE 4-4. REGIONAL RECREATION OPPORTUNITIES WITHIN 60 MILES OF THE PROJECTS

Seven national wilderness areas are contained within the Forest: Big Draft, Dolly Sods, Cranberry, Laurel Fork, Roaring Plains West, Spice Run and Otter Creek (USFS, 2011a). The Cranberry Wilderness Area is located in the Gauley Ranger District in the southwestern reach of the Forest, within proximity of the Projects, and covers 47,815 acres and has 77.6 miles of designated trails. The wilderness area provides opportunities for angling, hunting, hiking, camping and backcountry recreation (USFS, 2011b).

State Parks and State Forests

The WVDNR Section of State Parks and Forests is the managing agency responsible for the state parks and state forests in West Virginia, which provide a variety of recreational opportunities including camping, hiking, fishing, hunting, picnicking, wildlife watching, boating, and swimming. There are 15 state parks and two state forests located within 60 miles of the three Developments (Appendix A).

Cabwaylingo State Forest (Cabwaylingo) is located 50 miles southwest of the Marmet Development (Figure 4-4). Cabwaylingo covers 8,123 acres and provides picnic tables and shelters, basketball and volleyball courts, swimming pool, and restrooms. Twelvepole Creek winds through Cabwaylingo and provides opportunities for fishing and hunting is permitted during the respective hunting seasons. In addition, there are nine hiking trails that range from 1 to 3 miles in length throughout the Forest (WVDNR, 2011b).

Camp Creek State Forest (State Forest) is approximately 50 miles south of the London Development, in the northern part of Mercer County. In 1988, the state Legislature designated 487 acres of the Forest as the Camp Creek State Park. The State Forest comprises 5,269 acres and offers hiking, fishing, and hunting opportunities. Camp Creek is stocked with trout in the spring for recreational fishing and terrestrial habitat is managed for both deer and turkey. In addition, there are 10 hiking trails located throughout the Forest (WVDOF, 2011).

Wildlife Management Areas

The Wildlife Resources Section of the WVDNR is the managing agency responsible for West Virginia's WMAs. The statewide Wildlife Management Program is designed to conserve and manage high quality wildlife habitat for a variety of wildlife species and to improve public access to these resources. The management activities involved at WMAs include tree planting to enhance wildlife habitat and the introduction of food plots to maintain current wildlife populations (WVDNR, 2011a).

The region in which the London/Marmet and Winfield Developments are located spans four of the six WMA districts identified by the WVDNR. West Virginia has 73 WMAs, 25 of which are located within 60 miles of the three Developments (Appendix A). WMAs are open to hunting and provide opportunities to pursue various large and small game, depending upon the season. Many also have lakes and streams with public angling opportunities. Some WMAs provide additional recreation facilities such as campsites, swimming beaches, picnic areas, playgrounds, and restrooms.

Angling and Boating Opportunities

In the region, there are approximately 51 public fishing areas managed by the WVDNR. These include a variety of waterbodies including lakes, streams, creeks and rivers that may be part of a state park, state forest, or WMA. In addition, some sites such as the tailwaters of Burnsville and Sutton Lakes in Braxton County are stocked with trout (WVDNR, 2011f). In addition to the tailrace fishing piers offered at the London, Marmet, and Winfield Developments, there are 30 public fishing piers offered within the region.

Regionally, there are 126 boat launches that provide anglers access to a number of lakes, streams, and rivers, 25 of which are identified as compliant with the Americans with Disabilities Act (ADA), providing universal access. In general, these public boat launches are associated with the WMAs in the region and are categorized as either hand-carry (*i.e.* canoes, kayaks, lightweight boats) or as a ramp (*i.e.* trailerable watercraft). In the region, there are 75 boat ramps and 51 hand-carry launches. The

lakes and rivers in which boat launches are provided include but are not limited to the Kanawha River, Elk River, Greenbrier River, Little Kanawha River, Guyandotte River, Ohio River, Bluestone Lake, and East Lynn Lake (WVGTC, 2002). A complete list of boat launches in the region and associated facilities is provided in Appendix A.

In addition, a number of amenities may be available at any given launch or pier including restrooms, courtesy docks, picnic tables and grills, and restroom facilities.

PROJECT VICINITY RECREATIONAL FACILITIES

The Projects' vicinity recreational opportunities include all state parks and forests, national parks and forests, WMAs, and boat launches within 20 miles of the three Developments. In the Projects' vicinity, there is one state park, one state forest, nine WMAs, and 43 boat launches (Figure 4-5). A complete inventory of recreation areas and facilities within the Projects' vicinity is provided in Appendix B.

National Parks and National Forests

The New River Gorge National River (Park), established in 1978 as a unit of the national park system, is approximately 16 miles southeast of the London Development. The New River and the Gauley River converge to form the Kanawha River. The Park encompasses over 70,000 acres along the New River and is a popular tourism destination in the state, serving over one million visitors annually (NPS, 2009). The Park offers a variety of recreational opportunities including climbing, whitewater rafting, hiking, bicycling, and fishing (NPS, 2011a). In addition, there are over 80 miles of hiking/walking, mountain bike, and equestrian trails in the Park (NPS, 2011a). The New River Gorge National River has five primitive camping areas including Stone Cliff Beach, Army Camp, Grandview Sandbar, Glade Creek, and War Ridge/Backus Mountain (NPS, 2011a).

The western boundary of the Gauley River National Recreation Area (GRNRA) is approximately 14 miles east of the London Development. The GRNRA is managed by the NPS under the New River Gorge National River management guidelines and

consists of 25 miles of free-flowing Gauley River and 6 miles of the Meadow River. Whitewater rafting and kayaking are the primary recreation activities at the GRNRA, attracting over 60,000 visitors annually. The whitewater of the Gauley River is rated from a Class III to V+ in the upper section with turbulent chutes and rocky routes and is rated from a Class III to V in the lower section with less formidable sections (NPS, 2011b).

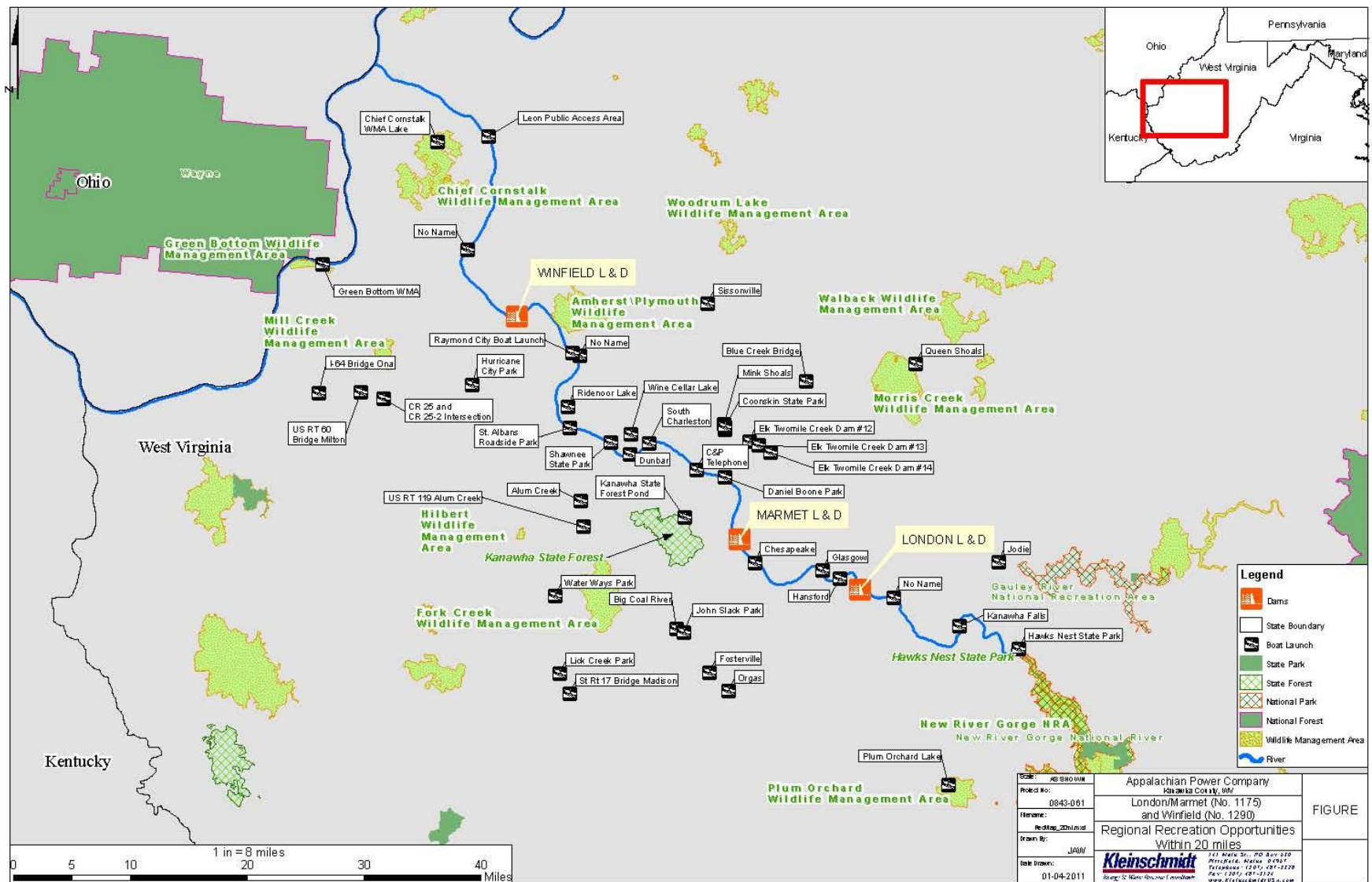


FIGURE 4-5. PROJECT VICINITY RECREATION FACILITIES

The closest block of the Wayne National Forest (Forest), the Iron-ton District, is located approximately 20 miles west of the Winfield Development in southeastern Ohio. The Forest is over a quarter million acres, in total, and provides over 300 miles of trails for hiking, horseback riding, mountain biking, and all-terrain vehicle riding. In addition, the Forest has a variety of camping opportunities including campgrounds, primitive camping, group camping, and RV camping. Developed recreation sites within the Forest offer a variety of amenities such as boat rentals, swimming beaches, picnic tables and shelters, visitor centers, and target shooting areas (USFS, 2011c).

