# 3. AFFECTED ENVIRONMENT

## 3.1 Chapter Overview

This chapter provides a discussion of the environmental setting as it relates to the Proposed Action and alternatives. The chapter has been prepared to address the required elements of an EIS prepared under NEPA (40 CFR 1502.15 and 1502.16) and includes information on relevant environmental resource areas identified through the scoping process and is organized into the following key sections:

3.2 Local Features, Aesthetics, and Light

3.3 Atmospheric Conditions

3.4 Surface Water Resources

3.5 Floodplains

3.6 Geology and Groundwater Resources

3.7 Biological Resources

3.8 Cultural Resources

3.9 Socioeconomics

3.10 Environmental Justice

3.11 Land Use

3.12 Utilities and Community Services

3.13 Transportation and Traffic

3.14 Public Health and Safety

3.15 Noise

The extent of information provided in each section of this chapter is commensurate with the baseline data necessary to support the impacts analysis presented in Chapter 4.

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## 3.2. Local Features, Aesthetics, and Light

This section summarizes the existing aesthetic attributes that characterize the region and the vicinity of the proposed project, including the characterization of glare from existing light sources. Principal aesthetic and scenic resources include National Parks, forests, nature areas, and other resources designated for preservation and management by the federal, state, and local governments.

### 3.2.1 National Parks and Wilderness Areas in West Virginia

West Virginia is characterized by mountainous terrain, lush valleys, and white-water rivers that offer abundant opportunities for scenic enjoyment and outdoor recreation. Greenbrier County is surrounded by national parks that offer year-round recreational activities, including the New River Gorge National River, Gauley River National Recreation Area, and Bluestone National Scenic Area. These three parks combined consist of approximately 95 miles (150 kilometers) of major rivers and 86,000 acres (35,000 hectares) (NPS, 2002). Peak visitation for the three parks occurs from July through October. There are also four designated wilderness areas in West Virginia: Otter Creek Wilderness Area, Cranberry Wilderness Area, Dolly Sods Wilderness Area, and the Laurel Creek Wilderness Area.

In the Clean Air Act (CAA) Amendments of 1977, Congress specified the initial classification of lands for the Prevention of Significant Deterioration (PSD) of air quality. Under PSD regulations, Class I areas are areas of special national or regional natural, scenic, recreational, or historic value for which the regulations provide special protection where almost no change from current air quality is allowed (EPA, 2006). Class I areas include all international parks, national memorial parks larger than 5,000 acres (2,000 hectares), and national parks larger than 6,000 acres (2,400 hectares) that were in existence when the Amendments were passed. Class II designation indicates areas where moderated change is allowed but where stringent air quality constraints are nevertheless desired. Class III designation indicates areas where substantial industrial or other growth is allowed and where increases in concentrations up to the national standards would be insignificant. With the exception of Otter Creek and Dolly Sods National Wilderness areas, the entire state of West Virginia is designated as a Class II PSD area designed for moderate growth. Table 3.2-1 and Figure 3.2-1 list the Class I and II areas closest to Rainelle. Section 3.3 (Atmospheric Conditions) discusses additional air-related resources in greater detail.

### 3.2.2 Greenbrier and Nicholas Counties

Greenbrier County lies within the Appalachian Plateau and the Ridge and Valley Region where elevations range from approximately 1,600 to 4,000 feet (500 to 1,200 meters) above sea level (GCPC, 1994). The county is predominantly rural in character with farms and forest comprising up to 95 percent of the county's 1,030 square miles (2,700 square kilometers) (EK, 2003a). The county consists of many small rural communities with typical populations of less than 2,500. The City of Lewisburg, which is the Greenbrier County seat, has a population of approximately 4,000 (USCB, 2004). More than 10 percent (100,000 acres [41,500 hectares]) of the Monongahela National Forest (800,000 total acres [300,000 hectares]) is situated in Greenbrier County. Greenbrier State Forest provides 5,130 acres (2,100 hectares) of recreational lands and scenic overlooks in the eastern portion of the county. Cranberry Back Country, which covers 53,000 acres [21,000 hectares] in various counties, including Greenbrier, provides wilderness area with 75 miles (120 kilometers) of recreational trails.

The western portion of Greenbrier County features mountainous terrain and rushing streams. After Interstate 64 (I-64) was completed, U.S. Route 60 (US 60) was designated as the Midland Trail National Scenic Highway because of the many unique scenic, historic and recreational features along its path.

**Table 3.2-1. Class I and II Areas in Closest Proximity to Rainelle, WV**

| AREA | PSD CLASS | DISTANCE FROM RAINELLE* |
|---|---|---|
| New River | Class II | 10 miles |
| Gauley River | Class II | 15 miles |
| Bluestone Lake Project | Class II | 23 miles |
| Bluestone River | Class II | 25 miles |
| James Face Wilderness Area | Class I | 75 miles |
| Otter Creek Wilderness Area | Class I | 89 miles |
| Dolly Sods Wilderness Area | Class I | 102 miles |
| Shenandoah National Park | Class I | 105 miles |

**To convert miles to kilometers, multiply by 1.6093; PSD - Prevention of Significant Deterioration*

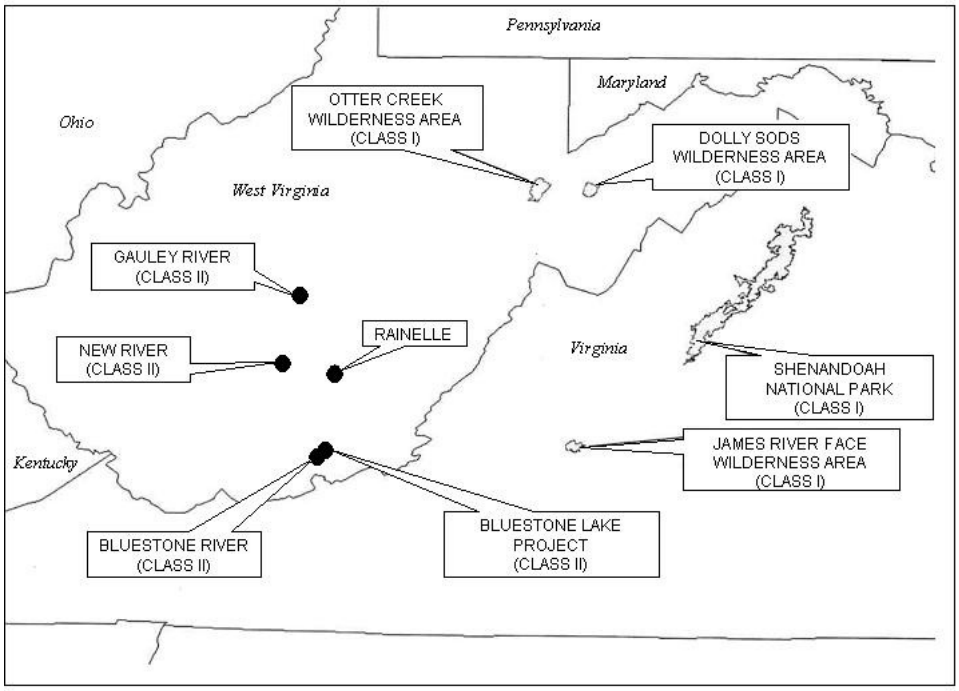


**Figure 3.2-1. Class I and II Areas in Closest Proximity to Rainelle, WV**

US 60 extends from Charleston to the eastern border of West Virginia, passing through Rainelle. Hawks Nest State Park is located on the Midland Trail in Fayette County, approximately 30 miles (50 kilometers) west of Rainelle and is one of West Virginia's popular state parks with its lodge, hiking trails, and a variety of recreational activities. The closest state park to Rainelle is Babcock State Park in Fayette County, which is within 15 miles (24 kilometers) to the west via US 60 and WV 41 near Hico. This 4,100-acre (1,700-hectare) park is adjacent to the New River Gorge National River and includes a trout stream in a small canyon, as well as mountainous vistas from several scenic overlooks.

Nicholas County borders Greenbrier County to the north and is also located within the Appalachian Plateau. The topography is comprised of steep hills and narrow valleys. The county has two incorporated municipalities, Summersville, the county seat, and Richwood. Summersville Lake, the largest lake in West Virginia, comprises the majority of the 6 square miles (16 square kilometers) of water in Nicholas County, which is controlled by the Summersville Dam (EK, 2003b). The dam is on the Gauley River near the town

of Summersville and is designated as one of the U.S. Army Corps of Engineer's (USACE) most scenic dams. Summersville was a major crossroads on the historic Pocahontas Trail, which connected the westward-flowing Kanawha River with the east. Nicholas County has several Civil War sites, including Carnifex Ferry State Park, and other early settlement sites, such as Richwood, which was created as a result of the lumber industry. Richwood is also the southern gateway to the Monongahela National Forest and the federally protected Cranberry Wilderness Area, and offers various recreational activities such as skiing, hiking, and trout fishing.

Grassy Falls and Hominy Falls are two small waterfalls located in Nicholas County. Grassy Creek drops approximately 20 feet (6 meters) over a ledge at Grassy Falls, 2 miles (3 kilometers) south of Nettie on WV 20 (see Figure 3.2-2). Hominy Falls is a similar fall that is located 1 mile (2 kilometers) southwest of Grassy Falls on WV 39.

**Figure 3.2-2. Grassy Falls on WV 20**

### 3.2.3 Rainelle and Local Features

The headwaters of the Meadow River, near the historic Sam Black Church on I-64, create West Virginia's second largest wetland and a home for sport fish and fowl. Near Lewisburg, which is approximately 30 miles (50 kilometers) southeast of Rainelle, there are a host of famous recreational areas including the Greenbrier State Forest and the Greenbrier Resort (National Historic Landmark). The Meadow River/Western Greenbrier Youth Park is a small park located in Charmco between Rainelle and Rupert. In Rainelle there is an approximate 77-acre (31-hectare) (9-hole) golf course, the Western Greenbrier Hills Golf Course, and a small neighborhood park located approximately 2,000 feet (600 meters) west of the project site. The Rainelle City Park is located in northern Rainelle, along Sewell Creek and includes a paved walking trail and a baseball field.

Historically, Rainelle supported an active lumber industry that was centered around the Meadow River Lumber Company (MRLC) (JMA, 2005). Since the closure of the MRLC and the opening of I-64, the town has experienced an economic downturn, but it still retains some of the architectural features from the lumber era, as described in Section 3.8 (Cultural Resources). During the initial growth of MRLC's enterprise (early 1900s), many two-storey, frame houses with clapboard siding and front porches were constructed for the MRLC's employees (PHE, 2005). The houses were constructed along the western stretch of US 60, near the intersection of US 60 and WV 20. Most of these original houses are still occupied today with few changes, except for the addition of vinyl or aluminum siding.

As the MRLC expanded and prospered, the community of Rainelle also continued to expand. During the early 1920s, the community of East Rainelle was developed and incorporated to accommodate the growing population. In 1969, East Rainelle and Rainelle were incorporated under the name Rainelle. In the past, East Rainelle served as the business and commercial center, while today it contains a mix of historic and modern homes. The well-defined commercial district that is located along the eastern stretch of US 60 in Rainelle, referred to as Main Street, also comprises a blend of old and new buildings. Main Street is dominated by one- and two-storey frame and masonry commercial buildings that date from the first decade of the twentieth century through the late 1940s (PHE, 2005). Although some alterations are evident, most of the buildings still possess a high degree of integrity of materials, workmanship, design, and association with the history of the MRLC and the subsequent general history of Rainelle.

The proposed project site and planned EcoPark area are situated on and adjacent to the site of the former MRLC on the southern outskirts of the town's city limits. The land is relatively flat in the Sewell Creek floodplain from the proposed Co-Production Facility site generally northeast to Rainelle's downtown, and north and northwest toward the Rainelle City Hall, Rainelle Medical Center, Rainelle School, and golf course. Sewell Creek to the northwest and an exposed ridge of the 3,300-foot (1,000-meter) high Sims Mountain to the southwest provide natural boundaries for the project area. Meadow River is located approximately 1.5 miles (2.4 kilometers) north of the project site.

The proposed Co-Production Facility site consists mainly of wild vegetative growth, and most of the area is disturbed land with random piles of refuse scattered around open grounds. The toe slope of the exposed ridge has been stripped of vegetation and has been mechanically truncated in much of the study area. This prominent ridge within the study area trends northeast and has its northern terminus within the footprint of the proposed Co-Production Facility. Figures 3.2-3 through 3.2-7 display views taken from vantage points of and from the proposed project site (see Appendix G for Cultural Resources Reports). Because the project site basically lies on a valley floor, the view of the project area is limited to neighboring areas within surrounding hills. The view of the proposed project site along US 60 is framed with various commercial and industrial buildings in the foreground and with vegetated rolling hills in the background. The scene along US 60 (looking in a southward direction toward the project site) provides a view of the truncated ridgeline and the distinct cut of trees that creates an obvious gap in the surrounding topography (see Figure 3.2-3).

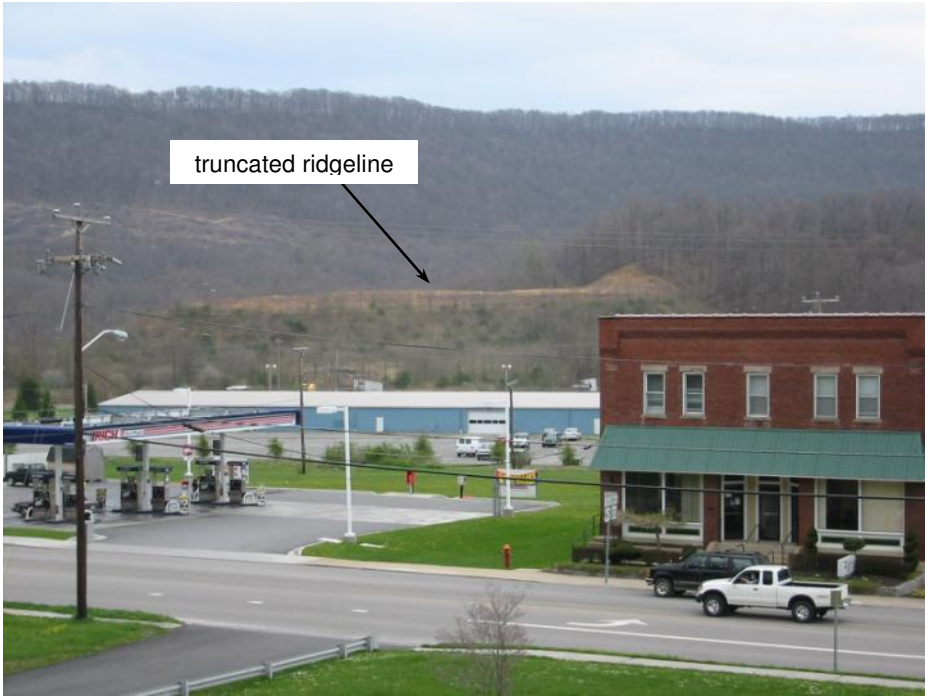


**Figure 3.2-3. View toward Project Site along US 60, Facing Southeast (Truncated Ridge in Background)**

**Figure 3.2-4. View toward Project Site at Intersection of US 60 and WV 20, Facing South**

**Figure 3.2-5. View toward Project Area at the Intersection of US 60/Park Center Drive/Railroad, Facing Southwest**

**Figure 3.2-6. View of Truncated Ridge Crest, Facing North**

**Figure 3.2-7. View of Former Log Ponds, Currently Grassy Fields – Facing North (U.S. Army Reserve Center in Background)**

While Rainelle is predominantly rural in character, it is also an area with a strong history of natural resource extraction and industrial activity, including the associated noise, dust and nighttime light. The area in the vicinity of the proposed Co-Production Facility is largely indistinguishable from large parts of the surrounding area. None of the landscape features would be considered unique within the topographic region. A small golf course and neighborhood park are located northwest of the project site, near the intersection of Fayette Avenue and WV 20. Whereas the south side of the project site faces a wooded

ridge, the north side faces an open, grassy space for a planned industrial park (EcoPark), a U.S. Army Reserve Center, an abandoned industrial building, and the backside of a small shopping complex. Residential areas, including a nursing home and an apartment complex, are located east of the proposed site, and another residential area is located to the northwest. An old rail yard is located southwest of the project site, from which an active rail line extends through Rainelle. Additional discussions on nearby land uses are included in Section 3.11 (Land Use).

Local sources of light and glare were surveyed on Wednesday, June 15, 2005 between 10:00 p.m. and 11:00 p.m. Major and minor light sources were documented in the vicinity of the power plant and EcoPark sites. Principal sources are located east of the intersection of US 60 and WV 20, including the Dollar General Plaza, located on the north side of US 60, and the Park Center Shopping Complex, located to the south of US 60. The Park Center Shopping Complex abuts the EcoPark portion of the project area. Light at the Park Center is provided by eight lamp posts that include three lights each and produce a considerable amount of local glare as shown in Figure 3.2-8.

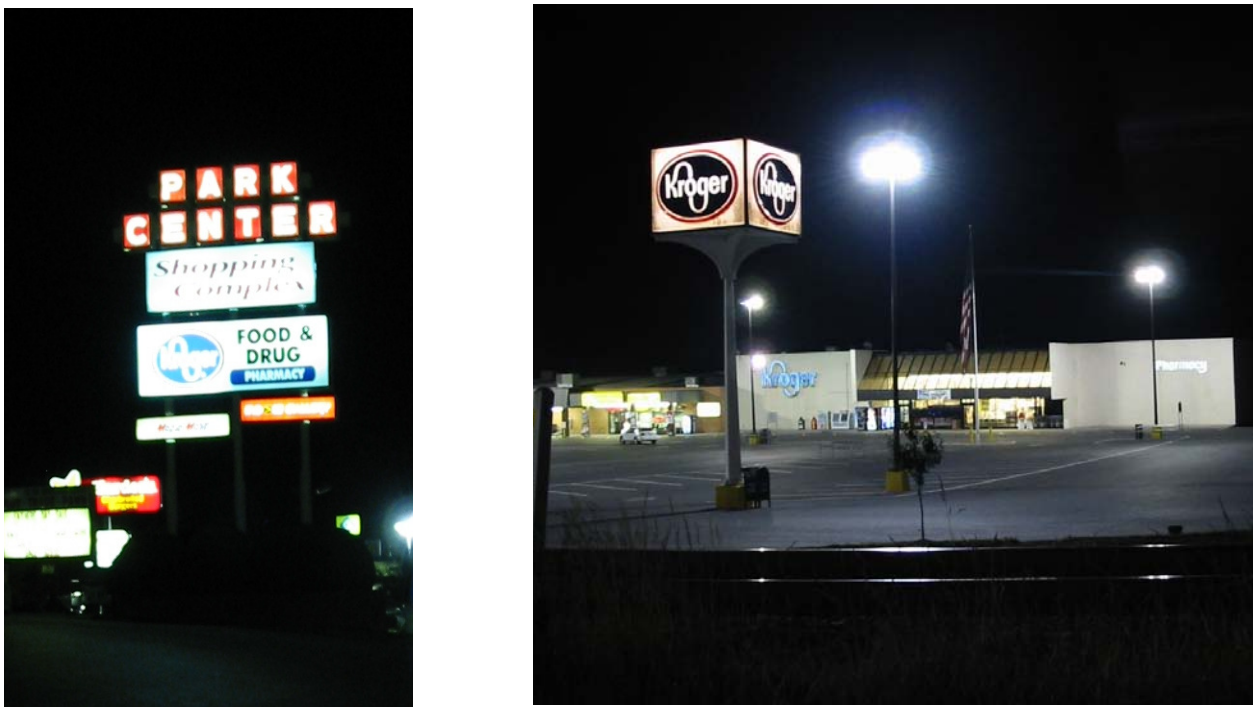


**Figure 3.2-8. Park Center in the City of Rainelle at Night**

Minor sources of light include street, security, and parking lot lighting at businesses along US 60 to the east of Park Center, as well as the U.S. Army Reserve Center located to the west of Park Center. Streetlights are located approximately every 100 feet (30 meters) along WV 20, US 60, and on most of the side streets in Rainelle. Sensitive light receptors include the residential neighborhoods located to the north and east of the Co-Production Facility site.

### 3.2.4 Anjean and Local Features

The Anjean coal mine, located approximately 6 miles (10 kilometers) north of the US 60 and CR 1 intersection in Rupert, was founded by the Leckie Smokeless Coal Company in 1926 and continued operations until closing in 1954. During the height of the mining period, Anjean contained 100 houses, mostly built along CR 1 (also referred to as Anjean Road or Church Street) (PHE, 2005). However, the majority of buildings and structures that were associated with the coal mining operations at Anjean no

longer exist. All that remains of the structures that comprised the company buildings at Anjean are abandoned concrete block dwellings located near the entrance to the Anjean mining site.

**Figure 3.2-9. View of Anjean 40-acre Strip Mine and Coal Refuse, Facing North**

The Anjean site is in a mountainous region. The coal refuse in the Anjean mining site are generally pushed to the middle of the level areas that have been modified as a result of the strip mining, while the contoured margins usually have very steep slopes (JMA, 2005). Re-vegetation of these areas is difficult due to the stony nature of the soil residue, the extremely low pH values, excessive erosion, and low available soil moisture capacity. As shown in Figures 3.2-9 and 3.2-10, there is virtually no vegetation on these waste piles.

**Figure 3.2-10. View of Anjean High Wall and Coal Refuse, Facing Southeast**

WGC has identified three candidate sites (AN1, AN2, and AN3 – see Figures 2.2-15 and 2.2-16) for a new prep plant that would process coal refuse from the Anjean and Joe Knob coal refuse piles. AN1, approximately 10 acres (4 hectares), is located just inside the entrance to Anjean and is mostly disturbed land with a couple of treatment/settling ponds located on the site. Except for the ponds, the land cover is mostly grass and shrubs (see Figure 3.2-11). From CR 1 the view to the site is obstructed by the set of abandoned buildings in front of the entrance.

**Figure 3.2-11. View of AN1, Facing Northeast**

AN2, approximately 3 acres (1 hectare), is located on CR 1 and across the road from the Anjean entrance and a set of abandoned buildings as mentioned in Section 3.2.4. The site is located on developed land, which was graded to accommodate a rail line (now abandoned) and a gravel road, both of which parallel CR 1 (see Figure 3.2-12). A hill borders the site to the west and there are a couple of dilapidated and abandoned houses to the east of the site and along CR 1. Although the site is clearly visible from CR 1, the surrounding structures are reminiscent of mining activities from the past.

AN3, approximately 2 acres (1 hectare), is directly adjacent the coal refuse pile (i.e., the Buck Lilly pile) and is located on the southeast corner of the coal refuse limits. The site is located on the access haul road and is heavily disturbed and graded, with some patchy grass cover and shrubs (see Figure 3.2-13). WVDEP equipment is scattered across the site.

**Figure 3.2-12. View of AN2, Facing North**

**Figure 3.2-13. View of AN3, Facing East**

### 3.2.5 Joe Knob and Local Features

Joe Knob is located east of Anjean along a ridge top approximately 2 miles (3 kilometers) driving distance from the Buck Lilly pile. Its surrounding landscape could be described as being similar to Anjean (see Figure 3.12-14). The Joe Knob coal refuse site, however, is a fully reclaimed site and its land cover is mainly a grassy field with some trees. At this time it is uncertain where the coal refuse boundaries are located because of limited historical data of the site; however, based on USGS maps Joe Knob ranges from approximately 10 to 20 acres (4 to 8 hectares).

**Figure 3.12-14. View of Joe Knob, Facing West**

### 3.2.6 Green Valley and Local Features

The small community of Green Valley is located in southern Nicholas County. The Green Valley mining site is located approximately 13 miles (21 kilometers) driving distance from Rainelle. The Green Valley coal refuse is bordered by WV 20, which provides site access from the west, and Hominy Creek to the south.

**Figure 3.2-15. Green Valley Coal Refuse Site**

In 1996, Massey Coal Company acquired the Green Valley complex from Lady H Coal. Currently, the Green Valley complex includes two underground room and pillar mines and a coal preparation (prep) plant. The Green Valley prep plant receives coal from two mines and has a rail loading facility that services customers on the CSXT rail system with unit train shipments of up to 75 railcars (Massey, 2005).

WGC has identified a candidate site for a new prep plant to process the coal refuse from Green Valley, GV (see Figure 2.2-15). GV, approximately 8 acres (3 hectares), is located along the southern margin of the coal refuse limits. The site is heavily vegetated with grass, shrubs, and young deciduous trees (see Figure 2.2-17 and 3.2-16) and is bounded to the north by an active rail line, currently used by Massey Coal Company to haul marketable coal. The site overlooks several ponds used to treat the runoff from the coal refuse pile, and its surrounding landscape is characterized by rolling hills. Though current mining activities on the northern boundary are visible from WV

**Figure 3.2-16. View of Green Valley, Facing East**

20, the coal refuse site along the southern boundary are barely visible because of heavy vegetation and hilly topography.

### 3.2.7 Donegan and Local Features

The Donegan coal refuse site is located adjacent to the small community of Jetsville in Nicholas County, approximately 14 miles (23 kilometers) north of Anjean, near the intersection of CR 39/14 and CR 32/1. The coal refuse area is somewhere between 110 to 120 acres (45 to 50 hectares) and is fully reclaimed with trees and grassy fields (see Figure 3.2-17) (Martin, 2005). Several ponds surround and treat the runoff from the refuse pile.

**Figure 3.2-17. View of Donegan Coal Refuse**

Lease of the Donegan property began in 1942 by the Gauley Coal and Coke Company (GCCC). A permit for the coal preparation plant and coal refuse pile was issued to GCCC in February 1969, which was later transferred to Island Creek Coal Company (ICCC) in March 1981, and subsequently to Falcon Land Company, Inc. (FLC) in June 1995. The only mining that took place at Donegan was incidental removal of coal during reclamation activities performed by ICCC. ICCC performed most, if not all, of the grading and vegetation reclamation at the refuse site, which occurred from the late 1970s through at least the mid-1980s.

**Figure 3.2-18. View of DN1, Facing South**

WGC has identified two candidate sites for a new prep plant to process the fuel from Donegan, DN1 and DN2 (see Figure 2.2-15). Surrounded by rolling hills, DN1 is located on WV 39/14 (Fenwick Road) in a remote area adjacent to the entrance to the Donegan site. The site, approximately 7 acres (3 acres), is disturbed and is partially developed as a result of past mining activities as evidenced by an abandoned maintenance building on-site. The surrounding land cover is fairly vegetated with mainly grass and shrubs. To the west of the site there are a couple of ponds to manage some of the runoff from the Donegan coal refuse pile before it eventually drains into Laurel Creek.

**Figure 3.2-19. View of DN2, Facing East (Candidate Site in Background)**

DN2 is located on CR 1 at Beech Knob and is located on privately-owned property. Limited data is available for DN2 because of limited access; however, review of USGS topographic maps and aerial photography reveal that an 8-acre (3-hectare) patch of disturbed land exists in this area. Cursory investigations suggest that the land was previously used for agricultural purpose. The surrounding

area is fairly remote. A few residential properties exist approximately half a mile (1 kilometer) north of the site, while the site is directly adjacent to a house, which is assumed to be the property owner's residence.

### 3.2.8 Boxley Quarry

The Boxley Quarry in Alta, near Lewisburg (see Figure 3.2-13), which is owned by the Boxley Materials Company (BMC), is located just off of US 60 and exit 161 of I-64. The entire property is 293 acres (119 hectares) in size, with a total permitted area of 190 acres (77 hectares). The quarry operates 6 days per week; Monday through Friday from 6:00 a.m. to 5:00 p.m. and Saturdays from 6:00 a.m. to 12:00 p.m. Approximately 1.1 to 1.3 million tons per year (1.0 to 1.2 million metric tons per year) of product is mined from this quarry.

**Figure 3.2-20. View of Typical Section of Boxley Quarry**

Most of the limestone product required for the operation of the Co-Production Facility would come from the "Boxley New Area," a newly permitted section of the quarry. Limestone would be trucked over US 60 from the quarry, approximately 20 miles to Rainelle.

The New Area, which consists of an additional 280 acres (110 hectares) on the west side of the quarry, was purchased recently. This area consists of: (1) the remainder of the hill that is currently being quarried; (2) an adjacent valley that includes an agricultural field (presently leased to a farmer) and a stream that runs through it; and (3) the next adjacent hill to the west.

In 2004, Boxley applied for and received a permit to quarry in a 38.14-acre (15.43-hectare) area that constitutes the remainder of the hill on which they are currently quarrying. An aerial photo taken on June 30, 2004 shows the 38.14-acre (15.43-hectare) area to be wooded and undisturbed. During a site visit on August 29, 2005, it was noted that this area had been completely clear-cut and was essentially devoid of vegetation, with the exception of a thin grassy cover with some weeds and wildflowers. A small portion of this area had already begun to be excavated.

### 3.2.9 Mill Point Quarry

The Mill Point Quarry, which is also owned and operated by Boxley, is located near the intersection of WV 39 & US 219 in Mill Point, Pocahontas County, West Virginia. Boxley has owned and operated the quarry since 2002; however, the quarry has been in operation for over 25 years. The total permitted area is about 120 acres (50 hectares) in size. The quarry operates 7 days per week from 7:00 a.m. to 4:30 p.m. and currently produces about 400,000 tons (360,000 metric tons) of limestone per year.

The primary limestone transportation route from Mill Point to Rainelle is US 219 south to I-64 west to US 60 west, which is approximately 65 miles (105 kilometers) in driving distance. This route consists of narrow winding roads with numerous switchbacks and steep inclines. The surrounding topography is hilly with areas of heavy vegetation.

**Figure 3.2-21. View of Mill Point Quarry**

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# 3.3 Atmospheric Conditions

## 3.3.1 Climate and Topography

Rainelle is located in Greenbrier County, WV. The mean annual temperature in Rainelle is 51°F (11 °C), with averages of 17 °F to 36 °F (-8 to 2 °C) in January and 54 °F to 75 °F (12 to 24 °C) in July. Annual precipitation of 51.8 inches (131.6 centimeters) includes an average of 4.6 inches (11.7 centimeters) in January and 4.4 inches (11.2 centimeters) in July. The annual snowfall ranges from 25 to 80 inches (64 to 203 centimeters). Prevailing winds are from the west and northwest. Average wind speeds range from 10.3 miles per hour (16.6 kilometers per hour) in March to 6.5 miles per hour (10.5 kilometers per hour) in July. During the mornings, the relative humidity is generally high, ranging from 75 percent in April to 91 percent in August and September. The afternoon humidity is somewhat lower, ranging from 37 percent in December and January to 54 percent in June.

The proposed site is located adjacent to Sewell Creek on the floor of a valley at an elevation of approximately 2,420 feet (738 meters) above mean sea level (amsl). Nearby terrain peaks exceed 3,600 feet (1,097 meters) amsl.

## 3.3.2 Sensitive Land Use Areas

For the purposes of air quality analysis, any area to which the general public has access is considered a sensitive receptor site. However, analyses typically focus on land uses that are especially sensitive to increased emissions of air pollutants. Examples include residences, day care centers, educational and health facilities, places of worship, parks, and playgrounds. In the vicinity of the proposed power plant, sensitive land uses include single-family homes, a nursing and rehabilitation home, and an apartment complex. Rainelle is a rural area, and sensitive land uses may also include farming operations that may be affected not only by air pollutants but also by solar radiation loss and additional water vapor deposition (i.e., fog and ice) from the cooling tower plumes.

## 3.3.3 Air Quality Regulations

### *3.3.3.1 National Ambient Air Quality Standards (NAAQS)*

The EPA has promulgated National Ambient Air Quality Standards (NAAQS) for six major pollutants, deemed criteria pollutants. They are called criteria pollutants because EPA developed health-based criteria as the basis for setting permissible levels.

The NAAQS include primary standards, established to protect public health***, including the health of "sensitive" populations, such as asthmatics, children, and the elderly. The NAAQS also include secondary standards, which set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (40 CFR 20)***. The six criteria pollutants are:

- Sulfur dioxide ($SO_2$) - Sulfur dioxide is a heavy gas, primarily associated with the combustion of sulfur-containing fuels such as coal and oil. Mobile sources are not considered to be significant $SO_2$ emitters.
- Inhalable Particulates, also known as Respirable Particulate Matter (PM) - The PM10 standard covers only those particles with diameters of 10 micrometers or less, which are the ones most likely to reach the lungs. The $PM_{2.5}$ standard covers particulates with diameters of 2.5 micrometers or less.
- Carbon Monoxide (CO) - The primary source of CO in urban areas is from motor vehicles. It is a colorless, odorless gas produced from the incomplete combustion of gasoline and other fossil fuels.

- Ozone ($O_3$) - This pollutant is a principal component of smog. It is not emitted directly into the air but is formed through a series of chemical reactions between hydrocarbons and nitrogen oxides in the presence of sunlight.
- Nitrogen dioxide ($NO_2$) - $NO_2$ is a highly oxidizing, extremely corrosive toxic gas, formed by chemical conversion from nitric oxide (NO), which is emitted primarily by industrial furnaces, power plants, and motor vehicles.
- Lead (Pb) - Lead emissions are principally associated with industrial sources. Because most vehicles produced in the U.S. since 1975, and all produced after 1980, are designed to use unleaded fuel, emissions of lead from motor vehicles have declined significantly.

**Table 3.3-1. National and West Virginia State Ambient Air Quality Standards**

| Pollutant | Type Of Standard | Averaging Period | Standard |
|---|---|---|---|
| $SO_2$ | Primary | 12-month arithmetic mean | 80 µg/m3 (0.03 ppm) |
| | Primary | 24-hour average | 365 µg/m3 (0.14 ppm) |
| | Secondary | 3-hour average | 1300 µg/m3 (0.5 ppm) |
| Inhalable Particulates ($PM_{10}$) | (Primary & Secondary) | (Annual arithmetic mean) [1] | (50 µg/m$^3$) |
| | Primary & Secondary | 24-hour average | 150 µg/m$^3$ |
| Inhalable Particulates ($PM_{2.5}$) | Primary & Secondary | Annual arithmetic mean | 15 µg/m$^3$ |
| | Primary & Secondary | Maximum 24-hour average | ***35*** µg/m$^3$* |
| CO | Primary | 8-hour average | 9 ppm (10 µg/m$^3$) |
| | Primary | 1-hour average | 35 ppm (40 mg/m$^3$) |
| $O_3$ | Primary & Secondary | Maximum daily 8-hr average[2] | 0.08 ppm (235 mg/m$^3$) |
| $NO_2$ | Primary & Secondary | 12-month arithmetic mean | 0.053 ppm (100 µg/m$^3$) |
| Pb | Primary & Secondary | Quarterly mean | 1.5 µg/m$^3$ |

*Notes:*

**** Effective December 18, 2006, EPA revoked the 24-hour $PM_{2.5}$ NAAQS of 65 µg/m$^3$ and implemented a revised 24-hour $PM_{2.5}$ NAAQS of 35 µg/m$^3$.***

***[1]EPA revoked the annual $PM_{10}$ standard of 50 µg/m$^3$ effective December 18th, 2008. As of July 2007 this standard currently prevails under the State of West Virginia Code of State Rules 45 CSR 8, under part 45-8-4.1.a.1.B until updated to reflect part 45-8-1.1 which part states: "The purpose of this rule is to establish ambient air quality standards for sulfur oxides and particulate matter, equivalent to those national primary and secondary ambient air quality standards established by the U.S. EPA."***

***[2]EPA revoked the 1-hour $O_3$ standard of 0.12 ppm nationwide in June 15, 2005, except for 14 Early Action Compact (EAC) Areas, of which Greenbrier County, West Virginia is not one.***

*Source: EPA and WVDEP, Division of Air Quality*

The air quality regulations for the State of West Virginia are codified in Title 45 of the Code of State Regulations (45 CSR) – Series 1 through 38. West Virginia State Ambient Air Quality Standards may further regulate concentrations of the criteria pollutants discussed above. Table 3.3-1 lists the National and West Virginia State Ambient Air Quality Standards. The WVDEP, Division of Air Quality (DAQ), is responsible to monitor air quality for each of the criteria pollutants and assess compliance.

### *3.3.3.2 State Implementation Plan (SIP) and SIP Conformity*

An area that does not meet (or contributes to ambient air quality in a nearby area that does not meet) the primary or secondary NAAQS for a pollutant is referred to as a nonattainment area. The CAA requires states to submit to the EPA a State Implementation Plan (SIP) for attainment of the NAAQS. The 1977 and 1990 amendments to the CAA require comprehensive plan revisions for areas where one or more of the standards have yet to be attained. Within West Virginia, various counties are in nonattainment for $O_3$ and/or $PM_{10}$ and $PM_{2.5}$. The DAQ is coordinating with neighboring states to develop air quality plans to identify and reduce emissions contributing to the pollution problem in these areas as part of its effort to attain the NAAQS. The DAQ is also working with industry to reduce

emissions on a facility-wide basis, as well as expanding efforts to work with communities to identify and implement control strategies for air pollution in their neighborhoods.

The 1990 Amendments to the CAA require federal actions to show conformance with the SIP. Federal actions are those projects that are funded by federal agencies and include the review and approval of a Proposed Action through the NEPA process. Conformance with the SIP means conformity to the approved SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS, and achieving expeditious attainment of such standards. The need to demonstrate conformity is applicable only to areas that are not in compliance with the NAAQS, or that were previously in nonattainment for one or more pollutants and are currently designated as maintenance areas. Guidelines for determining conformity are found in 40 CFR, Parts 6, 51 and 93, Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule. A federal action will fall under the jurisdiction of either the General Conformity Rule or the Transportation Conformity Rule. The Transportation Conformity Rule covers highway and transit projects.

### 3.3.4 Local Air Quality

Rainelle is located in Greenbrier County. Ambient air quality concentrations for the nearest monitoring sites are summarized in Table 3.3-2. Of the 64 air quality monitors maintained throughout the state by DAQ, only one — an $O_3$ monitor — is located in Greenbrier County. No air quality monitors for lead (Pb) or nitrogen dioxide are maintained in the state. The nearest $NO_2$ monitoring site is in Virginia (VA) and was selected for Table 3.3-2. Lead is not currently monitored in either WV or VA. Many states have ceased or reduced the monitoring of lead concentrations because of the decrease in ambient lead concentrations resulting from restrictions on the use of leaded gasoline. DAQ monitored lead in several counties through 1997, and the closest county location for that year is shown in Table 3.3-2. As shown in Table 3.3-2, the monitored values at the air quality monitoring sites are in compliance with the NAAQS; therefore, air quality concentrations at Rainelle are considered to be within the NAAQS.

**Table 3.3-2. Ambient Air Quality Monitoring Data**

| Pollutant | Averaging Period | Nearest Relevant Monitor Location (County) | Monitor ID | Year | Monitored Concentration | NAAQS |
|---|---|---|---|---|---|---|
| CO | 1-Hour | Hancock, WV | 54-029-1004 | 2004 | 14.8 ppm | 35 ppm |
| CO | 8-Hour | Hancock, WV | 54-029-1004 | 2004 | 5.3 ppm | 9 ppm |
| $SO_2$ | 3-Hour | Kanawha, WV | 54-039-0010 | 2004 | 0.098 ppm | 0.50 ppm |
| $SO_2$ | 24-Hour | Kanawha, WV | 54-039-0010 | 2004 | 0.052 ppm | 0.14 ppm |
| $SO_2$ | Annual | Kanawha, WV | 54-039-0010 | 2004 | 0.01 ppm | 0.03 ppm |
| $O_3$ | 8-Hour | Greenbrier, WV | 54-025-0003 | 2004 | 0.074 ppm | 0.085 ppm |
| $PM_{2.5}$ | 24-Hour | Summers, WV | 54-089-0001 | 2004 | 29.4 $\mu g/m^3$ | ***35*** $ug/m^3$* |
| $PM_{2.5}$ | Annual | Summers, WV | 54-089-0001 | 2004 | 9.8 $\mu g/m^3$ | 15 $\mu g/m^3$ |
| $PM_{10}$ | 24-Hour | Kanawha, WV | 54-039-0010 | 2004 | 50 $\mu g/m^3$ | 150 $\mu g/m^3$ |
| $PM_{10}$ | Annual | Kanawha, WV | 54-039-0010 | 2004 | 22.1 $\mu g/m^3$ | 50 $\mu g/m^3$ |
| $NO_2$ | Annual | Roanoke, VA | 19-A6 | 2004 | 0.014 ppm | 0.053 ppm |
| Pb | 3-Month | Hancock, WV | Not available | 1997 | 0.01 $\mu g/m^3$ | 1.5 $\mu g/m^3$ |

*Note: NAAQS – National Ambient Air Quality Standard*

**** Effective December 18, 2006, EPA revoked the 24-hour $PM_{2.5}$ NAAQS of 65 $\mu g/m^3$ and implemented a revised 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$. Greenbrier County is currently in attainment for $PM_{2.5}$ under this new standard.***

*Sources: West Virginia Department of Environmental Protection, Division of Air Quality 2004; Virginia Department of Environmental Conservation, Office of Air Quality,2004; U.S. EPA, AirData, 1997*

Although currently in attainment of the NAAQS, in previous years Greenbrier County had been designated as being in marginal nonattainment for the 1-hour $O_3$ standard. It was redesignated to being in

attainment on September 18, 1995. The county is therefore an $O_3$ maintenance area and is subject to the same requirements as an $O_3$ nonattainment area. Because Rainelle is within the County's air quality maintenance area, federal actions within Rainelle must show conformity with the SIP, and the Proposed Action would fall under the General Conformity Rule. However, because the proposed power plant is a major new source of air pollutant emissions that must prepare permits under the Prevention of Significant Deterioration (PSD) regulations, it is exempt from the need to demonstrate SIP conformity for the EIS (subsequent section).

#### *3.3.4.1 New Source Review Permits*

New Source Review (NSR) refers to preconstruction permitting requirements for new construction of, or modifications to, industrial sources of air pollution. The permits may be termed New Source Review, Prevention of Significant Deterioration, Minor New Source Review, and/or Nonattainment Area Permits, depending on the issuing agency, the site's NAAQS attainment status, and the type and volume of pollutants potentially emitted by the source. NSR serves two purposes:

- First, it ensures that air quality is not significantly degraded from the addition of new and modified factories, industrial boilers and power plants. In areas with unhealthy air, NSR assures that new emissions do not slow progress toward cleaner air. In areas with clean air, especially pristine areas like national parks, NSR assures that new emissions do not significantly worsen air quality.
- Second, the NSR program assures people that any large new or modified industrial source in their neighborhoods will be as clean as possible, and that advances in pollution control occur concurrently with industrial expansion.
- NSR permits are legal documents with which the facility owners/operators must comply. The permit specifies what construction is allowed, what emission limits must be met, and often how the emissions source must be operated. The three types of NSR permits are:
- PSD permits which are required for new major sources or a major source making a major modification in an attainment area;
- Nonattainment NSR permits which are required for new major sources or major sources making a major modification in a nonattainment area; and
- Minor source permits.