State Parks and State Forests

The Hawks Nest State Park (State Park) is approximately 20 miles southeast of the London Development and encompasses 276 acres including portions of the New River and Hawks Nest Lake. Recreation opportunities at the State Park include hiking, swimming, fishing, golfing, jetboat rides and an aerial tram ride to the New River Gorge. The State Park also includes a marina and overlook located on Hawks Nest Lake (WVDNR, 2011d).

The Kanawha State Forest (State Forest) is located approximately 5 miles west of the Marmet Development and encompasses approximately 9,300 acres. The State Forest provides a variety of recreational opportunities including hiking, biking, picnicking, fishing, hunting, and swimming. There are over 25 miles of hiking trails located throughout the Forest and open year-round. In addition, freshwater fishing is available on Ellison Pond, which is stocked with trout, bass, and bluegill (WVDNR, 2011e).

Wildlife Management Areas

The WMAs within 20 miles of the London/Marmet and Winfield Projects total 48,167 acres and range in size from 289 acres (Hilbert) to 11,758 acres (Walback). In general, each WMA provides fishing opportunities for a variety of species including largemouth and spotted bass, bluegill, crappie, muskellunge, channel catfish, carp, and freshwater drum (WVDNR, 2011a). Chief Cornstalk is the only WMA in the Projects' vicinity

that is stocked with trout. Hunting is also allowed at the WMAs, and popular game species available may include deer, rabbit, squirrel, grouse and various waterfowl. In addition, some WMAs, including Chief Cornstalk and Plum Orchard Lake, provide camping opportunities (WVDNR, 2011a).

County and Municipal Parks

The Bill Wells Community Park (Park) is located approximately 500 feet downstream of the Marmet tailwater fishing access site, on the same side of the river (Photo 4-1). The Park can be accessed from 82nd Street off Route 61 in Marmet, West Virginia. The Park is also accessible via an overgrown shoreline footpath connecting to the Marmet tailwater fishing access site.

The Park is owned and operated by the City of Marmet, West Virginia and is open year round. The primary activities available at the Park are shoreline fishing and picnicking. The Park includes a variety of amenities including picnic tables and shelters, concrete fishing pier, fishing pole holders, children's playground, and trash receptacles (Photo 4-3). In addition, the Park is ADA accessible with a concrete ramp and parking (Photo 4-4). The parking area is paved and can accommodate approximately 40 vehicles.



PHOTO 4-1. BILL WELLS COMMUNITY PARK, MARMET WEST VIRGINIA



PHOTO 4-2. VIEW OF MARMET DEVELOPMENT FROM CONCRETE ACCESS RAMP AT BILL WELLS COMMUNITY PARK.



PHOTO 4-3. VIEW OF PICNIC SHELTER IN FOREGROUND AND PLAYGROUND IN BACKGROUND AT BILL WELLS COMMUNITY PARK



PHOTO 4-4. VIEW OF ADA COMPLIANT FISHING ACCESS AT BILL WELLS COMMUNITY PARK

The Ben Morris field is located adjacent to the Marmet Development. The field is used for little league baseball, softball, and football games. The Ben Morris field is accessible from Maccorckle Avenue in Marmet, West Virginia and includes a paved parking area.

The Daniel Boone Park is located southeast of Charleston between the Marmet Development and the Winfield Development, on the opposite side of the Kanawha River. The park provides a public access boat launch, picnic facilities, and fishing access.

Angling and Boating Opportunities

The lakes, streams, creeks and rivers of the Projects' vicinity may be part of a state park, state forest, or WMA. These waters may be accessed by formal angling piers such as those provided by the Projects or by hand-carry boat launches and boat ramps. The lakes and rivers in which boat launches are provided include but are not limited to the Kanawha River, Elk River, Gauley River, Big Coal River, Ohio River, Anderson Lake, Ridenoor Lake, and Plum Orchard Lake. A complete list of boat launches in the Projects' vicinity and associated facilities is provided in Appendix B.

In the Projects' vicinity, there are approximately 21 hand-carry launches and 22 boat ramps that provide anglers access to a number of lakes, streams, and rivers in the vicinity (WVGTC, 2002), eight of which are identified as ADA compliant. In general, these public boat launches are associated with the WMAs in the Projects' vicinity. Sixteen of the boat launches in the Projects' vicinity are located on the Kanawha River. There are a total of 13 fishing piers in the vicinity of the Projects. A number of amenities may be available at any given launch or pier including restrooms, courtesy docks, picnic tables and grills.

PROJECT RECREATION FACILITIES

The recreational facilities associated with the London/Marmet and Winfield Projects primarily provide angling opportunities on the Kanawha River. Access at each

Development consists of a tailwater fishing pier, parking area, and walkway. The following sections describe these facilities and any additional amenities available at each of the three sites.

There are no protected river segments along the Kanawha River in the London/Marmet or Winfield Project areas. The Projects are not located within a national park and while there are nine national wilderness areas in the state of West Virginia, the Projects are not located within any of them (NWPS, 2011).

London Development

The London Development tailwater angling access site (currently closed, see details below) is accessed via West Virginia State Road No. 61 in Handley, West Virginia. The recreation facilities at the London Development include a tailwater fishing pier and a gravel parking area that can accommodate approximately 25 vehicles (Photo 4-5). A 5-foot-wide by 35-foot-long gravel walkway provides anglers access from the parking area to the top of the tailwater fishing pier stairs. The stairway is 5 foot wide with handrails, extending from the top of the riverbank to the three draft tube piers in the tailrace. The concrete fishing piers and connecting walkways are approximately 6.5 foot wide with handrails (Photo 4-6). In addition, Appalachian maintains dusk to dawn lighting, sirens, and signage to warn and protect the public of potential hazards of Project operations and to restrict the public from certain Project structures.

The London Development tailwater angling access site has been closed since February 16, 2009 due to the absence of designated public access from West Virginia State Road No. 61 over CSX's railroad tracks to the site. The site was previously served by a gravel parking area, located approximately 750 feet west of the tailwater fishing stairway on the opposite side of State Road 61. Historically, anglers crossed over a bridge in order to access the tailwater fishing piers (Photo 4-7). Due to the deterioration of the bridge located over the railroad tracks, the structure deteriorated and, as Appalachian was unable to rehabilitate or modify it for use as an access point, it was removed. Subsequently, Appalachian installed signs at the London Development to direct anglers to the Marmet and Winfield tailwater access sites. Currently,

Appalachian is conducting an access study to determine the best option for providing public access to the London Development tailwater angling access site. Appalachian is also continuing to negotiate with CSX to establish a public Right-of-Way.

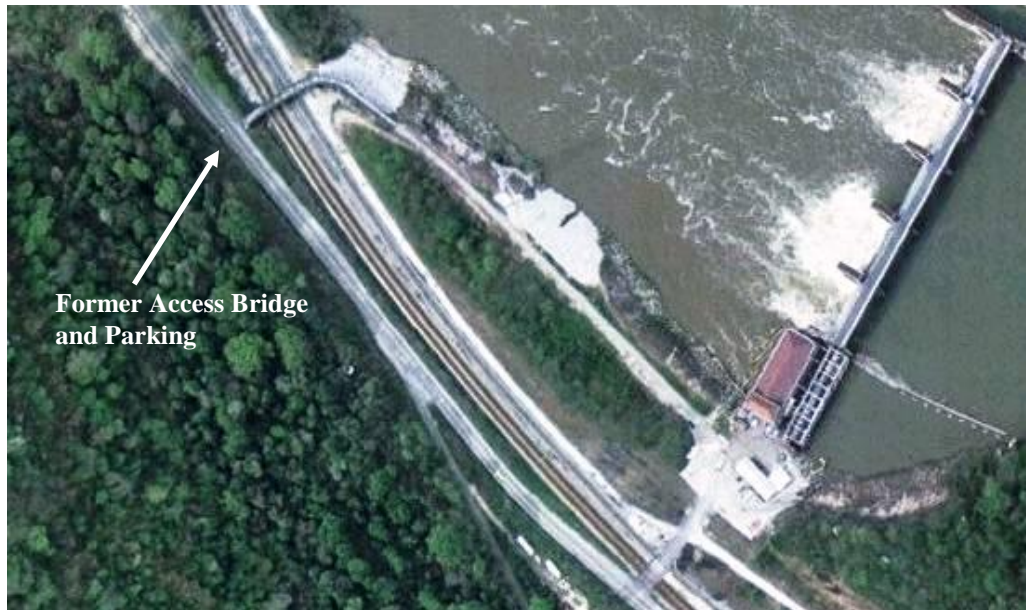


PHOTO 4-5. OVERVIEW OF THE LONDON DEVELOPMENT TAILWATER ANGLING ACCESS SITE

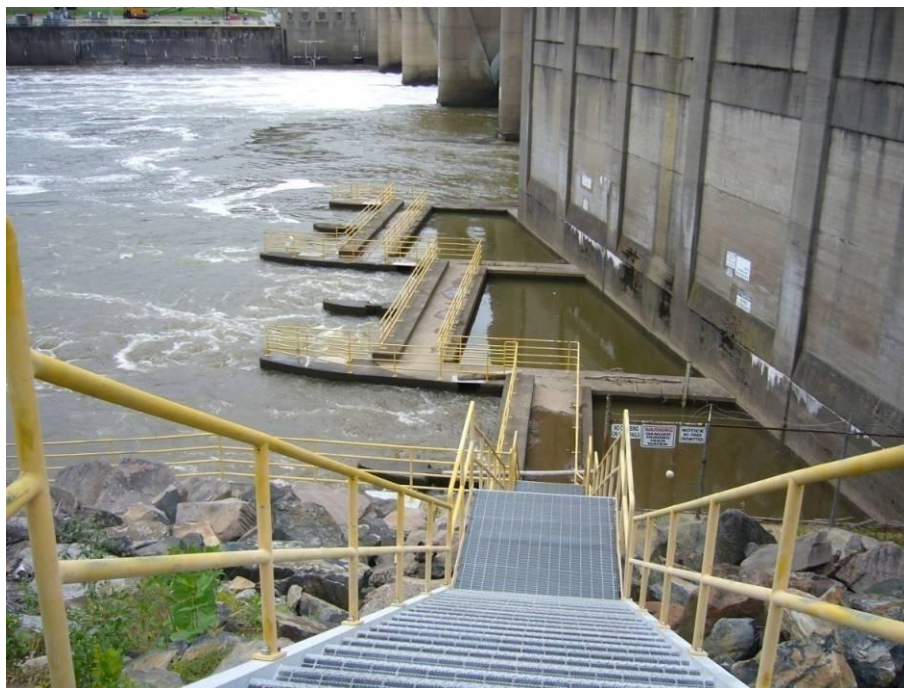


PHOTO 4-6. LONDON DEVELOPMENT TAILWATER FISHING PIER



PHOTO 4-7. RETIRED ACCESS BRIDGE AT THE LONDON DEVELOPMENT

Marmet Development

The Marmet Development tailwater angling access site is accessed off 86th Street via West Virginia State Road No. 61 in Marmet, West Virginia. The tailwater angling access site is also accessible on foot from the neighborhood to the north of the Development. The recreation facilities at the Marmet Development include a tailwater fishing pier and a gravel parking area that can accommodate approximately 28 vehicles (Photo 4-8 and Photo 4-9). A 5 foot-wide by 300-foot-long gravel walkway provides anglers access from the parking area to the top of the tailwater fishing pier stairs. The stairway is 5-foot-wide with handrails, extending from the top of the riverbank to the three draft tube piers in the tailrace. The concrete fishing piers and connecting walkways are approximately 6.5-foot-wide with handrails (Photo 4-10). In addition, Appalachian maintains dusk to dawn lighting, sirens, fencing and signage to warn and protect the public of potential hazards of Project operations and to restrict the public from certain Project structures.