The WVDEP is responsible for implementing federal air quality requirements, including the PSD program (40 CFR 52.21 and 45 CSR 14). A state's NSR program is defined and codified in its SIP. The proposed Co-Production Facility is categorized as a "fossil fuel-fired steam electrical generating plant," and is considered a major source. In April 2006, WVDEP DAQ issued a PSD Permit (R14-0028) to WGC for the proposed construction of the waste coal-fired steam electric co-generation facility. The PSD permit review requires a case-by-case Best Available Control Technology (BACT) analysis to determine the maximum achievable degree of reduction of each compound subject to PSD. The BACT evaluation takes into account energy and environmental issues, technical feasibility, and costs associated with each alternative technology, as well as the benefit of reduced emissions that the technology would achieve.

For the purposes of PSD review, the federal government has classified lands into Class I, Class II, and Class III areas. In Class I areas, where existing good air quality is considered to be of national importance, very little deterioration of air quality is allowed. All other areas to which the PSD provisions apply are designated as Class II. Rainelle is within a PSD Class II area. The closest PSD Class I areas to the proposed Project are the James River Face Wilderness Area (74 miles [120 km]) in Virginia, Otter

Creek Wilderness Area (89 miles [143 km]) in West Virginia, Dolly Sods Wilderness Area (102 miles [164 km]) in West Virginia, and Shenandoah National Park (105 miles [169 km]) in Virginia.

#### *3.3.4.2 Acid Rain Regulations*

The overall goal of the Acid Rain Program is to achieve significant environmental and public health benefits through reductions in emissions of $SO_2$ and nitrogen oxides (NOx), the primary causes of acid rain. Because the Co-Production facility utilizes fossil fuel-fired combustion to generate over 25 MW of electricity for sale, it is considered an "affected unit" under the Acid Rain Program and must apply for an Acid Rain permit one year prior to initial operation of the unit. The requirements for affected units under the Acid Rain Program, established pursuant to Title IV of the Clean Air Act, are covered under 40 CFR 72 through 78. West Virginia has adopted these regulations in 45 CSR 33.

#### *3.3.4.3 National Emission Standards for Hazardous Air Pollutants (NESHAP)*

Non-criteria pollutants that can cause serious health and environmental hazards are termed hazardous air pollutants (HAPs) or air toxics. The 1970 CAA Amendments required EPA to promulgate national emissions standards for hazardous air pollutants (NESHAP) to protect the public health and welfare with an ample margin of safety. Due to the difficulty in establishing health risks for HAPs, EPA identified and regulated only 8 pollutants during the 20 years following the 1970 legislation. They are asbestos, benzene, beryllium, inorganic arsenic, mercury, radionulides, and vinyl chloride. The 1990 CAA Amendments, section 112, renewed emphasis on controlling HAPs but changed the regulatory approach, basing it instead on available control technology. Subsequently, a list of 189 compounds to be controlled as HAPs was developed. In 1996 EPA removed caprolactam from the list, and the current list contains 188 compounds including the original eight from the 1970 legislation. The NESHAP is codified in 40 CFR 61.

The 1990 CAA Amendments define two types of NESHAP emissions standards: maximum achievable control technology (MACT) and generally available control technology (GACT). The MACT standards are codified under 40 CFR 63. Unlike the health-based standards established under the initial NESHAPs, the MACT standards are technology-based emission limits that take into account available methodologies for controlling emissions of targeted HAPs from each source category. In general, a source is subject to a MACT standard if it is in a source category regulated under 40 CFR 63 and part of a facility that is defined as a major source for HAPs. A source is defined as a major source for HAPs if it emits a single HAP in excess of 10 tons (9.1 metric tons) per year or an aggregate emission rate of over 25 tons (22.7 metric tons) per year of any combination of regulated HAPs. GACTs are less stringent emission standards based on the use of more standard technologies and work practices.

In December 2000, EPA announced that it was "appropriate and necessary" to regulate and control emissions of mercury and other air toxics from coal- and oil-fired electric utilities under section 112 of the CAA Amendments (i.e., the MACT requirements). In January 2004, under the CAA, EPA was given the authority to regulate power plant mercury emissions by establishing performance standards or MACT, whichever the agency deems most appropriate. On March 15, 2005, EPA revised and reversed its December 2000 finding because it believed that the December 2000 finding lacked foundation and because recent information demonstrates that it is not appropriate or necessary to regulate coal- and oil-fired utility units under Section 112.

#### *3.3.4.4 Clean Air Mercury Rule*

On March 15, 2005, the EPA issued the Clean Air Mercury Rule (CAMR), which creates performance standards and establishes permanent, declining caps on mercury emissions from coal-fired power plants. This rule makes the United States the first country in the world to regulate mercury

emissions from utilities. The CAMR establishes “standards of performance” limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program. New coal-fired power plants (“new” means construction starting on or after Jan. 30, 2004) will have to meet stringent new source performance standards in addition to being subject to the caps. The regulation is promulgated under Section 111 of the CAA (i.e. the NSPS). As an electric utility steam-generating unit with more than 25Mwe output, the Co-Production Facility will be subject to the CAMR. The key aspects of the regulation are that it:

- Creates Subpart HHHH of 40 CFR Part 60, which establishes the model rule provisions for the mercury budget-trading program for coal-fired utility boilers.
- Incorporates Performance Specification 12A for mercury CEMS in Appendix B of 40 CFR Part 60.
- Revises 40 CFR Part 75 to incorporate mercury monitoring, recordkeeping and reporting requirements where applicable. This includes missing data substitution procedures, QA/QC requirements, quarterly reporting, etc.
- Creates Subpart I of 40 CFR Part 75 which establishes the mercury mass emission provisions.
- Revises Subpart D of 40 CFR Part 60 by establishing stringent mercury emissions limits in addition to the trading program "cap" for new units (i.e., unit construction on or before January 30, 2004).
- Emission limits are set according to fuel type (e.g., $1.4 \times 10^{-6}$ lb mercury/megawatt hour for waste coal-fired units) and compliance is determined on a 12-month rolling average basis.
- Establishes a market-based cap-and-trade approach in two phases; an initial cap for each source will be set in 2010, and then further reductions on a plant basis will take effect after 2018.

## 3.4 Surface Water Resources

This section describes the surface water resources at and in the vicinity of the Proposed Action, including the coal refuse locations identified for initial fuel supplies. The discussions include regional and local identifications of prominent surface water features, hydrologic characteristics, baseline surface water quality, and surface water rights and permits. Hydrogeologic characteristics of unsaturated materials and water-bearing units (aquifers); baseline groundwater quality of regional and local aquifers; onsite and offsite groundwater usage; and groundwater rights, agreements, and allocations are discussed in Section 3.6 (Geology and Groundwater Resources). Municipal water and wastewater services are discussed in Section 3.12 (Community Services and Utilities).

### 3.4.1 Hydrology

#### *3.4.1.1 Regional Setting*

The project site and its associated components are located within the Appalachian Plateau and the Kanawha-New River Basin where streams generally follow a dendritic drainage pattern (i.e., similar to the branching pattern of tree roots). The New River begins in North Carolina, and flows north to Gauley Bridge in West Virginia. The Gauley and New Rivers converge to form the Kanawha River, which flows into the Ohio River, and subsequently into the Mississippi River. The Kanawha-New River Basin drains 12,223 square miles (31,657 square kilometers) in the southern half of West Virginia, and parts of Virginia and North Carolina (Paybins, 2000). In general, the area within the basin can be described as mountainous, forested, humid, and rural. The basin drains areas in three physiographic provinces: Blue Ridge (17 percent), Valley and Ridge (23 percent), and Appalachian Plateaus (60 percent). The climate within the basin is primarily continental with mild summers and cold winters. The annual mean temperature ranges from 48°F to 55°F (9° C to 13°C) within the basin (Paybins, 2000). The basin precipitation patterns are affected by orographic lifting (i.e., influenced by mountains) and rarely suffer from dry spells. The basin generally sees maximum precipitation May through July and minimum precipitation November through January with the annual average precipitation being 43.5 inches (111 centimeters) (Paybins, 2000). Summer vegetation uses a large fraction of the precipitation, and as a result, maximum streamflow does not coincide with the maximum precipitation. On average, streamflow throughout the basin is greatest February through March and least in September through October (OWR, 2000). Localized flooding on tributaries can result from intense thunderstorms from late spring through the summer months.

The Gauley River's mouth is immediately upstream of the falls of the Great Kanawha River. The Gauley River watershed, which comprises 15 subsheds, drains over 1,400 square miles (3,600 square kilometers) and includes areas in Kanawha, Clay, Fayette, Nicholas, Summers, Greenbrier, Webster, Pocahontas and Randolph Counties. Predominant land cover in the watershed is deciduous forest (NLCD, 1999). Significant public lands within the watershed include portions of the Monongahela National Forest, Summersville Reservoir, Gauley River National Recreation Area, Meadow River Wildlife Management Area (WMA), and the Carnifex Ferry Battlefield State Park. The Gauley River watershed includes the Upper Meadow River subshed in which Rainelle and Anjean/Joe Knob lie, the Hominy Creek subshed in which Green Valley lies, and the Cherry River subshed in which Donegan lies (see Figure 3.4-1).

As one of the major and direct tributaries of the Gauley River, the Meadow River begins above Grassy Meadows in Greenbrier County and flows generally northwest for approximately 60 miles (100 kilometers) to its mouth on Gauley River. The Meadow River winds through an undeveloped wildlife-management area, the Meadow River WMA, which comprises 2,272 acres (919 hectares) of protected wetlands habitat, also used for recreational hunting, and then further downstream flows through the Gauley River National Recreation Area for the last several miles of its course.

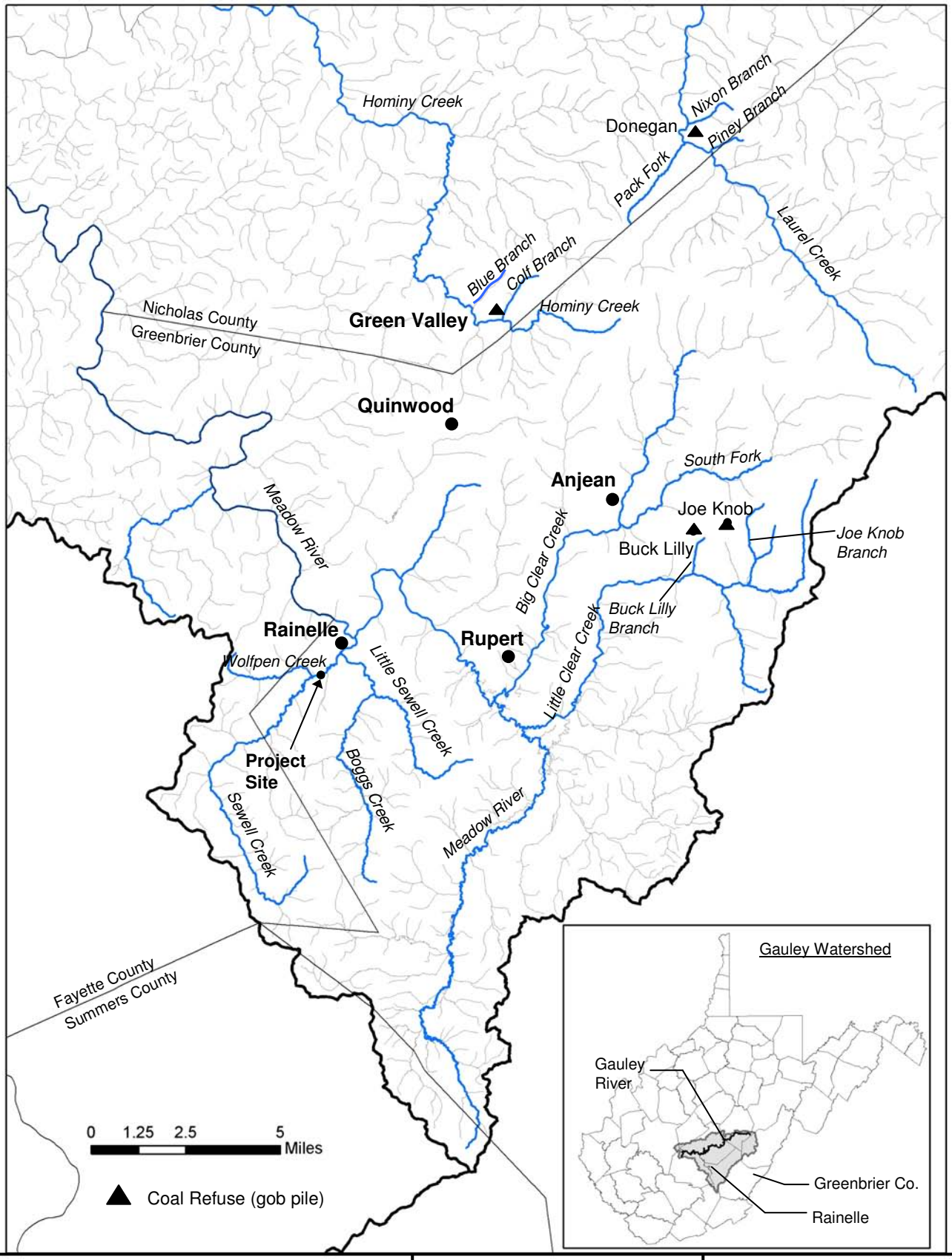


**Figure 3.4-1.**
Gauley Watershed, West Virginia

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Meadow River flow (discharge) data, dating from October 1979 through September 1982, was made available through a U.S. Geological Survey (USGS) gaging station located in McRoss, WV, approximately 2 miles (3 kilometers) upstream the confluence of Sewell Creek and Meadow River. Since only three years of river flow data were available at this location, this data was compared to 33 years of annual precipitation data (1956 through 1988) to assess whether the Meadow River flow during these years were representative of a typical year. Based on the average annual precipitation over the 33-year period (49.6 inches), the period of October 1981 through September 1982 (50.7 inches) was considered to be representative of a typical year from a precipitation perspective. Because the flow rates within the Meadow River are directly related to precipitation, this year is also considered representative of flow conditions in the Meadow River for a typical or average year.

Figure 3.4-2 shows the Meadow River flow for the sample year, October 1981 through September 1982. Flow in the Meadow River varies from season to season and generally follows a similar pattern as other streams in the Kanawha-New River Basin. On average, discharge is greatest January through March and lowest August through October. The peaks in Figure 3.4-2 are most likely a result of precipitation events, while the troughs represent drier periods. ***(Meadow River flow was analyzed in greater detail for potential impacts to surface water and groundwater resources for the Final EIS - see Sections 4.4.3.3 and 4.6.3.4 of this volume for evaluation on existing flow data.)***

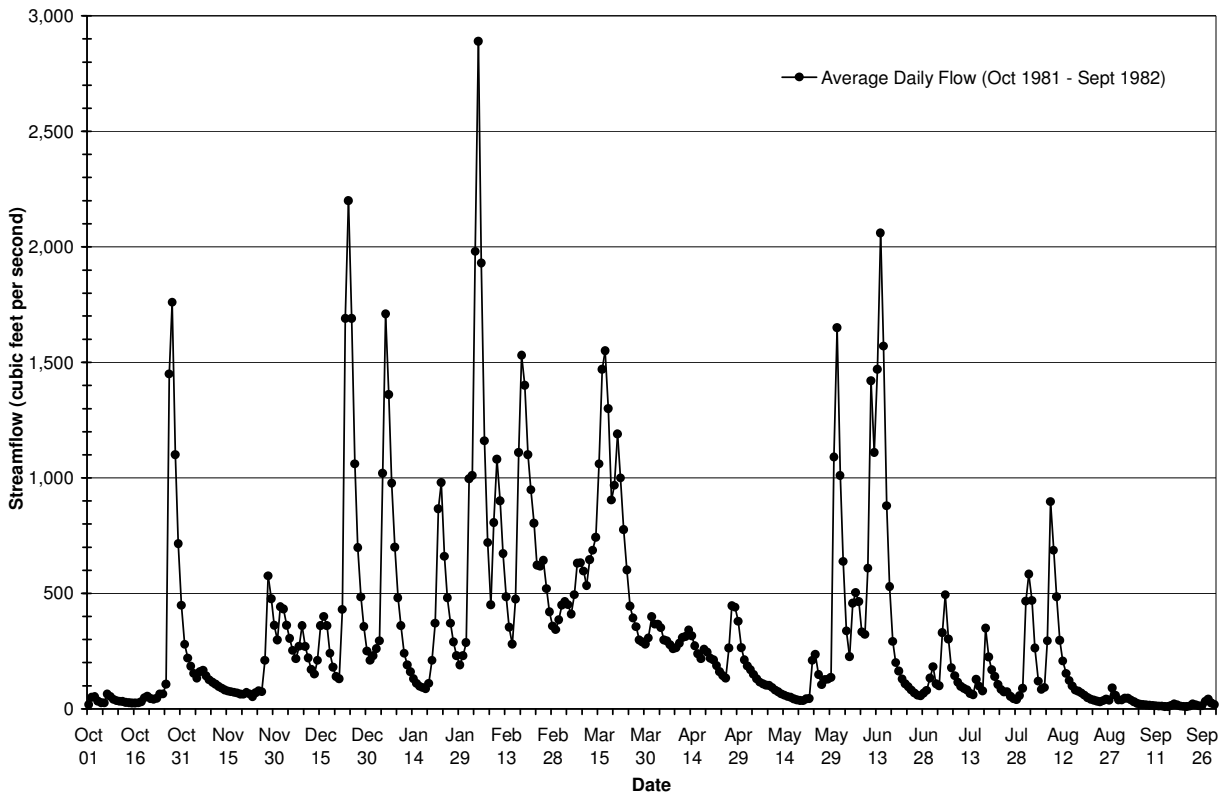


**Figure 3.4-2. Meadow River Streamflow (October 1981 through September 1982) (USGS, 2006)**

### *3.4.1.2 Power Plant Site*

Sewell Creek is the primary receiving water for the power plant site's drainage and is a direct tributary of the Meadow River (see Figure 3.4-3). The proposed power plant site is south of Sewell Creek and slopes downward from the base of a ridgeline along Sims Mountain to Sewell Creek in a northwest direction. As Sewell Creek winds through Rainelle it receives water from Wolfpen Creek, Little Sewell

Creek, and an unnamed tributary before draining into the Meadow River, located approximately 1.5 miles (2.4 kilometers) downstream. Sewell Creek flows from southwest to northeast.

Sewell Creek's sinuous path has created a natural meander neck cutoff in the project area that has begun to erode and has nearly resulted in an oxbow lake. Sewell Creek's channel meanders within highly erodable silty sand alluvium that makes up the floodplain along the west and north sides of the power plant site. A study of Sewell Creek meandering was performed to determine past migration of the stream and to predict potential future migration (see Figure 3.4-4 and Appendix F, Stream Studies). Future positions of Sewell Creek were estimated using a mathematical model that incorporated stream parameters ascertained from digitized historical images of the creek. The prediction displays the creek's past meander movement for the years of 1940, 1970, 1996, and 2004. Based on the creek's modeling, and assuming that no floods would significantly impact the area, it is estimated that the large meander loop will likely cut off by the year 2060, because the neck is predicted to become smaller and smaller in each successive year (Edwards, 2005). The exact date of the cutoff depends on the extent of flooding each spring, during which most erosion and resulting migration occurs.

The vegetation at the project site can be characterized as a wild growth of grass, brush, and relatively young deciduous trees, part of which lies in wetlands areas (see Section 3.7.2 for wetlands discussion); however, the northern tip of the ridge has been stripped and graded flat due to previous site development efforts. As a result, this disturbed area is currently exposed and lacks vegetation and topsoil. The EcoPark area that is located north of Sewell Creek was formerly owned by the Meadow River Lumber Company (MRLC) and is now intended for industrial land use development. The EcoPark site will be developed independently of the Proposed Action by a third party and its discussion is presented only as conceptual terms. The EcoPark study area includes two former log ponds which have since been filled and converted into an open grassy field.

Highlights of the hydrologic features of the project site are presented in Figure 3.4-3. Wolfpen Creek flows under WV 20 and the rail tracks through a culvert, and drains portions of the EcoPark area before its confluence with Sewell Creek 1,000 feet (300 meters) west of the proposed power plant site. A small portion of the power plant site drains east into an unnamed tributary located east of the ridge. This unnamed tributary is an intermittent stream that is mostly dry during the summer months and has a defined bed and bank. During past development efforts, the material from the ridge was deposited on the surrounding floodplain, which resulted in the relocation of the unnamed tributary to the east. This intermittent stream drains into Sewell Creek and both streams function as a natural boundary around the main project site. Sewell Creek subsequently flows in a general northeast direction and merges with Little Sewell Creek a half mile (1 kilometer) downstream from the project site before it flows into the Meadow River. Section 3.5 (Floodplains) provides discussion on other hydrological and flooding aspects for this area.

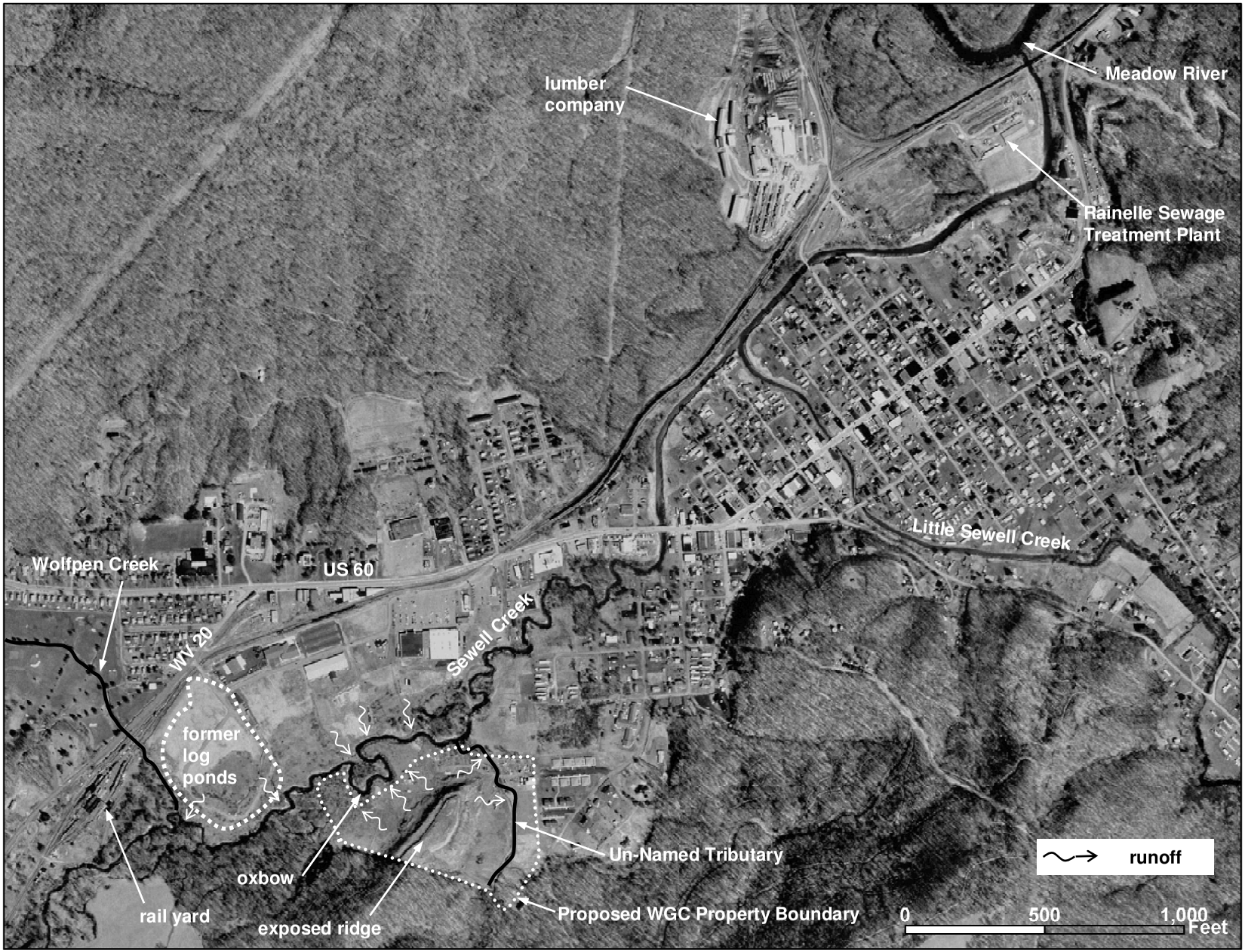


**Figure 3.4-3.**
Project Site Hydrological Features - Rainelle, West Virginia

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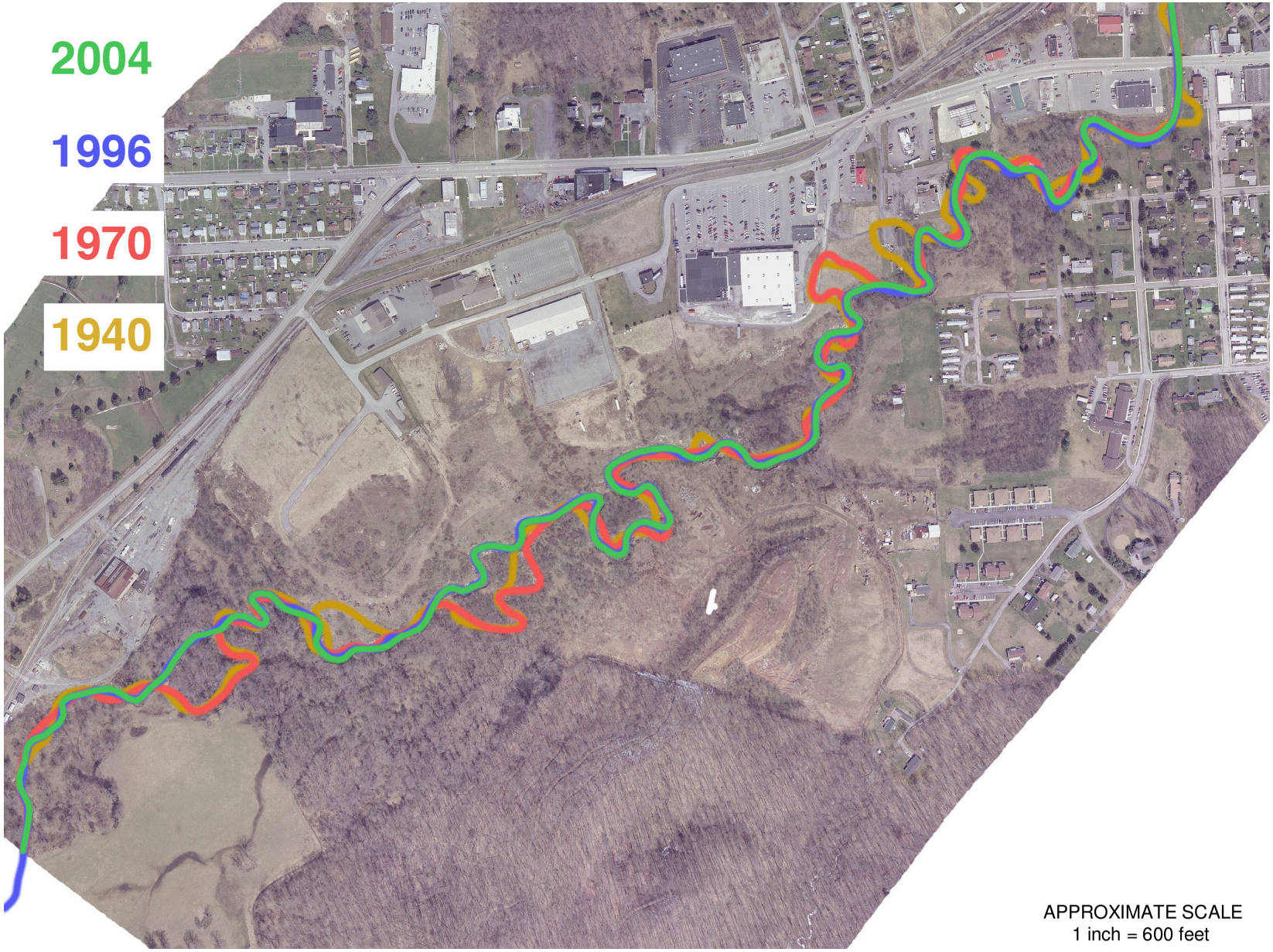


**Figure 3.4-4.**
Sewell Creek Meander Study

Map Source: Edwards, 2005

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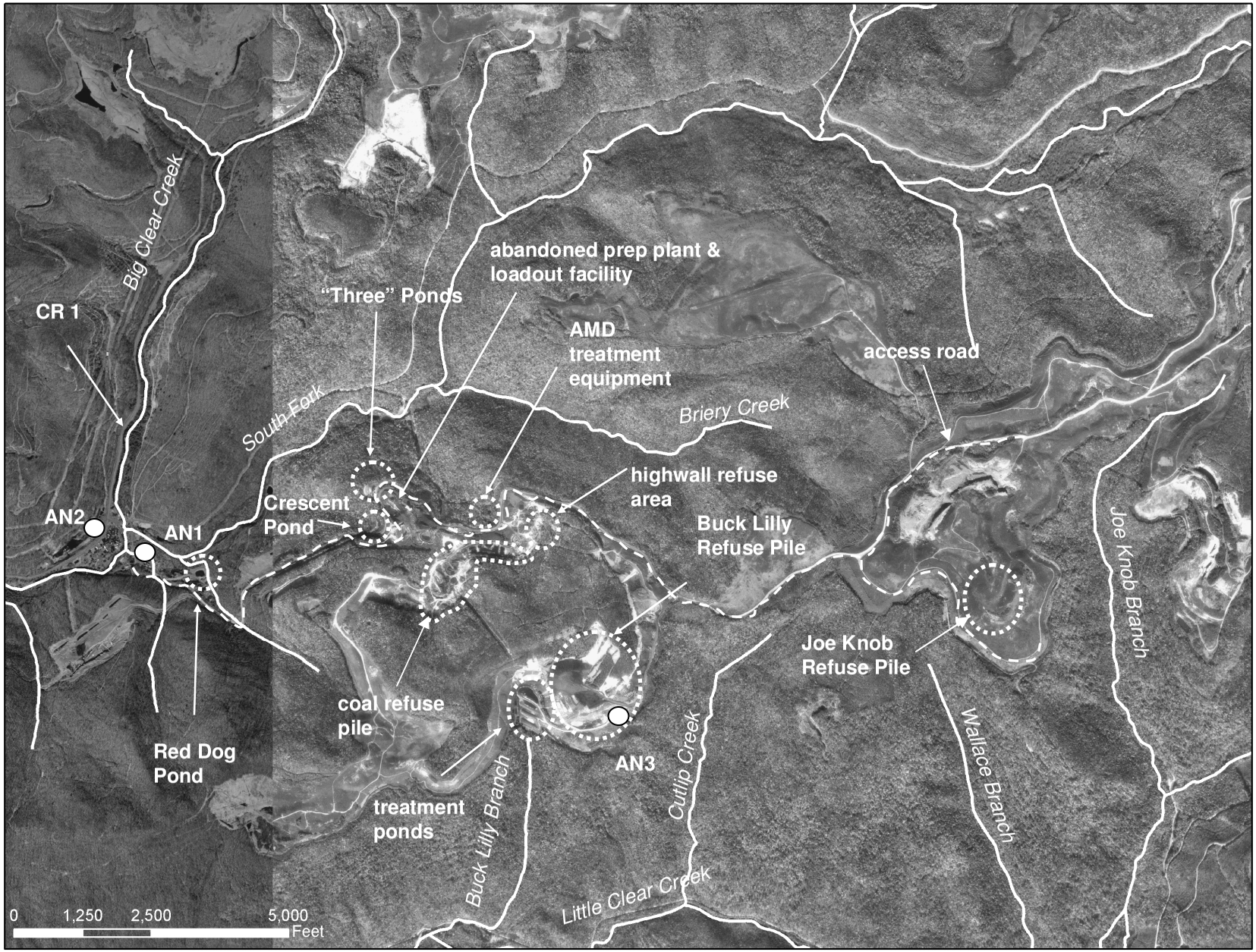


**Figure 3.4-5.**
Existing Conditions at Anjean and Joe Knob, West Virginia

Map Source: USGS orthophoto (1:12,000) Quinwood SE (1997), Duo (1990)

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### *3.4.1.3 Anjean and Joe Knob*

Figure 3.4-5 illustrates the existing site conditions at the Anjean and Joe Knob ***coal refuse sites***. The Little Clear Creek and South Fork of Big Clear Creek, both of which flow generally south and eventually empty into the upper reaches of the Meadow River and its associated wetlands, provide surface drainage for the Anjean mining operations. Surface water runoff from the coal refuse piles is diverted through established channels and into treatment ponds before draining into the local streams. A small tributary, referred to by WVDEP as Buck Lilly Branch, receives the treated water from Buck Lilly pile and drains into Little Clear Creek. The hydrology and water quality issues at the Anjean coal refuse site are discussed in greater detail in Section 3.4.2.3.

Several sites having the potential to serve as coal processing facilities (for beneficiation of the coal refuse) have been identified by WGC (AN1, AN2, and AN3). AN1 is situated east of Big Clear Creek and south of Briery Creek. A couple of ponds that appear to have been excavated lie in the vicinity of the AN1. It is assumed that the ponds function as settling basins or stormwater retention basins.

AN2 is situated west of Big Clear Creek. Several riprap-lined channels were observed near the gravel road accessing the site. It is assumed that these channels were constructed to manage the runoff from the gravel road. No surface water bodies, such as ponds were observed on the site.

AN3 is situated south of the Buck Lilly pile. This area is partially vegetated and heavily disturbed. Abandoned trailers, PVC pipes and a container for hydrochloric acid are present on-site. No surface water body features were observed on the site during the site reconnaissance.

The Joe Knob coal refuse pile drains to Joe Knob Branch and Wallace Creek, which are tributaries to Little Clear Creek. Both streams possess a steep gradient profile, with the headwaters having an elevation that roughly ranges from approximately 3,500 to 3,600 feet (1,170 to 1,100 meters) above mean sea level (amsl) to an estimated elevation below 3,000 feet (900 meters) amsl at their confluence with Little Clear Creek. Slopes bordering the streams are steep and vegetated by forests typical for that region of West Virginia.

### *3.4.1.4 Green Valley*

The Green Valley coal refuse site is located in the Hominy Creek subshed (within the Gauley watershed). The site is situated on a ridge between Hominy Creek and Colt Branch (see Figure 3.4-6). Hominy Creek has been identified by the state as a stream with reproducing native trout (EQB, 2004). The coal refuse disposal area slopes in a south and easterly direction, directing surface water runoff into water treatment settling ponds before entering Hominy Creek. The hydrology and water quality issues at the Green Valley coal refuse site are discussed in greater detail in Section 3.4.2.4.

A portion of the Green Valley site was evaluated for its feasibility to function as a location for a coal prep plant. As shown in Figure 2.2-17, the candidate site GV would be located somewhere along the southern border of the coal refuse pile that parallels Hominy Creek. Several settling ponds that treat runoff from the coal refuse are located in the southeast corner of the site.

### *3.4.1.5 Donegan*

The Donegan coal refuse site is also located in the Gauley watershed and drains into Laurel Creek, a tributary to the Cherry River. Drainage from the site is directed to the north and then drains into Laurel Creek (see Figure 3.4-7). Water quality issues at the Donegan site are discussed in Section 3.4.2.5.

Two candidate prep plant sites have been identified as potential locations for processing the coal refuse from Donegan (DN1 and DN2). The land bordering the DN1 site is primarily vegetated with herbaceous

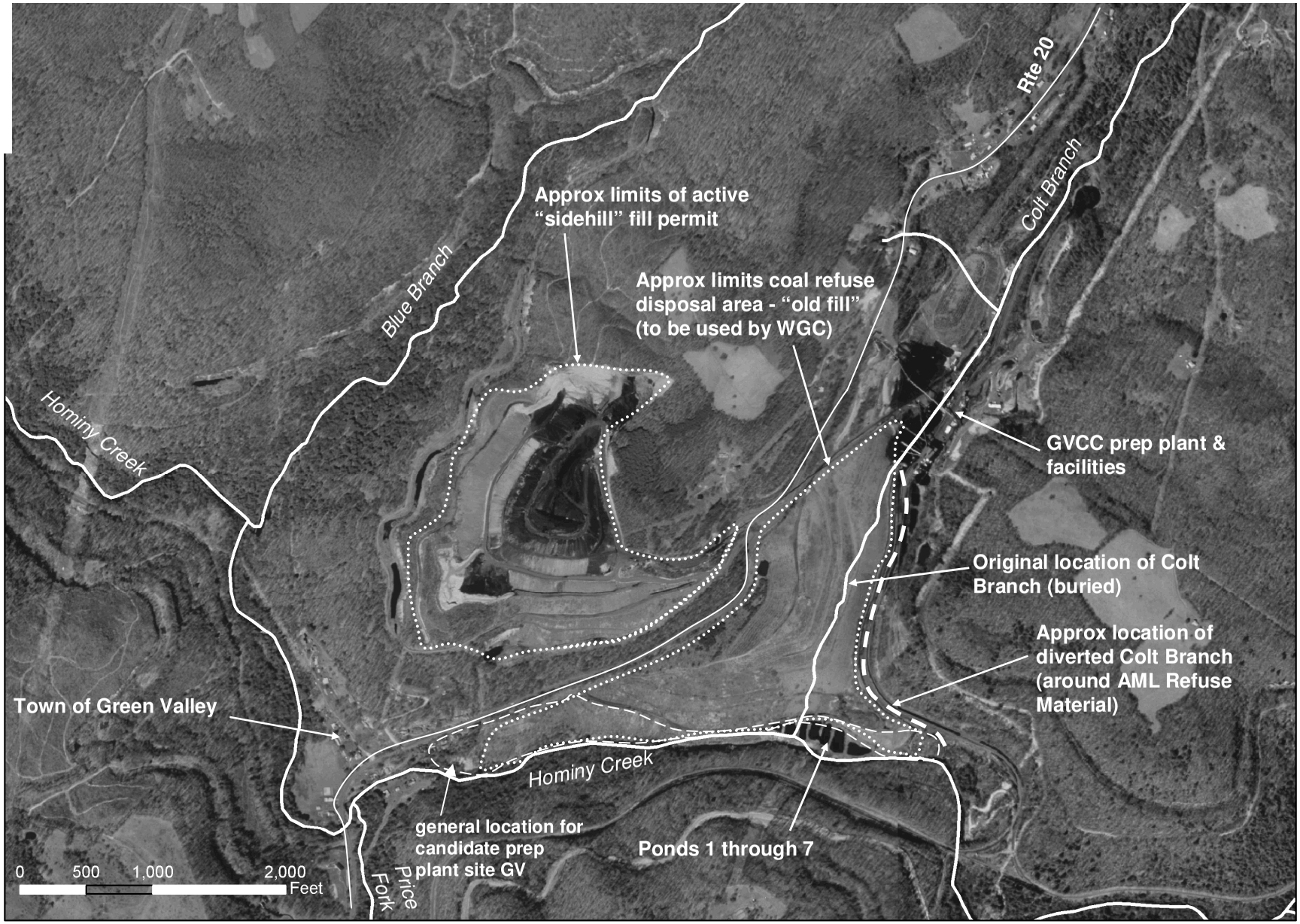


**Figure 3.4-6.**
Existing Conditions at Green Valley, WV

Map Source: USGS orthophoto (1:12,000) Quinwood NW and NE (1997)

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and woody trees common to the region. DN1 drains into Laurel Creek of the Cherry River. One sediment/treatment pond is located to the west of DN1.

The DN2 site is situated in the Long Branch and Elija Branch Watersheds and contains several sediment ponds and other forms of storm water management infrastructures (Green 2006). Long Branch and Elija Branch are characterized as first or second order streams with a well-defined bed and bank drainage morphology located down slope of the proposed area. The riparian corridor of both streams (Long Branch and Elija Branch) is vegetated by woody and herbaceous plants common to the region. No jurisdictional bodies of water (streams or wetlands) were observed within the proposed beneficiation site.

## 3.4.2 Surface Water Use and Quality

### *3.4.2.1 Regional Water Use and Quality*

Within the Kanawha-New River Basin the National Park Service manages the New River Gorge National River, the Gauley River National Recreation Area, and Bluestone National Scenic River. New River and Gauley River are considered world-class whitewater rafting locations and are used heavily by whitewater kayakers and rafters. The only major industrial area within the Kanawha-New River Basin is located within 20 miles (30 kilometers) of Charleston, along the terraces of the Kanawha River. Based on 1990 data most of the population within the Kanawha River Basin lived in rural areas (Paybins, 2000). Industrial and residential areas had accounted for less than 5 percent of the basin's total area in 1990.

Between the years 1996 and 1998, the USGS National Water-Quality Assessment (NAWQA) program conducted a water quality assessment of the Kanawha-New River Basin. The NAWQA report found that, overall, the basin's river system contained low concentrations of nutrients and pesticides most likely owing to the relatively low population and low intensity of agriculture and urban development in the basin. Between the years 1980 and 1999 it was discovered that the streams within the coal regions of the Appalachian Plateaus Physiographic Province generally improved with respect to pH, total iron, total manganese, and sedimentation; however, the effects of mining-related activities were reflected in high sulfate concentrations and impaired biological communities (Paybins, 2000). In general, waters affected by mine drainage exhibit high acidity and/or high metals content, which includes iron, aluminum, and manganese. Although mine drainage is mainly discussed with respect to metals, sulfate concentrations greater than 50 mg/l may also signify mine drainage influence. The NAWQA report cited coal mining, improper disposal of human and animal wastes, and past industrial activities as the major influences on water quality for the streams and rivers within the Kanawha-New River Basin.

As with most states in the U.S., West Virginia has enacted clean water legislation, which at a minimum, includes the requirements of the federal Clean Water Act (CWA). The principal water quality law in the state is the West Virginia Water Pollution Control Act (WPCA). The WPCA designates the Division of Water and Waste Management (DWWM) as the primary water pollution control agency for the state. The Environmental Quality Board (EQB), a Governor-appointed board comprising members with expertise in various water resources backgrounds, promulgates West Virginia's water quality standards.

West Virginia has adopted an anti-degradation policy pursuant to the federal CWA, which complements the water quality standards by limiting additional degradation to the state's water bodies. The Anti-Degradation Implementation Rule is essentially a preventive maintenance measure for protecting existing uses and high quality standards for the state's waters. The implementation rule provides more protection for state waters by assigning different levels or tiers of protection. In general, there are four tiers of protection, with Tier 1 protection (lowest level) applying to all waters and Tier 2 protection being the default level of protection for most waters in West Virginia. Tier 2 waters are high quality waters where pollution levels fall below the water quality standards and degradation is permissible (up to the level of the standard) if deemed necessary by the state. Tier 2.5 protection signifies high-quality waters of "special

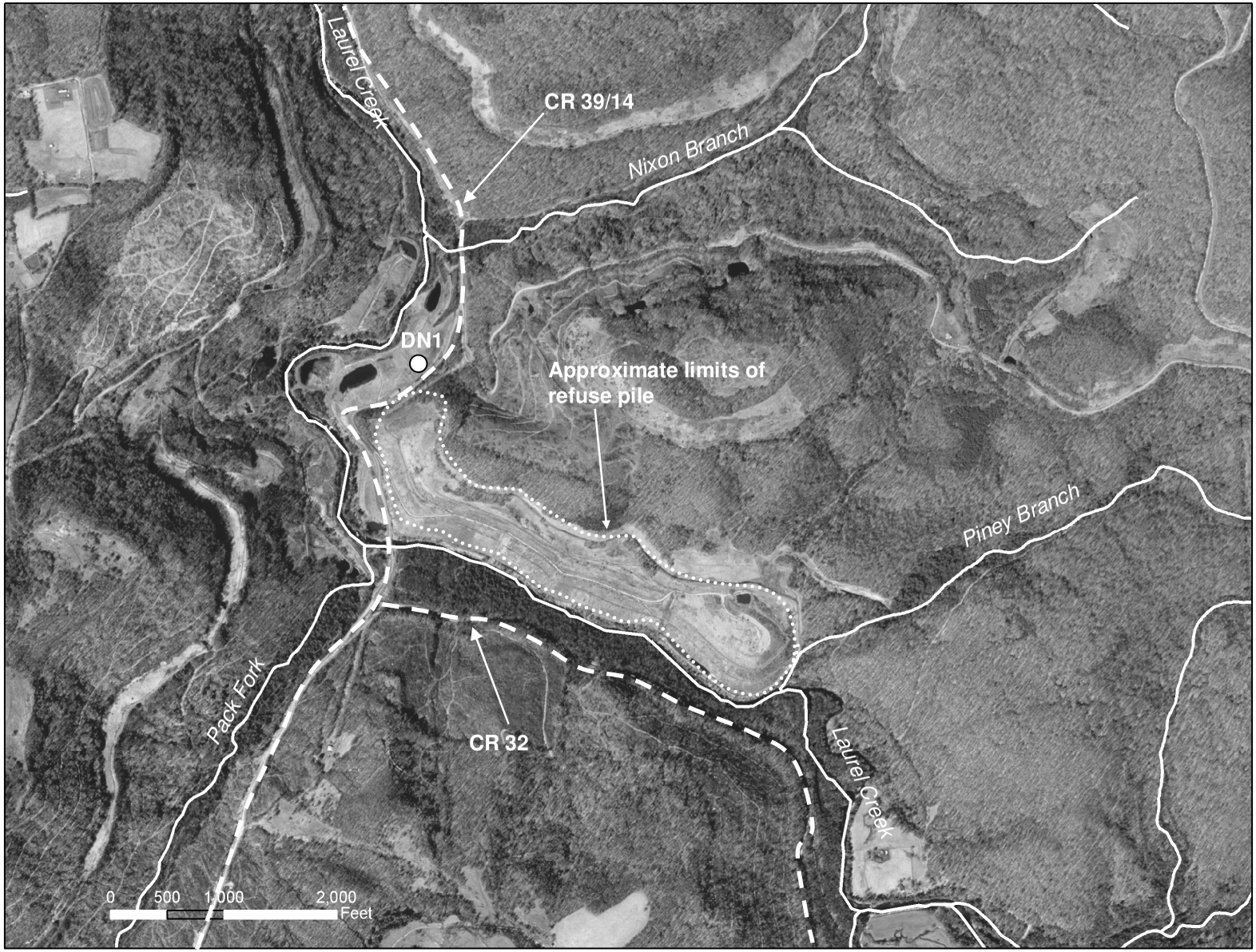


**Figure 3.4-7.**
Existing Conditions at Donegan Site (Nicholas County)

Map Source: USGS orthophoto (1:12,000) Richwood SE

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concern" where no significant degradation is allowed and the existing water quality effectively becomes the standard. Little Clear Creek near Anjean and Hominy Creek, Price Fork, and South Fork near Green Valley are considered trout-reproducing streams and are currently listed as Tier 2.5 streams (DWWM, 2005b). For Tier 3 waters no permanent lowering of existing water quality is allowed. Tier 3 waters are to be maintained, protected and improved. All streams and their tributaries within the state's wilderness areas are considered Tier 3 streams. There are currently no Tier 3 streams within the Gauley watershed.

Under the CWA, two federal strategies have been developed to deal with polluted streams: the Total Maximum Daily Load (TMDL) and the listing of 'impaired' streams. Section 303(d) of the CWA requires a routine listing of streams determined by WVDEP to be "impaired" and TMDL development for these listed streams. A stream is considered impaired when it does not meet the state's water quality standards or does not meet its designated use. A designated use has associated criteria that describe specific standards that must be met to ensure that a stream can support its use. The TMDL is essentially a plan of action to clean up an impaired stream and involves calculating the total load of pollutants that a segment of a stream can accept without violating the water quality standard. Under the recommendations of the EPA, West Virginia classifies a stream into one of the following categories:

- Category 1 – Stream is attaining water quality standards and no use is threatened (i.e., fully supporting all designated uses);
- Category 2 – Stream is attaining some of the designated uses, but no or insufficient information is available to determine if the remaining uses are attained or threatened;
- Category 3 – Currently, there is insufficient or no data and information to determine if any designated use is attained;
- Category 4 – Stream is impaired or threatened but does not need a TMDL;
  - Category 4a – Stream is impaired or threatened for one or more designated uses and TMDL has been completed;
  - Category 4b – Stream is impaired or threatened for one or more designated uses but does not require the development of a TMDL. Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future;
- Category 5 – Water quality standards are not attained. Stream is impaired.

In summary, if all uses are attained (i.e., all water quality standards are being met for each designated use), the water is unimpaired and is listed as a Category 1. At the other end of the spectrum, Category 5 waters are in violation of water quality criteria and must obtain a TMDL. Categories 2 through 4 are waters which either have insufficient data to make assessments, no data, or TMDLs have already been completed or are not required. Table 3.4-1 lists the streams draining Rainelle and the coal refuse piles in Anjean, Green Valley, and Green Valley and their assigned categories. Table 3.4-2 lists the streams near Rainelle, Anjean, and Green Valley that were included in the 2004 Section 303(d) List (i.e., identified as an impaired stream).

#### *3.4.2.2 Rainelle Water Quality & Use*

As shown in Table 3.4-1, Sewell Creek's designated uses include Agriculture and Wildlife (no impairment currently exists for this use); Public Water Supply (use is currently impaired); Warm Water Fishery (use is currently impaired); and Water Contact Recreation (insufficient data at this time to determine whether or not stream is impaired for this particular use). In addition to Sewell Creek, Little Sewell Creek and Meadow River are also currently included in the 303(d) listing of impaired streams with the latest projected TMDL year of 2006 (see Table 3.4-2).

**Table 3.4-1. Stream Designated Use and Category (Rainelle, Anjean, Green Valley, Donegan, Joe Knob Branch, Beech Knob, and Wallace Branch)**

| Stream | Designated Use | | | | | Category | Location | Length (miles)** |
|---|---|---|---|---|---|---|---|---|
| | Agriculture and Wildlife | Public Water Supply | Trout Waters | Warm Water Fishery | Water Contact Recreation | | | |
| Meadow River | F | N | X | F | N | 5 | Entire Length | 68.8 |
| Sewell Creek | F | N | X | N | I | 5 | Entire Length | 14.1 |
| Little Sewell Creek | NA | NA | X | NA | NA | 5 | Entire Length | 6.1 |
| Boggs Creek | F | F | X | I | F | 2 | Entire Length | 6.3 |
| Wolfpen Creek | NA | NA | X | NA | NA | 3 | Entire Length | 2.8 |
| Big Clear Creek | F | I | F | X | I | 2 | Entire Length | 16.6 |
| South Fork* | NA | NA | X | F | F | 2 | Entire Length | 6.3 |
| Little Clear Creek* | I | N | N | X | I | 5 | Entire Length | 16.3 |
| Hominy Creek* | F | F | F | X | F | 1, (5) | Mouth to MP17.3 and MP19.1 to headwaters, {MP17.3 to MP19.1}) | 24.6, 1.8 |
| Price Fork* | I | I | NA | I | I | 3 | Entire Length | 3.0 |
| Colt Branch | F | N | X | N | F | 5 | Entire Length | 2.2 |
| Laurel Creek* | NA | NA | NA | NA | NA | - | - | - |
| Joe Knob Branch | X | X | I | X | X | 3 | Entire Length | 3.9 |
| Wallace Branch | X | X | | X | X | 5 | Entire Length | 3 |
| Long Branch | X | X | | X | X | 3 | Entire Length | 2.6 |
| Elijah Branch | F | F | | F | F | 1 | Entire Length | |

*Note: *Tier 2.5 Streams; F – Fully Supporting (use is being fully met and no impairment exists for that use); N – Not Supporting (use is impaired); I – Insufficient Data; NA – Not Assessed; X – Not Considered a Designated Use; **To convert miles to kilometers, multiply by 1.609 (Source: DWWM, 2004a, 2006)*

**Table 3.4-2. 303(d) Listed (Impaired) Streams near Rainelle, Anjean and Green Valley**

| Stream | Criteria Affected | Cause | Impaired Length (miles)* | Reach Description |
|---|---|---|---|---|
| Meadow River | Fecal Coliform | Unknown | 68.8 | Entire length |
| Sewell Creek | Fecal Coliform, Iron | Unknown, Mine Drainage | 14.1 | Entire length |
| Little Sewell Creek | Fecal Coliform, Iron | Unknown, Unknown | 6.1, 0.3 | Entire Length, Mouth to MP 0.3 |
| Little Clear Creek | Iron, pH | Mine Drainage, Unknown | 16.3 | Entire length |
| Hominy Creek | Iron | Mine Drainage | 1.8 | From MP17.3 to MP 19.1 |
| Colt Branch | Iron | Mine Drainage | 2.2 | Entire length |
| Wallace Branch | pH | Unknown | 1.6 | Entire Length |

** To convert miles to kilometers, multiply by 1.609 (Source: DWWM, 2006)*

An aquatic survey of Wolfpen Creek and Sewell Creek was conducted in June 2004 to assess the water quality of the streams (see Appendix F, Stream Studies). Figure 3.4-8 displays the sampling points and Table 3.4-3 summarizes the resulting physical and chemical parameters estimated for the streams. In general, the survey determined that both streams could be described as similar in both physical and chemical characteristics (Jones et al, 2005). However, due to the relatively larger upstream flow of Sewell Creek, it was determined that Sewell was largely responsible in determining the water quality near the project area. The report noted that the contamination amounts and contributing flow of the unnamed intermittent tributary (Site 4 in Figure 3.4-8) are likely too small to affect Sewell Creek. The survey also determined that Wolfpen and Sewell Creeks exhibit reasonable water quality, but both are too habitat- and flow-limited to support diverse aquatic communities. Further discussions on the biological conditions of the stream can be found in Section 3.7 (Biological Resources) and in Appendix F (Stream Studies).

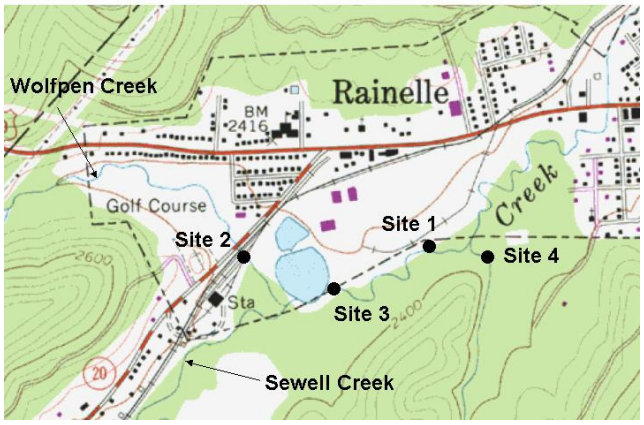


**Figure 3.4-8. Sampling Sites for Wolfpen Creek and Sewell Creek Stream Parameters**

**Table 3.4-3. Existing Water Quality Analytical Results**

| PARAMETER | SITE 1* Sewell Creek downstream | SITE 2 Wolfpen Creek | SITE 3 Sewell Creek upstream | SITE 3 DUP Sewell Creek upstream | SITE 4 UNT** | UNITS |
|---|---|---|---|---|---|---|
| Flow | 13.0 | 2.0 | 15.0 | 15.0 | 0.219 | cfs |
| Conductivity | 90.7 | 109.5 | 90.7 | 90.7 | 33.3 | umhos |
| pH | 6.9 | 7.4 | 7.3 | 7.3 | 7.0 | |
| Temperature | 16.4 | 16.8 | 16.4 | 16.4 | 17.9 | ℃ |
| Total Suspended Solids | <1 | 2 | 3 | 1 | 4 | mg/l |
| Alkalinity | 26 | 44 | 26 | 34 | 8 | mg/l |
| Acidity | <1 | <1 | <1 | <1 | 6 | mg/l |
| Hot Acidity | <1 | <1 | <1 | <1 | <1 | mg/l |
| Sulfate | 17 | 3 | 18 | 19 | 4 | mg/l |
| Turbidity | 4 | 4 | 5 | 4 | 7 | mg/l |
| Iron | 0.43 | 0.17 | 0.39 | 0.48 | 0.4 | mg/l |
| Manganese | 0.08 | 0.05 | 0.07 | 0.08 | 0.1 | mg/l |
| Aluminum | 0.087 | 0.036 | 0.156 | 0.081 | 0.115 | mg/l |
| Selenium | <2 | <2 | <2 | <2 | <2 | ug/l |
| Zinc | <10 | <10 | <10 | <10 | <10 | ug/l |
| Dissolved Iron | 0.23 | 0.1 | 0.17 | 0.24 | 0.2 | mg/l |
| Dissolved Aluminum | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | mg/l |
| Dissolved Copper | 2 | 2 | 2 | 1 | 1 | ug/l |
| Dissolved Zinc | <10 | <10 | <10 | <10 | <10 | ug/l |
| Nitrite/Nitrate | 2.64 | 1.76 | 2.2 | 1.76 | 1.76 | mg/l |
| Phosphate | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | mg/l |
| Total KJELDAHL Nitrogen | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | mg/l |

**Refer to Figure 3.4-8 for site locations; **UNT – unnamed tributary*

*Source: Jones et al, 2005*

### *3.4.2.3 Anjean Site and Water Quality*

Anjean is a small coal town, approximately 13 miles (20 kilometers) outside of Rainelle and located along Anjean Road (CR 1). It began mining operations almost 80 years ago and closed in 1999 when Royal Scot Minerals, the final operator of the Anjean mines, went bankrupt. The Anjean mines reside on the Sewell and Fire Creek coal seams, which are located within the Greenbrier coalfield. The Anjean mining location occupies approximately 400 acres (162 hectares) of land and includes an abandoned preparation plant and load out facility. Past mining operations utilized both deep and surface mining methods to extract coal along Big Clear Creek. In 1972 a surface mine permit on top of Little Clear Creek Mountain was issued to Leckie Smokeless Coal Company.

Drainage for the Anjean site is provided by Little Clear Creek and the South Fork of Big Clear Creek, both of which flow generally south and drain into the upper reaches of the Meadow River. As Anjean's operations expanded, several coal refuse piles, including the Buck Lilly coal refuse pile, began to emerge. At approximately 40 acres (16 hectares) and 4,000,000 tons (3,600,000 metric tons), the Buck Lilly pile, also referred to as Anjean Mountain, contains the majority of the available coal refuse at Anjean. Drainage from this area is provided by a small tributary, referred to by WVDEP as Buck Lilly Branch, that directly

drains into Little Clear Creek. Figure 3.4-5 illustrates the existing site conditions at the Anjean mining facilities. Little Clear Creek is currently included in the 303(d) listing of impaired streams with the latest projected TMDL year of 2006 (see Table 3.4-2).

The 400-acre (162 hectares) property is divided between the Little Clear Creek and Big Clear Creek watersheds. Both of these creeks, which include several features of associated tributaries, are known for trout fishing. There are four specific treatment sites within the Big Clear Creek watershed, referred to as Three Ponds, Crescent Pond, AMD treatment equipment, and Red Dog Pond and one treatment site in the Little Clear Creek watershed known as Buck Lilly (see Figure 3.4-5). WVDEP has been overseeing the treatment sites since Royal Scot Minerals became bankrupt in 1999. A coal screening facility that was built in the Big Clear Creek watershed resulted in dry refuse that was stored over the hill and adjacent to the plant. Subsequently, the screening facility was converted to a wash plant, which generated its own coal refuse that was also stockpiled in the same location as the screened refuse. As a result of coal refuse disposal, acid mine drainage (AMD) began to emerge from the coal refuse and was collected and diverted just below the preparation plant to Three Ponds. Other AMD was being generated by other coal and refuse piles on the opposite side of the preparation plant and was diverted into the pond referred to as Crescent Pond. Water from Three Ponds and Crescent Pond was treated and discharged to South Fork. AMD resulting from fine slurry refuse from an unreclaimed pit was also detected in seepage at the toe of the surface mine spoil and was diverted to Red Dog Pond where it was treated and discharged into South Fork. In the early 1980's (post-Surface Mining, Control, and Reclamation Act (SMCRA)) coal refuse began to be stored at the Buck Lilly site and after a couple of years AMD was detected in Little Clear Creek.

Over the past 20 years, water treatment (including treatment with sodium hydroxide), has been continuous within both watersheds in the hopes of maintaining the water quality needed to support the native and stocked trout population. Only recently was Little Clear Creek re-stocked with trout. A report was conducted for WVDEP, "Evaluation of the Analytical Effects of Acid Mine Drainage from Royal Scot Permit 31-72 (Buck Lilly) on Receiving Streams, and Little Clear Creek of Meadow River," that assessed the water quality upstream and downstream of the Anjean sites. The assessment analyzed untreated effluent plus stream water both upstream and downstream of the treated effluent discharge points on South Fork and Little Clear Creek. The results are presented in Table 3.4-4.

Table 3.4-4 indicates that water quality of the runoff from the coal refuse on the South Fork drainage basin is significantly degraded; however, water quality of the treated effluent is comparable to that of South Fork upstream of the Anjean site, if not better. The untreated effluent downstream of the Buck Lilly refuse pile also indicates significant water quality degradation, but treatment results show considerable improvement. Although treatment at Anjean obviously plays an important role in maintaining water quality in both the Big Clear Creek and Little Clear Creek watersheds, Little Clear Creek has been listed in the federal CWA Section 303(d) List of Impaired Streams due to acid mine drainage (see Table 3.4-2).

#### *3.4.2.4 Green Valley Site and Water Quality*

Approximately 12 miles (19 kilometers) from Rainelle, the Green Valley Coal Company (GVCC) operates a coal preparation plant and an associated active "sidehill" refuse disposal facility located along route WV 20 in Green Valley, Nicholas County. The majority of the Green Valley coal refuse pile sits on the active side hill fill permit owned by GVCC. The active fill lies on a ridge between Blue Branch and Colt Branch, both of which are direct tributaries of Hominy Creek, a subshed of the Gauley watershed (see Figure 3.4-6). Hominy Creek and Colt Branch are currently included in the 303(d) listing of impaired streams with the latest projected TMDL year of 2006 (see Table 3.4-2). Hominy Creek has been identified by the state as a native reproducing trout stream (EQB, 2004). The storm water runoff from the disposal facility is collected by perimeter drains and routed into sediment control ponds that discharge into Blue Branch under NPDES permit regulations. Directly underneath the active fill area are old underground

mine workings in the Sewell coal seam, which effectively capture any downward infiltration of water from the fill. Part of the captured infiltration discharges within the permitted disposal area and into Blue Branch, while the other part discharges outside the permitted area and into Hominy Creek. There is some underground mine drainage that enters Blue Branch from the Sewell seam. Overall, the main flow elements for Hominy Creek are surface runoff and extensive Sewell underground mine drainage throughout the watershed (MMA, 2001).

**Table 3.4-4. Water Quality in South Fork and Little Clear Creek Watersheds**

| Location | Acidity (mg/L) | Iron (mg/L) | Aluminum (mg/L) | Manganese (mg/L) |
|---|---|---|---|---|
| **South Fork of Big Clear Creek** | | | | |
| South Fork of Big Clear Creek – Upstream mining permit (i.e., no influence from Anjean) | 6.10 | 0.50 | 0.84 | 1.19 |
| Untreated/Raw Effluent (before treatment ponds) | 185.12 | 5.83 | 16.87 | 11.49 |
| South Fork of Big Clear Creek – Downstream mining permit (after treatment) | 4.11 | 0.13 | 0.15 | 0.14 |
| **Little Clear Creek** | | | | |
| Little Clear Creek – Upstream mining permit (i.e., no influence from Anjean) | 0.02 | 0.49 | 0.16 | 0.08 |
| Untreated/Raw Effluent into Buck Lilly Stream (before treatment ponds) | 101.10 | 29.59 | 6.54 | 4.77 |
| Little Clear Creek – Downstream mining permit (after treatment) | 5.00 | 0.46 | 0.29 | 0.21 |

*Source: WOPEC, 2003*

The remainder of the Green Valley coal refuse (also referred to as the "old fill" in Figure 3.4-6), which would be used by WGC for fuel, is located on non-permitted land that is maintained by WVDEP. The coal preparation plant and its associated facilities are located near the mouth of Colt Branch, and are underlain by old mine and plant refuse material that extend some distance downstream beyond the boundaries of the preparation plant permit area. The old refuse fill, often referred to as Abandoned Mine Lands or old AML fill, exists as a result of past operations not associated with current operations and is thought to contain refuse from several different mines and seams in the region. The old AML fill sits south and east of the active sidehill fill area and overlies the lower reaches of Colt Branch, resulting in the relocation of the branch and, perhaps, parts of Hominy Creek (see Figure 3.4-6)). Coal refuse and spoil material has been detected in Hominy Creek's streambed at this location, as well as at numerous points upstream of the site, which is believed to be originating from historical mining operations near the headwaters of the creek (MMA, 2001).

Although the plant's operational activities take place approximately 2,000 feet (610 meters) from Hominy Creek, there are a series of settling ponds (Ponds 2 through 7 in Figure 3.4-6) that accept and treat the surface runoff from the permitted area. Pond 1 does not have a surface inlet point; however it receives infiltrated groundwater from the AML fill through a buried drain. There are a number of seepages discharging from both the AML fill along the north side of the stream and from undisturbed (and possibly disturbed) ground along the south side of the stream. Iron-rich seepages have been detected where the old AML fill material sits along the immediate banks of Hominy Creek.

WVDEP has issued several investigations at the old AML refuse fill to characterize the natural background water quality and potential sources of iron seeps at and around the site to determine whether or not the iron content was arising from the AML fill or from the active sidehill fill. At the request of WVDEP, two investigations were made regarding iron-laden seepages detected in Hominy Creek: "Results of Monitoring Well Installation, Ground Water Analyses, and Acid Base Accounting Analysis, Green

Valley Coal Company, Nicholas County, West Virginia" dated April 2001, and "Evaluation of Iron-Laden Seepage to Hominy Creek near Mouth of Colt Branch, Nicholas County, West Virginia" dated July 2002. In the April 2001 report it was claimed that the water discharging from the active fill from the two known points was low in iron and manganese, and the study concluded that the overall water quality from the active fill was good (MMA, 2001). The report indicated that other groundwater in the area was naturally high in iron. The old AML fill had the highest levels of pyritic sulfur, and groundwater from the fill material also displayed the highest level of sulfates among the groundwater analyses. The report concluded that although high iron concentrations were evident in groundwater throughout the project area, including groundwater apparently not contaminated by flow from either the active refuse disposal area or the old AML fill, "the existing, active refuse disposal activity does not impact Hominy Creek, but the old, AML fill marginal to and locally lying within the streambed does exert water quality impacts" (MMA, 2001). Hence, the report indicates that the active fill is not directly or indirectly contaminating Hominy Creek (i.e., proposed area for WGC fuel source).

WVDEP issued a Notice of Violation (NOV) to GVCC on November 7, 2001 on the basis of failing to minimize hydrologic impacts by allowing iron-laden seepage to discharge into Hominy Creek without passing through a sediment control structure. As a result, the July 2002 report was generated with the purposes of determining: 1) if Pond 1 was causing the seepage; 2) whether or not the seeps exerted significant adverse impact upon the creek; and 3) whether or not the GVCC's activities were causing the creek to deteriorate. The report claimed that the source of the seeps in question appeared to be coming from waters running through flow paths in the old AML fill that discharged at the toe of the fill (MMA, 2002). Based on hydrogeologic characteristics of the area, the report further concluded that the seeps could exist despite the GVCC ponds and that there seemed to be no significant interaction between the seeps and the ponds. In support of this finding, the study's results showed that the iron concentration of most of the seeps was much greater than that detected in the ponds. It was also discovered that although iron concentrations exceeded the 0.5 mg/L "trout waters" water quality level at some instances, the mean annual iron concentrations were within the standard, even in the "low flow" season when concentrations are generally highest, and seemed to be diminishing with time.

Another important result from the July 2002 study was that in addition to the AML fill, natural seeps and/or disturbed ground (not associated with GVCC's activities nor the old AML fill) were also sources of iron, and that these sources were now the principal influences regarding iron levels in Hominy Creek. A significant outcome of this study is the realization that re-disturbance and exposure of the old AML fill to oxygen through exposure to air and creation of new flowpaths through the fill could potentially release iron at higher than current rates (MMA, 2002). However, disturbance of the coal refuse for the Co-Production Facility's use would in effect be temporary and its negative short-term impacts would be outweighed by the long-term benefits of using, and ultimately depleting, the main source of water quality degradation.

#### *3.4.2.5 Donegan Site and Water Quality*

The coal refuse at the Donegan site drains into Laurel Creek, a tributary to the Cherry River, which drains directly into the Gauley River (see Figure 3.4-7). Total drainage area of the Donegan coal refuse site is approximately 61.107 hectares and runoff is collected in several treatment ponds along the perimeter of the pile. According to WVDEP, the coal refuse site is fully reclaimed with grading and vegetation (Martin, 2005). In April 2005 a mining permit continuation application was submitted by Falcon Land Company, Inc., but the permit was revoked for failing to continue water treatment and failing to submit the required water quality data. Recent WVDEP water quality readings found that the pH is 3.60 and the iron and manganese concentrations are at 9.13 and 3.97 mg/L, respectively. Discussions with WVDEP reveal that high iron levels and AMD are the two main water quality issues (Martin, 2005). Currently there are several seeps from the refuse site that are not being treated. However, WVDEP has plans to install more treatment facilities for these seeps in the future.

#### *3.4.2.6 Joe Knob Site and Water Quality*

The Joe Knob site is disturbed from previous coal mining activities, and has undergone reclamation efforts after the coal mining activities ceased in 1999 (Green 2006). Tributaries draining portions of the site are identified as Joe Knob Branch and Wallace Creek, both of which are tributaries to Little Clear Creek. The headwater of Joe Knob Branch is located northeast of Joe Knob and is associated with ponds located in a disturbed area. Joe Knob Branch drains generally south and into Little Clear Creek. Wallace Branch is situated southwest of Joe Knob, and drains into Little Clear Creek.

A review of the 2006 WVDEP's list of 303(d) impaired streams indicates Joe Branch is not listed as an impaired stream. Wallace Branch is listed as a 303 (d) impaired stream. The stream use and category are presented in Table 3.4-1.

### 3.4.3 Storm Water and Industrial Wastewater Permits

Water pollution control for point source discharges in West Virginia is primarily achieved through the NPDES permitting program that is administered by DWWM. These permits include effluent limits and requirements for facility operation and maintenance, discharge monitoring, and routine reporting. The State's NPDES stormwater management program is closely modeled after the federal NPDES program, which requires stormwater to be treated to the maximum extent practicable. The state's stormwater management program also establishes permitting requirements for construction sites disturbing more than 1 acre (0.40 hectare) and industrial sites and requires proper best management practices. All stormwater treatment devices, as required by DWWM's review process, are to be designed based on the 2-year, 24-hour rain event and all proposed outlets must be designed to ensure that discharges occur at non-erosive velocities (DWWM, 2005c). In addition, West Virginia regulations include a pretreatment program for regulating proposed industrial wastewater connections to publicly owned treatment works (POTW). This program allows the DWWM to review proposals and make requirements for the installation of pretreatment facilities where necessary, or issue approval if compliance with required conditions is met.

A search of WVDEP's Water Resources Permit database shows that the following NPDES permits are issued in Rainelle, as of March 2005 (DWWM, 2005d):

- Greenbrier County PSD No. 2 (POTW) with a design flow capacity of 1.3 MGD;
- Meadow River Hardwood Lumber Company (formerly Georgia-Pacific Corp.) (industrial) with an average flow of 0.0286 MGD;
- Rainelle Water Department with an average flow of 0.014 MGD;
- Miscellaneous Water System Improvement Project (storm water construction) servicing 3.5 disturbed acres of land.

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# 3.5 Floodplains

This section discusses the existing floodplain conditions in the vicinity of the proposed Co-Production Facility site and the city of Rainelle. Information on the 100-year recurrence interval flood elevation and baseline hydrologic modeling of the proposed project area is provided. In addition, general assumptions on floodplain conditions at the coal refuse sites and the candidate prep plant sites are discussed.

## 3.5.1 Local Hydrology Features

Flooding can be a very costly natural disaster and can cause significant human suffering. West Virginia has encountered many flooding incidents in the past, and federal flood disasters have been declared at least once in every county in West Virginia during the period of 1967 to 2003, and as many as 10 times in some counties. The Federal Emergency Management Agency (FEMA) has disbursed over $300 million in assistance payments to individuals and communities for property damages in West Virginia. FEMA, through the National Flood Insurance Program (NFIP), enables property owners to purchase insurance protection against losses from flooding. The prerequisite for eligibility of the NFIP is that the community adopts and enforces a floodplain management ordinance to reduce future flood risks, particularly with respect to new construction (Haestad Methods, 2003).

The Meadow River is a major tributary of the Gauley River and flows within the Gauley River National Recreation Area. Sewell Creek flows in a northeasterly direction and then drains into the Meadow River. Sewell Creek is, for the most part, shallow 8 to 12 feet (2 to 4 meters), as measured from streambed to floodplain level, and is 30 to 35 feet (9 to 11 meters) wide, as measured at top of channel. Water depths, as measured along the center of the stream, range from about 6 inches (15 centimeters) over sand bars to about 4 feet (1 meter) in scour holes. As the creek flows in a northeast direction and along the northwest perimeter of the city of Rainelle, Wolfpen Creek, Boggs Creek, and Little Sewell Creek flow into Sewell Creek. Sewell Creek has been channelized from approximately the US 60 Bridge to its confluence with Meadow River. Stream slopes are approximately 2 feet per mile (0.4 meters per kilometer) on Meadow River and 16 feet per mile (3 meters per kilometer) on Sewell Creek and Little Sewell Creek (see Figure 3.5-1).

## 3.5.2 Floodplains

### *3.5.2.1 Flooding in Rainelle*

Rainelle has had significant flood disasters in recent years, with the most recent flood occurring in November 2003. The November 2003 flood event resulted from 4 inches (10 centimeters) of rain in such a short timeframe that it caused creeks to rise and overflow, damaging more than 300 homes and 50 businesses in Rainelle. Flooding in downtown Rainelle principally occurred due to overflows of Sewell Creek and Little Sewell Creek. As a result of the flooding, Rainelle has been working with USACE to initiate a flood mitigation study to determine what may be done to reduce the possibility of future floods. It is suspected that a railroad bridge that crosses the mouth of Sewell Creek at the confluence with the Meadow River resulted in a damming effect that may have contributed to the extent of flooding.

Signs of high water (e.g., depressed vegetation) were present in floodplain areas on the E&R property, EcoPark, and immediately adjacent properties.

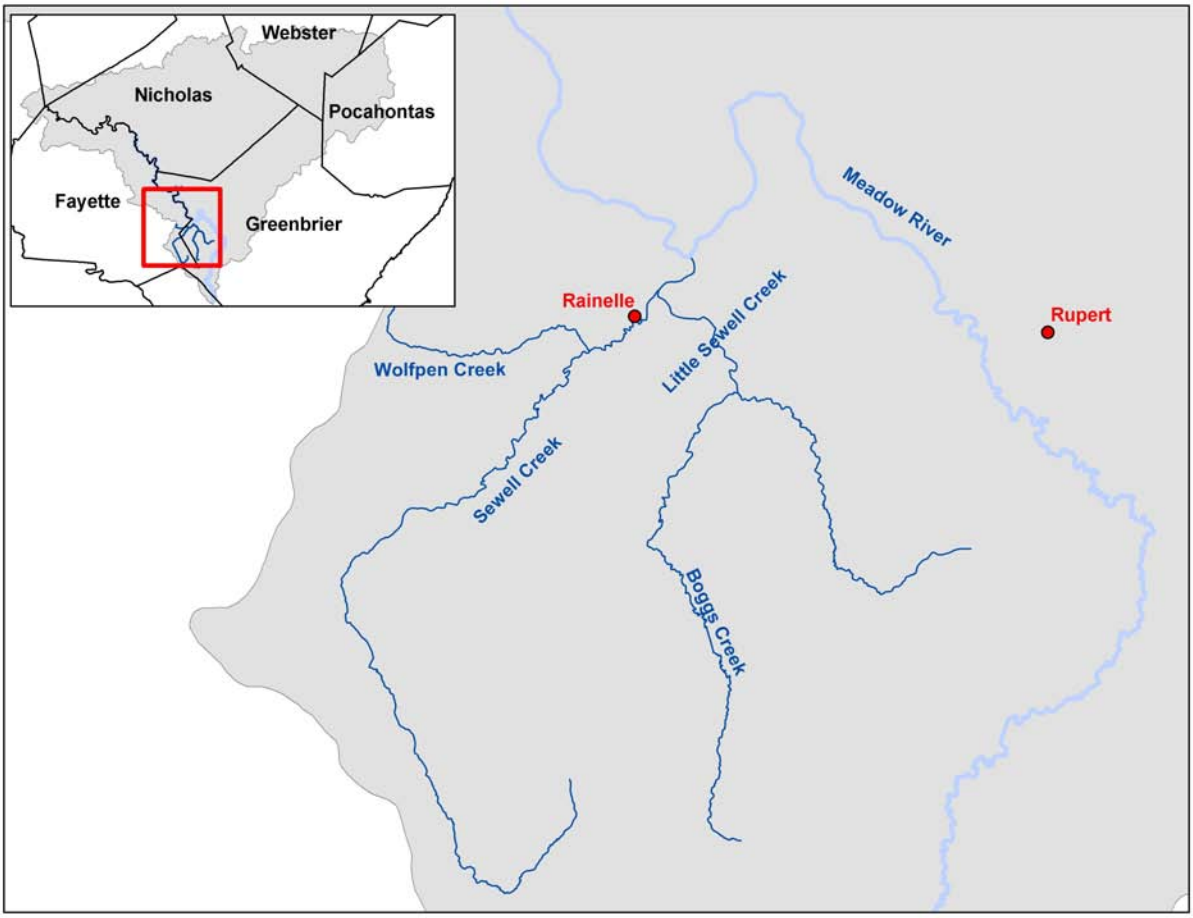


**Figure 3.5-1. Streams in the Vicinity of Rainelle**

### *3.5.2.2 Floodplain Management*

Floodplain management is the implementation of programs to ensure that flooding problems do not increase and to work toward the reduction in the risk of flood damage. These corrective and preventative measures take a variety of forms and generally include zoning ordinances, subdivision and building requirements, and other types of ordinances. One of the principle tools for a community's floodplain management is the designation of floodways and active floodplains as a basis for zoning ordinance enforcement and for establishing land uses ordinances (Haestad Methods, 2003). The floodway is the area around a stream that should remain free of obstructions to allow passage of large flood discharges. It consists of the stream channel plus that portion of the over-banks that must be kept free of encroachment to discharge the 100-year flood without increasing the flood level over the 100-year water surface elevations by more than an allowable height. FEMA has adopted a maximum allowable increase of water surface elevation of 1.0 foot (0.3 meter) for a 1.0 percent annual chance (100-year recurrence interval) flood event as the national standard for floodplain management purposes (Haestad Methods, 2003). Several states and municipalities, however, have adopted more stringent criteria with less than 1.0 foot (0.3 meter) allowable increase of water surface elevations.

As the basis for floodplain management activities of the NFIP, Flood Insurance Rate Maps (FIRMs) have been developed by FEMA for flood insurance rating purposes. A FIRM is a map that outlines flood risk zones within communities (see Figure 3.5-2) for insurance purposes. FIRMs are issued, published and

distributed by FEMA to a wide range of users, including private citizens, community officials, insurance agents and brokers, lending institutions, and other federal agencies. A FIRM is usually issued following a flood insurance study (FIS), which is a report prepared by FEMA that summarizes the analyses of flood hazards in the community.

FISs include a detailed engineering study to map predicted flood elevations at specified flood recurrence intervals. Generally, FISs are concerned with the peak discharges in streams for the 10-year, 50-year, 100-year, and 500-year storm events and includes engineering analysis of flood elevations for each flood recurrence interval. Based on the results of the engineering analyses, flood risk zones are assigned for insurance purposes.

#### *3.5.2.3 Flood Insurance Rate Map (FIRM) for Rainelle*

The FIRM map for Rainelle and the project area is presented in Figure 3.5-2, which is based on a FIS completed by FEMA in 1987. The FIS covered a detailed study of Sewell Creek from the confluence of the Meadow River to the confluence with Little Sewell Creek. A detailed study determines the water-surface elevations on streams and Base Flood Elevations (BFEs) for 10-year, 50-year, 100-year and 500-year flood events. The remaining portion of Sewell Creek and Wolfpen Creek were studied by approximate methods (FEMA, 1987). The approximate method study does not establish BFEs and does not designate floodways.

#### *3.5.2.4 Power Plant Site and EcoPark*

Floodplains, floodways, and BFEs were delineated for Sewell Creek and Little Sewell Creek within the corporate limits of the city of Rainelle as part of the FIS. However, around the proposed power plant site only the floodplain was delineated. According to the previous FIS (FEMA, 1987), part of the proposed site falls under flood insurance Zone A. Zone A is the flood insurance rate zone that corresponds to the 100-year floodplain that is determined in the FIS by approximate methods. Because detailed hydraulic analyses were not performed for such areas, no BFEs or depths are shown around the proposed power plant site. Thus, for this area no floodway has been designated. Generally in these types of areas, the local community will require that project owners submit engineering analyses before permits are approved for development in the floodplain. The 100-year flood elevation from the FIRM was overlaid on a 1-foot contour topographic map that was developed as part of project efforts to estimate the elevation of the floodplain around the project area. Based on the overlay, the FEMA 100-year flood elevation is approximately 2,398 feet (731meters) at the proposed project site and covers approximately 300 feet (91 meters) above mean sea level (amsl) on either side of Sewell Creek (see Figure 3.5-3). However, because this estimate only approximates the extent of the 100-year flood elevation, modeling was employed to estimate flood risk at the project site as described in the following subsection.

#### *3.5.2.5 Anjean*

Three candidates sites for the coal processing prep plant were identified by WGC at Anjean (AN1, AN2, and AN3). AN1 is located south of the South Fork of Big Clear Creek, and southeast of the confluence of Big Clear Creek and the South Fork of Big Clear Creek. AN2 is situated northwest and upstream from the confluence of Briery Creek and Big Clear Creek. Neither site lies in the 100-year FEMA floodplain. However, the Quinwood USGS topographic shows several intermittent streams draining northwest that have the potential to affect AN1 during high magnitude, low frequency storm events.

Neither the Anjean coal refuse pile nor the AN3 candidate site (located at the southeast corner of the Buck Lilly pile) is located within the 100-year floodplain.