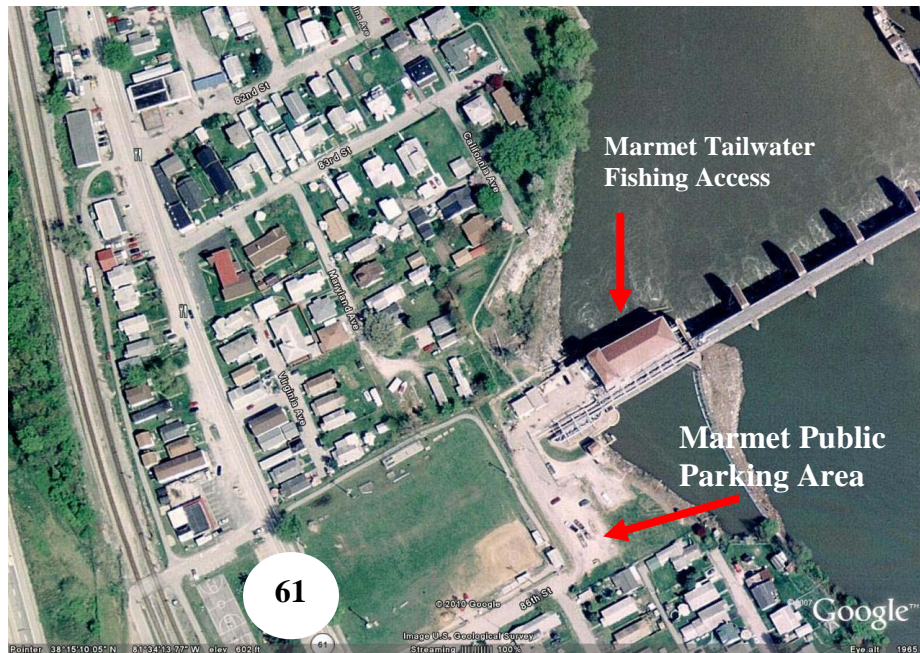


PHOTO 4-8. OVERVIEW OF THE MARMET DEVELOPMENT TAILWATER ANGLING ACCESS SITE



PHOTO 4-9. GRAVEL PARKING AREA AT THE MARMET DEVELOPMENT TAILWATER ANGLING ACCESS SITE

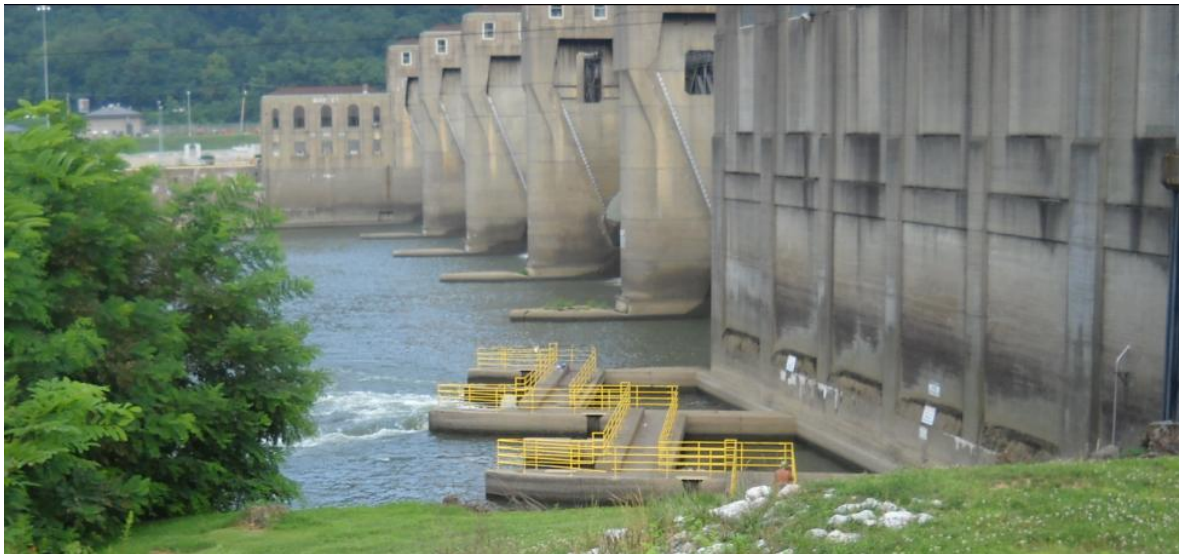


PHOTO 4-10. MARMET DEVELOPMENT TAILWATER FISHING PIER

Winfield Development

The Winfield Development tailwater angling access site is accessed off the Winfield Road via West Virginia State Road No. 34 in Winfield, West Virginia. The recreation facilities at the Winfield Development include a tailwater fishing pier and parking areas (Photo 4-11). The gravel parking area located directly off the Winfield Road is accessed via a gated entrance and can accommodate approximately 28 vehicles (Photo 4-12). A short gravel road connects the southern corner of the gravel parking lot to a paved parking area that provides 4 ADA compliant parking spaces (Photo 4-13 and Photo 4-14).

An ADA compliant access ramp begins at the paved parking area and continues over the riverbank following along the western shoreline (Photo 4-15). The ADA access ramp is owned and maintained by the USACE, and does not connect to the tailwater fishing pier, but does provide anglers with access to waters of the tailrace for angling. A 5 foot-wide by 200-foot-long gravel walkway also provides anglers access from the gravel parking area to the top of the tailwater fishing pier stairs. The stairway is 5-foot-wide with handrails, extending from the top of the riverbank to the fishing piers in the tailrace. At the end of September, the Applicant performed routine maintenance on the fishing pier handrails, improving damages from exposure to high water and debris. The

concrete fishing piers and connecting walkways are approximately 6.5-foot-wide with handrails (Photo 4-16). As with the other Developments, Appalachian maintains dusk to dawn lighting, sirens, fencing and signage to warn and protect the public of potential hazards of Project operations and to restrict the public from certain Project structures.



PHOTO 4-11. OVERVIEW OF THE WINFIELD DEVELOPMENT TAILWATER ANGLING ACCESS SITE



PHOTO 4-12. GRAVEL PARKING AREA AT THE WINFIELD DEVELOPMENT TAILWATER ANGLING ACCESS SITE



PHOTO 4-13. GRAVEL ROAD CONNECTING THE TWO WINFIELD DEVELOPMENT TAILWATER ANGLING ACCESS SITE PARKING AREAS



**PHOTO 4-14. PAVED ADA COMPLIANT PARKING AREA AT THE WINFIELD DEVELOPMENT
TAILWATER ANGLING ACCESS SITE**



PHOTO 4-15. ADA COMPLIANT FISHING ACCESS AT THE WINFIELD DEVELOPMENT



PHOTO 4-16. TAILWATER FISHING PIERS AT THE WINFIELD DEVELOPMENT TAILWATER ANGLING ACCESS SITE

EXISTING RECREATION USE

Appalachian conducted a Recreation Assessment and Angler Use Creel Survey from March 1, 2010 to November 30, 2010 to characterize recreational use and needs for the Marmet and Winfield tailwaters for angling and other recreational purposes. On February 16, 2009, Appalachian was required to close the tailwater fishing pier at the London Development due to the absence of a designated public access through the railroad property. At the time of the Recreation Assessment and Angler Use Creel Survey, the London tailwater angling access site remained closed; therefore Appalachian did not evaluate recreation use as part of the study. The results of this study are summarized below.

Total estimated public recreation use (in recreation days) for the Marmet and Winfield tailwater angling access sites is provided in Table 4-12. The Winfield tailwater angling access site received the highest amount of public recreation use, accounting for

approximately 62 percent of total use (6,160 recreation days). The Marmet tailwater angling access site, by comparison, supported approximately 3,760 recreation days from March 2010 to November 2010.

TABLE 4-12. PUBLIC RECREATION USE AT PROJECT TAILWATER ANGLING ACCESS SITES (MARCH 2010 TO NOVEMBER 2010)

MONTH	DAY TYPE	TAILWATER ANGLING ACCESS SITE USE (RECREATION DAYS)		TOTAL
		WINFIELD	MARMET	
MARCH	Weekend	30	10	40
	Weekday	30	10	40
APRIL	Weekend	140	180	320
	Weekday	180	310	490
MAY	Weekend	120	190	310
	Weekday	620	300	920
	Holiday	410	90	500
JUNE	Weekend	430	330	760
	Weekday	700	440	1,140
JULY	Weekend	160	110	270
	Weekday	310	270	580
	Holiday	160	30	190
AUGUST	Weekend	390	110	500
	Weekday	840	170	1,010
SEPTEMBER	Weekend	160	350	510
	Weekday	400	150	550
	Holiday	80	60	140
OCTOBER	Weekend	200	70	270
	Weekday	460	110	570
	Holiday	110	400	510
NOVEMBER	Weekend	50	0	50
	Weekday	180	60	240
	Holiday	0	10	10
TOTAL	Weekend	1,680	1,350	3,030
	Weekday	3,720	1,820	5,540
	Holiday	760	590	1,350
TOTAL		6,160	3,760	9,920

The summer months (June, July, and August) experience the majority of total use at both sites, with this 3-month time frame supporting approximately 45 percent of the total use during the study period. Fall (September, October, and November) receives the next highest level of use overall, approximately 29 percent of total use.