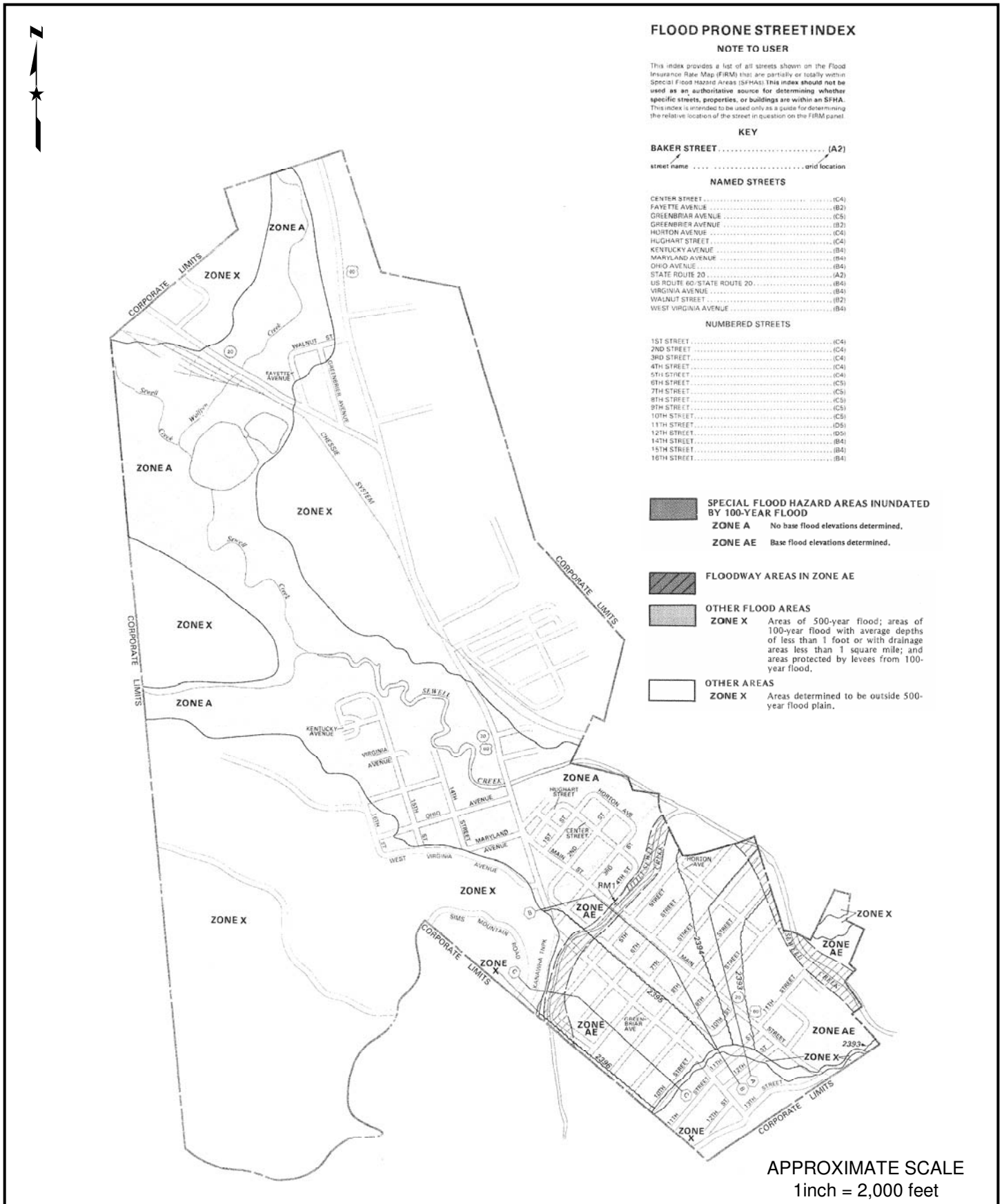


**Figure 3.5-2**
Flood Insurance Rate Map (FIRM) of Rainelle

Source: FEMA Community Panel Number 540228 0001 A
Effective Date: 19 Nov 1987

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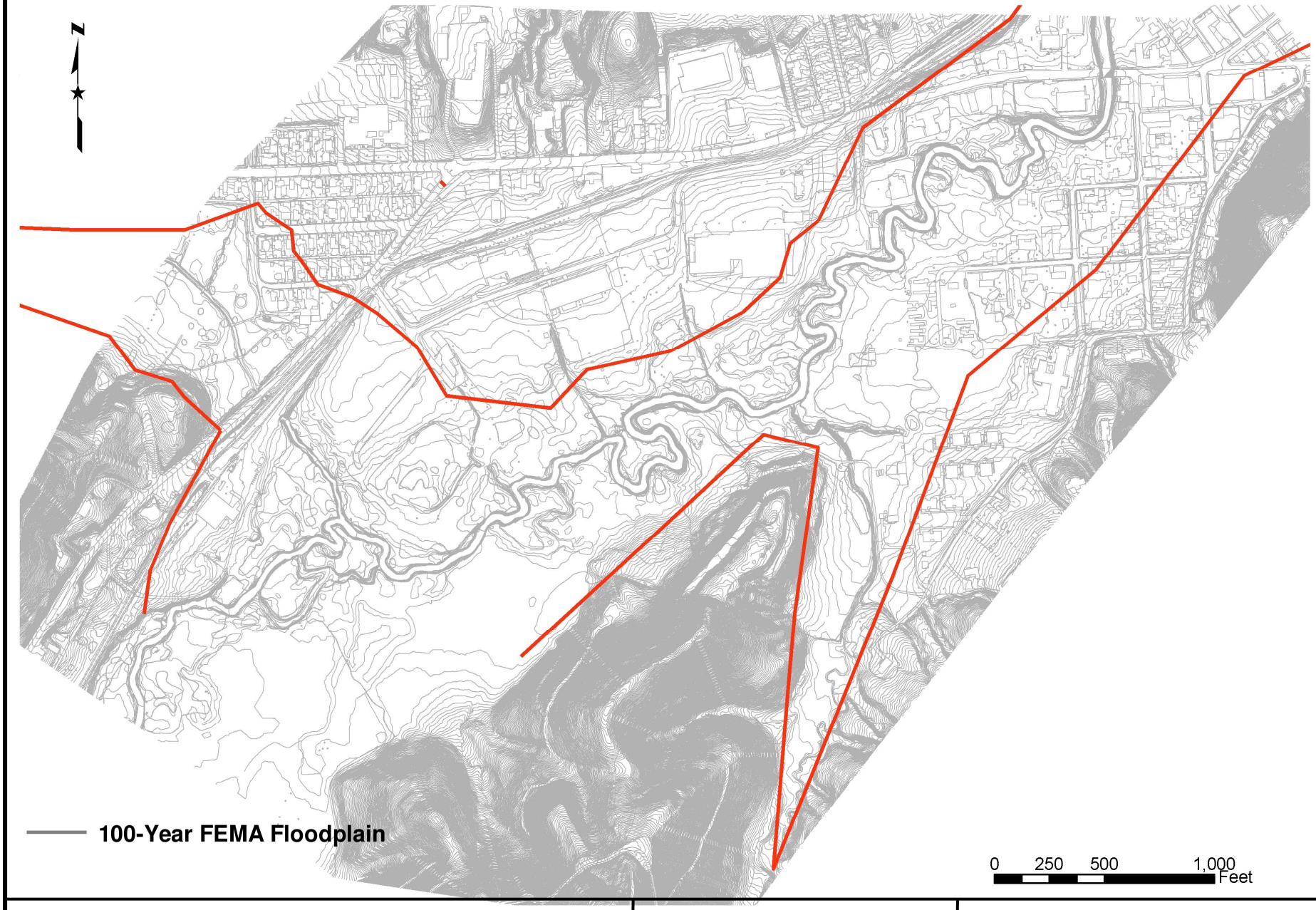


**Figure 3.5-3**
FEMA 100-Year Floodplain at Project Site
Map Source: Potesta, 2004

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#### *3.5.2.6 Donegan*

The 100-year floodplain has not been mapped by FEMA in the area immediately adjacent to Laurel Creek and in the area of the Donegan coal refuse site; however, the topographic elevation above Laurel Creek suggests that it would be unlikely for DN1 to be flooded. There are no 100-year floodplains associated with Beech Knob, Long Branch and Elijah Branch in the vicinity of the DN2 prep plant candidate site; however, flooding is unlikely because the site is situated on relatively elevated ground.

#### *3.5.2.7 Green Valley*

The Green Valley coal refuse pile is not within a mapped 100-year floodplain, nor is the candidate site (GV) for the coal prep plant. The GV site is located within an area along the southern border of the coal refuse pile and parallel Hominy Creek. Though the site is not mapped within a floodplain, potential flooding would need to be investigated due to its proximity to Hominy Creek.

#### *3.5.2.8 Joe Knob*

There are no 100-year floodplains associated with the Joe Knob coal refuse site.

### 3.5.3 Baseline Modeling & Analysis

As part of baseline characterization, floodplain boundaries were determined by detailed hydraulic modeling around the proposed project site. The streams that were studied included the stretch of Sewell Creek from the confluence of Wolfpen Creek to US 60, Wolfpen Creek from the WV 20 (South Street) Bridge to the confluence with Sewell Creek, and an unnamed tributary approximately 2,300 feet (700 meters) downstream on Sewell Creek from the confluence with Wolfpen Creek.

Expected flood flows for 100-year, 100-year + 1Standard Error Estimate (SEE), and 100-year + 2SEE storm events were calculated based on techniques presented in U.S Geological Survey (USGS) Open-File report 80-1218, "Runoff Study on Small Drainage Areas in West Virginia." This technique provides a method of estimating the magnitude of peak discharges of 100-year, 100-year + 1SE, 100 year +2SE frequency for unregulated, virtually natural streams in West Virginia. The method is applicable for drainage areas between 0.3 and 2,000 square miles (0.5 and 3,200 square kilometers). Discharge data was also cross-referenced to previous FISs in the city of Rainelle. Discharge volumes calculated from this method are presented in Table 3.5-1.

**Table 3.5-1. Summary of Stream Flow Data**

| Streams | Drainage Area ($mi^2$)* | 100-yr Peak Discharge (cfs)** | 100-yr + 1SE Peak Discharge (cfs)** | 100-yr + 2SE Peak Discharge (cfs)** |
|---|---|---|---|---|
| Sewell Creek | 18.55 | 3,568 | 5,138 | 6,708 |
| Wolfpen Creek | 2.84 | 926 | 1,333 | 1,740 |
| Unnamed Tributary | 0.88 | 399 | 574 | 749 |
| Little Sewell Creek | 6.39 | 1,658 | 2,388 | 3,117 |

*Notes: SE – standard error; *To convert square miles to square kilometers, multiply by 2.59; **To convert cubic feet per second to cubic meters per second, multiply by 0.0283*

Based on the calculated discharge rates and detailed site mapping, a hydraulic model of the project area was developed. The model, developed in HEC-RAS, was then used to estimate base flood elevations for the calculated discharge rates. Estimated floodplains that correspond to values in Table 3.5-1 are

graphically depicted in Figure 3.5-4. The following parameters were used in the development of the HEC-RAS model:

- Field surveyed cross-section data for the proposed bridge location on Sewell Creek, WV 20 Bridge on Wolfpen Creek, a railway culvert downstream of WV 20 Bridge, and US 60 Bridge on Sewell Creek.
- Cross sections of the streams developed from a 1-foot (0.3-meter) interval topographic map. Elevations of the topographic map are referenced to North American Vertical Datum 1988 (NAVD88). The longitude and latitude data are referenced to North American Datum 1983 (NAD 83).
- Manning's equation is a mathematical formula used in HEC-RAS that evaluates the relationship of stream velocity, slope, area, wetted perimeter and frictional resistance. Frictional resistance, known as Manning's "n," is an established value that ranges from 0.011 to 0.25 and can assume a variety of physical forms. The type of frictional resistance associated with Manning's "n" can vary from the surface roughness of a concrete lined channel to the frictional resistance associated with grassy areas, or densely vegetated or woody areas of a riparian zone. Channel and over bank roughness factors (Manning's "n") for the site were chosen from field observations, aerial mapping and previous studies. The channel's "n" value used for Sewell Creek and Wolfpen Creek is 0.04 and the overbank's "n" value is 0.075.
- Geometric data of existing bridges and culverts from field surveys.
- Coefficients for expansion and contraction losses at the bridges adopted from "rules of thumb." Generalized expansion and contraction coefficients have been used, 0.3 and 0.1 respectively.
- The 100-year flood elevation has been determined to be at an elevation of 2,400 feet (732 meters) amsl and extends 300 feet (91 meters) on either side of Sewell Creek. The 100-year + 1SE flood elevation at 2,401 feet (732 meters) amsl and the 100-year + 2SE flood elevation is at 2,402 feet (732 meters) amsl.

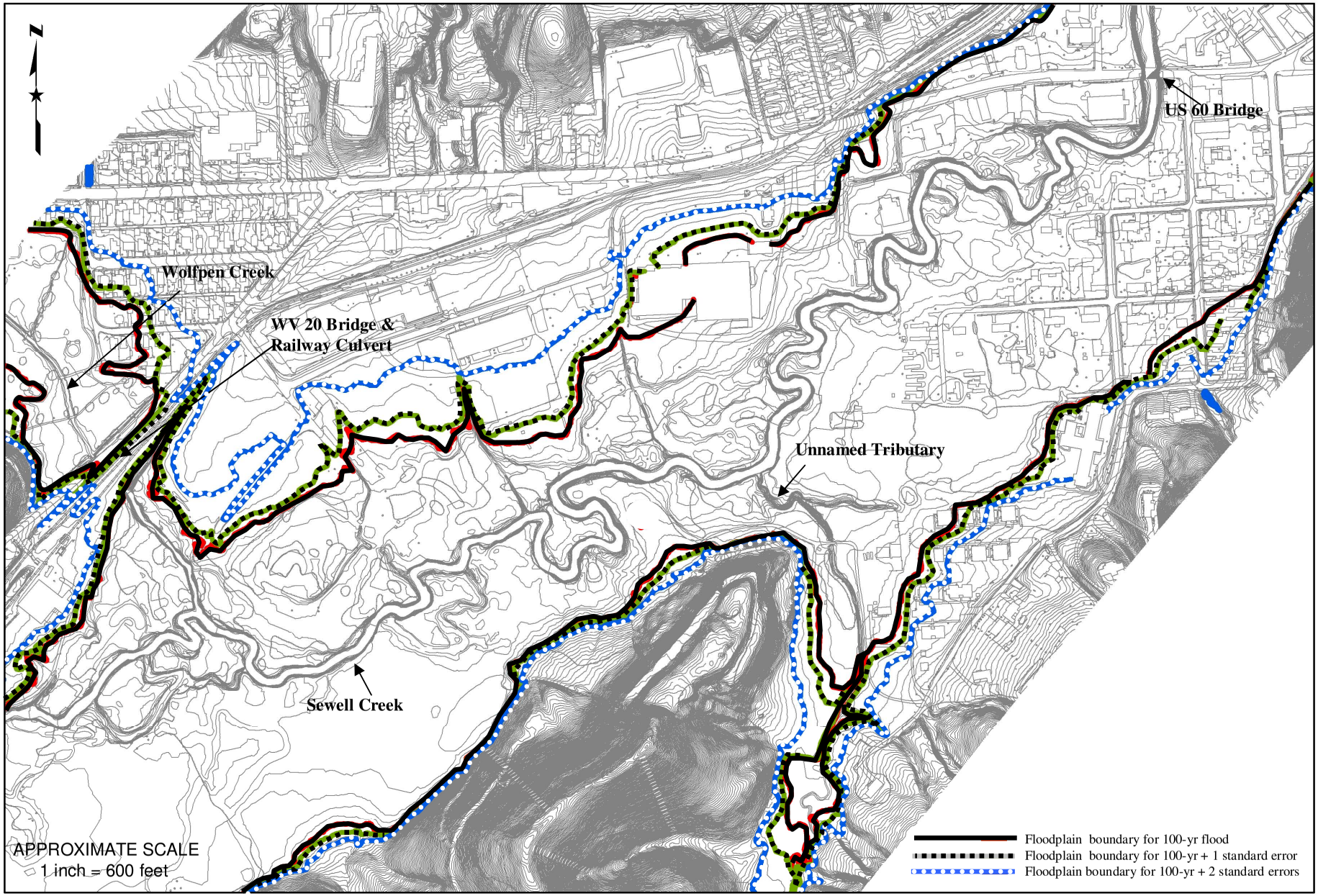


**Figure 3.5-4**
Floodplain boundaries for 100-yr, 100-yr + 1SE, and 100-yr + 2SE

Map Source: Potesta, 2004

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## 3.6 Geology and Groundwater Resources

This section presents the regional and local geology, soils, and hydrogeology for the proposed Co-Production Facility site, as well as for the coal refuse and quarry sites.

### 3.6.1 Geology

The proposed Co-Production Facility and ancillary facilities are located within the Appalachian Plateau Physiographic province. The local topography is characterized by flat to rolling hills varying in elevation from 2,360 to 2,550 feet (719 to 777 meters) above mean sea level (amsl). This province consists of steep to moderately sloped ridges separated by narrow to moderate width stream valleys. The proposed power plant site is located on a flat-topped point of a ridge adjacent to the valley bottom of Sewell Creek and an unnamed tributary.

The geology in the vicinity of the E&R Property and the EcoPark sites consists of 11 to 35 feet (3.6 to 11 meters) of Quaternary alluvial deposits (see Figure 3.6-1 and 3.6-2) made up of clays, silts, and clayey sands in the stream bottoms along with some fill material consisting of clay, bricks, and wood. The ridges adjacent to the stream bottoms contain rocks of the New River and Pocahontas Formations of Pennsylvanian Age unconformably underlain by the Mississippian Age Mauch Chunk Group (Price and Heck, 1939). The rocks in this area have strikes that vary from N 15$^{o}$ E to N 75$^{o}$ E and dip from 1 to 2 degrees to the NW.

The New River Formation occurs on the side and tops of the nearby ridges while the underlying Pocahontas Formation crops out on the sides of the nearby ridges. These formations consist of interbedded gray sandstones, gray shales, sandy shales, and coal beds. According to the USGS 7 ½ minute topographic map for Rainelle and field observations, contour surface mining has occurred in the Pocahontas 6 Coalbed on the ridges northwest and northeast of Rainelle. In addition, underground mining was also reported in this seam starting in 1914 (Price and Heck, 1939). The extent of this mining is unknown and mine maps are not likely to exist. All of the mining that has occurred in the Rainelle area was located at elevations above the plant site.

The proposed power plant site is located on a flat-topped point of a ridge that consists of red and brown shales and siltstones of the Bluestone Formation. The Bluestone Formation of the Mauch Chunk Group, which occurs on the lower ridges, lies below the Pocahontas Formation and underlies the alluvial deposits in the valley bottoms. This unit is approximately 300 to 330 feet (90 to 100 meters) thick and consists of red, green, and brown shales, sandy shales, and siltstones interbedded with brown to greenish sandstones, and occasionally thin coals. No coal mining has been reported for any of the thin coals that occur in this formation. This unit was intersected below the colluvial and alluvial deposits in some of the borings drilled for the hydrologic testing of water wells proposed for use as source water.

The Princeton Formation underlies the Bluestone Formation. This 20- to 60-foot (6.1- to 18-meter) thick unit consists of sandstones and conglomerates containing pebbles and cobbles of quartz and rock fragments. This unit was also encountered in some of the borings drilled at the E&R Property and EcoPark as part of hydrogeologic investigations prepared in support of the EIS.

The limestone quarry sites are all located in the Valley and Ridge Physiographic Province. This province consists of moderate sloped hills separated by narrow to wide valleys. The topography in the area of the quarries is karstic in character, consisting of isolated hills separated by valley bottoms containing sinkholes, streams and disappearing streams. The valley bottoms contain limestone, weathered limestone, and red and brown clays and silts formed from the weathering of the limestone.

**Figure 3.6-1. Geologic Map of Greenbrier County**

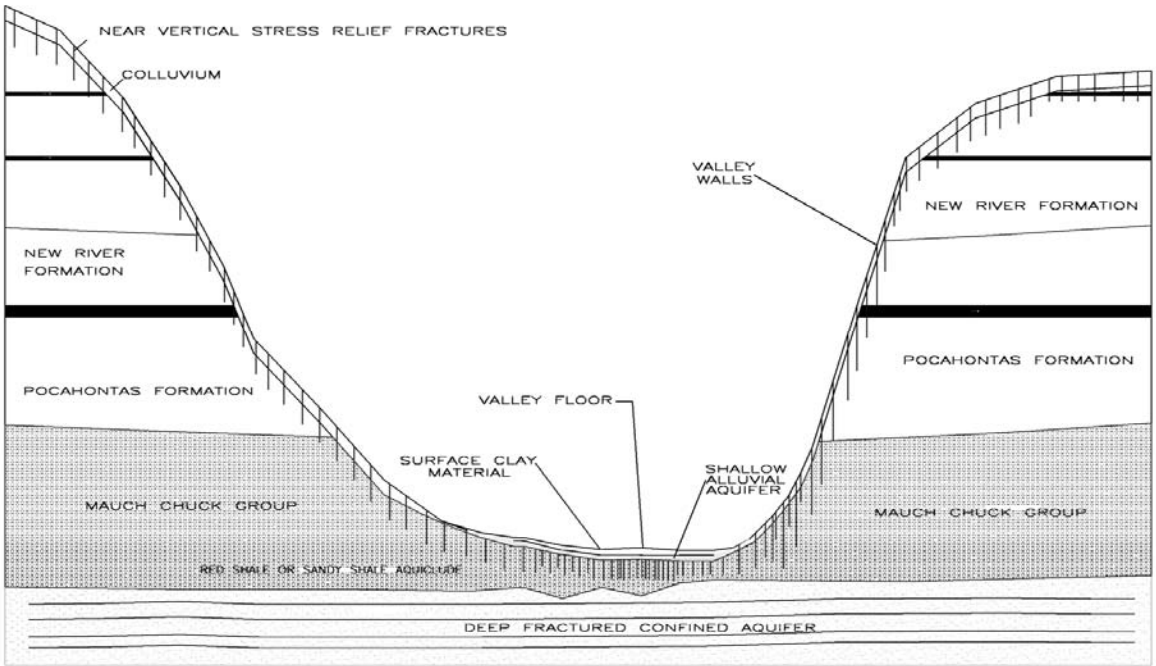


**Figure 3.6-2. Site Geology**

The Boxley Quarry lies on the west limb of the Pleasant Anticline and the rocks dip at 1 to 5 degrees to the northwest. The Greystone and Savannah Quarries lie on the west limb of the Sinks Grove Anticline and the rocks dip to the northwest at 1 to 5 degrees. The rocks at the three quarry sites consist of dolomitic and argillaceous limestone of the Greenbrier Group (Price and Heck, 1939). On some of the adjacent hills, rocks of the basal part of the Mauch Chunk Group overlie the Greenbrier Group. These rocks consist of red and brown shales, siltstones with some interbedded sandstone, and occasionally calcareous shales.

The Mill Point Quarry lies in Pocahontas County north of WV 39 and north of Stamping Creek. Tributary drainage to Stamping Creek in the vicinity of the quarry flows southwesterly. The rocks dip at 1 to 5 degrees to the northwest and consist of limestones, dolomitic limestone, and argillaceous limestone of the Greenbrier Group. On some of the adjacent hills, rocks of the basal part of the Mauch Chunk Group overlie the Greenbrier Group. These rocks consist of red and brown shales, siltstones with some interbedded sandstone, and occasionally calcareous shales.

The Anjean and Donegan coal refuse sites lie in the Appalachian Plateau physiographic province. This province consists of steep to moderately sloped ridges separated by narrow to moderate width stream valleys. The geology consists of Quaternary alluvial deposits of clays, silts, and clayey sands in the stream bottoms. The ridges adjacent to the stream bottoms contain rocks of the New River and Pocahontas Formations of Pennsylvanian Age unconformably underlain by the Mississippian Age Mauch Chunk Group (Price and Heck, 1939). The New River and Pocahontas Formations consist of interbedded gray to black shales, sandy shales, sandstones, and numerous thin to thick coal beds. These rocks dip to the northwest at 1 to 2 degrees and strike to the northeast.

The New River Formation, in the area of the Anjean coal refuse pile site, contains the following coal seams in stratigraphically descending order: Hughes Ferry, Castle, Sewell A, Sewell, Welch, Little Raleigh, Beckley, Firecreek, and Pocahontas 8. The underlying Pocahontas Formation contains the following coal seams in stratigraphically descending order: Pocahontas 7 and 6. Underground mining has occurred in the Sewell, Beckley, Firecreek, and Pocahontas 6 coal seams. Acid mine drainage (AMD) may be associated with the Little Raleigh seam; however, the primary source of AMD is associated with the waste products produced during the processing of the coal from the mining operations. The waste products from these mining activities have been placed in coal refuse piles on the sides of some of the ridges and in the stream valleys. The Bluestone and Princeton Formations of the Mauch Chunk Group lie near the base of the ridges at the Anjean site. The Bluestone Formation consists of red to brown shales and siltstone. The underlying Princeton Formation is principally a conglomerate composed of sandstone with pebbles and cobbles of quartz and rock fragments.

The Green Valley coal refuse site, located in Nicholas County, is also in the Appalachian Plateau physiographic province. The geology consists of Quaternary alluvial deposits of clays, silts, and clayey sands in the stream bottoms while the ridges adjacent to the stream bottoms contain rocks of the New River Formation. These rocks dip to the northwest at 1 to 2 degrees. The rocks of the New River Formation consist of interbedded gray to black shales, sandy shales, sandstones, and numerous thin to thick coal beds (Reger, et al, 1921). The Sewell coal seam has been the primary seam mined at this site. It has been mined on or adjacent to the property since the early 1900s by underground methods and locally by surface mining techniques. The Beckley and Firecreek seams have also been mined less extensively by underground mining methods. The waste products from these mining activities have been placed in coal refuse piles on the sides of some of the ridges and in the stream valleys.

### 3.6.2 Seismic Activity

The proposed Co-Production Facility and ancillary facilities lie in a low seismic risk zone as shown on Figure 3.6-3. The estimated peak horizontal acceleration (%g) with a 10 percent probability of exceedance

in 50 years is 3 to 4 %g (USGS, 2002). In addition, there are no known quaternary faults or reported earthquakes in this area.

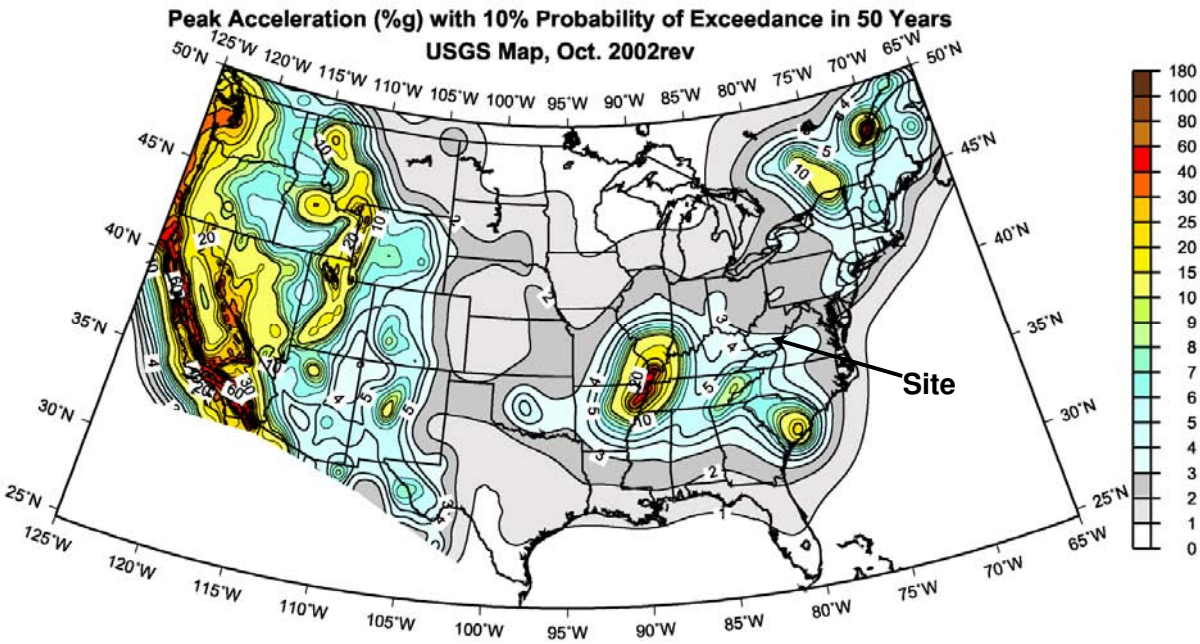


**Figure 3.6-3. Seismic Map of the U.S.**

### 3.6.3 Soils

Soils within Greenbrier County, as is typical in most areas, reflect the lithology of the underlying rock formations and the respective physiographic provinces. Western Greenbrier County, which includes the project site, is part of the Appalachian Plateau and contains generally deep, easily eroded soils that formed in material weathered from shale. Drilling in this area has shown that the soil is underlain by saturated alluvial sand of variable thicknesses that lies above the bedrock. As described in the Phase I Archeological Report (John Milner Associates, 2005) produced in support of the EIS, three major soil associations are found within the project area vicinity. These are:

- Atkins-Teas-Monongahela association along Sewell Creek and other lowlands in the area;
- Teas-Calvin-Gilpin-Litz association in the upland ridges east of Sewell Creek and south of US 60; and
- Dekalb-Gilpin-Laidig-Cookport association in the upland areas west of WV 20 and south of US 60.

These general soil associations are further broken down into more specific individual soil map units, as depicted in the Soil Survey of Greenbrier County, West Virginia (1972). According to the Soil Survey, there are four soil map units present on the site as indicated in Figure 3.6-4 and described in Table 3.6-1. Soil types present at the Anjean Coal refuse pile and Green Valley Coal refuse Pile are described in Table 3.6-2 and the following text.

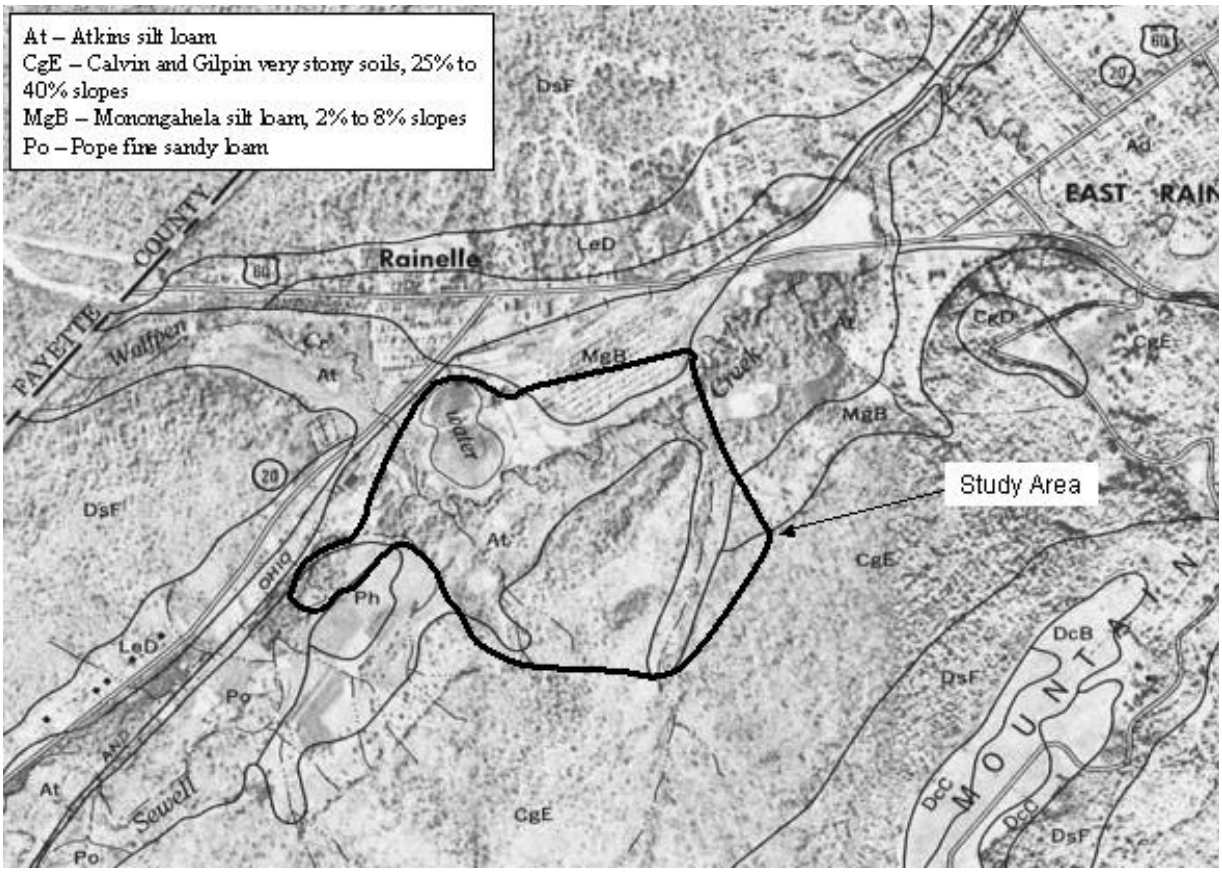


**Figure 3.6-4. Soil Survey, Rainelle, WV**

**Table 3.6-1. Soil Units Present on Rainelle Site**

| Soil Units | Description |
|---|---|
| Atkins silt loam (At) | The Atkins silt loam soil type is classified as a hydric soil (i.e., that soil typically found in wetlands) based on information obtained from the U.S. Department of Agriculture, Natural Resources Conservation Service (12/27/04). The Atkins series consists of deep, poorly drained, nearly level soils. These soils are on bottom lands, generally near the base of the hills, but in certain places they occupy the entire bottom. They are commonly along streams that drain the upland areas. These soils formed in alluvium derived from upland soils that are underlain by acid sandstone and shale. They are subject to flooding, as slopes typically range from 0 to 3 percent. |

**Table 3.6-1. Soil Units Present on Rainelle Site (continued)**

| Soil Units | Description |
|---|---|
| Calvin and Gilpin very stony soils, 25 to 40 percent slopes (CgE); | The Calvin and Gilpin soils are very stony and have moderate permeability. The available moisture capacity and fertility of both series are low to moderate. Generally, these soils are better suited to trees than to other uses. They are difficult to manage because of the large stones. These soils may consist of the Calvin or Gilpin series alone or in combination.<br>The Calvin series consists of moderately deep, well-drained, reddish-brown stony soils. These soils are on dissected uplands common in the west-central part of the county. They formed in material weathered from reddish, acidic siltstone and shale. In a typical profile of the Calvin series in a wooded area, a thin mat of dark-colored organic matter covers the surface. The surface layer, below this mat, is dark-reddish brown silt loam in the uppermost 2 inches (5.1 centimeters) and reddish-brown silt loam in the next 5 inches (13 centimeters). The subsoil extends to a depth of about 23 inches (58 centimeters). The upper part is dark reddish-brown heavy silt loam, and the lower part is dark reddish-brown very channery silt loam. Siltstone fragments make up 60 to 70 percent of the lower part. Red siltstone bedrock begins at a depth of 23 inches (58 centimeters).<br>The Gilpin series, which is commonly found with the Calvin series, consists of moderately deep, well-drained, strongly sloping to very steep soils. These soils are also on dissected uplands in the western portion of the county and formed in residuum weathered from gray acid siltstone and shale and some interbedded sandstone. In a typical profile of the Gilpin series in a wooded area, a thin mat of organic matter covers the surface. The surface layer, below this mat, is very dark grayish-brown silt loam in the uppermost 2 inches (5.1 centimeters) and brown silt loam in the next 6 inches (15 centimeters). The subsoil extends to a depth of 22 inches (56 centimeters). The upper part is yellowish-brown, friable, shaly silty clay loam, and the lower part is yellowish-brown, shaly heavy silt loam. Shale fragments are common in the subsoil and increase in volume with increasing depth. Below the subsoil is yellowish-brown very shaly silt loam that is about 75 percent shale fragments. Gray shale bedrock begins at a depth of 28 inches (71 centimeters). |
| Monongahela silt loam, 2 to 8 percent slopes (MgB); | The Monongahela series consists of deep, moderately well drained, gently sloping to strongly sloping, silty soils. These soils formed in old alluvium washed from uplands that are underlain principally by acid sandstone and shale. In a typical profile, the surface layer is dark grayish-brown and pale-brown silt loam about 10 inches (25 centimeters) thick. The subsoil extends to a depth of 57 inches (145 centimeters). The upper part is light olive-brown, firm silty clay loam. The middle part is yellowish-brown, firm heavy silt loam. The lower part is yellowish brown, very firm and compact silt loam that is mottled with light gray and yellowish red. The very firm layer begins at a depth of about 27 inches (69 centimeters). Below the subsoil is light yellowish-brown, yellowish-red, and gray, firm light silty clay loam that contains some sandstone fragments. This layer extends to a depth of 65 inches (165 centimeters) or more.<br>Permeability is moderate above the fragipan, but slow within it. The available moisture capacity is moderate. The water table is high in winter and spring and seepy spots are common. The use of these soils is limited mainly by the seasonal high water table and the slowly permeable fragipan. The usefulness of these soils for building sites is also limited by the high water table. |
| Pope fine sandy loam (Po). | The Pope series consist of deep, well-drained, moderately coarse textured soils. These soils are on bottom lands, generally near stream banks. They formed in recent alluvium washed from upland areas underlain by gray, acid sandstone and shale. These soils are flooded at intervals ranging from once a year to once in 3 or 4 years; the length varies by location. In a typical profile of the series, the surface layer is dark grayish-brown fine sandy loam about 10 inches (25 centimeters) thick. The subsoil extends to a depth of 40 inches (102 centimeters). The upper part is dark yellowish-brown, friable fine sandy loam, and the lower part is dark yellowish-brown, very friable sandy loam. Below the subsoil is loose, stratified silty, sandy, and gravelly material to a depth of 60 inches (152 centimeters) or more. Permeability is moderately rapid and the available moisture capacity is moderate to moderately low. The use of these soils is limited by flooding and by their tendency to be droughty. |

**Table 3.6-2. Soil Units Present at Anjean**

| Soil Units | Description |
|---|---|
| Dekalb or Gilpin Series on slopes that range from 20 to 65 percent | The Gilpin soils consist of a brown silt loam that is underlain by a yellowish brown silt loam that contains abundant fragments of shale and/or siltstone. This soil type overlies bedrock of either shale or siltstone. The Dekalb soils are a channery sandy loam. Channery soil contains fragments of sandstone or other rock fragments that are at least 6 inches (15 centimeters) in length. This type of soil generally overlies bedrock of sandstone. Both of these soil types have a moderate permeability. |
| Laidig very stony loam on slopes that range from 5 to 15 percent, | The Laidig soil is a deep, up to 60 inches (152 centimeters), well drained, very stony to channery soil that lies at the base of the slopes (Gorman, et al, 1972). A typical soil section consists of a thin upper organic mat that is underlain by brown to yellowish brown channery or stony loam that shows increasing sand content and rock fragments with depth. |
| Laidig-Ernest complex of extremely stony complex adjacent to the stream bottoms | The combined Laidig-Ernest complex consists of Laidig soils intertwined with Ernest soils. The Ernest soils consist of up to 60 inches (152 centimeters) of well-drained, yellowish brown silt loam with some rock fragments and channery zones. These soils formed in colluvium derived from the upland slopes (Gorman, et al, 1972). This complex generally lies at the base of the slopes and adjacent to the stream channel |
| Strip mine spoil | The strip mine spoil is located on and down slope of areas that had been surface mined. This material consists of intermixes of shale, siltstone, sandstone and coal that were removed during the mining process. This material may be acidic and produce acid mine drainage. |
| Mine dump material | The mine dump material consists of waste material derived from the processing of material that was deep mined. This material generally contains a mixture of coal, shale, siltstone and sandstone. If the material has burned, zones of red burned rock “red dog” may exist on or within the pile. Mine dump material is frequently acidic and produces acid mine drainage. |

The soils at the Green Valley site consist of Gilpin silt loams with varying mixtures of stones and channery on the slopes and hill tops, to Buchanan stony to channery sandy loam that occurs on colluvial material at the base of slopes (Carpenter, 1992). Also present are the Itmann and Kaymine series in areas where previous surface mining and coal processing have occurred.

The Gilpin silt loams are similar to those found at the Anjean site. The amount of stony and channery material increases with increasing percent of slope, and also with the amount of sandstone present in the underlying bedrock.

The Buchanan series soils consist of deep (up to 65 inches [165 centimeters]), well-drained, yellowish brown silt loam with some rock fragments and channery zones. These soils formed in colluvium derived from the upland slopes (Carpenter, 1992). This complex generally lies at the base of the slopes and adjacent to the stream channels.

The Itmann Series developed on areas where coal waste from coal processing was placed on the surface. This soil type is similar to the mine dump material at the Anjean site. The Kaymine series occurs in areas where surface mine spoil was placed and is similar to the mine spoil of the Anjean site. Both of these soils types may be acidic and produce acid mine drainage.

***No prime or other important farmlands exist within the footprint of the Co-Generation Facility or the EcoPark area. One soil series, Pope fine sandy loam (Po), is located within 1,000 feet of the facility, which is considered prime farmland. The area of this soil type is located within an existing rail line and Sewell Creek. Although the majority of the land within the proposed new transmission corridor is not considered prime or other important farmlands, the corridor includes twelve soil series that are classified as either “Prime Farmland” or “Farmland of Statewide Importance.”***

### 3.6.4 Groundwater and Hydrogeology

Hydrogeologic investigations were completed to assess the potential impacts to local groundwater resources from the proposed use of groundwater wells for the operation of the power plant. These studies consisted of a groundwater modeling effort and ***four*** pump tests that were supported by the construction of ***15*** monitoring wells installed around the proposed power plant site. ***Two*** groundwater modeling ***studies were completed and have been*** included in Appendix D (Groundwater Pump ***Studies; Appendices D1 and D2***). ***Well construction data was also added as Appendix D3.***

Groundwater is currently the sole source of drinking water for the city of Rainelle. The Rainelle Water Department operates the water system that services a population of approximately 2,000 people. The Water Department obtains drinking water from two city-owned wells (CW) within the city limits of Rainelle, which provide an average daily production of 201,310 gallons per day (140 gpm [530 liters per minute]). Groundwater from the city wells often contains elevated levels of barium, sodium, iron, and manganese. Water treatment consists of disinfection with chlorine gas, pH adjustment, greensand filtration, fluoridation, and mineral sequestration. Finished water is stored in a 126,000-gallon (477-cubic meter) holding tank (WVDHHR, 2003).

In addition to effluent from the Rainelle Sewage Treatment Plant (RSTP), groundwater is proposed as a source of cooling water for the Co-Production Facility on days where the Meadow River cannot meet the daily requirement. There are several wells that are under consideration for use as production wells (PW) by WGC, including two wells within the EcoPark that were associated with the former Meadow River Lumber Company (PW-1 and PW-2) and a newly drilled well near the RSTP, the "Snake Island" well (PW-3). These potential production wells and the city drinking water wells are all installed in the same groundwater system (aquifer).

***Pump tests were conducted on PW-1, PW-3, and PW-4 to evaluate the hydrogeologic conditions at the site and the characteristics of the wells (Appendices D1 and D2). As part of these efforts, 15 observation wells were installed at areas surrounding the site. Two private wells and two city drinking water wells were also monitored as part of these studies. The locations of all of the production and monitoring wells are depicted in Figure 3.6-5 and the corresponding well construction information is listed in Table 3.6-3. Observations made in the field during the drilling of wells and during the pump tests conducted in support of the EIS provided the basis for the interpretation of the hydrogeologic conditions in the study area. In addition, according to a study by Wyrick and Borchers (1981), groundwater movement in the valleys of the Appalachian Plateau physiographic province of West Virginia is the result of stress relief fracturing. Stress relief, the removal of compressional stresses on underlying rocks by erosion of overlying rocks, results in predictable fracture patterns in valleys; fractures are generally horizontal under valley floors and are generally vertical along valley walls. The horizontal fractures beneath the valley floor typically develop along the bedding plane partings. Horizontal fracturing is limited beyond the valley walls and thus the valley walls essentially act as low permeability barriers. Recharge to the fracture-controlled aquifer primarily occurs via the vertical fractures along the valley walls. Another potential source of recharge to the deep aquifer may be located near the outcrop of this unit, 3 to 10 miles (5 to 16 kilometers) south of the study area. Based on these sources of information, the groundwater system in Rainelle and around the proposed site consists of four components (as shown on Figure 3.6-2):***

- a surficial-alluvial aquifer (approximately 5 to 15 feet [2 to 5 meters] in thickness),
- an intervening aquitard ***(low permeability unit)*** of interbedded red to green shales and sandstone (approximately 25 to 50 feet [8 to 15 meters] in thickness),
- a fracture-controlled confined sandstone aquifer (at least 100 feet [31 meters] thick)***; and***,
- ***an interbedded sand and shale unit (at least 60 feet thick).***

Within the shallow aquifer, which consists of of saturated silty sand that locally contains thin beds of clay, groundwater appears to flow toward Sewell Creek. The saturated zone is overlain by red, green and/or tan plastic to semi-plastic clay that extends to the ground surface. Recharge to the shallow aquifer is expected to occur primarily near the base of the adjoining hills as a result of infiltration during and after precipitation events.

The aquiclude that separates the shallow aquifer and the deep aquifer*s* is made up of red to green shales and sandy shales. The aquiclude essentially blocks the downward flow of water from the shallow aquifer to the deep aquifer. This conclusion is supported by the fact that no vertical or horizontal water-bearing fractures were encountered or observed in the groundwater wells installed through this unit. In addition, during pump tests conducted at the site, no drawdown was observed in the shallow aquifer when WGC production wells, which draw groundwater from the deep aquifer, were pumped at high flow rates for a period of three days.

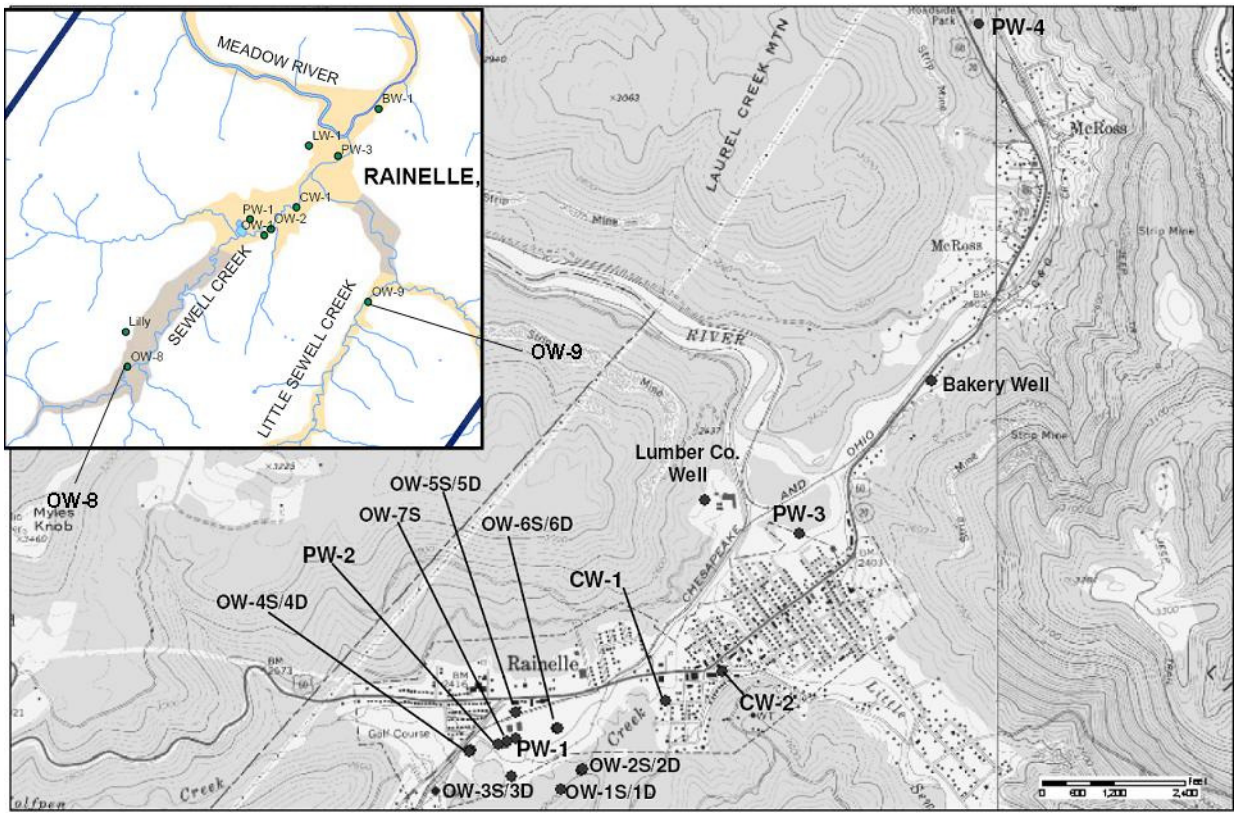


**Figure 3.6-5. Groundwater Well Locations (*see Table 3.6-3 for well details*)**

***Table 3.6-3. Well Construction Details***

| Well | Diameter (inches) | Well Depth | Casing Depth (feet) | Installed |
|---|---|---|---|---|
| WGC Production Wells | | | | |
| PW-1* | 10 | 150 | 42 | Unknown |
| PW-2 | 8 | 150 | 40 | Unknown |
| PW-3* | 8 | 170 | 51 | March 2005 |
| PW-4* | 6 | 247 | 39 | October 2005 |
| Rainelle City Wells | | | | |
| CW-1 | 8 | 200+ | 72 | Dec 1984 |
| CW-2 | 8 | 130+ | Unknown | Unknown |
| WGC Observation Wells | | | | |
| OW-1S* | 2 | 18 | Screen | June 2004 |
| OW-1D* | 6 | 160 | 42 | June 2004 |
| OW-2S* | 2 | 15 | Screen | June 2004 |
| OW-2D* | 6 | 160 | 29 | June 2004 |
| OW-3S* | 2 | 12 | Screen | June 2004 |
| OW-3D* | 6 | 160 | 33 | June 2004 |
| OW-4S* | 2 | 15 | Screen | June 2004 |
| OW-4D* | 6 | 160 | 31 | June 2004 |
| OW-5S* | 2 | 13 | Screen | June 2004 |
| OW-5D* | 6 | 160 | 31 | June 2004 |
| OW-6S* | 2 | 25 | Screen | June 2004 |
| OW-6D* | 6 | 160 | 42 | June 2004 |
| OW-7* | 2 | 12 | Screen | June 2004 |
| OW-8* | 6 | 200 | 39 | August 2006 |
| OW-9* | 6 | 160 | 14 | August 2006 |
| Other Observation Wells (private wells) | | | | |
| Lumber Co. Well | 6 | 240 | 84 | April 1996 |
| Flowers Bakery Well | 6 | approx 200 | Unknown | Unknown |

**See Appendix D3 for more well logs; +Depths based on record reviews and interviews with local officials*

***The sandstone aquifer consists of near horizontal fractures in sandstone beds within the Mississippian Age Mauch Chunk Group that underlies the valleys in this area. The sandstone aquifer is under a confined artesian state and is characterized as having high transmissivity and low storativity. Less is known about the deeper shale unit, since it was only observed in OW-9; however, it is believed to be less transmissive than the sandstone aquifer.***

***During the pump tests that were conducted in support of the EIS (see Appendices D1 and D2), drawdown was observed in all of the deep wells that were monitored.*** The immediate and significant drawdown observed in the deep observation wells during each pump test indicates that there is a significant direct hydraulic connection between the near horizontal fractures in all of the deep wells, including the city production wells.

The boundary for the ***sandstone*** aquifer is expected to be located under the valley walls surrounding the Sewell Creek, Little Sewell Creek, and Meadow River. There does not appear to be a significant connection within the valley between the deeper fractures and the surficial-alluvial sands based on the results of the pump tests. This is supported by the fact that no drawdown was observed in any of the shallow surficial-alluvial aquifer wells during the 72-hour pumping test at PW-1. However, it is likely that

vertical stress-relief fractures at the valley walls provide a conduit for water to flow from the shallow regolith aquifer into the deep fracture-controlled aquifer.

Groundwater flow in the ***sandstone*** aquifer is more poorly defined than for the shallow aquifer. ***Based on the available geologic maps for the region and the borehole logs from the monitoring wells, it is concluded that there is no direct connection between the surface water bodies and the sandstone aquifer in and around the study area.***

The recharge rate to the aquifers is unknown in this area; however, rates from a similar geologic area with similar rock types, but slightly higher precipitation levels indicate ground-water recharge rates of 0.737 to 0.745 Mgal/d/mi$^2$. These rates are based on stream hydrograph separations that were used to partition stream flow into its surface-runoff and ground-water-discharge components (Hjelmfelt and Cassidy, 1975).

### 3.6.5 Groundwater Contamination

Most of the monitoring wells on the site were sampled in support of a Phase II Environmental Assessment of the study area (Appendix D, Groundwater Pump Study). The Phase II groundwater sampling revealed contamination in one of the shallow wells located on the E&R Property, OW-1S. Several chlorinated solvents (see Table 3.6-4) were detected in this shallow well; however, they were not detected in any of the other wells on the site or any of the soil samples collected from the site. Only two samples exceeded the West Virginia Groundwater Standards (Title 46, Series 12, Requirements Governing Groundwater Standards).

**Table 3.6-4. Monitoring Well Results for OW-1S**

| Analyte | Concentration April 2005 (μg/L) | Concentration November 2005 (μg/L) | West Virginia Groundwater Standard (μg/L) |
|---|---|---|---|
| 1,1-Dichloroethane | 384.0 | 298 | *NA* |
| 1,2-Dichloroethane | 3.5 | 1.6 | 5.0 |
| 1,1-Dichloroethene | **54.6** | **31.4** | 7.0 |
| Methylene Chloride | 8.0 | 5.9 | *NA* |
| Toluene | 2.0 | ND | 1000 |
| 1,1,1-Trichloroethane | 25.6 | ND | 200 |
| Vinyl Chloride | **3.0** | ND | 2.0 |

*Notes: NA – Not Applicable; bold typeface indicates exceedance of standard*

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# 3.7 Biological Resources

This section provides a detailed discussion on the existing biological resources in the vicinity of the proposed Co-Production Facility, the power line corridor, water line and intake structure location, and coal refuse sites.

## 3.7.1 Vegetation and Wildlife

Several site visits were conducted as part of EIS data collection efforts to evaluate and characterize the existing vegetative communities and wildlife, including wetlands (see Section 3.7.2), aquatic habitats, and endangered and/or threatened species (see Section 3.7.4). Visits to the project area included several trips in 2004 (April 19-23, June 21-24, September 13-16, and October 18-21), two trips in 2005, (April 26-28 and June 14-17, 2005) and one trip in 2006 (March 14-16, and March 30-31). Site visits were conducted in July 2004 to various parts of the project area for the purpose of conducting field studies related to protected mammalian species.

The project area consists of several vegetative cover types and wildlife utilization areas. Components of the project area are described below, and primary areas subject to detailed field investigations are presented in Figure 3.7-1 (also see Figure 2.2-3 for property areas). Additional investigations were conducted along power transmission corridor routes as new routes were developed. For purposes of describing the environment for the various corridor segments, the preferred corridor has been divided into three major segments as presented in Chapter 2, Figure 2.4-9. Table 3.7-1 provides a combined list of all vegetative species and Table 3.7-2 provides a combined list of all wildlife species observed at all of the areas evaluated as part of the overall project.

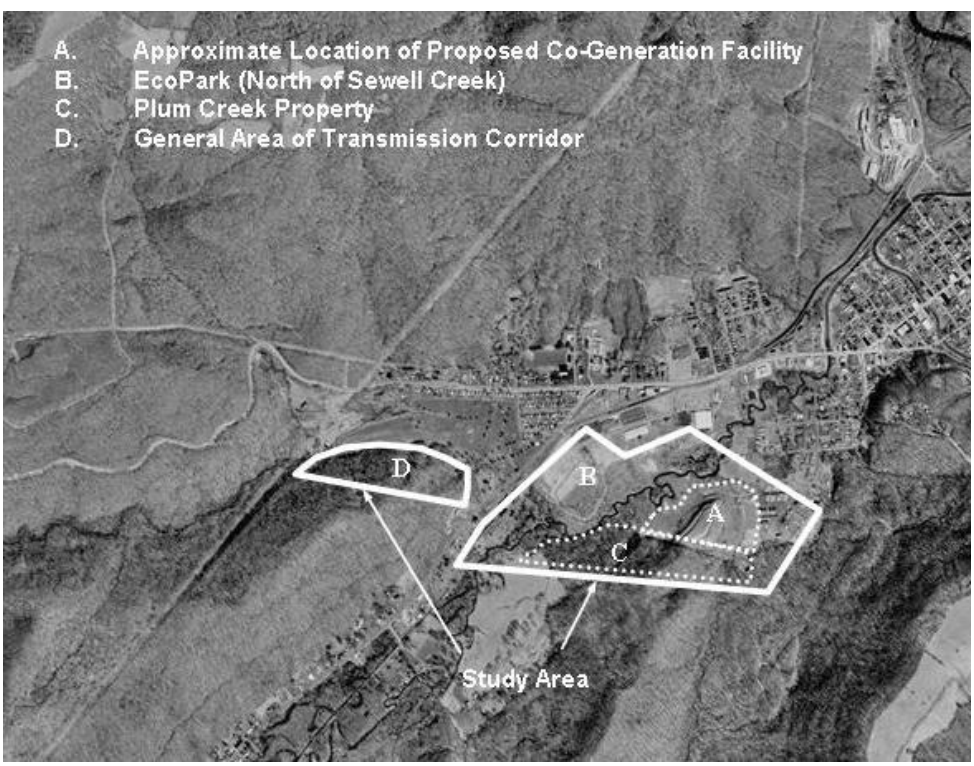


**Figure 3.7-1. Principal Field Investigation Areas in Rainelle**

The project area consists of several vegetative cover types and wildlife utilization areas. Components of the project area are described below, and primary areas subject to detailed field investigations are

presented in Figure 3.7-1 (also see Figure 2.2-3 for property areas). Additional investigations were conducted along power transmission corridor routes as new routes were developed. For purposes of describing the environment for the various corridor segments, the preferred corridor has been divided into three major segments as presented in Chapter 2, Figure 2.4-9. Table 3.7-1 provides a combined list of all vegetative species and Table 3.7-2 provides a combined list of all wildlife species observed at all of the areas evaluated as part of the overall project.

**Table 3.7-1. Vegetation Observed Throughout the Project Area**

| Common Name | *Scientific Name* | Common Name | *Scientific Name* |
|---|---|---|---|
| **TREES** | | | |
| Red maple | *Acer rubrum* | Apple | *Malus sp.* |
| Striped maple | *Acer pennsylvanicum* | Hop-hornbeam | *Ostrya virginiana* |
| Norway maple | *Acer platanoides* | Sourwood | *Oxydendrum arboreum* |
| Tree-of-heaven | *Ailanthus altissima* | Virginia pine | *Pinus virginiana* |
| Sweet birch | *Betula lenta* | Quaking aspen | *Populus tremuloides* |
| Paper birch | *Betula papyrifera* | Pin cherry | *Prunus pensylvanicum* |
| Ironwood | *Carpinus caroliniana* | Black cherry | *Prunus serotina* |
| Shagbark hickory | *Carya ovata* | Pear | *Pyrus sp.* |
| Mockernut hickory | *Carya tomentosa* | White oak | *Quercus alba* |
| Flowering dogwood | *Cornus florida* | Red oak | *Quercus rubra* |
| Hawthorn | *Crataegus sp.* | Pin oak | *Quercus palustris* |
| American beech | *Fagus grandifolia* | Swamp white oak | *Quercus bicolor* |
| Green ash | *Fraxinus pennsylvanica* | Scarlet oak | *Quercus coccinea* |
| Red cedar | *Juniperus virginiana* | Black locust | *Robinia pseudoacacia* |
| Tulip tree | *Liriodendron tulipifera* | Black willow | *Salix nigra* |
| Cucumber-tree | *Magnolia acuminata* | Sassafras | *Sassafras albidum* |
| Mountain magnolia | *Magnolia fraseri* | American linden | *Tilia americana* |
| **SHRUBS/VINES** | | | |
| Smooth alder | *Alnus cf. serrulata* | Multiflora rose | *Rosa multiflora* |
| Common barberry | *Berberis cf. vulgaris* | Pussy willow | *Salix discolor* |
| Swamp dogwood | *Cornus amomum* | Elderberry | *Sambucus canadensis* |
| Autumn Elaeagnus | *Elaeagnus umbellata* | Bristly greenbrier | *Smilax hispida* |
| Witch hazel | *Hamamelis virginiana* | Roundleaf greenbrier | *Smilax rotundifolia* |
| Spicebush | *Lindera benzoin* | Maple-leaf viburnum | *Viburnum acerifolium* |
| Bush honeysuckle | *Lonicera sp.* | With-rod | *Viburnum cassinoides* |
| Staghorn sumac | *Rhus typhina* | Southern Arrow-wood | *Viburnum dentatum* |
| Raspberry | *Rubus spp.* | Grape | *Vitis sp.* |
| **HERBACEOUS SPECIES** | | | |
| Yarrow | *Achillea millefolium* | Shining clubmoss | *Lycopodium lucidulum* |
| Wingstem | *Actinomeris alterniflora* | Purple loosestrife | *Lythrum salicaria* |
| Ragweed | *Ambrosia artemisiifolia* | Evening primrose | *Oenothera biennis* |
| Wood anemone | *Anemone quinquefolia* | Sensitive fern | *Onoclea sensibilis* |

**Table 3.7-1. Vegetation Observed Throughout the Project Area (continued)**

| Common Name | *Scientific Name* | Common Name | *Scientific Name* |
|---|---|---|---|
| Jack in the pulpit | *Arisaema atrorubens* | Cinnamon fern | *Osmunda cinnamomea* |
| Common mugwort | *Artemisia vulgaris* | Long-styled sweet cicely | *Osmorhiza longistylis* |
| Asters | *Aster spp.* | Fall panicum | *Panicum dichotomiflorum* |
| Beggar ticks | *Bidens cf. frondosa* | Virginia creeper | *Parthenocissus quinquefolia* |
| False nettle | *Boehmeria cylindrica* | Pokeweed | *Phytolacca americana* |
| Sedge | *Carex crinita* | English plantain | *Plantago lanceolata* |
| Sedge | *Carex intumescens* | May apple | *Podophyllum peltatum* |
| Blue-cohosh | *Caulophyllum thalictroides* | Japanese knotweed | *Polygonum cuspidatum* |
| Oxeye daisy | *Chrysanthemum leucanthemum* | Pennsylvania smartweed | *Polygonum pensylvanicum* |
| Bugbane | *Cimicifuga racemosa* | Christmas fern | *Polystichum acrostichoides* |
| Spring beauty | *Claytonia cf. caroliniana* | Curly dock | *Rumex crispus* |
| Virgin's bower | *Clematis virginiana* | Woolgrass sedge | *Scirpus cyperinus* |
| Crown vetch | *Coronilla varia* | Golden ragwort | *Senecio aureus* |
| Umbrella sedge | *Cyperus strigosus* | Star flowered Solomon's seal | *Smilacena stellata* |
| Orchard grass | *Dactylis glomerata* | Golden rod | *Solidago spp.* |
| Jimson weed | *Datura stramonium* | Skunk cabbage | *Symplocarpus foetidus* |
| Queen Anne's lace | *Daucus carota* | Dandelion | *Taraxacum officinale* |
| Deertongue grass | *Dichanthelium clandestinum* | Poison ivy | *Toxicodendron radicans* |
| Field horsetail | *Equisetum arvense* | Red clover | *Trifolium pratense* |
| Trout lily | *Erythronium umbilicatum* | Nodding trillium | *Trillium cernum* |
| Gill-over-the-ground | *Glechoma hederacea* | Purple trillium | *Trillium erectum* |
| Bluets | *Hedyotis caerulea* | Common cattail | *Typha latifolia* |
| Jewelweed | *Impatiens capensis* | Common mullein | *Verbascum thapsus* |
| False Rue anemone | *Isopyrum biternatum* | Violet | *Viola sp.* |
| Soft rush | *Juncus effusus* | Common blue violet | *Viola papilonacea* |
| Everlasting pea | *Lathyrus latifolius* | Wooly blue violet | *Viola sororia* |
| Lily | *Lilium sp.* | Cocklebur | *Xanthium chinense* |

• *Observations based on field investigations conducted during April, June, July, September and October 2004, and April and June 2005.*

**Table 3.7-2. Wildlife Observed Throughout the Project Area**

| Common Name | *Scientific Name* |
|---|---|
| **MAMMALS OBSERVED** | |
| Eastern cottontail | *Sylvilagus floridanus* |
| White tailed deer | *Odocoileus virginianus* |
| Chipmunk | *Tamias striatus* |
| Eastern gray squirrel | *Sciurus carolinensis* |
| Raccoon | *Procyon lotor* |
| Groundhog | *Marmota monax* |
| Black bear | *Ursa americanus* |
| Big brown bat | *Eptesicus fuscus* |
| Northern bat | *Myotis septentrionalis* |
| Red bat | *Lasiurus borealis* |
| **BIRDS OBSERVED** | |
| American robin | *Turdus migratorius* |
| Bank swallow | *Riparia riparia* |
| European starling | *Sturnus vulgaris* |
| Red-winged blackbird | *Agelaius phoeniceus* |
| Mourning dove | *Zenaida macroura* |
| Belted kingfisher | *Ceryle alcyon* |
| Killdeer | *Charadrius vociferus* |
| Black-capped chickadee | *Parus atricapillus* |
| Turkey vulture | *Cathartes aura* |
| Northern cardinal | *Cardinalis cardinalis* |
| Gray catbird | *Dumetella carolinensis* |
| American goldfinch | *Carduelis tristis* |
| Eastern towhee | *Pipilo erythrophthalmus* |
| Ovenbird | *Seiurus aurocapillus* |
| Red-eyed vireo | *Vireo olivaceus* |
| Wild turkey | *Meleagris gallopavo* |
| **REPTILES OBSERVED** | |
| Spring peeper | *Pseudacris crucifer* |
| Eastern garter snake | *Thamnophis sirtalis sirtalis* |
| Box turtle* | *Terrapene carolina carolina* |

** Observed only on the power line corridor*

During the summer of 2004, students from the Greenbrier West High School participated in an educational outreach effort as part of National Environmental Policy Act community outreach for the WGC project. Interested students were assembled into small teams and asked to collect samples, analyze various environmental issues, and make presentations about their work at local public meetings. A local science teacher coordinated this effort with the help of other local teachers and volunteers. The students earned valuable experience in basic ecological theory, ecological field methods, taxonomic identification

of selected organisms, data analysis, report preparation, and public presentation. The student teams analyzed various environmental issues of importance to the project, including the following:

- Estimation of the relative dominance and importance values of herbaceous and shrub plants in non-forested areas near the proposed power plant site using the line intercept method. The average relative dominance and the average importance value were calculated for the local vegetation that consisted of mostly grasses and forbs.
- Collection of herbaceous plants in the area of the proposed power plant to identify any endangered or threatened species. Plant specimens collected included grasses, sedges, rushes, mosses, lichens, ferns, legumes, forbs, shrubs, and trees.
- Determination of the relative dominance and importance value of forest trees in areas likely to be impacted by the proposed power plant using the random pairs method. Results indicated that beech, maple, and cherry ranked highest in both average relative dominance and average importance value.
- Estimation of the number of bat species located in the areas of two proposed timber sales in Seneca and Calvin Price State Forests using mist nets. No endangered species of bats were found. Although this work was not directly applicable to the proposed power plant site, it illustrated the methodology for analyzing an issue applicable to other projects in the region.
- Analysis of benthic macro-invertebrates communities (stream insect larvae, etc.) and water quality parameters in small streams impacted by coal mining activities and acid mine drainage (AMD). This work provided a baseline for later analysis of stream conditions after coal waste piles have been removed to see if conditions have improved.

Wetlands in the project area were identified as jurisdictional and non-jurisdictional. Jurisdictional wetlands are water resources that are adjacent to or have a hydrological connection to streams that cross state boundaries. Non-jurisdictional wetlands are water resources that are not hydrologically connected to streams (intermittent or perennial) that cross state boundaries. In general, non-jurisdictional wetlands may occur as isolated topographic depressions that are characterized as vernal pools.

#### *3.7.1.1 E&R Property and EcoPark*

Development of the EcoPark site is not associated with the WGC Proposed Action, but would be developed as a third action party independent of WGC actions. Consequently, references to the EcoPark are presented for analysis and conceptual purposes only. The EcoPark component of the project is situated on the north side of Sewell Creek and includes the former location of the Meadow River Lumber Company (MRLC). The entire mill and lumberyard, including two former log ponds, were razed by 1975 and woody and herbaceous vegetation currently covers the site. Most of the EcoPark site is characterized as mowed and maintained grassy fields, abandoned vacant land consisting of tall herbaceous plants and small clusters of trees and shrubs on the north side of Sewell Creek. The E&R (see Figure 2.2-1 and 2.2-3) component of the project area, southeast of Sewell Creek consists of a disturbed area associated with previous earth moving activities, and approximately 15 acres (6 hectares) of woodlands. Portions of the wooded area are wetland, and the remainder is upland, with some areas of the wooded uplands occurring on the hillside slopes and along the base of the mountain.

The following vegetative communities are present within the overall project area, which includes the areas north and south sides of Sewell Creek:

- Open field areas, with only small areas of trees and shrubs, located on the north side of Sewell Creek;

- Forested areas, both upland and wetland, present as small patches of woods along the north side of Sewell Creek and as larger, contiguous wooded areas on the south side of Sewell Creek; and
- Disturbed areas with only small amounts of vegetation located on the south side of Sewell Creek.

Currently, the upland areas within the open fields north of Sewell Creek are vegetated primarily herbaceous species, including wingstem, various grasses, goldenrod, Indian hemp and milkweed. Parts of these fields are mowed occasionally, while other areas are not mowed and shrubs and young trees have become established. Species observed in the shrubby upland areas include sumac, black cherry, multiflora rose, and blackberry in addition to the herbaceous species listed above. Sections of the field south of Sewell Creek, such as near the eastern edge of the site and in the western part of the site near the CSXT Railroad yard, contain small, wooded areas. A part of these wooded areas is upland and the remainder is wetland. The dominant species observed in the upland section of the eastern wooded area include American beech, ironwood, hawthorn, black cherry, jack-in-the-pulpit, May apple and blackberry. Table 3.7-1 summarizes plant species observed throughout the project area, and Table 3.7-2 lists the wildlife species observed.

Wetland areas at this location are vegetated with swamp dogwood, black willow, sedges, sensitive fern and skunk cabbage. The wooded area near the CSXT Railroad yard is vegetated with black cherry, flowering dogwood, black willow, May apple, sensitive fern and skunk cabbage. Along the banks of Wolfpen Creek near this wooded area, young specimens of these trees as well as poison ivy, goldenrod, blackberry and evening primrose are found.

South of Sewell Creek, wooded areas occupy most of the ridgeline that extends into the E&R property and into parts of the adjacent, lower elevation areas. Most of the wooded area north of the ridgeline is a forested wetland with several channels leading to Sewell Creek. The dominant plant species observed in the wooded wetland are red maple, pin oak, spicebush, swamp dogwood, cinnamon fern, jewelweed, sensitive fern, and skunk cabbage. The wooded upland areas are dominated by red maple, American beech, red oak, hawthorn, ironwood, Christmas fern, witch hazel and Virginia creeper. Heading east along the base of the hillside, the wooded area transitions into the disturbed area associated with the earth disturbance begins. Additionally, part of the hillside has been disturbed by heavy equipment and portions of the hilltop have been graded flat. Many of the disturbed areas lack topsoil and are unvegetated. In the parts of the disturbed areas that are vegetated, wingstem, grasses, sedges, soft rush and goldenrod form the dominant herbaceous community, while other parts are dominated by early seral/pioneer shrubs and young trees, such as sumac, black cherry and black locust.

East of the ridgeline, near the eastern edge of the E&R site, an unnamed tributary drains into Sewell Creek (see Section 3.4, Surface Water Resources). Based on reviews of historical aerial photographs and topographic maps, this stream was relocated during previous site grading activities. Hence, the relocated portion of the unnamed tributary runs through part of the disturbed area. Undisturbed sections to the south and west consist of wooded areas of similar vegetation types as mentioned above. Within the disturbed area, the tributary's channel banks are vegetated with sedges and soft rush and some shrubs including elderberry and arrow-wood. These two shrubs are also common in other parts of the site.

The March 2006 field investigation addressed the proposed relocation of the water line south of US 60 and Sewell Creek. The relocation of the water line was proposed as an attempt to minimize and avoid impacts to the environment. The new alignment for the waterline would use the peripheral edge of existing roads within the modular home community and a mowed grassy field. Consequently, the field investigations identified a small emergent wetland situated along the eastern limits of the E&R property, and within the proposed water line right-of-way (ROW). Vegetation along this wetland consists of soft rush, sedges, deer tongue grass and dogbane. The emergent wetland transitions into an early to mid-sucessional forested east of where the water line crosses the emergent wetland.

Observations of wildlife noted during the wetland delineation and subsequent visits to the project area include: Eastern cottontail, white tailed deer, raccoon, big brown bat, American robin, swallows, European starlings, red-winged blackbird, Eastern towhee, American cardinal, belted kingfisher, American goldfinch, killdeer, mourning dove, finches, black-capped chickadee, spring peepers, garter snake, an unidentified dog, snake, and salamander.

#### *3.7.1.2 Meadow River and Sewell Creek*

The description of Meadow River and Sewell Creek in this section discusses the area in close proximity of the confluence of these two streams and the Rainelle Sewage Treatment Plant (RSTP).

The Meadow River and Sewell Creek are perennial streams characterized by well-defined bed and bank channel morphology. The channel banks of Sewell Creek has been modified and redirected by human activities to lower the risk of potential flooding., where as Meadow River appears to have been minimally altered by human activities. The stream channel banks for both streams have steep to moderately steep vegetated channel bank slopes and the ordinary high water mark is easily discernable. No exposed roots of woody riparian plants were observed along the channel banks. However, undercut channel banks could occur in portions of Meadow River that lay outside of the limits of study. Occasional woody debris (trees, logs) deposited during high stream flows were observed in the Meadow River and Sewell Creek. The woody debris functions in providing habitat for fish and macroinvertebrates. The floodplain of Meadow River contains a noticeable levee on the southern western stream bank. The levee is vegetated with non-wetland plants such as black cherry, iron wood, and Canada goldenrod.

The riparian vegetation hanging over both streams functions in moderating surface water temperature from the warming effects of direct sunlight, and is a source of detritus for the aquatic vertebrate and invertebrate life. The riffle in the Meadow River can function as spawning substrate for fish, provide habitat for macroinvertebrates such as caddisflies and help aerate the water column of the stream. During periods of low flow, the riffles function in preventing larger fish from migrating in portions of the stream reach, whereas deeper pools habitat for larger fish during the summer.

Portions of the riparian zones are vegetated by non-native plants such as Japanese stilt grass. However, the herbaceous riparian plant community generally consists of deer tongue grass, yellow nut sedge, iron weed, clover, Timothy grass, clear weed, false nettle, winged stem, mana grass, and soft rush. The woody riparian community consists of silver maple, cucumber tree, red maple, iron wood and black willow. An unnamed vegetated drainage swale is situated south of the rail road track and west of Sewell Creek. Section of the unnamed vegetated drainage swale area bordering Sewell Creek appears to be vegetated by non-wetland, such as lespedeza and broom sedge. However, approximately 100 feet west from the confluence with Sewell Creek, vegetation in the drainage swale transitions from an upland field into a palustrine emergent wetland dominated by woolgrass, iron weed, boneset and other types of persistent and non-persistent wetland plants. The vegetated drainage swale functions filters sediments carried by seasonal water and provides a substrate for microbes that affect the nitrogen and carbon cycle.

The area of the proposed cooling intake water structure (see Figure 2.2-3), along the Meadow River, is situated approximately 4 to 6 feet (1 to 2 meters) above the normal surface water elevation. Vegetation is dense and the diameter of trees in this portion of the floodplain varies from 2 to 14 inches (5 to 36 centimeters) in diameter and the floodplain can function as a transportation corridor for a variety of avifauna and wildlife.

#### *3.7.1.3 Anjean*

Anjean is highly disturbed from past mining activities (see Figure 2.2-4). Some remediation efforts have been undertaken at this site, but many areas consist of coal refuse piles and unvegetated areas, some

with exposed rock outcrops. Runoff from the coal refuse pile is collected at the base of the site and directed into a series of ponds used to treat the acidic leachate. A few abandoned buildings associated with previous mining activities are also present on the site. WVDEP maintains a field office in a trailer near the entrance from Anjean Road (CR 1).

Along the edge of the mining and coal refuse areas, wooded areas are present and are dominated by relatively young black locust and pin cherry trees. Other tree species observed include hop hornbeam, a few red and white oaks, red maple and quaking aspen. Goldenrod, crown vetch, virgin's bower, Japanese knotweed, yarrow and curly dock are common in the herbaceous layer observed in different parts of the Anjean site.

Briery Creek and Big Clear Creek are present at the base of the Anjean site (see Figure 3.4-4). The channels of these two creeks are very rocky and mostly unvegetated, except for a few black willows. The black willow trees are more common along the banks of these creeks. Wildlife at the Anjean site is somewhat limited due to the overall conditions of the property. The following species or evidence of these species were observed at the Anjean site during the site visits: chipmunk, groundhog, black bear, white tailed deer, American crow, swallow, and turkey vulture.

Several sites were identified as candidates for the coal prep plant (AN1, AN2, and AN3). AN1 is situated just south of the Big Clear Creek and South Fork confluence. AN1 is characterized as disturbed, steeply sloping to moderately flat landscape. Most of the disturbed area is grassy field vegetated with a sod forming grass such as Kentucky fescue. Most of the grassy fields appear maintained and mowed on a regular schedule. Wooded portions of the area are vegetated by trees having an estimated diameter at breast height (DBH) of 6 to 10 inches (15 to 25 centimeters) trees, and could qualify as an early seral forest community. Ponds were observed at the site and it is assumed that these ponds were constructed to manage some of the runoff from the coal refuse pile, and therefore, are probably not subject to jurisdictional wetlands review by the regulatory agencies.

AN2 is west of Big Clear Creek and the community of Anjean. Most of the site is vegetated by herbaceous grasses. Several riprap lined drainage swales were observed within the candidate site. Topography of the site is mostly flat and is bordered by a hillside along the western periphery of the site.

AN3 is a highly disturbed area situated near the base of the Anjean coal refuse (Buck Lilly pile). A large portion of the site is characterized as an unimproved dirt access road. The remainder of the site contains abandoned facilities such as a holding container for hydrochloric acid, discarded PVC pipes and an old trailer. Vegetation is sparse, but where it does occur the vegetation can be characterized as persistent and nonpersistent plants common to disturbed areas. Topography is mostly flat.

#### *3.7.1.4 Donegan*

The Donegan coal refuse site, approximately 132 acres (53 hectares), drains into Laurel Creek of the Cherry River, a direct tributary of the Gauley River. Drainage of the site is directed to the north and then east where it empties into Laurel Creek (see Figure 3.4-6). Water quality issues at the Donegan site are discussed in Section 3.4.2.5.

Two candidate sites for the fuel processing prep plant were identified, DN 1 and DN2. DN1 is characterized by a grassy field with scattered clusters of shrubs. The herbaceous plants typically consisted of Lespedeza, broom sedge, fescue and autumn or Russian olive (*Elaeagnus sp.*). Topography of the site is mostly flat. DN2 is characterized as an early seral to mid-sucessional forest. Portions of the site are vegetated with a dense understory of saplings in the 2- to 4-inches (5- to 10-centimeters) DBH size class, and several larger trees in the 10 to 14 inches (25 to 36 centimeters) DBH size class occur intermittently in the wooded areas. No wetlands or other water bodies were observed at the site.

#### *3.7.1.5 Green Valley*

The coal refuse site at Green Valley is over 1,000 feet (300 meters) in length and up to 200 feet (60 meters) in height. In the past the site was used for coal refuse disposal. The coal refuse was capped with topsoil gathered from other portions of the site and surrounding areas. While the intent was to blanket the coal refuse with 3 to 4 feet (0.9 to 1 meter) of soil, coverage in most areas is less than 2 feet (0.7 meter) and is several inches in certain portions of the pile.

Leachate from the coal ash has caused the soil to become very acidic across the coal refuse area. As a result, the hill was planted with various pine tree species, which thrive in acidic soil conditions. The predominant pine species appeared to be Virginia pine. The majority of the trees range in height from approximately 8 to 20 feet (2 to 6 meters). A few widely scattered young hawthorn, sassafras, red maple, and tree-of-heaven saplings are also present. The hawthorn and tree-of-heaven are slightly more numerous on the north and west sides of the pile. Isolated shrub species include maple-leaved viburnum, multiflora rose, sumac, and greenbrier. A few privet and honeysuckle shrubs are present at the north end of the pile. Grasses and wildflowers fill the herbaceous layer between the trees, including goldenrod, several species of asters, blackberry, soft rush, sedge species, switch grass, reed canary grass, deer-tongue grass, and purple loosestrife. Some of the plants mentioned above (tree of heaven-hawthorn) are typical of non-native or invasive plants that colonize disturbed areas that form monocultures and lower the quality of wildlife habitat.

A general area has been identified as the candidate site (GV) for the coal prep plant that would beneficiate the coal refuse from Green Valley. The plant community at the GV site is characterized as having a moderate to densely vegetated shrub layer over a moderate to steeply sloping topography.

#### *3.7.1.6 Joe Knob*

The Joe Knob coal refuse is situated along the summit of Little Clear Creek Mountain at an elevation of approximately 3,600 feet (1,100 meters) above mean sea level (amsl). The area encompassing Joe Knob and immediate surrounding area is characterized as a disturbed landscape, which has undergone reclamation efforts after previous coal mining activities. A mining permit was issued in 1987 to Leckie Smokless, Inc. by WVDEP. In 1999, the permit was forfeited by the applicant, and reclamation efforts were performed and competed by WVDEP in 2003 (Green 2006). Much of the vegetation colonizing the site is typical of pioneer, early seral plant species that vegetate nutrient poor, disturbed areas. Some of the vegetation occurring at the coal refuse consists of Kentucky fescue and orchard grass. The high uplands bordering Joe Knob consist of species commonly encountered at high elevations. Typical species include hickory, sugar maple, black cherry and oaks. The reclaimed coal refuse area is characterized as a moderately sloping grassy field.

#### *3.7.1.7 Transmission Corridor*

### Segment A - WV 20 to the AEP Easement

The initial power line corridor considered by WGC (Segment A – see Figure 2.4-9) extends from near the existing CSXT property on the south side of WV 20, over WV 20, into the wooded area on the ridge of Sewell Mountain and then ties into the existing AEP power line easement. This corridor is adjacent to a golf course. Also, a section of Wolfpen Creek intersects the existing power line in this area. At this location, Wolfpen Creek has a very rocky channel, but various sedges, goldenrod and young striped maple trees are growing in some areas near the channel bank. A few specimens of mountain magnolia were observed near Wolfpen Creek in the vicinity of the existing power line.

The wooded ridge is dominated by American beech, black cherry, and tulip tree. Hickory, red maple and striped maple are also present. The canopy of this area is relatively closed, with between 80 and 90 percent coverage. The understory consists of young specimens of the above mentioned tree species as well as witch hazel, maple leaf viburnum, a few arrow-wood and some grape vines. Christmas fern is the predominant herbaceous species.

During the field investigations of this corridor, gray catbird, ovenbird, red-eyed vireo, white tailed deer, chipmunk, Eastern cottontail rabbit, big brown bat and northern bat were observed.

### Segment B – Rainelle to Laurel Creek Mountain

A walk-through inspection of a 100-foot (30 meter) -wide corridor, along and directly adjacent to an approximately 3-mile (5-kilometer) section of an existing power line corridor was conducted on April 27-28 and June 14-16, 2005. The purpose of the inspection was to evaluate the feasibility of constructing a power line in an easement immediately adjacent and parallel to the existing easement within this 3-mile (4-kilometer) section. The existing easement within the 3-mile (4-kilometer) segment investigated is currently owned and maintained by American Electric Power (AEP). The portion of the easement that was the focus of this investigation begins immediately south of US 60, near the golf course just west of the incorporated area of Rainelle and runs northeasterly to a point approximately 3,000 feet (910 meters) north of the Meadow River. The existing AEP transmission line corridor consists of consecutively numbered poles; the area inspected for this investigation and anticipated to be paralleled by WGC extends from pole 321-108 (southernmost) to pole 321-132 (northernmost). A few areas of herbaceous species, including saplings (5 to 6 feet [1.5 to 2.8 meters] high), were encountered during the site investigation.

Section B1 – For purposes of this biological resources discussion, the segment beginning from the southernmost point of the power line easement near the golf course (intersection of Segment A and B in Figure 2.4-9) to the Meadow River is identified as Segment B1. This area is the southernmost section of the power line corridor and varies in elevation from approximately 2,400 feet (730 meters) amsl adjacent to the Meadow River, to nearly 3,200 feet (980 meters) amsl at the top of a mountain located near the center of this area. The area adjacent to the easement in Segment A consists of primarily a closed canopy forest located on steep hillsides. In general, the forest consists of mixed deciduous hardwoods. Predominant tree species in this area consist of American beech, paper and gray birch, and ash. Very few shrub or herbaceous species exist in this area, especially on the northern half of Section A. Hemlock is abundant on the northern half. Where any understory vegetation did exist, it consists primarily of saplings of the above-mentioned tree species, as well as ferns and mosses. One white-tailed deer was observed in this section, and evidence of turkey, bear, frogs, and salamanders was found.

Section B2 – For purposes of this biological resources discussion, Section B2 is identified as the segment between the northern end of Section B1 to Laurel Creek Mountain (intersection of Segment B and C in Figure 2.4-9). This section varies in elevation from approximately 2,400 feet (730 meters) amsl along the Meadow River at the southernmost point, to approximately 3,100 feet (950 meters) above msl at the top of a ridge in the center of the section. Poles 321-124 to the south, adjacent to the Meadow River, and pole 321-132 to the north, located at the top of Laurel Creek Mountain, bound the area. On Laurel Creek Mountain, a relatively small wetland area was observed in a depression at the top of the ridge. Further south, another former strip mine was encountered. This area contained a large area of clear-cutting outside of the strip mine area, possibly from logging operations. The clear-cutting is much more pervasive on the northwest side of the easement. Ponded water was observed in several disturbed areas resulting from the former strip mine and/or logging operations. The remainder of this section, to the Meadow River, contained hardwood forest, with oak, red maple, and a few ironwood trees.

### Segment C – New Corridor from Laurel Creek Mountain to Grassy Falls

WGC conducted an ecological evaluation of the proposed corridor segment that extends from the AEP ROW to the Grassy Falls Substation (see Appendix L, Transmission Line Corridor Study). This evaluation consisted of a site walkover of the proposed corridor alignment and a review of aerial photography. The majority of wetlands along the AEP ROW were emergent, or characterized as a wetland complex containing emergent/open water components or emergent and scrub-shrub components. Vegetation in the emergent wetlands was typically represented by soft rush, jewel weed, and sensitive fern, the scrub-shrub wetlands were typically vegetated by black willow, slippery elm, and silver maple. One emergent/forested wetland occurred along the proposed ROW and was vegetated by the plant species occurring in the emergent or scrub-shrub wetlands. In addition to the wetlands, the field reconnaissance identified 24 perennial streams, seven intermittent streams and one stream possessing intermittent and perennial characteristics. More intensive surveys were not undertaken because the corridor had not been professionally surveyed, mapped and flagged. The evaluation estimated that approximately 50 percent of the segment consists of forested lands, and substantial portions of the segment traverses lands that have been subject to mining and timber activities. As part of the evaluation efforts, field biologists conducting the survey assessed the suitability for T/E species habitat as described in Section 3.7.4.