To estimate off-season recreation use, recreationists were asked to approximate how often they visited the recreation site for recreation purposes by month in a given year, on average. Reported use for unsurveyed months (December, January, and February) accounts for 6.9 percent of total reported use.

Escalating total estimated use (reported in Table 4-12) by 6.9 percent results in 686 recreation days estimated to occur in January, February, and December, 2010.

Given the amenities available at each of the tailwater angling access sites, pier fishing was reported to be the most popular recreational activity (approximately 85 percent of respondents) followed by bank/shoreline fishing and other activities such as sightseeing and picnicking.

Approximately 46 percent of all anglers interviewed indicated that they were not targeting a specific species and for those anglers that were, anglers often targeted more than one species. Most anglers at either the Winfield or Marmet tailwater angling access site were targeting various species of bass, with 75 percent of Winfield tailwater anglers and 72 percent of Marmet tailwater anglers indicating hybrid striped bass as their target species. This was followed by smallmouth bass targeted by approximately 30 percent and 38 percent of Winfield and Marmet tailwater anglers, respectively. Catfish was targeted by approximately 45 percent of Marmet tailwater anglers while 39 percent of Winfield tailwater anglers indicated catfish as their target species. Walleye, sauger saugeye, and crappie were indicated as the target species by a significantly higher percentage of Marmet tailwater anglers than by Winfield tailwater anglers. Seasonal differences in target species indicated also occurred at the sites. In early spring and late fall, there was an increase in anglers targeting sauger and walleye, with an increase in pressure on muskellunge in the spring. In the summer, catfish angling increases, as well as hybrid striped bass, which also peaks in the fall.

Of the fish reportedly caught and released by tailwater anglers, approximately 28 percent (235 fish) were reported to be white drum, while approximately 22 percent of the total catch for tailwater anglers was reported to be hybrid striped bass (178 fish).

The fish most often harvested was reported to be hybrid striped bass. Winfield tailwater anglers harvested 13 hybrid striped bass with an average length of just over 17 inches and an average weight of 5.8 lbs. Other bass species, such as smallmouth and white bass, were more often harvested from Marmet tailwaters. A total of 8 bass, other than hybrid striped bass, were caught and kept by anglers at the Marmet tailwater angling site. These bass averaged 11.88 inches in length, with the longest bass recorded at 14 inches. Catfish were likewise more often harvested from Marmet tailwaters: a total of 7 fish with an average length of almost 18 inches and an average weight of 3.6 lbs. The largest catfish harvested weighed in at 6 lbs.

FUTURE RECREATION USE ESTIMATES

Cordell *et al.* (2004) reports that, “Population has been, is, and will be the major driver of outdoor recreation participation growth in this country.” Kanawha County is expected to decline in population by approximately 4.7 percent from 2010 to 2035. Putnam County population is expected to increase by approximately 8.1 percent over the next 15 years and continue to increase by approximately 3.0 percent from 2025 to 2035. Projections beyond 2035 were unavailable for either county (WVU, 2010). Should use of the Winfield and Marmet tailwater angling access sites follow population growth patterns, angling pressure at the these sites is expected to remain relatively stable over the next 25 years (Table 4-13).

TABLE 4-13. ESTIMATED FUTURE RECREATION DAYS FOR THE MARMET AND WINFIELD TAILWATER ACCESS SITES

	ESTIMATED FUTURE PARTICIPATION					
	2010 ^a	2015	2020	2025	2030	2035
Kanawha County Population	191,008	190,002	188,584	186,913	184,809	181,957
Putnam County Population	56,126	57,785	59,356	60,770	61,862	62,596
Population Growth Rates for Kanawha and Putnam County		0.264%	0.062%	-0.104%	-0.409%	-0.859%
Project Tailwater Angling Use	10,606	10,630	10,640	10,630	10,590	10,500

^a Project tailwater angling use estimate includes estimated use from March 1 through November 30, 2010 plus use projections for unsurveyed months based on reported use totals.

Angling is one of the most popular recreation activities in the state of West Virginia and is reported to be among the top three recreation activities for the Projects' vicinity. However, according to the West Virginia SCORP, future participation in angling "may decline as it has elsewhere due to increased suburbanization of buffer zones and riverine areas" (WVDO, 2009).

RECREATION NEEDS

Parking capacity was used to determine facility use capacities at the Projects. Facility capacity use densities are based on average daily vehicle counts compared with parking capacity, which are used as a proxy for site design capacity (Table 4-14).

TABLE 4-14. USE DENSITIES BY SITE, MONTH AND DAY TYPE

MONTH	DAY TYPE	WINFIELD	MARMET	TOTAL
MARCH	Weekend	2.34%	1.07%	1.71%
	Weekday	1.09%	0.18%	0.64%
	Total	1.72%	0.63%	1.17%
APRIL	Weekend	10.42%	12.05%	11.35%
	Weekday	5.27%	7.44%	6.20%
	Total	7.48%	10.08%	8.78%
MAY	Weekend	9.77%	13.39%	11.78%
	Weekday	17.84%	7.14%	12.49%
	Holiday	64.06%	11.61%	37.83%
	Total	19.11%	10.12%	14.42%
JUNE	Weekend	28.26%	18.75%	23.93%
	Weekday	17.66%	9.11%	13.38%
	Total	23.44%	13.93%	18.91%
JULY	Weekend	12.50%	7.14%	10.20%
	Weekday	8.44%	5.89%	7.17%
	Holiday	25.00%	4.46%	14.73%
	Total	11.72%	6.15%	9.08%
AUGUST	Weekend	25.16%	5.95%	14.68%
	Weekday	22.97%	3.93%	13.45%
	Total	24.06%	5.03%	14.09%
SEPTEMBER	Weekend	17.19%	32.14%	24.67%
	Weekday	12.70%	3.93%	7.82%
	Holiday	14.06%	9.82%	11.94%
	Total	14.84%	15.80%	15.35%
OCTOBER	Weekend	17.97%	5.80%	9.86%
	Weekday	17.19%	3.57%	10.38%
	Holiday	21.88%	69.64%	53.72%
	Total	18.08%	17.68%	17.84%
NOVEMBER	Weekend	6.72%	0.45%	3.93%
	Weekday	7.66%	1.96%	4.81%
	Holiday	0.78%	0.89%	0.84%
	Total	6.61%	1.25%	4.06%
TOTAL	Weekend	14.88%	10.63%	12.70%
	Weekday	12.48%	4.75%	8.62%
	Holiday	25.16%	27.68%	26.53%
	Total	14.28%	8.94%	11.56%

The highest use densities were reported for the Winfield tailwater angling access site on Memorial Day weekend (64 percent). For the Marmet tailwater angling access site, the highest use density was reported for the Columbus Day weekend (70 percent). For

non-holiday weekends, June was the busiest month for the Winfield tailwater angling access site while September was the busiest for the Marmet tailwater angling access site.

Crowdedness was generally reported to be “light” by Marmet tailwater angling access site visitors (68 percent). Winfield tailwater angling access site visitors reported slightly higher crowdedness, with 36 percent indicating “moderate” crowdedness, 28 percent indicating a fairly light level of crowding and 24 percent indicating “light” crowding, on average. Recreationists’ opinions of crowdedness did change across day type with an average weekend crowdedness rating of 2.13; an average weekday rating of 1.84; and an average holiday rating of 3.30 (on a scale of 1 “light” to 5 “heavy”). The month of April had the highest reported crowdedness rating (2.39 average) at the Marmet tailwater angling access site while May had the highest reported crowdedness rating (3.65 average) at the Winfield tailwater angling access site.

Site condition was rated as generally “good” between the two sites. For the Winfield tailwater angling access site, respondents indicated that the condition was “good” overall (3.60 average rating on a scale from 1 “poor” to 5 “excellent”). The average condition rating at the Marmet tailwater angling access site was just slightly less (3.28 average rating). Regardless, over 90 percent of Winfield tailwater angling access site respondents and approximately 66 percent of Marmet tailwater angling access site respondents indicated the need for additional site amenities or improvements, with restrooms and trash receptacles being the most suggested improvements at both sites. Individuals were also asked to indicate whether they had experienced or observed any significant safety hazards at the site at which they were interviewed. Approximately 84 percent of Winfield tailwater angling access site respondents indicated no significant safety hazards while approximately 82 of Marmet visitors indicated the same. Among those calling attention to safety hazards, broken and loose pier railings and high water levels were cited most often. It is important to note that Appalachian replaced the fishing pier handrail at the Winfield tailwater angling access site in October 2010.

PROJECT LAND USE

The Project boundary for each of the three Developments includes the forebays and log booms, powerhouses, tailraces, switchyards, recreational facilities, and in some cases, transmission lines. With the exception of the transmission lines, the Projects' facilities are located at the opposite end of the USACE dams from the locks. The dams, locks, and reservoirs are not part of the licensed hydroelectric facilities. The Project boundaries include all of the land and facilities necessary to safely operate the Projects.

There are approximately 578,050 acres in Kanawha County where the London/Marmet Project is located. An estimated 40,000 acres (7 percent) is developed. The remainder is agricultural, wetlands, waterways, barren or forestland (Kanawha County, 2000).

Lands within the Project boundary at the London/Marmet Project consist primarily of the areas immediately around the powerhouse areas – approximately 4.40 acres for the London Development and 8.64 acres for the Marmet Development. The lands within the Project boundary are owned by the U.S. government except for some transmission line right-of-ways and 1.33 acres at Marmet owned by Appalachian.

Putnam County, where the Winfield Project is located, is approximately 221,440 acres. Thirty percent of the land is used for agriculture, and Putnam County is one of the most productive agriculture regions in the state (Putnam County, 2011; USDA, 2007).