#### *3.7.1.8 Exchange Property*

The exchange properties consist of two areas of land along opposite sides of a residential property (see Figure 2.2-3). The area along the east and southeast side of the residence is the smaller of the two areas. These two parcels meet at a point south of the residence along the power line easement.

The smaller portion of the exchange site is a landscaped and developed area associated with the adjacent golf course. This area is bordered to the north by US 60, to the southeast by the power line easement, and to the northwest by the residential property. This area includes an entrance road extending south from US 60, which splits in two directions shortly after entering the site. One portion of the road extends toward some buildings associated with the country club, while the other leads to a parking lot. The landscaped areas between the entrance roads and adjacent to the residence include domestic grasses, ornamental spruce and fir trees, and large red and white oaks. An unnamed tributary to Wolfpen Creek drains from north to south and runs adjacent to the eastern boundary of the western portion of the exchange property, between it and the residential property. This tributary also crosses the far southwest corner of the eastern portion of the exchange site at the power line easement. The banks of this tributary are well defined and rocky, and the immediate areas along the stream are vegetated with rushes and various species of sedges (*Carex spp.*), goldenrod, wildflowers, and a few tulip tree saplings.

The larger western portion of the site is generally a closed canopy, deciduous hardwood tree forest. The canopy layer consists primarily of American beech and oak trees, as well as some tulip trees, red and Norway maple and hickory trees. The trees were becoming seasonally leafless at the time of the survey, but the canopy coverage is estimated to be approximately 90 percent or more during the midst of the growing season. The shrub layer (approximately 50 percent coverage) consists almost solely of saplings of the above-mentioned tree species, with a few witchhazel. The herbaceous layer coverage is estimated to be 10-15 percent or less, and include Christmas fern, cinnamon fern, and sphagnum moss.

Throughout the western portion of the site, the topography rises generally from south to north. Broad swales and narrower erosional channels oriented in a north-south direction are scattered across the western portion of the exchange site. Within these features, which may contain freshwater wetlands, are areas of soils containing muck and ponded water. In these areas, the larger trees are absent and the vegetative community is dominated by grasses and shrubs, including rhododendrons.

A few piles of large rocks were observed along the eastern side of the western portion of the exchange site. These piles contain numerous small openings and fissures that may serve as habitat for certain bat species. However, few (if any) trees across the exchange site possessed the shaggy bark that would be suitable for additional bat habitat.

The highest point of the site is near the north-central area of the western portion of the site. Topography slopes downward sharply toward the southwest, south, southeast, and east. A slight depressional area between US 60 and the high point of the site contains an area of cattails, switch grass, soft rush, and other typical wetland grasses.

Wolfpen Creek crosses the far southwest portion of the western area of the exchange site, immediately north of the power line easement. This rocky stream also contains well-defined channels. The vegetation is noticeably denser adjacent to the stream.

#### *3.7.1.9 Plateau on Plum Creek Site*

A plateau that extends from the tree line on the E&R property, on the northern side of the ridge, has been considered for project purposes (see Figure 2.2-3). This area is located within a hardwood, deciduous forested mountainside. The area is approximately 2 to 3 acres (0.8 to 1 hectares) in size and is located on a small plateau. The vegetation consists primarily of large beech trees, as well as some Norway and red maples, red and black oaks, and hawthorn. There are also tulip trees scattered throughout the area, as well as a few barberry shrubs. Some of the largest trees are over 12 inches (30 centimeters) DBH. The large trees create a nearly closed canopy layer that has limited the understory vegetation in this area. The shrub layer consists primarily of saplings of the above-mentioned trees, with a few grape vines. The herbaceous layer is nearly non-existent, consisting largely of Christmas fern and mosses.

#### *3.7.1.10 Proposed Water Line Corridor*

The proposed water line would begin at the power plant site and end at the RSTP adjacent the Meadow River. Starting from the power plant site the proposed water line corridor would run north through a small emergent wetland and a grassy mowed field until it meets 15$^{th}$ Street. Upon meeting 15$^{th}$ Street, the water line would then head east along the road to a back alley between modular homes leading north to the US 60 bridge and beyond. Upon crossing US 60, the water line would continue northeast along the east side of Sewell Creek towards the waste water treatment plant. This segment of the corridor consists of previously disturbed landscaped areas consisting of various grasses and other herbaceous species. The proposed corridor route would continue across Little Sewell Creek to the 7$^{th}$ Street Bridge. The water line ROW corridor extends across Sewell Creek at the 7$^{th}$ Street Bridge and parallels WV 20 to the gravel road accessing the RSTP. The water line would be placed within or adjacent to the gravel road accessing the wastewater treatment facility. Areas adjacent to the access road are characterized as a field of various grasses and other herbaceous species and a small wooded area, dominated by shagbark hickory, white oak, American beech, red maple, spicebush, black cherry and jewelweed in the understory. A potential corridor location along the CSXT rail line was also surveyed as part of the EIS efforts. This potential corridor lies adjacent to the existing railroad tracks through areas that have already been developed. However, there is a portion of the corridor where natural vegetation exists on both sides of the existing railroad tracks and includes wetlands. This vegetated area is located along that portion of the railroad tracks between US 60 and the RSTP. From US 60 to the existing Meadow River Hardwood Lumber Company, the vegetated area is primarily wooded with species such as red maple, American beech, black locust, ironwood and black cherry trees. Between the lumber yard and the RSTP, the area includes a field of various grasses and other herbaceous species, and a small wooded area, dominated by shagbark hickory, white oak, American beech, red maple, spicebush, black cherry and jewelweed in the understory.

Wildlife observed along the proposed water line corridor includes gray catbird, an unidentified woodpecker, turkey feathers, European starlings, and a chipmunk.

#### *3.7.1.11 Proposed Truck Storage Area*

The proposed truck storage area is located on the north side of WV 20/US 60 in the small town of Charmco. The site, which measures approximately 9 acres (4 hectares) in size, is located approximately 3 miles (5 kilometers) northeast of the proposed power plant site and was formerly the site of a drive-in movie theater. The majority of the site has been disturbed and cleared of vegetation, with the exception of areas along the perimeter of the property, and consists of bare soil and gravel.

Wooded areas exist along the northern, western, and eastern property boundaries. The eastern portion of the site contains the broadest area of vegetation. Both upland and wetland areas are found. Narrow drainage channels with water exist within the tree lines along the northern and eastern property line, and a slightly broader stream channel was observed within the wooded area of the eastern portion of the site. These channels would likely be considered regulated wetland features by the U.S. Army Corps of Engineers (USACE).

Tree species observed at the site include hemlock, cherry, maple, tulip tree, black locust, hickory, American beech, and white and red oaks. Shrub and herbaceous species include saplings of the above-mentioned species, as well as witch hazel, barberry, arrow-wood, multiflora rose, jack-in-the-pulpit, May apple, golden rod, clover, milkweed, asters, and thistle. Some sections of the wetland features also contained cattails, sensitive fern, and rush species.

Wildlife observed onsite in June 2005 includes nesting killdeer and white-tailed deer.

### 3.7.2 Wetlands

An extensive wetland delineation was conducted within the potential project areas referred to in Section 3.7.1 and Figure 3.7-1. Because the potential areas for project activities expanded as site planning efforts proceeded, the wetland delineation was conducted in several stages including April 19-23, September 13-16 and October 18-21, 2004, and March 14-16, 2006. The purpose of the field delineations was to identify and delineate the limits of jurisdictional freshwater wetlands and *Waters of the U.S.* in areas that could be impacted by project activities. The delineation was based upon the Routine On-Site methodology outlined in the USACE Wetlands Delineation Manual (1987), which uses the three-parameter approach (i.e., an evaluation for the presence of hydrophytic [wetland] vegetation, hydric [wetland] soils and wetland hydrology). This methodology is described in the Wetland Delineation Report in Appendix C. Areas that are disturbed are considered atypical or problematic, and consequently the presence of all three wetland criteria may not always be required.

#### *3.7.2.1 E&R Property and EcoPark*

Jurisdictional waters and wetlands delineated for this project include Sewell Creek, unnamed tributaries to Sewell Creek, low-lying vegetated areas adjacent to the north and south sides of Sewell Creek, and Wolfpen Creek. Indicators of wetland hydrology in the areas delineated include defined bed and bank channels, standing water, saturated soils, and/or mottling observed in the soil profiles. In the vegetated wetlands, the types of vegetation and the characteristics of the soil were evaluated and determined to be representative of wetland conditions. The Wetland Delineation Report (Appendix C) includes detailed information about the various wetlands, along with photographs and data points recorded throughout the delineation area.

The open fields on the north side of Sewell Creek (EcoPark) are the site of a former lumber mill and yard, which included two log ponds. Subsequent to the demolition of the lumber company's facilities in

1975, the field became vegetated. The discussion of EcoPark is presented for analysis purposes and on conceptual terms as the site will be developed by an independent third party. The following is a list of all wetlands delineated on the north side of Sewell Creek beginning from a point on the western edge of the EcoPark and heading east:

(1) A small, emergent wetland area vegetated primarily with cattails located adjacent to Sewell Creek 0.05 acres [0.02 hectares]);

(2) A short ditch* adjacent to the dirt roadway within the CSXT Railroad property (0.02 acres [0.01 hectares]);

(3) A section of wooded wetland near the CSXT Railroad property and west of Wolfpen Creek (0.48 acres; [0.19 hectares]), vegetated with swamp dogwood, willows, sedges, sensitive fern and some skunk cabbage;

(4) Wolfpen Creek from the railroad crossing south to its confluence with Sewell Creek (0.44 acres [0.18 hectares]);

(5) A ditch* that runs parallel to the railroad tracks and enters Wolfpen Creek near the railroad crossing (0.11 acres [0.04 hectares]);

(6) A two-part ditch*, connected via a culvert, within the open field part of the site (0.2 acres [0.08 hectares]);

(7) An isolated, emergent wetland vegetated with cattails and sedges located within the open field part of the site (0.23 acres [0.09 hectares]);

(8) Topographically low areas adjacent to a ditch within the open field and adjacent to Sewell Creek (2.36 acres [0.96 hectares]);

(9) A ditch* beginning within the open field that widens into a back channel area as it approaches Sewell Creek (0.39 acres [0.16 hectares]); and

(10) A narrow wetland that exists within a portion of the wooded area and the adjacent open field (0.71 acres [0.29 hectares]).

*These ditches are primarily vegetated with cattails, sedges, and soft rush. Some swamp dogwood, arrow-wood and multiflora rose shrubs are present along the banks in some areas of these ditches.

The areas delineated south of Sewell Creek, include many back channels that are separated from Sewell Creek by small upland areas. Some of these back channels are also separated from a larger wetland system that is located adjacent to the bottom of the hillside on the southern edge of the site. This larger, wetland system is a wooded area where standing water was observed in some locations and a small, unnamed tributary provides runoff from the adjacent hillside. Most of these features occur in the western half of the E&R project area south of Sewell Creek.

Most of the eastern half of the E&R project area, and south of Sewell Creek has been disturbed from previous earth moving activities. In this area, Sewell Creek is the primary watercourse feature delineated. However, there is also an unnamed tributary located near the eastern edge of the project area, which has several smaller tributaries of its own. Some of the areas along the unnamed tributary are primarily open water, while other areas are wooded wetlands or narrow drainage features without defined drainage channels.

Maps of the wetland boundaries delineated for this project are provided in Appendix C. These boundaries represent only those wetlands observed within the site. Many of the features delineated extend beyond the limits of the site, such as Sewell Creek, Wolfpen Creek, and the unnamed tributary on the southern side of Sewell Creek. Wetland boundaries are illustrated in Figure 3.7-2.

#### *3.7.2.2 Anjean*

A site investigation for the presence of wetlands was conducted on March 15, 2006, at the Anjean coal refuse project area. The field reconnaissance identified one isolated emergent wetland within a pond where coal fines have been deposited. Vegetation in the emergent wetland consists of soft rush, woolgrass and sedge. The substrate consists of coal fines. As an isolated wetland this feature is not subject to regulation by the USACE because it is not adjacent to or connected to *Navigable Waters of the U.S*. Because the wetland is developed within a pond for coal fines, the water quality functions would be characterized as poor (i.e., leachate permeates through and out of the wetland).

There are several topographic depressions on and around AN1 could be considered non-jurisdictional wetlands. These features appear related to past grading and earth moving activities (e.g., potential sediment basins). AN2 contains several riprap lined drainage channels that is assumed to convey heavy runoff away from the roads (i.e., CR 1 and on-site gravel road). AN3 has no wetlands or streams occurring on-site.

#### *3.7.2.3 Donegan*

An investigation for the presence of wetlands was not conducted at the Donegan site because the extraction of the gob from Donegan for use at the site facility is not anticipated within the next five years.

Consequently, a wetland boundary determination was not performed because USACE verified wetland boundary confirmations are valid for only a five-year period. USACE Jurisdictional confirmations that exceed the five-year lifespan of a confirmation period are invalid and would require an additional site visit to see if conditions have changed and to re-establish the wetland boundary line if needed. Runoff is directed to several treatment ponds along the perimeter of the pile. Since these ponds function in treating AMD, they would probably not qualify as a jurisdictional water resource. However, a wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of these water resources. Because the Donegan coal refuse is situated adjacent to Laurel Creek, wetland impacts could occur and an investigation for potential jurisdictional waters would be required at the site.

DN1 is characterized as a moderately sloping grassy field and no wetlands are present on this site. In addition, no wetlands were observed at DN2.

#### *3.7.2.4 Green Valley*

An investigation for the presence of wetlands was not conducted at the Green Valley coal refuse site because the extraction of coal refuse from Green Valley would not be anticipated within the next five years.

Consequently, a wetland boundary determination was not performed because USACE verified wetland boundary confirmations are generally valid for only a five-year period. USACE Jurisdictional confirmations that exceed the five-year longevity of the confirmation period are invalid and would require an additional site visit to determine if site conditions have changed and to re-establish the wetland boundary line for verification. Storm water runoff generated by the disposal facility is collected by perimeter drains and routed into sediment control ponds that discharge into Blue Branch under NPDES permit regulations. Since these ponds function in treating AMD, they would most likely not qualify as a

**Figure 3.7-2.**
Jurisdictional Wetlands Boundaries

Map Source: Photo Science, 2004

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National Energy Technology Lab

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jurisdictional water resource. However, a wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of these water resources. Because the Green Valley coal refuse site is situated near surface waters, wetland impacts might occur and an investigation for potential presence of jurisdictional waters would be required at the site prior to moving the prep plant to this location.

Portions of the candidate prep plant site, GV, are characterized as a palustrine emergent/scrub-shrub wetland. Soils in the wetland are black and a drainage pattern with perennial flow slope was observed. The drainage pattern is characterized as a slightly meandering first-order intermittent stream bordered by a herbaceous plant community. Several corrugated metal pipes occur within the stream channel and function in conveying surface water down stream. The remainder of the prep plant site is characterized as a scrub-shrub upland and contains no wetlands.

#### *3.7.2.5 Joe Knob*

Tributaries draining portions of the site are identified as Joe Knob Branch and Wallace Creek, both of which are tributaries to Little Clear Creek. The USGS topographic map shows several ponds are located within the project area. These ponds probably function in treating AMD, and consequently would not be considered jurisdictional water resources. These ponds are generally 25 feet (8 meters) wide and range in length up to 100 feet (30 meters). Two forms of AMD treatment are currently occurring at Joe Knob, passive and active treatment. Active treatment consists of applying sodium hydroxide to AMD. The passive form of treatment consists of constructed wetlands for AMD. All of the treatment wetlands are hydrologically connected to each other and provide water quality functions through phytoremediation. Phytoremediation is the process by which contaminants are remediated through adsorbtion, translocation into the plant biomass, transformed into a less concentrated form of the pollutant, volatized or precipitated into a less mobile form. Typical AMD contaminants that can be controlled include iron, sulfur, magnesium and aluminum. The depth and duration of the water also influences the rate of the phytoremedition process. Wetlands at Joe Knob coal refuse site are vegetated by plants such as broad-leaved cattail, woolgrass and similar species. Regardless of whether the wetlands are constructed or naturally occurring, a wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of these water resources. Extraction of the gob from Joe Knob site is not anticipated within the next five years. Therefore, a water resource boundary determination was not performed because USACE verified wetland boundary determinations are valid for a five-year period. Projects possessing a USACE wetland boundary confirmation exceeding the five-year period are not valid and would require an additional site visit to re-establish the wetland boundary line and determine if site conditions have changed.

#### *3.7.2.6 Power Line Corridor*

### Segment A – WV 20 to the AEP Easement

North of WV 20, Segment A (see Figure 2.4-9) consists of upland areas with no wetland features. A portion of this segment of the power line corridor will traverse Wolfpen Creek in the vicinity of the EcoPark, and wetland features in this portion of the project area were described in the previous section.

### Segment B – Rainelle to Laurel Creek Mountain

Field surveys were conducted to evaluate the presence of wetland-related features along the 100-foot (30 meter)-wide corridor for Segment B. The results of these surveys are for two distinct sections of this segment including Section B1 (south of the Meadow River) and Section B2 (north of the Meadow River).

Section B1 – For purposes of this biological resources discussion, the segment beginning from the southernmost point of the power line easement near the golf course (intersection of Segment A and B in Figure 2.4-9) to the Meadow River is identified as Segment B1. A total of eight wetland features (including the Meadow River) were identified and delineated within Section B1. Two former strip mines were encountered, and the mining activities produced areas of ponded water and numerous ephemeral streams. In several of the small ponds, frog and salamander egg masses were observed. The ground surface in the strip mine areas consists of gravel and coal fragments; no vegetation or hydric soils are typically found in these areas. Around the fringes of the former strip mine areas, where the trees were cleared but the soil was less disturbed, shrub and herbaceous vegetation such as multiflora rose and assorted species of rush and lily are present. Two intermittent stream channels were also observed within the northern portion of this section. A depression approximately 200 feet wide by 200 feet long (60 by 60 meters) is also located atop the ridge, and areas of hydric soils and ponded water are located throughout the area. Additional intermittent streams were observed on the southern portion of this section, between the top of the ridge and US 60.

Section B2 – For purposes of this biological resources discussion, Section B2 is identified as the segment between the northern end of Section B1 to Laurel Creek Mountain (intersection of Segment B and C in Figure 2.4-9). Three wetland features were identified and delineated within this section of the proposed corridor. A relatively small wetland area was observed in a depression at the top of the ridge on Laurel Creek Mountain. Further south, another former strip mine exists that contains a large area of clear-cutting outside of the strip mine area. The clear-cutting is much more pervasive on the northwest side of the easement. Ponded water was observed in several disturbed areas resulting from the former strip mine and/or logging operations. The remainder of the section, to the Meadow River, contains hardwood forest, with oak, red maple and a few ironwood trees.

### Segment C – New Corridor from Laurel Creek Mountain to Grassy Falls

As part of the ecological evaluation conducted by WGC (see Appendix L, Transmission Line Corridor Study), potentially regulated wetland features were assessed. A total of 14 wetlands were identified within Segment C of the power line corridor including an estimated total of 2.79 acres (1.13 hectares) of wetland habitat. The majority of the wetlands occurring along Segment C are emergent wetlands and open water, and only a small portion of the wetlands identified along the corridor were characterized as scrub-shrub, or forested. In addition to the wetlands identified, 32 intermittent and perennial streams also occur along the proposed ROW.

## 3.7.3 Aquatic Ecosystems

An aquatic sampling program was conducted on portions of Sewell Creek and Wolfpen Creek within the project study area on June 21 and 22, 2004 (see Appendix F – Aquatic Biota and Habitat Survey of Two Streams in Rainelle, WV). The purpose of the aquatic sampling was to obtain an inventory of the animal life within the waterways. The sampling program consisted of electro fishing; taxonomic identification of finfish and macroinvertebrates, such as crayfish, and benthic (bottom dwelling) organisms; and a collection of various water quality parameters, such as flow, conductivity, pH, temperature, turbidity, and metal content. The sampling locations were also described in accordance with the West Virginia Stream Classification System.

*Water Quality Sampling:* Water quality samples were collected at four sampling sites; sampling technique details may be found in Appendix F. Because the drainage area of Sewell Creek was much greater than Wolfpen, it was determined that Sewell Creek was the greater influence of water quality conditions in the project site area. The chemical and physical results from this survey are summarized and discussed further in Section 3.4 (Surface Water Resources).

*Benthic Macroinvertebrate Sampling*: Overall, two sections of Sewell Creek and one section of Wolfpen Creek were sampled designated as Sites 1, 2 and 3. For Sites 1 and 2, both an upstream and downstream location were sampled for benthic organisms, thus producing labels of Site 1A, Site 1B, Site 2A, Site 2B and Site 3, as described below and depicted in Figure 3.7-3:

- Site 1A just downstream of railroad crossing on Wolfpen Creek, described as the upstream sample of Wolfpen Creek;
- Site 1B on Wolfpen Creek just upstream of confluence with Sewell Creek, described as the downstream sample of Wolfpen Creek;
- Site 2A on Sewell Creek, described as the Upper Sewell Creek site;
- Site 2B further downstream on Sewell Creek in the oxbow portion of channel, described as the Middle Sewell Creek sampling location; and
- Site 3 on Sewell Creek near the eastern edge of the project study area, described as Lower Sewell Creek.

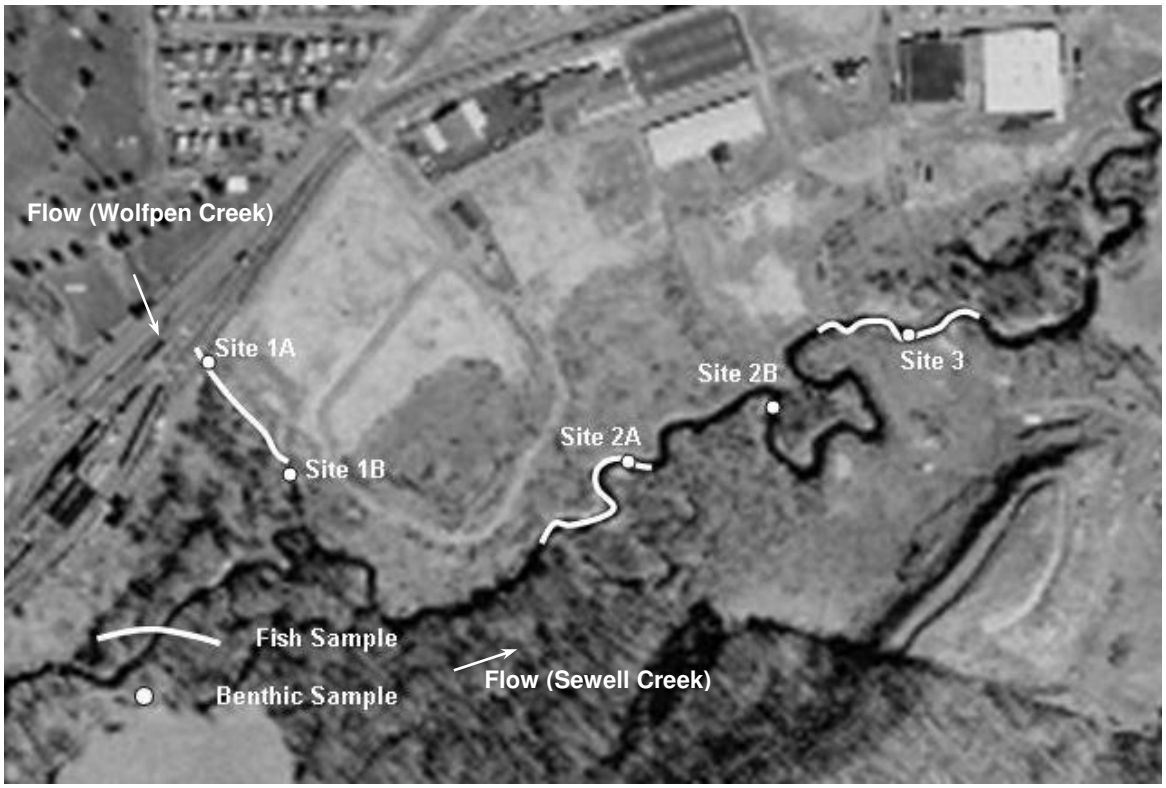


**Figure 3.7-3. Benthic invertebrate sampling sites and fish sampling transects at Wolfpen Creek (Sites 1A, 1B) and Sewell Creek (2A, 2B, and 3)**

The benthic sampling techniques used for this study followed the WVDEP's West Virginia Stream Index Protocol. Further details on the sampling methodology may be found in Appendix F. Results of the benthic sampling are shown in Table 3.7-3. The following lists a series of biologic metrics that were calculated for each sample to determine the condition of the site:

- Total taxa - measures the total number of macroinvertebrate taxa (diversity or different kinds) collected in the sample. Total taxa generally decrease with increasing stream degradation. In a

200-organism subsample, it is not uncommon for healthy streams to have 17 or more taxa at the family level of identification;

- EPT Index - measures the total number of distinct taxa within the generally pollution sensitive groups *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies) and *Trichoptera* (caddisflies). In general, this index increases with improving water quality. This index is widely used because it is very sensitive to changes in water quality. In a 200-organism subsample, healthy streams commonly have 9 to 12 EPT taxa at the family level of identification;

**Table 3.7-3. West Virginia stream condition index data in Rainelle, WV**

| Site Name | Total taxa | EPT Index | EPT% | CHIRO % | DOM2 % | HBI SCORE | WVSCI | Condition |
|---|---|---|---|---|---|---|---|---|
| Site 3 Lower Sewell Creek | 13 | 6 | 45 | 39 | 64 | 5.0 | 66.3 | Gray |
| Site 1A Wolfpen Creek Upstream | 16 | 8 | 56 | 33 | 64 | 4.3 | 73.7 | Good |
| Site 1B Wolfpen Creek Downstream | 15 | 9 | 54 | 26 | 63 | 4.4 | 73.6 | Good |
| Site 2A Upstream Sewell Creek | 15 | 7 | 26 | 67 | 74 | 5.1 | 56.3 | Fair |
| Site 2B Middle Sewell Creek | 16 | 9 | 34 | 58 | 77 | 5.1 | 60.9 | Gray |

*Source: Jones et al, 2005*

- Percent EPT – measures the relative abundance of mayfly, stonefly, and caddisfly individuals to the total number of organisms in the sample. In general, this metric increases with improving water quality. It is common in healthy streams that at least 70 to 90% of the total organisms are in these sensitive orders;
- Percent Chironomidae – measures the relative abundance of chironomid (midges) individuals to the total number of individuals in the sample. Chironomids are considered to be tolerant to many pollutant sources. This metric generally increases in value with decreasing water quality. In healthy streams, it is not uncommon that less than 10% of the organisms in a sample belong to the family Chironomidae;
- Percent Contribution of 2 Dominant Taxa - measures the relative abundance of the 2 numerically dominant taxa to the total number of organisms in the sample. In healthy streams, there are generally several taxa, with the individuals being relatively evenly distributed among the different taxa. As stream water quality decreases, more individuals are concentrated in fewer, more tolerant taxa, and this metric increases. It is not uncommon for healthy streams to have as few as 40-60% of the total individuals in a sample in the 2 dominant taxa;
- HBI (Hilsenhoff's Biotic Index - modified) - summarizes tolerances of the benthic community to organic pollution. Tolerance values are assigned to each taxon on a scale of 0 to 10, with 0 identifying the organisms that are least tolerant (most sensitive), and 10 identifying the most tolerant (least sensitive) organisms. The HBI metric score can be thought of as an average organic pollution tolerance value for a sample, weighted by the abundance of organisms. As water quality of a stream decreases, the HBI increases. This is especially true where organic enrichment is present. Because many of the organic pollution tolerant organisms are also tolerant to other stressors, the HBI is often used as a general indicator of stress. It is not uncommon for healthy streams with good water quality to have HBI scores in the 3 to 4 range; and

- West Virginia Stream Condition Index (WVSCI) - The six benthic community metrics were combined into a single multimetric index, the WVSCI. The WVSCI was developed by Tetra Tech, Inc. using WVDEP data collected from riffle habitats in wadeable streams. In general terms, all metric values were converted to a standard 0 (worst) to 100 (best) point scale. The six standardized metric scores were then averaged for each benthic sample site to come up with a final index score that ranges from 0.0 to 100.0. If a stream site received a WVSCI score greater than 78.0, it is considered in *very good* condition. A WVSCI score greater than 68.0, but equal to or less than 78.0 indicates *good* conditions. The *gray zone* ranges from 60.6 to 68.0. If a site has a WVSCI score within the gray zone, a single kick sample is considered insufficient for classifying it as impaired. If a site receives a WVSCI score equal to or less than 60.6, the agency is highly confident that the site is truly biologically impaired based on a single benthic macroinvertebrate sample. Thus, scores greater than 45.0 and equal to 60.6 indicate *fair* conditions. Scores between 22.0 and 45.0 indicate *poor* conditions, and between 0.0 and 22.0 indicate *very poor* conditions.

A habitat evaluation was conducted utilizing a modified version of the Rapid Bioassessment technique. This approach focuses on integrating information from specific parameters on the structure of the physical habitat that are important to the survival and maintenance of benthic macroinvertebrate populations. Ten parameters were evaluated and given a score on a scale of 0 to 20. The scoring is broken down into four categories: 1) 0 to 5 = *Poor*; 2) 6 to 10 = *Marginal*; 3) 11 to 15 = *Suboptimal*; and 4) 16 to 20 = *Optimal*. The ten scores were summed to provide a total habitat score for each station (maximum score = 200). The sampling results are shown in Table 3.7-4.

**Table 3.7-4. Rapid Bioassessment habitat data collected in Rainelle, WV**

| Habitat Metrics | Lower Sewell Creek Site 3 | Upper Sewell Creek Site 2A | Middle Sewell Creek Site 2B | Wolfpen Creek Upstream Sample 1A | Wolfpen Creek Downstream Sample Site 1B |
|---|---|---|---|---|---|
| Epifaunal Substrate | 5 | 11 | 12 | 12 | 14 |
| Embeddedness | 5 | 2 | 3 | 14 | 14 |
| Velocity/Depth Regime | 4 | 5 | 5 | 13 | 15 |
| Sediment Deposition | 5 | 2 | 1 | 12 | 14 |
| Channel Flow Status | 12 | 9 | 8 | 10 | 9 |
| Channel Alteration | 18 | 18 | 17 | 13 | 14 |
| Frequency of Riffles | 2 | 2 | 1 | 15 | 16 |
| Bank Stability (LB+RB) | 8 | 5 | 6 | 4 | 3 |
| Vegetative Protection (LB+RB) | 15 | 16 | 15 | 8 | 9 |
| Riparian Vegetative Zone Width (LB+RB) | 20 | 18 | 17 | 16 | 14 |
| **Total** | **94** | **88** | **85** | **117** | **122** |

*Source: Jones et al, 2005*

Electro fishing efforts were also conducted along sections of the creeks in the vicinity of the benthic sampling sites, thereby producing sampling locations 1, 2 and 3 for finfish collection (See Figure 3.7-3). Sampling details may be found in Appendix F. Tables 3.7-5 and 3.7-6 summarize the results.

**Table 3.7-5. Fish metrics data collected in Rainelle, WV.**

| Fish IBI Metrics | Site 1A | Site 2A | Site 3 |
|---|---|---|---|
| Total Number of Species | 11 | 8 | 9 |
| Number of Darter Species | 0 | 1 | 0 |
| Number of Sunfish Species | 2 | 2 | 2 |
| Number of Sucker Species (Catostomids) | 0 | 0 | 1 |
| Number of Intolerant Species (Trout) | 0 | 0 | 0 |
| % Green Sunfish | 0.016 | 0.034 | 0.1 |
| % Omnivores (Golden Shiner) | 0.008 | 0 | 0 |
| % Insectivorous (Cyprinids) | 0.94 | 0.72 | 0.74 |
| % Top Carnivores (*rupestrus & cyanellus*) | 0.044 | 0.206 | 0.24 |
| Number of Individuals (or catch per effort) | 247 | 29 | 50 |
| % Hybrids | 0 | 0 | 0 |
| % Diseased Individuals (deformities, lesions, and tumors) | 0 | 0 | 0 |

**Table 3.7-6. Finfish Collected in Sewell Creek & Wolfpen Creek**

| Common Name/ *Scientific Name* | Site 1* | Site 2* | Site 3* |
|---|---|---|---|
| Rock Bass/ *Ambloplites rupestris* | X | X | X |
| *Nocomis platyrhinchus* | | X | X |
| Central Stoneroller / *Campostoma anomalum* | X | X | X |
| Greenside Darter / *Etheostoma blennioides* | X | X | |
| Green Sunfish / *Lepomis cyanellus* | X | X | X |
| Bluntnose Minnow / *Pimephales notatus* | X | X | X |
| Silverjaw Minnow / *Ericymba buccata* | X | X | X |
| White Shiner / *Luxilus albeolus* | | X | X |
| Telescope Shiner / *Notropis telescopus* | X | X | |
| Northern Hog Sucker / *Hypentelium nigricans* | | | X |
| Creek Chub / *Semotilus atromaculatus* | X | | X |
| Rosy-side Dace / *Clinostomus funduloides* | X | | |
| Eastern Blacknose Dace / *Rhinichthys atratulus* | X | | |
| Golden Shiner / *Notemigonus crysoleucas* | X | | |

**See Figure 3.7-3*

*Aquatic sampling conclusions*: A general survey of water quality found that Wolfpen and Sewell Creek sites are similar in both physical and chemical characteristics. Because of Sewell Creek's larger volume of flow upstream of the confluence with Wolfpen Creek, as compared to Wolfpen Creek, it was determined that Sewell Creek would dictate the water quality in the project site area. Wolfpen Creek was found to have higher quality stream habitat and benthic invertebrate communities. Both sites ranked "good" with the WVSCI. The three Sewell Creek sites had a mean habitat score of 89 out of 200. Their benthic index scores ranked from "fair" to "grey zone." This suggests an intermediate level of impact. Fish communities in both streams are dominated by tolerant, pioneering species. Metric values all

suggested either a fish community highly impacted in the recent past and recovering or a system with repeated impacts such as periodic very low flows.

No dead shells or living unionid mussels were observed at any of the sites. Small stream size for Wolfpen Creek and poor habitat/flow characteristics in Sewell Creek would make the presence of any federally listed mussel species extremely unlikely. Overall Wolfpen and Sewell Creeks exhibited reasonable water quality, but the sampling results indicated that both streams are too habitat- and flow-limited to support diverse aquatic communities. No rare or endangered aquatic species were identified at any of the five sampling locations.

### 3.7.4 Protected Species and Habitats

Consultation letters (Appendix B) were sent to the U.S. Fish and Wildlife Service (USFWS) on April 27, 2004 and to the West Virginia Natural Heritage Program within the Division of Natural Resources (WVDNR) on April 28, 2004, requesting a list of any existing or proposed federally protected and/or other special status species for Greenbrier County. Currently, the WVDNR does not have a state-mandated level of protection to special status species and only provides a ranking of species with regard to rarity. Therefore, protection for species of special status is provided under the federal Endangered Species Act. Regional species occurrence that was identified is presented in Table 3.7-7.

**Table 3.7-7. Protected Species Potentially Present Within the Project Area**

| Common Name | Scientific Name | Status | Habitat Requirements |
|---|---|---|---|
| **WITHIN RAINELLE PROJECT AREA (USFWS)** | | | |
| Indiana bat | *Myotis sodalis* | E | As per USFWS, species typically uses riparian, bottomland, or upland forest and old fields or pastures with scattered trees for summer foraging. Roosting/maternity habitat consists of live or dead hardwood trees, with exfoliating bark, tree cavities, crevices, splits or hollow portions of tree boles and limbs. |
| Virginia northern flying squirrel | *Glaucomys sabrinus fuscus* | E | As per USFWS, species typically uses a high elevation (greater than 3,280 feet or 1,000 meters) northern hardwood forest with a conifer component. Often large, woody debris present on forest floor, and cool temperatures and higher humidity to promote lichen growth and presence of moss, fern, liverwort or clubmoss groundcover. |
| **WITHIN GREENBRIER COUNTY (WVDNR)** | | | |
| Indiana bat | *Myotis sodalis* | E | See above. |
| Virginia northern flying squirrel | *Glaucomys sabrinus fuscus* | E | See above |
| Shale barren rockcress | *Arabis serotina* | E | Found in soil that contains many hard, small shale fragments, usually associated with south or east facing hillsides of Devonian-aged shale exclusively in the Valley and Ridge Geographic Province of the Allegheny Mountains. |
| Small-whorled pogonia | *Isotria medeoloides* | T | Generally known from open, dry, deciduous woods with acid soil, typically with high shrub coverage or high sapling density. Also known from shaded openings among hardwoods and pines. |
| Virginia spiraea | *Spiraea virginiana* | T | As per WVDNR, this species is a colonial shrub typically found in rocky, flood scoured banks of high-energy streams or rivers. Flood scouring seems to be important to this species by preventing canopy closure and decreasing competition from larger trees. |
| **WITHIN 30-MILE RADIUS (USFWS)** | | | |
| Indiana bat | *Myotis sodalis* | E | See above. |

**Table 3.7-7. Protected Species Potentially Present Within the Project Area (continued)**

| | | | |
|---|---|---|---|
| Virginia northern flying squirrel | *Glaucomys sabrinus fuscus* | E | See above. |
| Northern riffleshell mussel | *Epioblasma torulosa rangiana* | E | Occurs in a wide variety of streams, large and small, preferring runs with bottoms composed of firmly packed sand and fine to coarse gravel. |
| Pink mucket pearly mussel | *Lampsilis abrupta* | E | Typically inhabits medium to large rivers with strong currents, but has also been able to survive & reproduce in areas of impounded reaches with river/lake conditions without standing water. Usually prefers sand and gravel substrate, or pockets between rocky ledges in high velocity areas and mud & sand in slower moving waters |
| Fanshell mussel | *Cyprogenia stegaria* | E | Inhabits medium to large rivers and has been reported primarily from relatively deep water in gravelly substrate with moderate current. |
| Virginia spiraea | *Spiraea virginiana* | T | See above. |
| Small-whorled pogonia | *Isotria medeoloides* | T | See above. |
| Running buffalo clover | *Trifolium stoloniferum* | E | Originally known from areas of rich soils in the ecotone between open forest and prairie. Also known from shaded lawn and open woodland areas, with some evidence of disturbance present, such as mowing, grazing, or the presence of trails. |
| **WITHIN 30-MILE RADIUS (WVDNR)** | | | |
| Shale barren rockcress | *Arabis serotina* | E | See above. |
| Also includes all species identified by USFWS within 30-mile radius | | | |

*NOTES: Habitat information extracted from a letter provided by the USFWS, dated 7/8/04 and from websites http: endangered.fws.gov and http://ecos.fws.gov. Additional information was extracted from WVDNR website regarding Endangered Species (http://www.dnr.state.wv.us/wvwidlife), http://2bnthewild.com/plants and ESI, 2005.*

*Source: Potomac-Hudson Engineering, Inc., based on response letters from USFWS dated 7/8/04 and from WVDNR dated 5/25/04.*

Of the species identified through consultation efforts, the following species were identified to be of particular concern for the project areas:

- Indiana Bat (*Myotis sodalis*) -The federally endangered Indiana bat is known from the region that includes central West Virginia and western Virginia, and has been reported in Greenbrier County. Winter hibernacula occur along the eastern and southern border of West Virginia, including Greenbrier, Hardy, Mercer, Monroe, Pendleton, Pocahontas, Preston, Randolph, and Tucker counties. In western Virginia, winter hibernacula have been reported from Bath, Bland, Craig, Giles, Dickenson, Highland, Lee, Montgomery, Tazewell, and Wise counties. Summer records for the area consist primarily of adult males, with sites in Clay and Nicholas counties, West Virginia. Two reproductive female Indiana bats were captured during the summer of 2003 in Boone County, West Virginia, indicating the presence of a summer maternity colony. These captures, located approximately 50 miles (80 kilometers) west of the project area, represent the first confirmed reproductive records for Indiana bats in West Virginia (Linda Smith, USFWS, pers. comm., 2003).

- Virginia Big-eared Bat (*Corynorhinus townsendii virginianus*) - The federally-endangered Virginia big-eared bat is the subspecies of Townsend's big-eared bat that occurs in Kentucky, North Carolina, Virginia, and West Virginia. It inhabits caves during both summer and winter. In winter, the species hibernates in clusters in cool portions of caves, while summer maternity colonies are formed in warmer portions of caves. WVDNR (Craig Stihler, pers. comm., 2002) and USFWS (2001) have been monitoring Virginia big-eared bat populations in West Virginia since 1983. Eleven summer colonies (including eight maternity colonies) and nine winter colonies are surveyed by WVDNR on a regular basis (annually in summer, biannually in winter). In addition to those caves, Virginia big-eared bats have been found in 29 additional caves. Usually these records are for occasional or sporadic occurrences, transients, and historic records. Caves used by the species are concentrated in the northeastern portion of the state: Grant, Tucker, Pendleton, Hardy, Preston, and Randolph counties. The largest single colony is approximately 90 miles (145 kilometers) to the northeast in Pendleton County. In Virginia, two active Virginia big-eared bat maternity colonies are currently known (Rick Reynolds, VDGIF, pers. comm., 2002); both are over 60 miles (97 kilometers) away from the project area in Tazewell County.

- Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*) - The federally-endangered Virginia northern flying squirrel is known only from the Appalachian Mountains in West Virginia and Virginia. In West Virginia, it has been captured in Greenbrier, Pendleton, Pocahontas, Randolph, Tucker, and Webster counties (USFWS 1990). Known locations in Virginia include Highland, Smyth, Grayson, and Montgomery counties (USFWS 1990). The closest known population is in Cranberry Wildlife Management Area on Monongahela National Forest, about 15 miles (24 kilometers) northwest of the project areas. This species is closely associated with higher elevations (>1000 m; >3,280 ft) and coniferous forests of spruce and fir (USFWS 1990). Recent, detailed studies in the southern Appalachians, however, have demonstrated that this squirrel occasionally uses lower elevations (down to approximately 710 m; 2,330 ft) and hardwood forests in proximity to spruce or hemlock (C. Stihler, pers. comm.).

A habitat assessment and summer mist netting survey for the endangered Indiana bat and Virginia big-eared bat, and a habitat assessment for the Virginia northern flying squirrel was conducted within proposed project development areas. Surveys were conducted in the vicinity of the proposed power plant and transmission line corridor that extends from the Co-Production site to the existing AEP ROW (Segment A), and at the Anjean coal refuse. In coordination with USFWS (see Appendix B, Consultation Letters), an appropriate level of effort for these areas was determined. Based on the habitat assessment, a total of two net sites were selected and netted. The net sites included a wooded area adjacent to the E&R property, as well as a site along the proposed transmission line corridor. Results of the survey indicate the following for each species (for survey details see Appendix E, *Habitat Assessments and Surveys for Endangered Mammals at Proposed Development Areas for Western Greenbrier Co-Gen, Greenbrier County, West Virginia*):

- Indiana Bat - Netting efforts provided no evidence that Indiana bats use the project area during summer months. The species complement, diversity, and number of bats captured in the project area were very low, which could be indicative of relatively poor habitat in this geographic location. Habitat at the Rainelle location is of moderate value for the Indiana bat, due to the presence of large trees and snags that could serve as potential roosts. This suitable habitat is only located off-

site (in a nearby wooded area on the south side of Sewell Creek known as the Plum Creek Property), outside of the E&R property and the EcoPark. Roosting and foraging potential is low to moderate in the vicinity of the transmission corridor that extends from the proposed site to the AEP ROW, and varies depending on aspect and position. Possible roosting areas are located on the west side and ridge top of the mountain, due to the presence of some larger trees and snags. Roosting and foraging potential at the Anjean facility is low, due to the disturbed nature of the area and lack of suitable vegetation. Based upon the known presence of the Indiana bat in Greenbrier County, presence of reproductively active females in nearby (approximately 50 miles (80 kilometers) west) Boone County, but the apparent absence of the Indiana bat in the survey area, a May Affect – Not Likely to Adversely Affect determination ***has been confirmed by the USFWS (see consultation letter in Appendix B)***.

- Virginia Big-eared Bat - Netting efforts provided no evidence that Virginia big-eared bats use the project area during summer months. Unlike Indiana bats, these bats are usually found in association with caves that are required for summer roosting (as well as winter hibernation). Foraging potential for these bats is considered low to moderate at all sites in the project areas. Roosting potential is low due to the apparent absence of suitable caves. Man-made structures and rock outcrops at the Anjean site contained no signs of use by bats, including the Virginia big-eared bat. Occasional occurrence of this species is possible due to migratory and foraging behavior; however, based upon the closest occurrence of the Virginia big-eared bat being at least 60 miles (97 kilometers) south, a May Affect – Not Likely to Adversely Affect determination ***has been confirmed by the USFWS (see consultation letter in Appendix B)***.
- Virginia Northern Flying Squirrel - Visual searches and subsequent mist netting efforts provided no evidence that Virginia northern flying squirrels are present in the project areas; however, these animals are shy, secretive, and rarely encountered. Habitat assessments of squirrel habitat were therefore performed in all areas. The Virginia northern flying squirrel is known from the region, although the closest known population is approximately 15 miles (24 kilometers) northwest of the project areas, in Cranberry Wildlife Management Area, Pocahontas County, West Virginia. Most of the project areas contain poor to moderate roosting and foraging potential at elevations below that most frequently used by the species, in hardwood habitat, which is also less frequently used by the squirrel than conifers. Only approximately one-third of the transmission line corridor, on the western slope of Sewell Mountain, is hardwood habitat with good foraging and roosting potential, although it is at an elevation below that most frequently used by the Virginia northern flying squirrel. In total, the transmission line includes only about 3.5 acres (1.5 hectares) and the portion of the corridor on the west side of the mountain is only about one-third of this, or less than 1.2 acres (0.48 hectares) In addition, mist netting and visual inventories failed to document the presence of any flying squirrels within the project areas. Based on these criteria, a May Affect – Not Likely to Adversely Affect determination ***has been confirmed by the USFWS (see consultation letter in Appendix B)***.

In addition, concerns relating to the presence of Virginia spirea along portions of the Meadow River were identified during the scoping process. Field surveys for Segment B indicate that portions of the Meadow River within the vicinity of the existing AEP power line corridor, which is also the same area as the proposed power line corridor for the Proposed Action, do not provide habitat suitable for Virginia spirea, a federally-listed endangered plant species. As described in Table 3.7-7, Virginia spirea is typically found in rocky, flood scoured banks where the tree canopy is relatively open. In June 2005 (a month when the species is known to flower), both sides of the Meadow River within the project study area were investigated to determine the presence or absence of Virginia spirea. During this evaluation, it was observed that the banks of the Meadow River in this area are sandy, not rocky or flood scoured, and that trees are growing very close to the water's edge. No specimens of Virginia spirea are present.

## 3.8 Cultural Resources

This section establishes the context for considering cultural resources, including historical and archeological resources in the EIS, and lays the foundation for assessing the potential impacts associated with the proposed alternatives. It provides a definition of cultural resources, a summary of relevant laws, regulations and directives, and a brief characterization of archaeological and historical resources in the area of the Proposed Action, focusing on Rainelle and the immediate surrounding area.

### 3.8.1 Definition of Cultural Resources

Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. They consist of prehistoric and historic districts, sites, structures, artifacts, and other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Prehistoric and historic archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains. Typical environments in which archaeological resources can be found include rock shelters, terraces, floodplains, Native American burial mounds, and ridgetops. Architectural resources, which may include dams, bridges, and other structures having historic or aesthetic importance, generally must be older than 50 years to be considered for protection under existing federal cultural resource laws.

More formally, cultural resources are defined as historic properties covered by the National Historic Preservation Act (NHPA); as cultural items covered by the Native American Graves Protection and Repatriation Act (NAGPRA); as archaeological resources covered by the Archeological and Historic Preservation Act (ARPA); as sacred sites (to which access is provided) under the American Indian Religious Freedom Act (AIRFA) and under Executive Order 13007; as collections and associated records covered by 36 CFR Part 79, *Curation of Federally Owned and Administered Collections*; and as paleontological specimens (i.e., fossils) covered by the Antiquities Act and, if found in association with archeological resources, by ARPA.

### 3.8.2 Relevant Laws, Regulations and Directives

The National Historic Preservation Act (NHPA) of 1966, as amended, is the overarching law concerning the management of cultural resources in the United States. The law requires that each state appoint a State Historic Preservation Officer (SHPO) to oversee the management of cultural resources in that state, and it creates the Advisory Council on Historic Preservation (ACHP), which provides national oversight and dispute resolution. The SHPO is also designated as the repository for all cultural resource information in each state.

Under the NHPA, cultural resources undergo an evaluation process to determine whether a resource is eligible for listing on the National Register of Historic Places (NRHP). Resources that are already listed, determined eligible for listing, or are undetermined are afforded a level of consideration under the NHPA Section 106 review process. Undetermined resources are those for which eligibility cannot be determined based on current knowledge of the resource and where further work is needed to make an evaluation. In order to be determined eligible for listing on the NRHP, a resource must meet one or more of the following criteria (36 CFR 60):

- **Criterion A** – Associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B** – Associated with the lives of persons significant in our past.

- **Criterion C** – Embodies the distinctive characteristics of a type, period, or method of construction.
- **Criterion D** – Yielded or may be likely to yield information important in prehistory or history. The resource must also retain most, if not all, of the seven aspects of integrity: location, design, setting, workmanship, material, feeling, and association.

The identification and evaluation of cultural resources for NRHP eligibility is the responsibility of the lead federal agency with the concurrence of the SHPO. The ACHP is an independent federal agency that administers the provisions of Section 106 of the NHPA regarding cultural resources, and has review and oversight responsibilities as defined in 36 CFR 800. Section 106 of the NHPA also addresses the appropriate process for mitigating adverse effects. The NHPA applies to federal undertakings and undertakings that are federally permitted or funded. It should be noted that the provisions of the NHPA refer only to cultural resources that are tangible properties, and that federal agencies are required by other statutes to consider impacts on traditional cultural and religious practices.

In addition to the NHPA, several federal laws and related policies have been enacted to protect and manage the Nation's cultural resources. These include:

- Antiquities Act of 1906
- Archeological Resources Protection Act (ARPA) of 1979
- Archeological and Historic Preservation Act (AHPA) of 1974
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- American Indian Religious Freedom Act of 1978 (AIRFA)
- Curation of Federally-Owned and Administered Archaeological Collections (36 CFR Part 79)
- Protection and Enhancement of the Cultural Environment (Executive Order No. 11593)
- Indian Sacred Sites (Executive Order No. 13007)
- Consultation and Coordination with Indian Tribal Governments (Executive Order No. 13175)
- Preserve America (Executive Order No. 13287)

*DOE P 141.1, Department of Energy Management of Cultural Resources*, aims at ensuring that cultural resource management is integrated into DOE's missions and activities, and to raise the level of awareness and accountability among DOE contractors concerning the importance of DOE's cultural resource-related legal and trust responsibilities. Specifically cited are DOE's responsibilities under all of the above referenced requirements (viz., NHPA, AHPA, ARPA, NAGPRA, and Executive Orders 11593, 13175 and 13007) as well as the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation, Standards and Guidelines for Federal Agency Historic Preservation Programs*, and *Standards for Rehabilitation* and *Guidelines for Rehabilitating Historic Buildings.* The policy states that DOE will uphold these laws by preserving, protecting and perpetuating cultural resources for future generations in a spirit of stewardship, and will implement management accountability for compliance with all applicable laws, treaties, orders and guidance.

### 3.8.3 Regional Context

This section characterizes relevant factors associated with the prehistoric and historic development of the region. Information contained in this section is summarized from two reports prepared in association with this EIS--the *Phase I Archaeological and Geomorphological Investigation of the Proposed Western Greenbrier Co-Production Plant* and the *Historic Resources Determination of Eligibility and Assessment*

*of Effects, West Greenbrier Co-Production Demonstration Project* (see Appendix G, Cultural Resources Reports, for complete copies of these reports).

### *3.8.3.1 Prehistoric Context*

The prehistory of West Virginia reflects the developmental patterns established for eastern North America. It shares similar cultural manifestations and demonstrates affinities with the general Appalachian region, but cultural relationships are most similar to those that characterize the Middle and Upper Ohio River zone.

#### The Paleo-Indian Period (10,000 To 8,000 B.C.)

Research to date indicates that the early prehistoric peoples did not extensively occupy the Central Appalachian Uplands. Therefore, it is unlikely that Paleo-Indian sites or artifacts, other than random surface finds, would be identified. Evidence of Paleo-Indian occupations in other areas of West Virginia (e.g., along the Kanawha and Ohio rivers) and surrounding states is more extensive.

#### The Archaic Period (8,000 To 1,000 B.C.)

The Archaic period is commonly divided into three subdivisions: the Early Archaic (8,000 to 6,000 B.C.), the Middle Archaic (6,000 to 3,000 B.C.), and the Late Archaic (3,000 to 1,000 B.C.).

Cultural developments during the *Early Archaic* period illustrate responses to dramatic climatic changes. Hunters and gatherers demonstrated their ability to adapt to these changes as witnessed by the emergence of a more broad-based subsistence economy and the development of new tool and projectile point technologies. Although significant quantities of Archaic artifacts have been recovered from the uplands of West Virginia, including sites in Kanawha and Braxton Counties, no stratified sites have been recorded or excavated in the western Greenbrier County area.

The *Middle Archaic* in West Virginia is generally placed between about 6,000 and 3,000 B.C. The period is characterized by a more intensive exploitation of diverse habitats (e.g., uplands, valleys, rivers, etc.) accompanied by the utilization of a wider variety of raw materials for tool production. The toolkit is also characterized by a dramatic increase in woodworking and plant-processing tools, including axes, adzes, celts, choppers, nutting stones, mortars, and pestles. The Hansford Site (46FA104), located on the Kanawha River in Fayette County, West Virginia, produced a series of projectile points that are considered typical of the Middle Archaic in the region.

The range for the *Late Archaic* in West Virginia extends from approximately 3,000 to 1,000 B.C. Hunting and gathering strategies similar to those of the Early and Middle Archaic continued through this period, but evidence suggests a shift toward more intensive exploitation of certain wild floral species. Diagnostic artifacts identified with the Late Archaic in West Virginia include a wide variety of notched and stemmed points. The Burnsville Reservoir surveys produced a substantial quantity of Late Archaic stemmed points.

#### The Woodland Period (1,000 B.C. To A.D. 1000)

Distinguished from the Archaic period by the appearance of ceramics and by an economy increasingly dependent on the exploitation of cultivated plants, the Woodland period represents a dramatic change from the broad-spectrum hunter/gatherer populations of the preceding period.

The Early Woodland period in West Virginia, dated between 1,000 B.C. and A.D. 100, is distinguished by the emergence of the Adena complex, which was centered in the Middle Ohio Valley and extended into the Kanawha River Valley of West Virginia. No Early Woodland mounds or sites are

reported from the immediate vicinity, although several mound sites and rockshelters have been found in the New and Greenbrier valleys.

The Middle Woodland period lasts from approximately 100 B.C. to A.D. 600, while the Late Woodland period persisted between A.D. 600 to A.D. 1200. The Middle Woodland period is best known for the Hopewell Culture, which evolved from and superseded the Adena Culture. Hopewell is identified with the construction of extensive earthworks, large burial mounds, and elaborate mortuary practices. The distribution of goods indicates the presence of a sophisticated trade network and widespread stylistic influences. In West Virginia, the Upper Ohio Valley has the best-documented cultural sequence during these time periods. In southeastern West Virginia, a comparable sequence occurs in the Kanawha Valley and extends into southern and central West Virginia.

### The Late Prehistoric and Contact Period (A.D. 1000 to A.D. 1780)

The Late Prehistoric period is characterized by the emergence of a fully horticultural subsistence system, augmented by seasonal hunting and gathering, the manufacture of shell-tempered pottery and the utilization of small triangular arrow points. The developmental trend to a nucleated settlement pattern is manifested in permanently occupied villages, which demonstrate a tendency to be fortified through time. However, the dominant Late Prehistoric groups of this region, the Monongahela and Fort Ancient cultures, lacked the complex settlement hierarchy that is characteristic of more culturally complex Mississippian populations to the south and west.

The Contact Period is marked by the presence of trade goods at Late Prehistoric archaeological sites. The presence of trade goods often only indicates limited, if not indirect, contact with European populations. Sites from this period reflect a continuation of Fort Ancient village patterns (i.e., fortified villages along major rivers) and a subsistence based on plant domesticates such as maize, squash, beans, and other cultigens, supplemented by hunting, fishing, and gathering. Principal trade items included glass beads, iron axes and ploughs, knives, and copper and metal ornaments.

## *3.8.3.2 Historic Context*

### Early Settlement and Frontier Forts (1700–1783)

During the early 1700s, central West Virginia, including present-day Greenbrier County, was used as a hunting ground by the Mingo, the Delaware, and other members of the Iroquois Confederacy, especially the Seneca, which was one of the largest and most powerful members of the Iroquois Confederacy. Along with the Seneca and other members of the Iroquois Confederacy, the Cherokee, headquartered in western North Carolina and eastern Tennessee, also claimed part of southern West Virginia.

The earliest European explorers to reach Greenbrier County was an expedition organized by Colonel Abraham Wood, a fur trader, and led by Captain Thomas Batts and Robert Fallum in 1671. The Batts-Fallum expedition reached present-day Alderson via a series of Indian trails and proceeded to cross the New River. European settlement of what is now Greenbrier County began in the 1720s and 1730s as immigrants from Pennsylvania and Virginia were encouraged by the British government and the Virginia assembly to settle in the fertile valleys west of the Allegheny Mountains.

In 1744, Virginia officials purchased the Iroquois title of ownership to West Virginia in the Treaty of Lancaster. The treaty reduced the presence of the Iroquois Confederacy in the state. In 1745, portions of present-day Greenbrier, Monroe, and Pocahontas counties were opened for settlement by the Greenbrier Land Company, which received a land grant for 100,000 acres (40,469 hectares). Settlers quickly moved westward, including Henry Baughman, namesake of Baughman's Fort, who received a grant for 780 acres (320 hectares) south and west of Alderson, near the mouth of Muddy Creek. Stephen Sewell (namesake of

Sewell Creek and Sewell Mountain) and Jacob Marlin founded Marlinton along the Greenbrier River in what is now Pocahontas County in 1749, and settlers moved into the Meadow River valley as early as 1758.

Between 1750 and the end of the Revolutionary War, western Virginia was marked by unceasing hostilities between the Euro-American settlers and various Indian tribes, which were either supported or encouraged by the French. Despite their defeat in the French and Indian War, many Indians continued to fight. The Shawnee chief Keigh-tugh-qua, or Cornstalk, led attacks on western Virginia settlements in present-day Greenbrier County. In order to secure their western defenses and continue to encourage settlement in the area, the Colonial government constructed a series of forts along major drainages. Only two forts were constructed in the vicinity of Greenbrier County during the French and Indian War. Baughman's Fort (or stockade), constructed near Alderson in Summers County at the mouth of Muddy Creek, was attacked by Indians during the summer of 1755. The other fort constructed at this time was Marlin's Fort, in present-day Marlinton (Pocahontas County), near the confluence of Knapp Creek and Greenbrier River.

## Greenbrier County, Formation and Prosperity (1778–1860)

Greenbrier County was formed from Botetourt County in 1778. Initially, Greenbrier County extended from the present-day Virginia-West Virginia state line on the east to the Ohio River on the west, and included all or parts of Greenbrier, Monroe, Summers, Pocahontas, Fayette, Nicholas, Webster, Clay, Kanawha, Putnam, Roane, Jackson, and Mason Counties. As settlement continued and population increased, other counties were formed from the original county. The first courthouse was erected in Lewisburg in 1782, and it remains the county seat today.

Improved transportation routes were critical for moving the county's agricultural products to markets in the east. The fertile valleys of the area proved to be conducive to the growth of corn and other grain crops, and along with dairy cattle, sheep, and horses, the region quickly became an important source of food to support the ever-increasing industrial population along the east coast. In 1821, construction began on the James River and Kanawha Turnpike, and the route between Lewisburg and Charleston was completed by 1824. Today, US 60 closely follows the route of the old turnpike. The James River and Kanawha Turnpike helped to promote commerce, and Thompson's Tavern (Inn) was built in the 1830s just west of Rainelle.

The development of steam locomotion and the construction of railroads, beginning in the 1840s, proved to be the demise of overland turnpikes and canals. In 1855, Virginia authorized the construction of the Covington and Ohio Railroad across the Allegheny Mountains. It was decided that the railroad would be routed through Greenbrier County to serve White Sulphur Springs. Railroad construction was halted during the Civil War.

### Civil War Years (1861–1865)

At the outbreak of the Civil War, Greenbrier County immediately raised troops for the defense of Virginia and the Confederacy. Although small skirmishes occurred in the eastern valleys, the whole of the county was largely untouched. However, by the winter of 1861 and 1862, more than 1,500 wounded Confederate soldiers were hospitalized at White Sulphur Springs. Between the spring of 1862 and late summer of 1863, Greenbrier County was the site of three battles. By June of 1863, Greenbrier County and the western counties of Virginia seceded from the Commonwealth of Virginia and formed the State of West Virginia, which maintained allegiance to the United States. The final battle within Greenbrier County is known as the Battle of White Sulphur Springs, or the Battle of Dry Creek, and occurred in August 1863.

### Reconstruction Years (1865–1890s)

By 1873, the Chesapeake and Ohio Railroad had been constructed through Greenbrier County and other roads were rebuilt. During the first half of the reconstruction era, the county remained largely agrarian. Many farmers began the transition from grain crops to dairy farming and market gardening, in part as a response to infrastructural improvements. By 1880 the population in the county had grown to 15,000.

Despite efforts to rebuild the infrastructure of the region, economic recovery was slow. The farmers in Greenbrier County and elsewhere in the region sought alternative methods of income. The solution for many was to sell off their timber or their land to timber moguls. The timber industry began on a large scale as early as 1882 in some parts of the county, but within the project area the timber industry did not begin until the first decade of the twentieth century. Despite these new endeavors, Greenbrier County was still more than 80% agrarian into the 1890s.

### The Economic Boom Years (1890s–1930s)

The industrial period from the late 1880s to the early 1910s saw a major transformation throughout the eastern United States. The initial transformation in West Virginia was triggered by a change in the lumber industry from small-scale local or portable saw mills that selected only the finest timber for cutting, to a huge factory-based industry that consumed entire forests within a few years and employed 100 people or more. The expansion of the railroad industry provided the impetus.

As the steel industry continued to grow rapidly in cities like Pittsburgh, Detroit, and Chicago, the demand for coal also increased, and as coalfields in Ohio and Pennsylvania were exhausted, new mines opened in West Virginia and Kentucky. To tap these new, high-quality coal reserves, it was necessary to expand the railroad network throughout the area. Consequently, numerous railroad and/or coal companies began to lay rail lines into West Virginia. This in turn allowed the timber industry to exploit the vast stands of yellow pine and mixed hardwoods that covered most of the Appalachian Plateau and the Allegheny Mountains.

The Chesapeake and Ohio Railroad (C&ORR) was the first company to construct new lines in the county. In 1896 and 1897, the C&ORR began surveying possible rail lines up the Greenbrier Valley, and construction began in the summer of 1899 for a line running from Caldwell in Greenbrier County to Marlinton in Pocahontas County. Rail service began in October of 1900, and by May of 1902 the line extended to Durbin at the north end of the valley. With the railroad infrastructure in place, the timing was right for the timber industry to take advantage of the virgin forests that covered much of the county. Within Greenbrier, Nicholas, and Fayette Counties, coal was not exploited on a widespread basis until the 1920s and early 1930s.

### Rainelle and the Meadow River Lumber Company (1906–1970)

The early histories of Rainelle and the Meadow River Lumber Company (MRLC) are intertwined with the lives of Tom and John Raine. Tom Raine (1851-1933) and John Raine (1863-1940), both born in southern Ohio, had experience in both logging and railroads prior to starting the MRLC and the Meadow River Coal and Land Company (MRC&L) in 1906. The Raine's purchased 32,000 acres (12,950 hectares) of virgin hardwood forest (the Beury Tract) on Meadow River. The former owners believed the timber was inaccessible and did not envision any railroads extending service to the area for many years.

The MRLC and the MRC&L were chartered on June 6, 1906. The Raine brothers selected the site for the new mill and the town at the confluence of Wolfpen Creek and Sewell Creek, just upstream from the mouth of Sewell Creek and the Meadow River. Initially, the charter members were hopeful that the C&ORR would extend a railroad up the Kanawha Valley to the Meadow River basin that would connect

with Ronceverte or Alderson, but after two years of waiting, the organization realized that it would be up to them to build a railroad into the middle of nowhere. Thus, their first order of business was to build a railroad feeder line to connect the mill to the existing C&ORR in Summers County. The feeder line, which extended about 21 miles (34 kilometers), was initially known as the Sewell Valley Railroad (SVRR). The feeder line ran from Meadow Creek Station, to Springdale, over Wallow Hole Mountain, and down Sewell Creek to Rainelle. Tom Raine undertook the construction of the railroad, while John worked a tract of land near Hillsboro Academy in Pocahontas County. Tom Raine also began work on the construction of the mill and the town. The Sewell Valley railroad was completed to Rainelle in 1910.

Construction of the town began in 1908 with the utilization of hemlock trees cut in proximity to the town site, and construction of the mill began in 1909. The mill, which had three six-foot bandsaws, was completed in 1910, and the first logs were cut on September 10, 1910. The principal tree species on company tracts included red and white oak, chestnut, hickory, poplar, maple, hemlock, bass, beech, cherry, and ash. Initially, the principal stock was rough lumber, but with time the mill expanded to accommodate stock of ties, flooring, siding, lath, and chair stock.

Eventually, the MRC&L land holdings grew to more than 125,000 acres (50,600 hectares) or nearly 200 square miles (500 square kilometers). Tom Raine later formed the Raine Lumber Company in 1916 and built a sawmill at Honeydew in Fayette County, which operated until 1923 under the supervision of his son J. W. Raine. The Raine Lumber Company also purchased a sawmill in Pocahontas County that operated between 1923 and 1928 on what is now Seneca State Park.

During the 1920s Tom Raine also became interested in the developing coal industry, and in 1921 he bought the Loop and Lookout railroad (L&LRR) and the SVRR from MRLC. He then proceeded to extend the SVRR to Glencoe and Duo, north of Rupert, and later extended lines to Nallen and Swiss to meet the New York Central (NYC). At the time he sold the SVRR to NYC in 1924, the Sewell Valley railroad was more than 100 miles (160 kilometers) in length. Eventually this rail line was operated as the Nicholas, Fayette, and Greenbrier railroad (NF&GRR). At the time of the sale, Tom Raine realized a profit of $3.75 million.

The town of Rainelle, which was incorporated in 1913, quickly earned a reputation for being one of the best hardwood mill towns in the United States. John Raine studied George Pullman's efforts to create a "model town" and reportedly built some of the finest company housing in the state. At the time the first houses were built, beginning around 1908-1910, each house was built with an eye toward comfort and sanitation. All the residences were two-story, frame houses with clapboard siding, a front porch and an enclosed rear porch/storage room. The houses were plastered and papered on the interior, and painted white on the exterior. The houses contained a living room, dining room, and kitchen downstairs, and two bedrooms and a bathroom upstairs. Each house had running water and most of the houses also had modern bathrooms, steam heat, and electricity. Each house had a lawn and garden, including a fruit tree, and in later years each was provided with a garage. The initial worker's houses were constructed in the area opposite the mill, south of US 60 and north of Wolfpen Creek. Housing for the foremen and officers of the company was constructed on the north side of US 60 opposite the worker's housing. Most of these original houses are still occupied today with few changes, save for the addition of vinyl or aluminum siding.

During the early 1910s, the company constructed a number of buildings in the original downtown area of Rainelle. The original downtown area started at the railroad depot, located on the south side of the intersection of Route 20 and US 60, and extended eastward along US 60. Adjacent to the railroad depot were the main corporate offices and company bank (owned by the Raine brothers), and next to the bank was the company store, which was razed within the last 20 years for construction of a gas station. The company also constructed the United Methodist Church at what was the east end of town in 1914. The Raine brothers built their personal homes on small hills on either side of the church. Tom Raine's house

was built on the west side of the church and was torn down to construct the Rainelle Medical Center. John Raine's house, located on the east side of the church, is still occupied and little changed from the original.

With the growth of the various business enterprises, the company built more workers' housing on the hillside immediately east of John Raine's house and north of where the railroad tracks cross US 60. These houses, which are still occupied and relatively unchanged from the original, were very similar in style and size to the initial workers' houses on the west end of town. During the 1920s the company also built a hotel and restaurant, a post office, and a movie theater; and in 1923-1924, the company provided the land and the bricks to build a new high school, which today is used as the elementary school. By the end of the 1920s, MRLC employed nearly 500 workers, and production had increased from about 3 million board feet in 1910 to an average of over 30 million board feet in the late 1920s, or the equivalent of cutting nearly 3,000 acres (1,200 hectares) of virgin forest every year. By 1929, the MRLC shipped products to 26 states and several foreign countries, and was renowned as the "largest hardwood lumber mill" in the world.

However, mismanagement, inattention to shrinking markets, the lack of technological updates, and two labor strikes (1963 and 1969) proved too much for the company to overcome. In 1970 MRLC was sold to Georgia-Pacific, which operated the plant for about one year before it closed the mill, and the last lumber was shipped out of town in 1971. At the time the mill was sold, the number of board feet produced had dropped to 18,000 per year. The mill was razed by 1975, and cultural resource documentation was completed in 1984.

### Growth of the "Smokeless" Coal Industry (1920–1960s)

Beginning in the 1920s, interest in the coal industry reached Greenbrier County and the surrounding region. Tom Raine extended the Nicolas, Fayette and Greenbrier (NF&G) Railroad to his property on Big Clear Creek, north of Rupert, in 1929, but the onset of the depression precluded mining the coal reserves in this area until 1932. In 1932 he formed the Raine Coal Company, and the company, under family ownership and supervision, continued to operate until 1959, when the company and property was sold to the Gauley Coal and Land Company.

The community of East Rainelle, which was founded in the 1910s and incorporated in 1921, was developed to accommodate the growing population of Rainelle. In the early years, East Rainelle, also referred to as "Slabtown" because the first houses were temporarily sided with "slabs" from a portable sawmill," was located east and south of Sewell Creek, primarily along US 60. During this time East Rainelle served as the business and commercial center for Rainelle and the surrounding area.

Beginning in 1921, the Greenbrier and Eastern (G&E) Railroad extended rail service to the Meadow River Valley area to exploit the low volatile, or 'smokeless,' coal supplies in the region. Many mines were opened in the Meadow River region after construction of this railroad, and additional mines were opened in the vicinity of Charmco, Quinwood, Duo, Clearco, and Anjean after the railroad was extended to the Big Clear Creek area in 1928-1929.

East Rainelle benefited from the development of the coal industry in the 1920s and 1930s, and the town's population eventually surpassed Rainelle. Between 1921 and 1950, the population of East Rainelle more than tripled from nearly 450 people in 1921 to nearly 1,700 people in 1950, whereas the population of Rainelle in 1950 was about half at 850 people. In 1969, Rainelle and East Rainelle were joined under the name of Rainelle. Today East Rainelle contains a mix of historic and modern homes, as does the well-defined commercial district along US 60, also referred to as Main Street in this area.

Leckie Smokeless Coal Company founded the town of Anjean and the Anjean coalmine in 1926. The coal company was founded by William S. Leckie and his brother Andrew F. Leckie, sons of Colonel William Leckie, who moved from Scotland to West Virginia in 1870. Anjean was named after Colonel

Leckie's wife Anna, and Andrew Leckie's daughter, Jean. The Leckie Smokeless Coal Company operated mines in West Virginia and Kentucky for 30-40 years, including the Anjean mine that operated from 1926 to 1954. During the height of the mining period, Anjean contained 100 houses and supported a mixed population of European Americans (67 percent) and African Americans (33 percent). Many of the mines in the area were re-opened in the late 1950s and 1960s under the name of the Royal Scot Coal Company.

### End of an Era (1970–Present)

Prior to its sale to Georgia-Pacific, MRLC had sold many of its assets such as the railroads, the power plant and the Pioneer Hotel. When Georgia-Pacific purchased the remaining assets from MRLC in 1970, it also acquired the company housing. Georgia-Pacific immediately allowed the families to purchase their homes rather than continue to pay rent. Reportedly, over 80 homes were sold in this manner in the first year. Georgia-Pacific sold over 200 acres (81 hectares) of land on the fringes of town to prospective homeowners and developers, and they also sold many of the outdated businesses, such as the company bank, company store, and post office. Thus, the purchase of the MRLC by Georgia-Pacific turned a "company town" into just a "plain town." By 1975, the lumber mill was razed, the millpond was filled, and the railroad tracks serving the mill were removed.

Except for the company housing that still dominates the residential area west of WV 20 in Rainelle and on either side of US 60 west of the WV 20/US 60 interchange, only a few buildings remain from the original company town. Extant buildings include the former Fire Pump House (Greenbrier County Public Service District #2), the abandoned railroad depot, the former company bank (American Electric Power Company offices), the former high school (currently the elementary school), the United Methodist Church, and the John Raine house. Within recent years the company store, located next to the bank, has been razed, the Tom Raine house was torn down to build the Rainelle Medical Center, and in 1982 the Pioneer Hotel (formerly a theater) was closed and torn down due to a lack of clientele.

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## 3.9 Socioeconomics

This section describes the demographic and socioeconomic context of the project area in western Greenbrier County, including recent trends in population, housing, employment and income, and business and economy.

### 3.9.1 Population

The project area consists of small, rural communities scattered throughout valleys surrounded by mountainous terrain. The population of Greenbrier County was 34,453 in the 2000 Census (Table 3.9-1) with a density of 34 persons per square mile. Collectively, the municipalities of Rainelle, Rupert, and Quinwood contain 9 percent of the county population. Although the national population grew by 13 percent from 1990 to 2000, population growth in West Virginia and Greenbrier County remained essentially level, and each of the three municipalities in the project vicinity lost population during the decade. West Virginia ranked 37th in 2000 among all 50 states in population and 49th in population growth rate from 2000 to 2004.

**Table 3.9-1. Comparative Population (1990 – 2000)**

| Area | 2000 Population | 1990 Population | Numeric Change 1990-2000 | Percent Change 1990-2000 |
|---|---|---|---|---|
| Rainelle | 1,545 | 1,681 | -136 | -8.1% |
| Rupert | 940 | 1,104 | -164 | -14.9% |
| Quinwood | 453 | 559 | -106 | -19.0% |
| Greenbrier County | 34,453 | 34,693 | -240 | -0.7% |
| State of West Virginia | 1,808,344 | 1,793,477 | 14,867 | 0.8% |
| United States Total | 281,421,906 | 248,709,873 | 32,712,033 | 13.1% |

*Source: U.S. Census Bureau, 2005a*

Estimates of population change in Greenbrier County by the West Virginia University Regional Research Institute (RRI) from 2000 to 2010 range from a loss of 2 percent to a gain of less than 3 percent, depending upon whether conditions follow current trends or growth factors improve. The RRI's projections for population change from 2000 to 2020 range from a loss of 2 percent to a gain of 7 percent (RRI, 2005).

Population in the three municipalities has continued to decline since the 2000 Census. Although RRI does not prepare estimates below county level, the population in western Greenbrier County is projected to remain essentially stable or decline through at least 2010 due to the absence of strong commercial and economic centers nearby. The project area is located approximately 30 miles (50 kilometers) northwest of Lewisburg, the county seat, which had a population of 3,624 in 2000 and grew by only 26 people in the preceding decade. Charleston, WV, the closest Metropolitan Statistical Area (MSA) with a population of 251,662 in 2000, is located more than 75 miles (120 kilometers) to the northwest over mountainous terrain. The Charleston MSA ranked 147th by population among the 170 largest U.S. metropolitan areas in 2003 and grew by less than 1 percent from 1990 to 2000 (U.S. Census Bureau, 2005b).

The Greenbrier County Planning Commission (GCPC) indicated its concern about the trend toward an aging population in the county (GCPC, 1994). Between 1990 and 2000, the median age of the population in Greenbrier County increased from 37.3 years to 41.6 years. The median ages in Rainelle, Rupert, and Quinwood were 45.9, 42.0, and 39.8 years, respectively, in 2000, which were considerably higher than the

median ages for West Virginia (38.9 years) and the United States (35.3 years) at that time. The three communities collectively lost 42 percent of their populations aged 20 to 29, while they gained 21 percent of their populations aged 60 to 69, between 1990 and 2000 (Koebel, et al., 2004). The GCPC attributed these trends both to an outflux of employment-aged individuals, due to the lack of suitable employment, and the influx of retirement-aged individuals attracted by the scenic resources, calm pace of life, and low cost of living in the region.

### 3.9.2 Housing

Housing characteristics in the project area and larger region are summarized in Table 3.9-2. Although local vacancy rates and the percentages of owner-occupied and renter-occupied housing units generally compared favorably with county and state statistics, the rates of housing construction since 1990 were generally lower in the three local municipalities than in the county as a whole. Also, except for Rupert, each of the local communities has a higher percentage of housing stock constructed before 1940 than the state and county averages. Local housing values and rental rates were considerably lower than in the county and state. Furthermore, average household sizes in the three local municipalities and in the county correlate inversely with median population age, such that the higher the median age, the lower the average household size. These factors point to the likely effects of the current trend in population aging, namely smaller households, fewer new homes built, and lower housing prices and rents.

**Table 3.9-2. Housing Characteristics, 2000**

| Characteristic | West Virginia | Greenbrier County | Rainelle | Rupert | Quinwood |
|---|---|---|---|---|---|
| Housing Units | 844,623 | 17,644 | 802 | 482 | 193 |
| Vacancy Rate% | 12.8% | 17.4% | 13.2% | 16.6% | 12.4% |
| Owner Occupied % | 75.2% | 76.6% | 64.2% | 76.1% | 78.7% |
| Renter Occupied % | 24.8% | 23.4% | 35.8% | 23.9% | 21.3% |
| % Units Built Since 1990 | 15.5% | 17.6% | 4.2% | 7.8% | 12.0% |
| % Units Built Before 1940 | 19.3% | 18.9% | 31.9% | 10.8% | 35.3% |
| Median Value (Owner-Occupied) | $66,000 | $67,300 | $37,700 | $48,300 | $30,000 |
| Median Contract Rent | $311 | $275 | $192 | $240 | $210 |
| Average Household Size | 2.40 | 2.32 | 2.14 | 2.27 | 2.57 |

*Source: U.S. Census Bureau, 2005a*

With respect to housing characteristics, the Greenbrier County Strategic Comprehensive Development Plan update concluded that the overall availability of housing and rate of new construction appeared to be meeting current demand, but that significant increases in economic growth could affect housing demand in certain areas (GCPC, 1994). The plan also noted the increasing utilization of mobile homes and the need for greater regulation of this source of housing. Furthermore, the plan expressed concerns about housing stock that lacked adequate water and sanitary facilities. Among the housing goals and objectives for Greenbrier County, the plan called for:

- Encouraging major rehabilitation or demolition of substandard housing;
- Establishing uniform standards for mobile home parks and encouraging the replacement of existing single-wide mobile homes with more attractive units, including modular or manufactured housing, as practical;
- Retaining quality traditional residential neighborhoods;

- Encouraging development of planned housing communities, including multi-family housing in areas adjacent to potential economic development sites; and
- Encouraging development of public water and sewer services to meet current and future housing needs.

A recent study by the Virginia Tech Center for Housing Research reviewed housing issues in the western Greenbrier area. The study noted that much of the developed land is located in floodplains, and severe flooding damaged local homes and businesses in Autumn 2003. Following that incident, a total of 27 counties in West Virginia were considered eligible for assistance from the Federal Emergency Management Agency and Small Business Administration, and 6,131 applications were submitted. Applicants in Rainelle, Quinwood, and Rupert submitted 359 of the 470 applications that originated from Greenbrier County (Koebel, et al., 2004).

The Virginia Tech study investigated developable lands in the area and identified several sites in Rainelle and Rupert that may provide opportunities for future housing construction. The amount of developable land in Quinwood, however, was considered negligible. The study concluded that the slow demand for housing, coupled with affordability issues posed by limited local incomes as described further below, would make speculative housing construction unlikely. The study also noted that Rainelle has expressed an interest in pursuing grant funds from the U.S. Department of Housing and Urban Development for the construction of affordable housing, because the town does not have the resources to fund such projects independently. The study further concluded that the local communities inevitably must address the housing needs of an aging population by providing affordable independent and assisted living opportunities.

### 3.9.3 Employment and Income

Table 3.9-3 summarizes employment data for the local communities in comparison to the nation, state, and county. Although the local distribution by sector is generally comparable to the larger jurisdictions in diversity of employment, a few differences are notable. First is the significantly higher local employment in retail trade compared to the nation, state, and county. Second is the fact that the local communities are not participating in the higher employment by the entertainment sector (including tourism) experienced elsewhere in Greenbrier County. Third is the fact that the county and local communities rely less on mining for employment than does the state on average. Finally, as representative of the rural character of the region, the local communities have substantially less employment in professional and scientific fields than do the nation, state, or county. Furthermore, lower percentages of workers are employed in manufacturing for the state and region than nationally. The ten largest employers in Greenbrier County as of March 2004 (WVBEP, 2005) were:

- CSX Hotels, Inc. (The Greenbrier)
- Greenbrier County Board of Education
- Greenbrier Valley Medical Center
- Wal-Mart Stores, Inc.
- West Virginia Department of Highways
- ABB, Inc.
- Greenbrier Resort Management
- West Virginia School of Osteopathic Medicine
- Mullican Flooring
- Panhandle Support Services, Inc.

**Table 3.9-3. Employment, 2000**

| Sector | United States | West Virginia | Greenbrier County | Rainelle, Rupert, Quinwood |
|---|---|---|---|---|
| Agriculture, Forestry, Hunting | 1.5% | 1.3% | 4.1% | 1.9% |
| Mining | 0.4% | 2.8% | 1.5% | 1.6% |
| Construction | 6.8% | 7.0% | 8.0% | 6.3% |
| Manufacturing | 14.1% | 11.9% | 10.2% | 10.0% |
| Wholesale Trade | 3.6% | 2.8% | 2.4% | 3.3% |
| Retail Trade | 11.7% | 13.1% | 12.9% | 17.1% |
| Transportation, Utilities | 5.2% | 6.0% | 4.8% | 7.7% |
| Information | 3.1% | 2.2% | 1.2% | 3.2% |
| Finance, Insurance | 6.9% | 4.6% | 3.4% | 3.9% |
| Professional, Scientific | 9.3% | 6.7% | 4.0% | 2.6% |
| Education, Health, Social | 19.9% | 23.0% | 22.4% | 22.7% |
| Arts, Entertainment, Food | 7.9% | 7.9% | 14.4% | 8.6% |
| Other Services | 4.9% | 5.0% | 5.0% | 7.3% |
| Public Administration | 4.8% | 5.8% | 5.9% | 3.8% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |

*Source: U.S. Census Bureau, 2005a*

Virginia Tech researchers concluded that a key factor in the employment characteristics and future prospects of the western Greenbrier area is the limited educational attainment of the local population (Koebel, et al., 2004). Only 11 percent of the population aged 25 or older held associate's degrees or higher in 2000, while 35 percent had not completed high school .

As of March 2005, West Virginia had a seasonally adjusted unemployment rate of 5.2 percent, which was the 18th highest among all 50 states and the District of Columbia (BLS, 2005). The average unemployment rate for West Virginia in 2004 was the 23rd highest at 5.3 percent. Over the past 10 years, the unemployment rate in West Virginia has generally declined from a high of 8.3 percent in January 1996 to a low of 4.7 percent in January 2005. The rate rose above 6 percent in both 2002 and 2003.

Table 3.9-4 lists labor force statistics from the 2000 Census for the nation, state, county, and local communities. Of particular interest is the fact that a majority of the adult population in the local communities is out of the labor force. This condition emphasizes the trend toward local population aging. Also, the percentage of unemployed in the labor force was substantially higher locally than in the county, state, or nation. The Virginia Tech study further noted that approximately 35 percent of the working aged individuals in the local communities have disabilities affecting their employment (Koebel, et al., 2004).

Table 3.9-5 summarizes the commuting characteristics of local workers in comparison to those of the larger jurisdictions. The statistics indicate that commuters in the local communities tend to be more reliant on carpooling given the absence of public transport options. Also, the local communities have higher percentages of employees who do not commute. For those individuals who commute, the distributions of travel times indicate that individuals in the local communities generally have either shorter or longer commutes on average than workers in the larger jurisdictions. These statistics highlight the remoteness of the local communities and the fact that most individuals work close to home, but some travel very long distances to reach their places of employment.