The Project boundary of the Winfield Project encompasses 8.25 acres primarily around the powerhouse area. The lands within the Project boundary are owned by the U.S. government except for some transmission line right-of-ways. The reservoirs created by the dams at London, Marmet, and Winfield are under the control of the USACE for navigation and recreational purposes and are located outside of the Project boundaries. Therefore, there are no shoreline management policies or shoreline buffer zones associated with the Project.

EXISTING AESTHETIC RESOURCES

The Kanawha River Basin topography includes the river valley as well as the steep slopes and narrow ridges. Primary land use in the basin includes coal mining in the upper basin, industrial development in the area around Charleston, and farming in the lower basin (USACE, 1993). Settlement in the region has been principally along the narrow valley floor, with urbanization and heavy industrialization being concentrated on the Kanawha River around Charleston (KVPC, 1981a, 1981b).

The visual characteristics of the Projects include views of primarily residential, commercial, and industrial development along the river corridor in the foreground and middle ground and more distant views of steep forested mountains. The area immediately around each Development includes the facilities associated with the USACE, locks and dams and Project powerhouse facilities, and transmission lines.

During the Recreation Assessment and Angler Use Creel Survey, individuals were asked by the recreation clerk about the visual quality of the tailwater angling access sites. The average response was an aesthetics rating of 3.6 (“good” on a scale from 1 “poor” to 5 “excellent”). Approximately 95 percent of Winfield tailwater angling access site visitors indicated that the aesthetics of the site was “good” to “excellent”, with 32 percent of respondents indicating “excellent” aesthetics. At the Marmet tailwater angling access site, approximately 41 percent of respondents rated the aesthetics as “good” and 11 percent rated the aesthetics as “excellent”. Among the comments received pertaining to the aesthetics of the Project tailwater angling access sites were the need for landscaping, trash removal and other maintenance issues.

4.3.6.2 ENVIRONMENTAL EFFECTS

Adequacy of existing public access, including the angler access facility at the London Development, and recreational facilities in the Project boundary to meet current and future recreational demand.

The Marmet and Winfield Developments provide parking and tailwater angling access. The sites are generally rural but within a reasonable drive of an urban center, Charleston, West Virginia.

The Winfield Project tailwater recreation site accommodated 6,160 recreation days between March 2010 and November 2010. The Marmet tailwater angling access site, by comparison, supported approximately 3,760 recreation days from March, 2010 to November, 2010. Both sites were reported to be well within their design capacities, with respondents indicating the sites to be in very good condition overall with limited crowding, primarily on peak weekends. Among the improvements recommended are maintenance of existing sites and amenities such as trashcans.

PROPOSED ACTION

Appalachian is working with resource agencies and interested stakeholders to re-establish access to the London tailrace fishing site. As such, Appalachian has undertaken the London Development Tailrace Fishing Access Feasibility Study to further address access options to the London Development, as well as available access alternatives within the vicinity of the London Development. The objective of the study is to identify, analyze and compare alternatives for providing public access to the London tailrace fishing access and to identify the preferred means to re-establish access to the London tailrace fishing access. Options include: 1) providing an at-grade crossing for the public and 2) replacing the pedestrian bridge. Additionally, in light of the complications associated with establishing a Right-of-Way with CSX, other options are being evaluated. They are: 1) establishing a new fishing access area at Appalachian owned property near Cabin Creek and 2) enhancing the existing facilities at the Marmet Development. The final report, and associated discussions, will be included within the FLA.

The results of the Recreation Assessment and Angler Use Study performed at the Projects indicate that the addition of restrooms and trash receptacles were the most suggested improvements at both the Marmet and Winfield angling access sites. As such, Appalachian proposes to install portable restrooms and trash receptacles at both sites to accommodate existing and future use.

Because of the London/Marmet and Winfield Projects' proximity to several state parks and forests, WMAs, national forests, public fishing areas and boat launches and the low

use levels reported at the Marmet and Winfield tailwater angling access sites, recreation facilities at the Projects provide opportunities sufficient to satisfy existing public recreation demand in the area. Further, population growth is not expected to contribute significant additional pressures to these resources. The recreation resources at the Projects are generally sufficient and acceptable to satisfy expected future recreation demand at Project recreation sites.

There are many uncertainties when predicting future recreational use, both in general, and specific to the Marmet and Winfield Developments. Among the general uncertainties are new technologies, shifting demographic patterns, economic growth, etc. However, based upon the data collected as part of the study, the recreational facilities at the Marmet and Winfield Developments do not appear to have reached a point of being at or over capacity, nor are they expected to approach capacity in the near future. It is expected that with continued maintenance, improvements and upkeep, these facilities will be able to accommodate additional growth. In addition, measures to mitigate the loss of angling opportunities at the London Development will help to continue support of recreational activity on the Kanawha River.

NO-ACTION ALTERNATIVE

Under the no-action alternative, Appalachian would continue to operate and maintain the existing recreation facilities at the Marmet and Winfield Developments. Restroom and trash facilities however, would not be available. Without these amenities, recreationists would need to leave the sites to use restrooms and would also be obligated to remove their own trash. It is likely that the potential for littering would then increase and in turn, affect the aesthetics of the sites.

Effect of continued Project operation on fishing opportunities within the Project areas.

PROPOSED ACTION

Appalachian is not proposing to modify current Project operations other than limiting the allowable London Pool level fluctuation to a value less than the currently allowed

3.0 feet. Currently, operation of the hydroelectric facilities at the London/Marmet and Winfield Projects is synchronized with the operations of the USACE locks at each dam.

Under the proposed action, anglers would continue to recreate at the tailwater angling access sites. Generally, water levels for angling were considered to be fairly good on the days of the interviews and this did not vary significantly amongst the tailwater angling access sites. Approximately 29 percent of Winfield tailwater anglers and 27 percent of Marmet tailwater anglers suggested no change should be made to water levels on the day they were interviewed.

At the London Development, the allowable 3-foot headpond fluctuation would allow for manipulation of the Project discharge and subsequently tailwater levels. The proposed action to reduce the allowable headpond fluctuation and follow a run-of-release scenario largely dictated by the USACE, reduces the magnitude of tailwater fluctuations due to Project operations. It also reduces potential effects to fishermen and recreational boaters in the London impoundment.

Based on the results of the Recreation Assessment and Angler Use Creel Survey Report, anglers were satisfied with existing fishing opportunities at the Winfield and Marmet Projects. In addition, Appalachian has no control over the inflow to the Projects, and very limited control over discharge volumes due to limited storage and allowable head pond fluctuations. Therefore, Appalachian has very limited control over the tailwater levels.

NO-ACTION ALTERNATIVE

Under the no-action alternative, Appalachian would continue to operate and maintain the existing recreation facilities at the Marmet and Winfield Developments and operation of the Projects would continue to be coordinated with the USACE. This does not constitute a significant difference from the proposed action.

At the London Development, however, a 3-foot headpond fluctuation could potentially effect recreationists in the London headpond by limiting areas of use. Subsequent

changes in discharge could also affect fishing conditions in the tailwater areas but the magnitude and type of affects (positive or negative) are unknown.

4.3.6.3 UNAVOIDABLE ADVERSE EFFECTS

Appalachian does not anticipate any adverse impacts to recreation resources or fishing opportunities at the Projects.

4.3.6.4 REFERENCES

Appalachian Power Company (Appalachian). 2009a. FERC Form 80 Licensed Hydropower Development Recreation Report for the Winfield Project (FERC No. 1290). Accession No.: 20090330-5101. Submitted March 30, 2009.

Appalachian Power Company (Appalachian). 2009b. FERC Form 80 Licensed Hydropower Development Recreation Report for the London/Marmet Project (FERC No. 1175). Accession No.: 20090330-5100. Submitted March 30, 2009.

Appalachian Power Company (Appalachian). 2003a. FERC Form 80 Licensed Hydropower Development Recreation Report for the Winfield Project (FERC No. 1290). Accession No.: 200303315029. Submitted March 31, 2003.

Appalachian Power Company (Appalachian). 2003b. FERC Form 80 Licensed Hydropower Development Recreation Report for the London/Marmet Project (FERC No. 1175). Accession No.: 200303315035. Submitted March 31, 2003.

Cordell, H. Ken, *et al.* 2004. Outdoor Recreation for 21st Century America: A Report to the Nation: The National Survey on Recreation and the Environment. State College, PA: Venture Publishing Inc.

Kanawha County. 2000. Draft Comprehensive Development Plan for Kanawha County, West Virginia. [Online] URL: http://www.kancocomm.com/planning/2020/document_intro.htm. Accessed on August 11, 2011.

Kanawha Valley Power Company (KVPC). 1981a. Application for new license for major project – existing dam. London/Marmet Project, FEC Project No. 1175. KVPA, Charleston, WV, January 1981.

Kanawha Valley Power Company (KVPC). 1981b. Application for new license for major project – existing dam. Winfield Project, FEC Project No. 1290. KVPA, Charleston, WV, January 1981.

Messinger, T. and C.A. Hughes. 2000. Environmental Setting and its Relations to Water Quality in the Kanawha River Basin, Water Resources Investigation Report 00-4020, National Water-Quality Assessment Program, Charleston; by Charleston, West Virginia. [Online]

- URL: <http://pubs.usgs.gov/wri/wri004020/pdf/wri00-4020.pdf>. Accessed on August 11, 2011.
- National Park Service (NPS). 2011a. New River Gorge National River. [Online] URL: <http://www.nps.gov/neri/planyourvisit/outdooractivities.htm>. Accessed on January 3, 2011.
- National Park Service (NPS). 2011b. Gauley River National Recreation Area. [Online] URL: <http://www.nps.gov/gari/index.htm>. Accessed on January 11, 2011.
- National Park Service (NPS). 2011c. National Trail System Map. [Online] URL: <http://www.nps.gov/nts/maps.html>. Accessed on August 11, 2011.
- National Park Service (NPS). 2009. Draft Foundation Plan for New River Gorge national River. [Online] URL: <http://parkplanning.nps.gov/document.cfm?parkID=259&projectID=11040&documentID=31487>. Accessed on January 3, 2011.
- National Wilderness Preservation System (NWPS). 2011. US Wilderness Preservation System Map. [Online] URL: <http://www.wilderness.net/index.cfm?fuse=NWPS>. Accessed on August 11, 2011.
- Pollock, K.H., C.M. Jones, and T.L. Brown. 1994. Angler Survey Methods and their Applications in Fisheries Management. American Fisheries Society Special Publication 25, Bethesda, MD.
- Putnam County Chamber of Commerce (Putnam County). 2011. History of Putnam County, WV. [Online] URL: <http://putnamchamber.org/history-of-putnam-county-wv/>. Accessed August 31, 2011.
- U.S. Army Corps of Engineers (USACE). 1993. Kanawha River navigation study, Marmet lock replacement draft feasibility report. USACE Huntington District, Huntington, WV. August 1993.
- U.S. Census (Census). 2010a. Handley, West Virginia. [Online] URL: http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&geo_id=16000US5432716&_geoContext=01000US|04000US54|16000US5432716&_street=&_county=handley&_cityTown=handley&_state=04000US54&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=160&_submenuId=population_0&ds_name=null&_ci_nbr=null&qtr_name=null®=null:null&_keyword=&_industry=. Accessed on December 30, 2010.
- U.S. Census (Census). 2010b. Marmet, West Virginia. [Online] URL: http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&geo_id=16000US5434756&_geoContext=01000US|04000US54|16000US5434756&_street=&_county=marmet&_cityTown=marmet&_state=04000US54&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=160&_submenuId=population_0&ds_name=null&_ci_nbr=null&qtr_name=null®=null:null&_keyword=&_industry=. Accessed on December 30, 2010.

- U.S. Census (Census). 2010c. Winfield, West Virginia. [Online] URL: http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&geo_id=16000US5451724&geoContext=01000US|04000US54|16000US5451724&street=&county=winfield&cityTown=winfield&state=04000US54&zip=&lang=en&sse=on&ActiveGeoDiv=geoSelect&useEV=&pctxt=fph&pgsl=160&submenuId=population_0&ds_name=null&ci_nbr=null&qtr_name=null®=null:null&keyword=&industry=. Accessed on December 30, 2010.
- U.S. Department of Agriculture (USDA). 2007. Census of Agriculture, County Profile. Putnam County, West Virginia. http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/West_Virginia/cp54079.pdf. Accessed August 31, 2011.
- U.S. Forest Service (USFS). 2011a. Monongahela National Forest. [Online] URL: <http://www.fs.fed.us/r9/mnf/index.shtml>. Accessed on January 10, 2011.
- U.S. Forest Service (USFS). 2011b. Cranberry Wilderness. [Online] URL: http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gDfxMDT8MwRydLA1cj72BTJw8jAwjQL8h2VAQAzHJMsO!!/?ss=110921&navtype=BROWSEBYSUBJECT&navid=1100000000000000&recid=12368&ttype=recarea&pname=Monongahela%2520National%2520Forest%2520-%2520Cranberry%2520Wilderness. Accessed on January 10, 2011.
- U.S. Forest Service (USFS). 2011c. Wayne National Forest. [Online] URL: http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_AI8zPwhQoY6BdkOyoCAPkATIA!/?ss=110914&navtype=BROWSEBYSUBJECT&navid=0910000000000000&pnavid=null&recid=null&actid=null&groupid=null&ttype=main&pname=Wayne%20National%20Forest-%20Home. Accessed on January 10, 2011.
- West Virginia Development Office (WVDO). 2009. West Virginia Statewide Comprehensive Outdoor Recreation Plan 2009 – 2013. [Online] URL: http://72.41.119.75/Library/SCORPs/WV_SCORP_2009.pdf. Accessed on January 12, 2011.
- West Virginia Division of Natural Resource (WVDNR). 2011a. West Virginia Wildlife Management Areas. [Online] URL: <http://wvweb.com/hunting/map.html>. Accessed on January 7, 2011.
- West Virginia Division of Natural Resources (WVDNR). 2011b. Cabwaylingo State Forest. [Online] URL: <http://www.cabwaylingo.com/recreation.html>. Accessed on January 10, 2011.
- West Virginia Division of Natural Resources (WVDNR). 2011c. West Virginia State Parks and Forests Locations. [Online] URL: <http://www.wvstateparks.com/parklistings.pdf>. Accessed on January 10, 2011.

West Virginia Division of Natural Resources (WVDNR). 2011d. Hawks Nest State Park. [Online] URL: <http://www.hawksnestsp.com/recreation.htm>. Accessed on January 11, 2011.

West Virginia Division of Natural Resources (WVDNR). 2011e. Kanawha State Forest. [Online] URL: <http://www.kanawhastateforest.com/recreation.html>. Accessed on January 11, 2011.

West Virginia Division of Natural Resources (WVDNR). 2011f. Fishing and Boating Points of Interest. [Online] URL: http://www.wvdnr.gov/fishing/public_access.asp?county=Braxton&type=all. Accessed on January 12, 2011.

West Virginia GIS Technical Center (WVGTC). 2002. GIS Data. [Online] URL: <http://wvgis.wvu.edu/data/dataset.php?ID=194>. Accessed on January 7, 2011.

West Virginia University, Bureau of Business and Economic Research (WVU). 2010. 2010 Population Projection for West Virginia Counties by Age-Group and Sex. [Online] URL: http://www.be.wvu.edu/demographics/documents/2010PopulationProjectionforWVaCounties_000.pdf. Accessed January 12, 2011.

4.3.7 CULTURAL RESOURCES

4.3.7.1 AFFECTED ENVIRONMENT

The USACE's London, Marmet, and Winfield locks and dams are part of what was originally called the Great Kanawha Navigation system. Completed in 1898, the system provided year-round water transportation for 90 miles of the Kanawha River from Boomer to Point Pleasant on the Ohio River. The system's 10 original locks and dams were replaced by four high lift dams with German roller gates in the early 1930s. Gallipolis (now called RC Byrd Locks and Dam) was built on the Ohio River, and London, Marmet, and Winfield were built on the Kanawha River. The London, Marmet, and Winfield lock/dam complexes also include facilities for hydropower generation, which Appalachian operates today.

It has been identified through previous archeological investigations that the dam complexes themselves are historically significant, with the hydroelectric facilities themselves contributing to their historical integrity. These studies thus resulted in the identification of a Multiple Property Historic District, the Kanawha River Navigation System, which has been determined eligible for the National Register of Historic Places (NRHP) (Green *et al.*, 2010).

AREA OF POTENTIAL EFFECT

The Advisory Council on Historic Preservation defines an Area of Potential Effect (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. Through relicensing and study activities, Appalachian has consulted with the WV SHPO and the USACE on an appropriate APE for the Projects. It was determined through these discussions that the APE for all three Developments should include the Projects' facilities and a 300-foot corridor both up and downstream from the facilities.

RESULTS OF ARCHAEOLOGICAL, HISTORICAL, AND TRADITIONAL CULTURAL RESOURCE SURVEYS

In consultation with WV SHPO, and in accordance with the FERC approved Cultural Resources Study Plan dated June 2009, Appalachian commissioned a Cultural Resources Survey at the London/Marmet and Winfield Projects. Research and field work associated through this study took place from September through November of 2009 and consisted of a historic architectural survey of the Projects' facilities and a Phase I archaeological survey of the APE. Archaeological investigations consisted of pedestrian survey and shovel testing (where appropriate) of areas within 300 feet of each of the three facilities. Areas both up and downstream of the dams were investigated, as was both banks of the river (for a total of four areas at each of the facilities). Shovel tests were excavated at 15-m intervals and site boundaries were determined by excavating shovel tests at 5-m intervals radiating from an initial positive shovel test until two negative shovel tests were excavated.

Architectural investigations were performed for the three Projects' facilities in order to identify those components that contribute to the eligibility of the Kanawha River Navigation System Historic District. These survey activities consisted of a visual inspection of the interiors and exteriors of the powerhouses and appurtenant facilities, both overview and detailed photographs of the powerhouses, and interviews with Appalachian staff members who had personal knowledge of various changes made to the generating equipment and appurtenant facilities (Green *et al.*, 2010). All survey

activities were performed in compliance with the qualifications specified in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (Federal Register [FR] 48:44716–44742) and the Guidelines for Phase I, II, and III Archaeological Investigations and Technical Report Preparation (Trader and Wilson, n.d.). Specific details regarding the archaeological and architectural surveys performed the hydroelectric Projects are described below.

ARCHEOLOGICAL INVESTIGATIONS

LONDON/MARMET PROJECT

London Development

As noted above, a Phase I archaeological survey was conducted at all three Developments during mid-November of 2009. Four areas were surveyed at the London Development, all of which were previously disturbed by rip-rap, retaining walls, and activities from construction of the lock and dam structure. No archaeological sites were identified as a result of survey activities (Green *et al.*, 2010).

Marmet Development

Of the four areas surveyed within the APE at the Marmet Development, three were previously disturbed by lock and dam construction, road construction, rip-rap, and a natural gas line. A single shovel test was performed within the Project area, which resulted in no cultural material recovery.

WINFIELD PROJECT

Three of the four areas surveyed for archaeological resources at the Winfield Project were found to be previously disturbed by activities pertaining to lock and dam construction, and/or maintenance. Shovel tests were performed in one non-disturbed area within the APE and one archaeological site was identified as a result. However, because of the heavy disturbance around the site, and the shallow depth of artifact recovery, this site has been recommended as ineligible for inclusion in the NRHP due to the fact that the site is unlikely to yield important information about the prehistory of the region (Green *et al.*, 2010).

ARCHITECTURAL INVESTIGATIONS

As described above, it was identified through previous investigations that the hydroelectric facilities contribute to the historic integrity of the lock and dam complexes. However, the specific components that contribute to the historic character of the facilities had not been previously identified. Green, *et al.* describes within their 2010 Phase I survey report that the London, Marmet, and Winfield powerhouses are characterized by their utilitarian construction with minimal ornamentation, including bare concrete walls, and the exterior use of simple, linear accents along the corners surrounding the large side doors. Previous investigations made note of the use of new Woodward governors at the three Developments, the significance of which being that the Woodward governors could be placed within a single cabinet, which was a technological advance at the time. Furthermore, the cabinets themselves were designed in an Art Deco style. The Winfield powerhouse includes an added design in the floor tiles, outlining the three generating units located below floor level. Furthermore, the building height, exposed shallow metal roof trusses, and economical use of glass block in the windows of the three facilities were identified as adding to the architectural character of the hydroelectric facilities (Green *et al.*, 2010).

As a result, Green *et al.* identifies the following components as contributing to the integrity of design and materials at the London/ Marmet and Winfield Projects:

- Original footprint
- Exposed concrete interior and exterior walls
- Pattern of incised lines on the interior walls
- Exterior forms in the concrete
- Woodward governor cases (the equipment inside does not contribute to the significance)
- Identification of the shape of the generators in the Winfield floor tiles
- Exposed shallow metal roof trusses
- Glass block windows

As identified above, the generation functions of the hydroelectric facilities themselves contribute to the historical integrity of the Multiple Property Historic District. Green *et al.* notes that the historic integrity of the three powerhouses, moreover, requires that the buildings continue to serve as hydroelectric powerhouses, which places certain requirements on the licensee regarding maintenance and upgrades to the electrical equipment. The specific electrical generating and controlling equipment, therefore, does not contribute to the eligibility of the powerhouses. The design integrity will not be affected so long as the components are replaced with equivalent modern equipment in a way that maintains the basic layout of the original design (Green *et al.*, 2010).

NRHP/NRHP ELIGIBLE SITES WITHIN THE APE

As discussed above, the Kanawha River Navigation System Historic District, which includes the London/ Marmet and Winfield Projects, has been determined eligible for the NRHP. The function of the London/ Marmet and Winfield Projects as hydroelectric facilities contributes to historic integrity of the sites.

Phase I cultural resource investigations performed as a part of the relicensing process found the Project areas to be highly disturbed and resulted in the identification of only one site, which was subsequently recommended ineligible for inclusion in the NRHP (Green *et al.*, 2010).

SITES OF CULTURAL SIGNIFICANCE TO INDIAN TRIBES

There are no known tribal lands or Indian traditional cultural and religious properties within the Projects' boundaries or in the Projects' vicinities. On September 30, 2009, the Tribal Historic Preservation Office of the Eastern Band of the Cherokee Indians corresponded with Appalachian, noting their continued interest in consulting under Section 106 of the National Historic Preservation Act.

4.3.7.2 ENVIRONMENTAL EFFECTS

Generally speaking, effects on historic properties within the APE can result from Project-related activities such as reservoir operations and Project-related ground-disturbing activities. Effects

can also result from other forces such as wind and water erosion, recreational activities, and vandalism. The type and level of effects on cultural resources can vary widely, depending upon the setting, size, and visibility of the resource, as well as whether there is public knowledge about the location of the resource.

4.3.7.3 **PROPOSED ACTION**

Appalachian proposes to prepare an HPMP to govern management of significant cultural resources in the APE's of the London, Marmet, and Winfield Developments over the term of a new license. The HPMP would be developed in consultation with the WV SHPO, and other interested parties, and in accordance with the FERC's guidelines for HPMPs. The HPMP would contain policies and procedures for identifying effects of the Projects' operations on historic properties over the term of the new license. The HPMP would also contain policies and procedures for the development and implementation of measures to avoid, minimize or mitigate any adverse effects. Appalachian will submit its HPMP to the Commission for approval, and will implement its finalized HPMP upon the Commission's issuance of new licenses for the London/ Marmet and Winfield Projects.

EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES ON PROPERTIES THAT ARE INCLUDED IN OR ELIGIBLE FOR INCLUSION IN THE NATIONAL REGISTER OF HISTORIC PLACES

Development and implementation of an HPMP in consultation with the WV SHPO will ensure that adverse effects on historic properties arising from operations of the Projects or Project-related activities over the term of the new license would be avoided or satisfactorily resolved. The HPMP will include specific measures to resolve any potential adverse effects arising from new license requirements.

4.3.7.4 **NO-ACTION ALTERNATIVE**

Under the no-action alternative, the London/Marmet Project and the Winfield Project would continue to operate as required by the current Project licenses (*i.e.*, there would be no change to the existing environment). Appalachian would continue to manage the historic properties within the APE in accordance with Section 106 of the NHPA, but would not prepare an HPMP and

would not enter into a PA. This means that Appalachian would comply with Section 106 on a case-by-case basis.

4.3.7.5 UNAVOIDABLE ADVERSE EFFECTS

Appalachian has proposed no changes to the operations or the facilities of the London/Marmet Project and the Winfield Project that will result in unavoidable adverse effects. Appalachian proposes to enter into a Programmatic Agreement between the FERC and the WV SHPO, which will call for the development and implementation of a HPMP. This HPMP will provide Appalachian with guidance on resolving or mitigating any potential adverse effects to historic properties that may arise in the future.

4.3.7.6 REFERENCES

Green, William, M.A., Bruce G. Harvey, Ph.D, Kimberly Nagle, and Heather Jones. 2010. Phase I Cultural Resources Survey of the London/Marmet and Winfield Hydroelectric Facilities, Putnam and Kanawha Counties, West Virginia. Prepared for Appalachian Power Company, Roanoke, Virginia. February 2010.

4.3.8 SOCIOECONOMIC ISSUES

The London and Marmet Developments are in Kanawha County, West Virginia. The London reservoir, which is not within the Project boundary, extends upstream into Fayette County. The Winfield Project is located in Putnam County; the reservoir, which is not in the Project boundary, extends upstream into Kanawha County. The counties are mostly rural, with extensive industrial, commercial, and residential development in the Kanawha River valley. Charleston is the nearest major city, located downstream of the Marmet Development and upstream of the Winfield Project. I-64/77 passes near the Projects and through Charleston.

4.3.8.1 AFFECTED ENVIRONMENT

DEMOGRAPHICS AND POPULATION

Table 4-15 summarizes the population statistics for the counties, as well as the state as a whole. From 2000 to 2010, Putnam County experienced the highest population growth of the three counties, approximately 7.6 percent. Conversely, the populations of

Kanawha and Fayette counties have declined. West Virginia's population, as a whole, has grown less than 3 percent. This is a continuation of the pattern established between 1990 and 2000, when the populations of Kanawha and Fayette counties also declined (U.S. Census, 2010).

TABLE 4-15. SELECTED SOCIOECONOMIC CHARACTERISTICS OF THE PROJECT AREA

	KANAWHA COUNTY ^a	PUTNAM COUNTY ^b	FAYETTE COUNTY ^c	WEST VIRGINIA ^d
Population				
Population, 2010 estimate	193,063	55,486	46,039	299,398,484
Population, percent change, 2000 to 2010	-3.50%	7.60%	-3.20%	2.50%
Population, 2000	200,076	51,586	47,579	1,808,344
Population, percent change, 1990 to 2000	-3.6%	20.4%	-0.8%	0.8%
Persons under 18 years old, percent, 2009	21.20%	23.10%	21.50%	21.20%
Persons 65 years old and over, percent, 2009	0.7%	13.8%	16.0%	15.8%
Race				
White persons, percent, 2010	89.10%	96.80%	93.50%	93.90%
Black persons, percent, 2011	7.30%	0.90%	4.60%	3.40%
American Indian and Alaska Native Persons, percent, 2010	0.20%	0.20%	0.20%	0.20%
Asian persons, percent, 2010 (a)	1.00%	0.70%	0.20%	0.70%
Persons reporting two or more races, percent, 2010	2.00%	1.10%	1.30%	1.50%
Persons of Hispanic or Latino origin, percent, 2010	0.90%	0.90%	0.90%	1.20%
White persons not Hispanic, persons, 2010	88.60%	96.20%	92.90%	93.20%
Education				
High school graduates, percent of persons age 25+, 2005-2009	85.90%	88.60%	76.70%	81.60%
Bachelor's degree or higher, pct of persons age 25+, 2005-2009	23.00%	23.90%	11.20%	17.10%
Households				
Housing units, 2009	95,576	23,915	22,464	893,771
Homeownership rate, 2005-2009	70.4%	85.8%	76.0%	74.3%
Housing units in multi-unit structures, percent, 2005-2009	17.70%	8.20%	7%	12.20%
Median value of owner-occupied housing units, 2005-2009	\$96,700	128,200	\$67,500	\$91,400
Households, 2005-2009	83,590	21,282	18,887	746,419
Persons per household, 2005-2009	2.26	2.56	2.35	2.37
Income				
Median household income, 2009	\$41,747	\$51,586	\$31,920	\$37,423
Per capita money income in past 12 months (2009 dollars) 2005-2009	\$24,816	\$25,215	\$17,711	\$20,891
Persons below poverty level, percent, 2009	14.40%	10.80%	21.60%	17.80%

^a <http://quickfacts.census.gov/qfd/states/54/54039.html>, accessed August 4, 2011.

^b <http://quickfacts.census.gov/qfd/states/54/54079.html>, accessed August 4, 2011.

^c <http://quickfacts.census.gov/qfd/states/54/54019.html>, accessed August 4, 2011.

^d <http://quickfacts.census.gov/qfd/states/54000.html>, accessed August 4, 2011.

EMPLOYMENT AND INCOME

In 2009, the annual per capita personal income in Kanawha and Putnam counties was \$24,816 and \$25,215, respectively, which was above the per capita income for the state of West Virginia. The annual per capita for Fayette County, \$17,711, was lower than Kanawha and Putnam counties, as well as the state of West Virginia. Fayette County has a higher poverty rate than the overall state average by about 4 percent; however, it exhibits a high rate of homeownership, comparable to the state's overall average (U.S. Census, 2010).

SOURCES OF EMPLOYMENT

The U.S. Bureau of the Census (1990) summarizes employment information for more than 6,000 geographic areas in the United States. Table 4-16 presents employment information for West Virginia and Kanawha, Putnam and Fayette counties. The manufacturing sector provides the greatest number of jobs in Kanawha County. Retail trade ranked highest in Putnam and Fayette counties, as well as the State of West Virginia as a whole. Jobs pertaining to agriculture and arts/entertainment employ relatively few people in all three counties.

TABLE 4-16. EMPLOYMENT BY INDUSTRY IN WEST VIRGINIA, KANAWHA, PUTNAM AND FAYETTE COUNTIES, 1990. (SOURCE: U.S. BUREAU OF THE CENSUS, 1990)

	KANAWHA COUNTY	PUTNAM COUNTY	FAYETTE COUNTY	WEST VIRGINIA
Agriculture, forestry, fishing and hunting, and mining	1	1	1	2
Construction	7	9	7	7
Manufacturing	13	14	11	15
Wholesale trade	6	7	2	3
Retail trade	2	20	21	18
Transportation and warehousing, and utilities	5	6	5	4
Finance and insurance, and real estate and rental and leasing	9	5	4	5
Other professional related services	8	5	5	5
Educational services, health care, and social assistance	10	7	11	10
Arts, entertainment, and recreation, and accommodation, and food services	1	1	1	1
Health services	12	8	10	10
Public administration	8	4	5	4
Mining	3	1	8	5
Communications and other public utilities	8	6	3	4
Business and repair services	5	4	3	3
Personal services	3	3	3	3

http://factfinder.census.gov/servlet/QTTable?_bm=y&-context=qt&-qr_name=DEC_1990_STF3_DP3&-ds_name=DEC_1990_STF3_&-tree_id=101&-keyword=Fayette&-redoLog=true&-all_geo_types=N&-caller=geoselect&-geo_id=04000US54&-geo_id=05000US54019&-geo_id=05000US54039&-geo_id=05000US54079&-search_results=05000US54039&-format=&-lang=en Accessed August 4, 2010.

4.3.8.2 ENVIRONMENTAL EFFECTS/ECONOMIC IMPACTS

Operation of the Projects has a small positive impact on the local economy and employment. Appalachian employs nine people locally to run all three Developments, including a supervisor, two instrumentation and control technicians, and six mechanics. The remainder of Projects' operations are handled from Appalachian's office in Roanoke, Virginia and the Operations Center in Columbus, Ohio.

PROPOSED ACTION

Although Appalachian has made no proposals that pertain directly to socioeconomic resources within the boundaries of the London/Marmet and Winfield Projects, several of the proposed environmental protection and enhancement measures would directly and indirectly affect socioeconomic conditions in the Project areas and communities in the region. Measures that are proposed for the protection and enhancement of fish, recreation and cultural resources could have a positive effect on socioeconomic conditions by enhancing recreational opportunities and potentially increasing tourism, thereby providing additional jobs and potentially increasing commercial and residential development in the area.

The cost of implementing such measures has the potential to increase the cost of Project power, which would have a negative effect on socioeconomic conditions by increasing consumer electricity rates. At this time, it isn't feasible to estimate the actual costs and other socioeconomic effects for the proposed measures.

NO-ACTION ALTERNATIVE

Under the no-action alternative, the Projects would continue to operate as they are currently. There would be no significant change to the existing environmental setting or Project operations. No new environmental measures would be implemented.

4.3.8.3 UNAVOIDABLE ADVERSE EFFECTS

No unavoidable adverse effects have been identified.

4.3.8.4 REFERENCES

U.S. Census Bureau. 2010. Kanawha County Quick Facts. [Online] URL: <http://quickfacts.census.gov/qfd/states/54/54039.html>. Accessed August 4, 2010.

U.S. Census Bureau. 2010. Putnam County Quick Facts. [Online] URL: <http://quickfacts.census.gov/qfd/states/54/54079.html>. Accessed August 4, 2010.

- U.S. Census Bureau. 2010. Fayette County Quick Facts. [Online] URL: <http://quickfacts.census.gov/qfd/states/54/54019.html>. Accessed August 4, 2010.
- U.S. Census Bureau. 2010. West Virginia Quick Facts. [Online] URL: <http://quickfacts.census.gov/qfd/states/54000.html>. Accessed August 4, 2010.
- U.S. Census Bureau. 1990. American Factfinder: Kanawha, Putnam, and Fayette Counties. [Online] URL: http://factfinder.census.gov/servlet/QTTable?_bm=y&-context=qt&-qr_name=DEC_1990_STF3_DP3&-ds_name=DEC_1990_STF3_&-tree_id=101&-keyword=Fayette&-redoLog=true&-all_geo_types=N&-_caller=geoselect&-geo_id=04000US54&-geo_id=05000US54019&-geo_id=05000US54039&-geo_id=05000US54079&-search_results=05000US54039&-format=&-_lang=en. Accessed August 4, 2010.

APPENDIX A
INVENTORY OF REGIONAL RECREATION AREAS

**LIST OF REGIONAL STATE PARKS, FORESTS, AND WILDLIFE MANAGEMENT AREAS NEAR THE
LONDON/MARMET AND WINFIELD PROJECTS**

PLACE	LOCATION	MANAGING AGENCY
<i>State Parks</i>		
Babcock	Clifftop	DNR, WV State Parks and Forests
Beartown	Hillsboro	DNR, WV State Parks and Forests
Beech Fork Lake	Barboursville	DNR, WV State Parks and Forests
Blennerhasset Island	Parkersburg	DNR, WV State Parks and Forests
Bluestone	Hinton	DNR, WV State Parks and Forests
Camp Creek	Camp Creek	DNR, WV State Parks and Forests
Carnifex Ferry	Summersville	DNR, WV State Parks and Forests
Cedar Creek	Glenville	DNR, WV State Parks and Forests
Chief Logan	Logan	DNR, WV State Parks and Forests
Droop Mountain	Hillsboro	DNR, WV State Parks and Forests
Hawks Nest	Ansted	DNR, WV State Parks and Forests
Little Beaver	Beaver	DNR, WV State Parks and Forests
Pipestem	Pipestem	DNR, WV State Parks and Forests
Tu-Endie-Wie	Point Pleasant	DNR, WV State Parks and Forests
Twin Falls	Mullens	DNR, WV State Parks and Forests
<i>State Forests</i>		
Cabwaylingo	Dunlow	DNR, WV State Parks and Forests
Camp Creek	Camp Creek	DNR, WV State Parks and Forests
<i>Wildlife Management Areas</i>		
Anawalt Lake	Anawalt	
Beech Fork Lake	Huntington	DNR, WV Wildlife Resources Section
Big Ditch	Cowen	DNR, WV Wildlife Resources Section
Big Ugly	Leet	DNR, WV Wildlife Resources Section
Bluestone Lake	Hinton	DNR, WV Wildlife Resources Section
Briery Mountain	Kingwood	DNR, WV Wildlife Resources Section
Burnsville Lake	Burnsville	DNR, WV Wildlife Resources Section
East Lynn Lake	Wayne	USACE and DNR, WV Wildlife Resources Section
Elk River	Flatwoods	DNR, WV Wildlife Resources Section
Frozenscamp	Ripley	DNR, WV Wildlife Resources Section
Horse Creek	Baileysville	DNR, WV Wildlife Resources Section
Hughes River	Parkersburg	DNR, WV Wildlife Resources Section
McClintic	Point Pleasant	DNR, WV Wildlife Resources Section
Meadow River	Rupert	DNR, WV Wildlife Resources Section
O'brien Lake	Ripley	DNR, WV Wildlife Resources Section
Panther	Panther	DNR, WV Wildlife Resources Section and Div of Forestry
R D Bailey Lake	Pineville	DNR, WV Wildlife Resources Section
Ritchie Mines	Melin	DNR, WV Wildlife Resources Section
Rollins Lake	Ripley	DNR, WV Wildlife Resources Section
Sand Hill	Parkersburg	DNR, WV Wildlife Resources Section
Stumptown	Stumptown	DNR, WV Wildlife Resources Section
Summersville Lake	Summersville	DNR, WV Wildlife Resources Section
Tug Fork	Welch	DNR, WV Wildlife Resources Section
Turkey Run Lake	Ravenswood	DNR, WV Wildlife Resources Section
Upper Mud Lake	Hamlin	DNR, WV Wildlife Resources Section

Source: (WVGTC, 2002; 2011c)

LIST OF PUBLIC FISHING AREAS NEAR THE LONDON/MARMET AND WINFIELD PROJECTS

FISHING AREA	COUNTY
Mill Creek	Barbour
Sutton Lake	Braxton
Saltlick Pond 9	Braxton
Burnsville Lake	Braxton
Barboursville	Cabell
Underwood Lake	Cabell
Boley	Fayette
Hawks Nest	Fayette
Plum Orchard	Fayette
Cedar Creek	Gilmer
Summit	Greenbrier
Rollins	Jackson
Frozenscamp Left Fork	Jackson
Frozenscamp Right Fork	Jackson
Turkey Run	Jackson
Woodrum	Jackson
O'Brien	Jackson
Elk Fork	Jackson
Coonskin Park	Kanawha
Elk Two Mile (Site 13)	Kanawha
Elk Two Mile (Site 12)	Kanawha
Elk Two Mile (Site 14)	Kanawha
Kanawha State Forest	Kanawha
Ridenour	Kanawha
Anderson	Kanawha
Upper Mud	Lincoln
Logan County Airport	Logan
Rockhouse	Logan
Chief Logan	Logan
Chief Cornstalk	Mason
Krodel	Mason
McClintic Ponds	Mason
Laurel	Mingo
Summersville Lake	Nicholas
Hurricane W.S. Res.	Putnam
Fitzpatrick	Raleigh
Stephens	Raleigh
Airport Pond	Raleigh
Charles Fork	Roane
Silcott Fork	Roane
Miletree	Roane
Bluestone Lake	Summers
Pipestem	Summers
Beech Fork Lake	Wayne
East Lynn Lake	Wayne
Millers Fork	Wayne
Lick Creek	Wayne
Big Ditch	Webster
Mountwood	Wood
Horse Creek	Wyoming
R.D. Bailey Lake	Wyoming & Mingo

Source: (WVGTC, 2002)

APPENDIX B
INVENTORY OF PROJECT VICINITY RECREATION AREAS

LIST OF PROJECT VICINITY STATE PARKS AND FORESTS AND WILDLIFE MANAGEMENT AREAS

PLACE	LOCATION	MANAGING AGENCY
<i>State Park</i>		
Hawks Nest	Ansted	DNR, WV State Parks and Forests
<i>State Forest</i>		
Kanawha	Charleston	DNR, WV State Parks and Forests
<i>Wildlife Management Areas</i>		
Amherst/Plymouth	Bancroft	DNR, WV Wildlife Resources Section
Chief Cornstalk	Arlee	DNR, WV Wildlife Resources Section
Green Bottom	Huntington	DNR, WV Wildlife Resources Section
Hilbert	Sod	DNR, WV Wildlife Resources Section
Mill Creek	Milton	DNR, WV Wildlife Resources Section
Morris Creek	Clendenin	DNR, WV Wildlife Resources Section
Plum Orchard	Mossy	DNR, WV Wildlife Resources Section
Walback	Clay	DNR, WV Wildlife Resources Section
Woodrum Lake	Kentucky	DNR, WV Wildlife Resources Section

Source: (WVGTC, 2002)