**Table 3.9-4. Labor Force Statistics, 2000**

| Characteristic | United States | West Virginia | Greenbrier County | Rainelle, Rupert, Quinwood |
|---|---|---|---|---|
| Population Aged 16 Years and Over | 217,168,077 | 1,455,101 | 27,914 | 2,426 |
| % In Labor Force | 63.9% | 54.5% | 52.9% | 41.0% |
| % Not in Labor Force | 36.1% | 45.5% | 47.1% | 59.0% |
| Labor Force | 138,820,935 | 792,344 | 14,755 | 994 |
| % Employed or in Armed Forces | 94.3% | 92.7% | 91.5% | 88.1% |
| % Unemployed | 5.7% | 7.3% | 8.5% | 11.9% |

*Source: U.S. Census Bureau, 2005a*

**Table 3.9-5. Commuting Statistics, 2000**

| Characteristic | United States | West Virginia | Greenbrier County | Rainelle, Rupert, Quinwood |
|---|---|---|---|---|
| **Means of Commuting** | | | | |
| Drove Alone | 75.7% | 80.3% | 80.6% | 75.5% |
| Carpool | 12.2% | 12.7% | 12.9% | 16.4% |
| Public Transport | 4.7% | 0.8% | 0.2% | - |
| Other Transport | 1.2% | 0.8% | 0.6% | - |
| Walked or Worked at Home | 6.2% | 5.4% | 5.7% | 8.1% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |
| **Travel Time** | | | | |
| Less than 15 min | 29.4% | 31.9% | 35.8% | 40.9% |
| 15 min to 29 min | 36.1% | 35.3% | 33.0% | 20.0% |
| 30 min to 44 min | 19.1% | 16.7% | 16.1% | 14.6% |
| 45 min to 59 min | 7.4% | 7.1% | 7.8% | 12.6% |
| 60 min or More | 8.0% | 9.0% | 7.3% | 11.9% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |

*Source: U.S. Census Bureau, 2005a*

Incomes in the project area are generally low. Median incomes for individuals, families, and households in western Greenbrier County communities for the 2000 Census were lower than in the county as a whole, which had median incomes below those of the State (Table 3.9-6). Moreover, West Virginia ranked last among all 50 states in median household income in 1995 (U.S. DOC, 1998). Correspondingly, the region has very high poverty rates led by Rainelle, where nearly 29 percent of individuals had incomes below the poverty level compared with a state average of 18 percent and a national average of less than 13 percent. West Virginia ranked 8$^{th}$ among all states in the percent of individuals with incomes below the poverty rate in 1995 (U.S. DOC, 1998).

**Table 3.9-6. Income, 1999**

| Characteristic | United States | West Virginia | Greenbrier County | Rainelle | Rupert | Quinwood |
|---|---|---|---|---|---|---|
| Income | | | | | | |
| Median Family | $50,046 | $36,484 | $33,292 | $26,528 | $26,932 | $24,196 |
| Median Household | $41,994 | $29,696 | $26,927 | $19,491 | $20,250 | $21,705 |
| Per Capita | $21,587 | $16,477 | $16,247 | $14,069 | $11,554 | $11,911 |
| Below Poverty Level % | | | | | | |
| Families | 9.2% | 13.9% | 14.5% | 23.8% | 19.9% | 22.9% |
| Households | 11.8% | 18.0% | 19.6% | 29.6% | 25.7% | 24.9% |
| Individuals | 12.4% | 17.9% | 18.2% | 28.7% | 25.2% | 26.9% |

*Source: U.S. Census Bureau, 2005a*

### 3.9.4 Business and Economy

The Greenbrier County Strategic Comprehensive Development Plan update recognized the economic challenges in the region but concluded that the county had shown significant economic growth from 1970 to 1990 (GCPC, 1994). The plan acknowledged the trend in retail trade growth in the county and the fact that the retail trade sector generally provides low-wage jobs. The plan also envisioned that opportunities in manufacturing would hold the greatest potential for growth among all sectors. Growth in the manufacturing sector was viewed as offering the greatest potential for improvement in the local quality of life. Among the economic goals and objectives for Greenbrier County, the plan called for:

- Actively promoting the development of areas that are attractive for commercial ventures;
- Supporting the further development of the wood products industry throughout the county;
- Strongly encouraging the development of public infrastructure improvements as necessary to support economic development;
- Encouraging the conversion of existing buildings and the construction of new facilities to support manufacturing and other employment-generating operations.
- Encouraging the development of high technology manufacturing operations to increase the county's economic base.
- Strongly supporting the efforts of the Greenbrier Valley Economic Development Corporation to promote economic development throughout its service area.

The Region 4 Planning and Development Council (R4PDC), which serves five West Virginia counties including Greenbrier, concluded in its 2003-2007 Comprehensive Economic Development Strategy that the lack of marketable industrial and technology parks is the largest constraint to economic development in the region (R4PDC, 2003). Among the seven primary economic development centers identified in the strategy, two are located in Greenbrier County:

- Greenbrier Valley Economic Development Center
- Greenbrier Valley Airport Industrial Park

Both centers are initiatives of the Greenbrier Valley Economic Development Corporation. However, both of these economic development centers are located in the vicinity of Lewisburg, approximately 30 miles (50 kilometers) from the WGC project area. The R4PDC plan did not specifically address the potential for economic development in western Greenbrier County.

The Greenbrier Valley Economic Development Corporation (GVEDC) is a nonprofit organization created under Section 501(c)(6) of the Internal Revenue Code that aims to assist the needs of the business communities of Greenbrier, Monroe, and Pocahontas Counties, West Virginia. The GVEDC provides a variety of services to new and existing businesses, including business financing, general and technical assistance, site selection, and workforce development. In Greenbrier Valley Progress 2000+ (GVEDC, 2002), the GVEDC presented its vision for a public-private partnership to promote economic development in the three-county region and outlined the following key strategies:

- Retaining and expanding existing businesses through needs assessments and financial, technical, and marketing assistance;
- Recruiting new industries through promotional efforts, trade shows, I-64 corridor development initiatives, and developing site locations for buildings and technology parks;
- Developing the regional workforce in partnership with colleges and universities to attract new industries by establishing the training programs that can provide skilled workers;
- Cultivating private and corporate investors by providing investor relations, newsletters, and reports;
- Improving and showcasing quality of life by promoting local tourism and by supporting the implementation of a multi-county road infrastructure plan to upgrade transportation corridors; and
- Supporting the development of master planned residential communities and quality housing developments in partnership with real estate agencies and developers, and by enhanced relationships with regional planning and zoning authorities.

GVEDC owns the Western Greenbrier Industrial Park in Rainelle, which includes a 30,000-square foot (3,000-square meter) building on 34 acres (14 hectares) in proximity to the proposed WGC site. Funding for the park was obtained from sources including USDA Rural Development, a Governor's Community Partnership Grant, and the Greenbrier County Commission (GVEDC, 2002).

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# 3.10 Environmental Justice

This section describes the context of minority and low-income populations in the planning area as a basis for determining whether the project might have a disproportionately high and adverse effect on such populations.

## 3.10.1 Background

Executive Order 12898 provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (The White House, 1994). In its guidance for the consideration of environmental justice under NEPA, the Council on Environmental Quality (CEQ) defines a "minority" as an individual who is American Indian or Alaskan Native, Black or African American, Asian, Native Hawaiian or Pacific Islander, Hispanic or Latino. CEQ characterizes a "minority population" as existing in an affected area where the percentage of defined minorities exceeds 50 percent of the population, or where the percentage of defined minorities in the affected area is meaningfully greater than the percentage of defined minorities in the general population or other appropriate unit of geographic analysis. The CEQ guidance further recommends that low-income populations in an affected area should be identified using data about income and poverty from the U.S. Census Bureau (CEQ, 1997).

With respect to environmental justice analysis for the WGC project, the "affected area" is considered to include the neighborhoods closest to proposed sites for facilities. The "appropriate units of geographic analysis" for the project are considered to be the smallest census units for which demographic data about minorities and incomes are available from the Census Bureau. Also, the "general population" is considered to include the local communities in the vicinity of proposed facilities, as well as Greenbrier County, West Virginia, and the United States.

## 3.10.2 Minority Populations

Table 3.10-1 summarizes the minority compositions of the local communities, Greenbrier County, West Virginia, and the United States from the 2000 census. The table indicates that the populations in the county and state are far more homogeneous ethnically than the population of the United States; the populations in the local communities are even more so. The potential Co-Production Facility site is located in Census Tract 9503, Block Group 3, Block 3078. The minority composition of this block (less than 5 percent) is essentially the same as that of the larger Block Group 3. The minority compositions of these smaller census units are also comparable to the compositions in the local jurisdictions. Therefore, a "minority population" as characterized by CEQ does not exist in the affected area of the project.

## 3.10.3 Low-Income Populations

A comparison of incomes in the WGC project area and in the local jurisdictions is described in Section 3.9 (Socioeconomics). Table 3.10-2 summarizes the poverty rates in the local communities, Greenbrier County, West Virginia, and the United States from the 2000 census. The table indicates that the state and county have significantly higher percentages of families, households, and individuals with incomes below the poverty level than does the United States as a whole. Furthermore, the poverty rates in Rainelle, Rupert, and Quinwood are even higher than those in Greenbrier County, but the poverty rates in the proposed project area (Census Tract 9503, Block Group 3) are comparable to the rates in the three communities. Therefore, in comparison to the state and county, the local communities in western Greenbrier generally have relatively large low-income populations. However, the population in the smallest census unit for which poverty data is available and in which the proposed power plant would be located has poverty rates that are comparable to those of the larger local communities in the vicinity.

**Table 3.10-1. Composition of Populations**

| Area | White Alone | Black or African American | Hispanic or Latino | Other Defined Minorities |
|---|---|---|---|---|
| Tract 9503, BG 3, Block 3078 | 96.2% | 0.0% | 1.0% | 2.8% |
| Tract 9503, BG 3 | 96.6% | 0.8% | 0.5% | 2.1% |
| Rainelle | 96.6% | 0.7% | 0.6% | 2.0% |
| Rupert | 96.9% | 1.3% | 0.7% | 1.1% |
| Quinwood | 94.5% | 2.5% | 0.9% | 2.1% |
| Greenbrier County | 94.7% | 3.0% | 0.7% | 1.5% |
| State of West Virginia | 94.6% | 3.1% | 0.7% | 1.6% |
| United States | 69.1% | 12.1% | 12.5% | 6.1% |

*Source: U.S. Census Bureau, 2005*

Sewell Landing is a USDA Rural Development apartment complex on Pennsylvania Avenue in Rainelle that contains 52 rental units (36 one-bedroom units and 16 two-bedroom units) located within 1,500 feet (460 meters) east of the proposed power plant site. USDA has classified the complex as a moderate-income housing facility with income limits to qualify for tenancy ranging from $28,250 for an individual to $34,750 for a family of three to $48,350 for a family of eight (USDA RD, 2005). As indicated in Table 3.9-6 previously, the median incomes of individuals and families in Rainelle and throughout Greenbrier County are below the qualifying income limits for Sewell Landing Apartments. Hence, the majority of individuals and families in Rainelle and throughout Greenbrier County could qualify for tenancy in the complex.

**Table 3.10-2. Poverty Rates**

| Area | Percentage of Incomes in 1999 Below Poverty Level | | |
|---|---|---|---|
| | Families | Households | Individuals |
| Tract 9503, BG 3 | 21.8% | 27.9% | 27.3% |
| Rainelle | 23.8% | 29.6% | 28.7% |
| Rupert | 19.9% | 25.7% | 25.2% |
| Quinwood | 22.9% | 24.9% | 26.9% |
| Greenbrier County | 14.5% | 19.6% | 18.2% |
| State of West Virginia | 13.9% | 18.0% | 17.9% |
| United States | 9.2% | 11.8% | 12.4% |

*Source: U.S. Census Bureau, 2005*

# 3.11 Land Use

This section describes land uses that may be affected by Proposed Action. The regions of influence for assessing the potential impacts on land uses include the communities and local environs of Rainelle, Anjean, Green Valley, and Donegan. Existing land uses were determined from aerial photography and site visits. Planned land uses were assessed from discussions with local government officials and by using information available in the Greenbrier County Strategic Comprehensive Development Plan (1994), the 2003-2007 Comprehensive Economic Development Strategy for Region 4, and a housing analysis prepared by Virginia Tech for the Greenbrier Housing Authority.

## 3.11.1 Existing Land Use

### *3.11.1.1 Rainelle*

Rainelle is located near the western border of Greenbrier County in southeastern West Virginia, within the Appalachian Plateau Physiographic Province. The surrounding topography varies from narrow valleys, to rolling hills, to wooded ridges and rocky terrain. Greenbrier County is predominantly rural with principal development located along US 60 and I-64, especially in and around Lewisburg, which is the most populous city in the county, located approximately 30 miles (50 kilometers) southeast of Rainelle.

The proposed power plant site comprises approximately 23 acres (9 hectares) of undeveloped land south of Sewell Creek, which includes a ridge associated with Sims Mountain (see Figure 2.2-3). A planned EcoPark for industrial use is located immediately northwest of the project site and north of Sewell Creek. The EcoPark area consists of approximately 20 acres (8 hectares) of vacant land formerly owned by the Meadow River Lumber Company (MRLC). When the MRLC was running, operations consisted of a sawmill and lumberyard on the site, including former log ponds that have been filled and are now grassy fields. A rail line owned by CSX Transportation (CSXT) parallels WV 20 and Sewell Creek southwest of Rainelle and continues northeast through the town. A former railroad engine maintenance facility is located southwest of the planned EcoPark between WV 20 and Sewell Creek. The proposed power plant site can be accessed from the east through a gate at the end of Glinton Avenue. The planned EcoPark can be accessed via a side road from WV 20 and Tom Raine Drive.

The project site slopes gently toward Sewell Creek, which flows in a northeasterly direction and drains into the Meadow River, approximately 1.5 mile (2.4 kilometers) downstream (floodplains are described in Section 3.5). The majority of the power plant site drains to the northwest into Sewell Creek, while a smaller portion drains to the east into an unnamed tributary of the creek. The power plant site consists of vacant upland areas with smaller wetland areas along Sewell Creek (wetlands are described in Section 3.7). The north end of the adjacent ridge was truncated during a prior aborted development project and is now mostly devoid of trees.

Rainelle supports a variety of recreational, industrial, commercial, and residential land uses. Most of the residential and commercial uses are located along the US 60/WV 20 corridor, including Main Street in Rainelle. Figure 3.11-1 illustrates the land uses in the vicinity of the proposed power plant site. Residential uses, including a mobile home park, an apartment complex, and a nursing home, are located along or near (within 1,000 feet [300 meters]) the proposed power plant site's eastern boundary. Commercial land uses, including a small shopping center and a US Army Reserve Center, border the site to the north. A small cluster of homes is located approximately 2,000 feet (600 meters) northwest of the site and includes a small neighborhood park in the southern corner of the cluster. The Rainelle Elementary School and Rainelle Medical Center are located north of the juncture of US 60 and WV 20 approximately 2,000 feet (600 meters) of the site.

An existing power transmission corridor generally parallels the edge of Greenbrier County along the border with Fayette County. The corridor traverses undeveloped wooded ridges northwest of Rainelle. The Rainelle Sewage Treatment Plant (RSTP) is situated at the confluence of Sewell Creek and Meadow River, in the northern part of Rainelle.

### *3.11.1.2 Anjean/Joe Knob*

The Anjean coal refuse site (see Figure 2.2-16) is located just east of the small community of Anjean (approximately 14 miles east of Rainelle) and is situated in a mountainous area off of CR 1. A few miles north of Anjean, CR 1 becomes a narrow and hilly single-lane road; hence, the community is relatively isolated from commercial areas. The community consists of a few scattered residential properties along CR 1. The coal refuse site is surrounded by essentially undeveloped land that was historically used for coal mining.

Joe Knob is located east of Anjean along a ridge top approximately 2 miles (3 kilometers) driving distance from the Buck Lilly pile, and is therefore, even more isolated from any residential or commercial areas (see Figure 2.2-16) than Anjean. Joe Knob is accessed through the same haul road that is used to access the Anjean mining area. Because Joe Knob is in close proximity to Anjean, both of these areas exhibit similar traits, including mountainous terrain and isolation from any sensitive receptors. Joe Knob has been fully reclaimed and is currently managed by Mead-Westvaco.

WGC has identified three candidate sites for a new prep plant to process the coal refuse from Anjean and Joe Knob (see Figure 2.2-15 and Section 2.4.4.2). As shown in Figure 2.2-16, AN1, AN2, and AN3 are all located within or adjacent to the Anjean mining area. The general area description for these sites is similar to that used to describe the Anjean coal refuse site – namely, isolated with only a few scattered residential areas on CR 1. AN1 is located inside the Anjean entrance, near CR 1. The property is currently managed by WVDEP and is being used for treatment/settling ponds to manage some of the runoff from the Anjean site. AN2 is located on CR 1, across the road from the Anjean entrance and from a set of abandoned buildings associated with mining activities in the past. The property is owned by Mead-Westvaco and is located on disturbed land that includes an abandoned rail line and a gravel road, most likely a maintenance road used for the rail line in the past. CR 1 and a small hill abut the site to the east and west, respectively. AN3 is located on the access haul road in the southeastern corner of the Buck Lilly coal refuse pile. The site is heavily disturbed and graded and is owned by Western Greenbrier Business Development Corporation (WGBDC). WVDEP equipment was observed to be scattered across the site.

### *3.11.1.3 Green Valley*

The Green Valley coal refuse site (see Figure 2.2-17 in Chapter 2) is located in southern Nicholas County off of WV 20. The site is situated just northeast of the small community of Green Valley, approximately 12 miles (20 kilometers) driving distance from Rainelle, and is surrounded by essentially undeveloped land that was historically used for coal mining. The Green Valley community consists of a few houses.

At this time only one candidate site (GV) has been identified for a new prep plant to process the coal refuse from Green Valley (see Figure 2.2-15 and Section 2.4.4.2). As shown in Figure 2.2-17, GV is located along the southern border of the coal refuse pile and parallel to Hominy Creek. The land is disturbed and heavily vegetated. Colt Branch is located in the southeast corner of the pile and was purposely diverted to go around the toe of the coal refuse pile. The property is owned by a subsidiary of Massey Energy, which is still actively mining parts of the Green Valley mining area. An active rail line, used to haul coal, borders the property to the north.

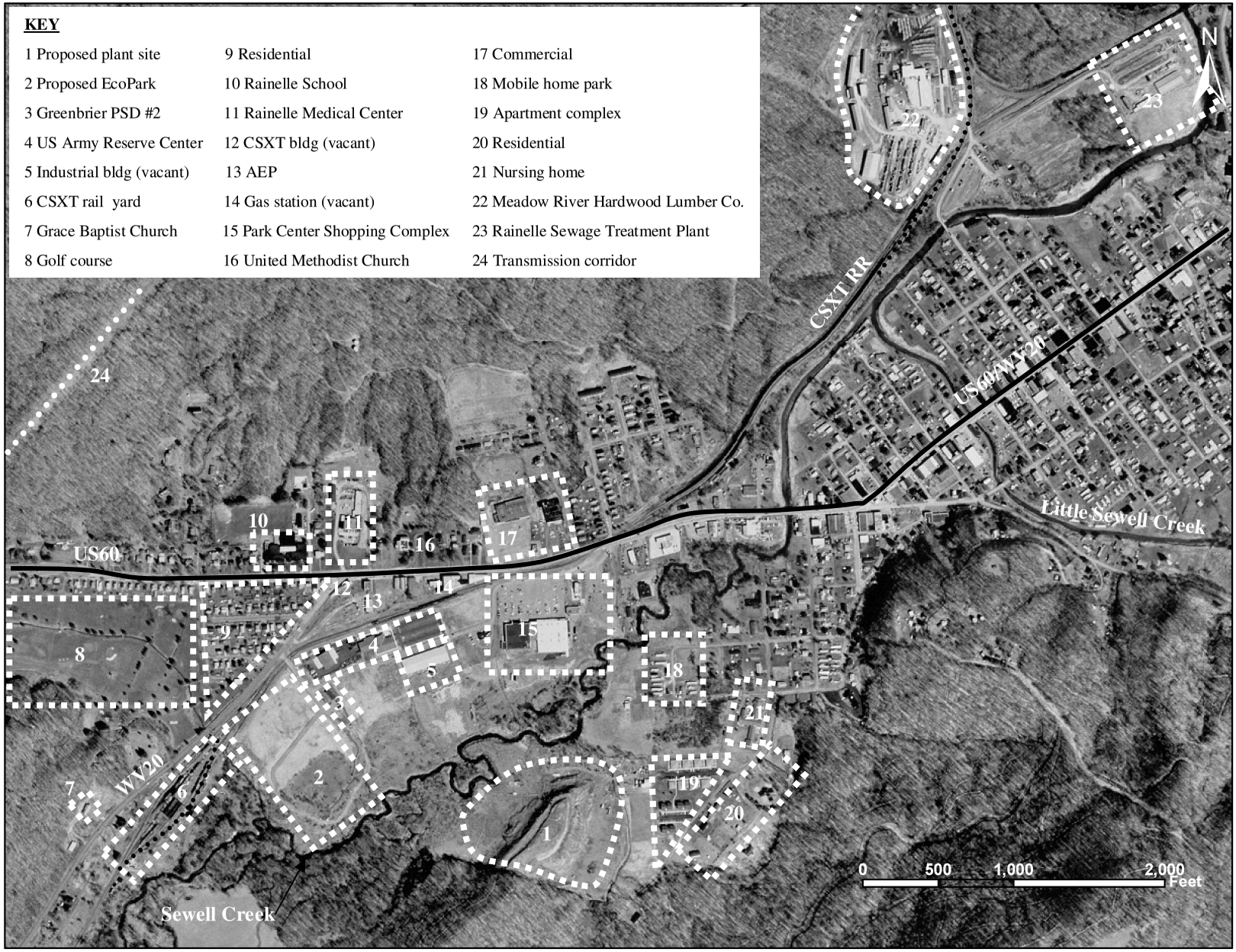


**Figure 3.11-1**
Land Uses Within the Vicinity of the Project Site

Map Source: USGS orthophoto (1:12,000) Rainelle (1976)

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

#### *3.11.1.4 Donegan*

The Donegan coal refuse site (see Figure 2.2-9) is located in southeastern Nicholas County approximately 26 miles (42 kilometers) driving distance from Rainelle and 13 miles (21 kilometers) north of Anjean on a single-lane road, CR 39/14 (CR 1 in Greenbrier County). The site is situated just east of the small community of Jetsville and is surrounded by essentially undeveloped land that was historically used for coal mining. The Jetsville community is characterized by a few houses.

Two candidate sites (DN1, DN2) have been identified for a new prep plant to process the coal refuse from Donegan (see Figure 2.2-15 and Section 2.4.4.2). As shown in Figure 2.2-18, DN1 is located on CR39/14, near the northwest corner of the coal refuse pile. Most of the land is heavily disturbed and graded and includes a gravel road and an abandoned building. The property is currently being held by the state for tax recovery. Two settling/treatment ponds are located east and north of the site. The Donegan site is in a highly remote area and no residential properties were observed within at least a mile (1.6 kilometers) of the site. DN2 is located on private property and aerial photography indicates that the land is disturbed. It is assumed that this property may have been used for agricultural purposes in the past. A few residential properties are located on CR1, approximately half a mile (1 kilometer) north of DN2, while the site is directly adjacent to a house, which is assumed to be the property owner's residence.

### 3.11.2 Local Zoning

#### *3.11.2.1 Rainelle*

Rainelle does not have a municipal zoning ordinance, and there is no zoning ordinance applicable to the Meadow Bluff District of Greenbrier County in which Rainelle is located. However, properties in Rainelle are subject to the Greenbrier County floodplain ordinance, which requires a building permit and the completion of a floodplain determination before any building or structure is constructed, improved, or relocated in the county. The ordinance also establishes minimum standards for structures to be located within a floodplain.

#### *3.11.2.2 Anjean, Green Valley, and Donegan*

Anjean is an unincorporated area in Greenbrier County for which there is no zoning ordinance. Green Valley and Donegan are located in unincorporated areas of Nicholas County for which there are no zoning ordinances.

### 3.11.3 Local and Regional Land Use Plans

In Greenbrier County, land use plans and zoning regulations are in effect only in the tax districts of Lewisburg and Fort Springs. The Greenbrier County Planning Commission (GCPC) is comprised of public officials and volunteers from the community who are appointed by the Planning Commission. The commission updated the Greenbrier County Strategic Comprehensive Development Plan in 1994, which addressed the topics of population, housing, transportation, economic development, community facilities, and land use (GCPC, 1994). The plan outlined broad goals and objectives relative to these topics, but it did not establish objectives for specific locations within the county. With respect to land use, the goals and objectives of the plan include:

- Encouraging the development of reasonable land use regulations that are compatible with local character and accurately reflect the desires of the citizenry.
- Discouraging development patterns that are incompatible with local character and that reduce the quality of life.

- Promoting economic growth and efficient land use.
- Utilizing land use planning to encourage consistency and positive growth patterns, and to discourage haphazard growth patterns.
- Encouraging planned zoning areas to promote positive development, while ensuring environmental protection.
- Promoting the utilization of scarce and limited lands to provide employment opportunities, while protecting the rural quality and natural beauty of the county.

The plan also proposed the following land use categories for future planning in the county, although these categories have not yet been mapped to particular land areas:

- The RC-1 category was proposed for areas that do not have full development potential due to topographic limitations or lack of public utilities. Such areas would be suitable for low density residential and convenience commercial uses that preserve the rural character of the lands.
- The RC-2 category was proposed for areas that are slightly more suitable for development than RC-1.
- Residential districts were proposed for areas within reasonable proximity of population centers that can support single family and multi-family housing.
- Commercial districts were proposed for areas that can meet local and regional needs for safe and convenient commercial uses and the creation of employment opportunities.
- Industrial districts were proposed for areas suitable to provide orderly economic development and employment opportunities by expanding the industrial bases.
- Industrial Unlimited districts were proposed for areas that can support more intensive industrial uses, such as quarries and mining.
- Planned Unit Development districts were proposed for areas that have unique development potential and can offer flexibility from traditional regulatory mechanisms applicable to individual lots.

Greenbrier County is also included among five counties in the 2003-2007 Comprehensive Economic Development Strategy (CEDS) by the Region 4 Planning and Development Council (R4PDC) based on research financed under the Appalachian Regional Development Act of 1965. CEDS was intended to comply with the West Virginia Regional Planning and Development Act of 1971 and to meet the United States Economic Development Administration's requirement for a Comprehensive Economic Development Plan. The plan was developed from studies on economic, social, environmental, physical and governmental conditions in the region and is intended to guide economic development activities for the region. Within Greenbrier County, the Greenbrier Valley Economic Development Center and the Greenbrier Valley Airport Industrial Park were identified as primary growth/economic development centers due to increased economic activity around I-64 near Lewisburg (R4PDC, 2003). CEDS' Development Council works in conjunction with other local economic development authorities, including the Greenbrier Valley Economic Development Corporation (see Section 3.9 "Socioeconomics").

Another development plan that could potentially affect Greenbrier County is the Master Land Use Plan currently being developed for each of West Virginia's counties. Based on Senate Bill 603 enacted in 2001 by the West Virginia Legislature, this plan proposes to give counties the opportunity for input on how post-mining land is reclaimed. The master plan is a voluntary plan created by the county with the support of the Office of Coalfield Community Development through the Nick J. Rahall II Appalachian Transportation Institute at Marshall University. Its intended purpose is to provide an analytical tool for land development

by determining land and infrastructure needs within jurisdictions, with the focus on surface mine sites as potential locations for economic development. In Greenbrier County, a steering committee was appointed by the county's Planning Commission to study mining sites within the county and to rate their potential for future development. The committee studied over 50 mining sites and selected ten that were best suited for future development based on criteria such as accessibility for transportation and proximity to floodplains, waterways, and public lands.

#### *3.11.3.1 Rainelle*

Rainelle does not have a municipal planning commission. Planning commissions are not required under West Virginia law, and they are not common in small municipalities such as Rainelle. Instead, planning issues and land use development projects are initiated through the town council.

The Center for Housing Research at Virginia Tech completed a housing study for the Greenbrier Housing Authority in May 2004. The report noted that Rainelle has identified two main sites for new housing in anticipation of the proposed project (Koebel, 2004). The first site is located just north of Rainelle's elementary school and is owned by the city. The site consists of an 8.5-acre (3.4-hectare) tract that lies at the foot of a hill with gentle slopes. The second site is located on the east side of the ridge that abuts the project site and is privately owned. The report indicated that for this site to be developable, significant blasting of the ridge would be required and construction of a bridge may be needed to provide access to the housing. The report also identified smaller areas for potential housing opportunities in other areas of Rainelle and various locations in the vicinity of Rupert.

#### *3.11.3.2 Anjean, Green Valley, and Donegan*

Comprehensive land use plans have not been prepared for the lands surrounding the coal refuse areas. However, any development of the areas would most likely be facilitated by removal of the coal refuse.

## 3.12 Utilities and Community Services

This section describes the utilities and community services within the vicinity of the proposed Co-Production Facility and coal refuse sites, including public utilities for water, wastewater, electric, and communication and services for solid and hazardous wastes, emergency response services, education, and health.

### 3.12.1 Water Supply

The Rainelle public water supply system serves approximately 2,000 people and is comprised of two active wells, one inactive well, a finished-water storage tank, treatment works, and approximately 870 service connections (BPH, 2003a). The Rainelle Water Department is located south of US 60, as shown in Figure 3.12-1. Well No. 6, which was constructed in 1984, is the primary source of drinking water and is located approximately 500 feet (150 meters) west of the treatment plant. The well is approximately 200 feet (60 meters) deep and is cased and grouted to approximately 75 feet (23meters). A pump, rated at 450 gallons per minute (gpm) (1,700 liters per minute), delivers water to the plant (BPH, 2003a). Well No. 3, which was constructed in the 1950s, is the secondary well and is located approximately 700 feet (200 meters) east of the treatment plant. This well is approximately 130 feet (40 meters) deep with a 230 gpm (1,000 liters per minute) pump that delivers water from the well to the plant.

According to a Susceptibility Report issued in April 2003 by the West Virginia Bureau for Public Health (BPH), the water supply wells are pumped an average of 200,000 gallons per day (800,000 liters per day), and the overall integrity of the wells meet the Safe Drinking Water Act (SDWA) standards (BPH, 2003b). The aquifer is determined not to be Ground Water Under the Direct Influence (GWUDI) of surface water. GWUDI is defined as any water beneath the surface of the ground that has: (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as Giardia lamblia; or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to weather or surface water conditions.

Within the estimated 1,588 acres (643 hectares) that lie in the wellhead area, approximately 24 land uses exist that are considered high threats for ground water contamination (BPH, 2003b). In general, the 2003 BPH report determined that the wells that supply the drinking water to the Rainelle Water Department are deemed to have a “moderate susceptibility to contamination” due to the sensitivity of the aquifer from which the drinking water wells are located, and the existence of several potential contamination sources within the protection zone (BPH, 2003b).

In May 2002, the Source Water Assessment and Protection Program (SWAPP) report was submitted to BPH, in accordance with the SDWA. The SWAPP report evaluated water quality data from treated drinking water and the untreated water at the source for years 1982 through 2000. The report concluded that “regulated inorganic, nitrate, and radiological finished water quality results were within the acceptable levels;” however, the SWAPP assessment noted that barium levels have been sporadically elevated since the 1980s, and that sodium, iron, and manganese levels have been elevated, especially from the late 1980s through the late 1990s (GFI, 2002). No speculation was made on the cause of rising sodium, iron, and manganese levels in the SWAPP report.

In November 2003, a sanitary survey of the drinking water treatment conducted by BPH indicates that Well No. 6 has shown a fluctuation in iron and manganese content over the past couple of years prior to publication of the report (BPH, 2003a). The iron content in Well No. 3 was reported as being considerably lower than in the primary well; however, the sanitary survey report indicated that Well No. 3 is used primarily as an emergency backup for the drinking water supply, and a consistent long-term supply from this well was not available (BPH, 2003a).

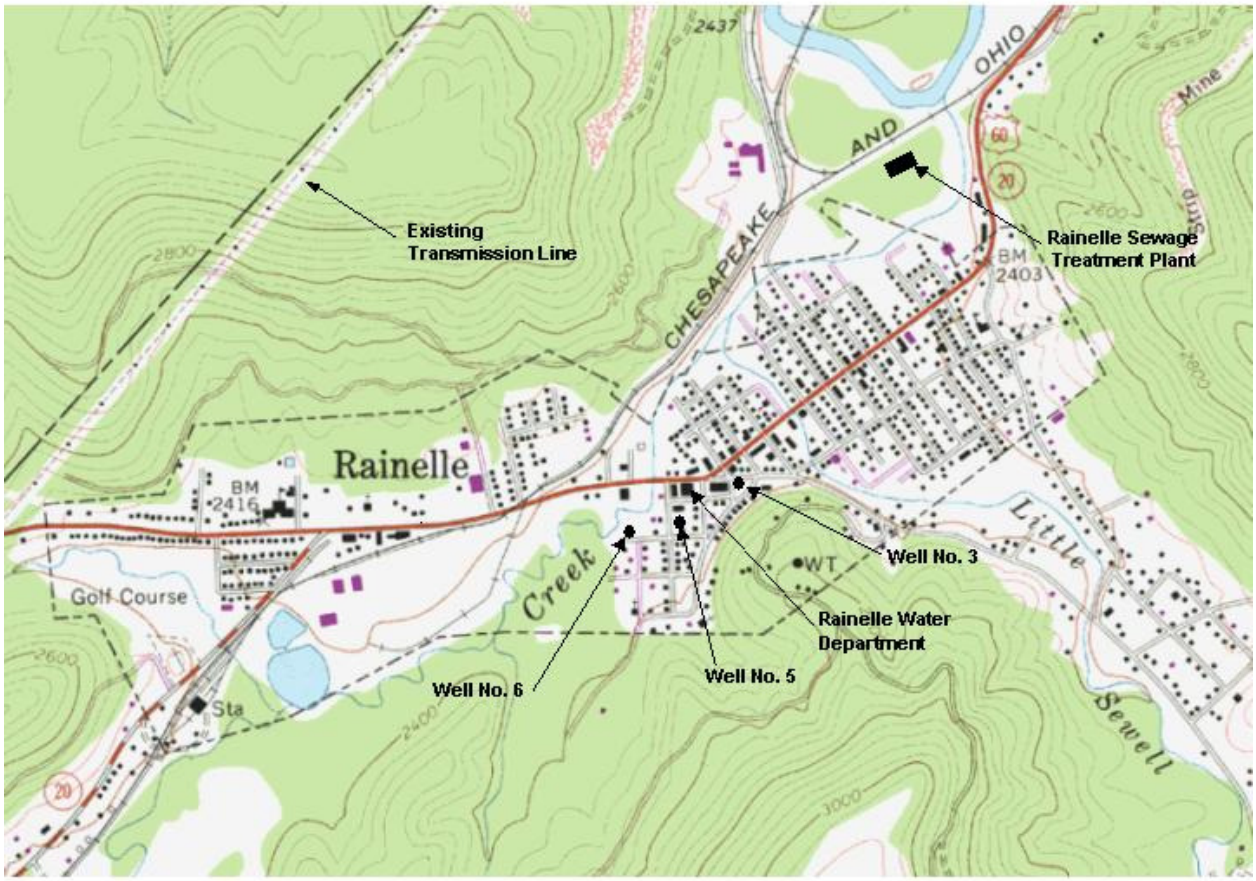


**Figure 3.12-1. Utility Services – Rainelle, WV**

Raw water from the two primary water supply wells enter the treatment plant. Treatment consists of disinfection with chlorine gas, pH adjustment, greensand filtration, and fluoridation. Water quality monitoring at the treatment plant includes analyses for iron, manganese, pH, hardness, alkalinity, fluoride, and free chlorine residual, as well as various contaminants for the analyses of finished water quality. The sanitary survey concluded that the Rainelle water plant was in compliance with SDWA requirements (BPH, 2003a).

### 3.12.2 Wastewater

The Rainelle Sewage Treatment Plant (RSTP), also referred to as Greenbrier County P.S.D. #2, collects and treats Rainelle's wastewater and discharges the treated effluent into the Meadow River. The RSTP has a hydraulic design capacity of 1.3 million gallons per day (MGD) (5 million liters per day) and routinely processes between 0.6 and 1.0 MGD (2 to 4 million liters per day) of municipal waste (RSTP, 2004a). Flows that would exceed the design flow capacity of 1.3 MGD (5 million liters per day) would be by-passed directly to the receiving stream to prevent solids washout or damage to the treatment system.

The RSTP's outflow varies seasonally, and is generally at its lowest flow rate during the mid to late summer season and at its highest between late fall and early spring. Fluctuations in seasonal flow rates are related to seasonal variations in precipitation that affect the rates of infiltration/inflow into the sewage collection system. The average daily flows during the summer vary from 0.4 to 0.6 MGD (1.5 to 2 million liters per day) and flows during the winter vary from 0.8 to 1.0 MGD (3 to 4 million liters per day) (RSTP,

2004a). Figure 3.12-2 exhibits available effluent data provided by the RSTP and illustrates the plant's monthly average flow rates for the years 2001, 2002, and 2003 (RSTP, 2004b). During this period, the lowest average flow rate occurred in September 2002, with a monthly average of 0.525 MGD (2.0 million liters per day), and peaked in November 2002 with a monthly average of 1.147 MGD (4.3 million liters per day).

The RSTP process consists of extended aeration oxidation ditches, mechanical aerators, and clarifiers to separate the solids from the wastewater and then return the effluent to the aeration for additional oxidation. An aerobic digester is used for additional reduction of biodegradable solids and to increase the percentage of solids that are dewatered in a belt filter press. The sewage sludge is applied to WVDEP-approved land application sites.

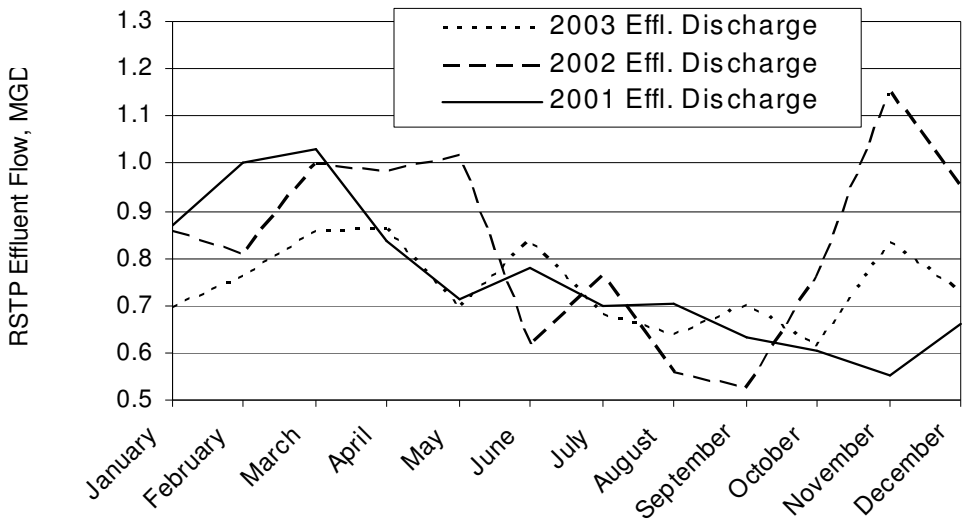


**Figure 3.12-2. RSTP Monthly Average Effluent Discharge for 2001, 2002, and 2003**

*Source: RSTP, 2004b*

In order for WVDEP to establish allowable daily levels for the plant's effluent discharge, effluent metals monitoring was performed May 1, 2000 through August 31, 2000 and is summarized in Table 3.12-1. Currently, the RSTP's discharge permit requires only copper and lead to be monitored and reported.

**Table 3.12-1. RSTP Effluent Metals Monitoring (May 1, 2000 to August 31, 2000)**

| Metal | Average (mg/L) | Min (mg/L) | Max (mg/L) | Permit Limits Daily Max (mg/L) |
|---|---|---|---|---|
| Zinc | 0.059 | 0.0171 | 0.38 | N/A |
| Copper | 0.0094 | 0.0053 | 0.017 | 0.0166 |
| Lead | 0.00095 | 0.0006 | 0.0038 | 0.0033 |
| Silver | 0.0003 | 0.0003 | 0.0004 | N/A |
| Arsenic | Not Detected | | | N/A |
| Cadmium | Not Detected | | | N/A |
| Mercury | Not Detected | | | N/A |

*Source: REI Consultants, Inc., 2000*

Based on data provided by the RSTP, Table 3.12-2 summarizes the monthly averages of flow parameters over a five-month period (September 2003 through January 2004). The copper limit was exceeded on June 26, 2000, and lead on May 1, 2000.

**Table 3.12-2. RSTP Flow Characteristics - Monthly Averages (Sept 2003- Jan 2004)**

| Month | Plant Flow (MGD) | Influent $BOD_5$ (mg/L) | Effluent $BOD_5$ (mg/L) | Influent TSS (mg/L) | Effluent TSS (mg/L) | Effluent pH | Effluent Temperature (°C) |
|---|---|---|---|---|---|---|---|
| September | 0.70 | 122 | 2.3 | 113.0 | 4.8 | 7.16 | 17.8 |
| October | 0.61 | 146.2 | 2.6 | 156.4 | 6.6 | 7.11 | 14.6 |
| November | 0.83 | 59.0 | 2.8 | 104.3 | 4.5 | 7.14 | 13.0 |
| December | 0.73 | 87.2 | 3.6 | 84.2 | 6.2 | 7.08 | 9.5 |
| January | 0.73 | 85.5 | 4.3 | 98.0 | 8.0 | 7.16 | 6.3 |

*Note: $BOD_5$ – 5-day biochemical oxygen demand, TSS – total suspended solids; Source: RSTP, 2004c*

### 3.12.3 Electric

West Virginia is among one of several states represented in the East Central Area Reliability Coordination Agreement (ECAR), which is one of ten Regional Reliability Councils comprising the North American Electric Reliability Council (NERC). NERC was formed by the electric utility industry in 1968 to promote the reliability of bulk power supply in the electric utility systems of the United States and Canada. PJM is the regional transmission organization that operates the transmission system in the Mid-Atlantic area in which the subject transmission lines are located.

There are 15 regulated private electric utilities in the state of West Virginia, three of which generate electric power, while the rest are solely transmission and distribution companies. American Electric Power (AEP) is one of the electric companies providing services in the part of Greenbrier County that includes Rainelle. In January 2001 the Public Service Commission of West Virginia (PSC) issued a report that forecasts the supply-demand for electrical energy during a 10-year period (winter 2000-2001 through summer 2010) in the ECAR area. The report concluded that neither the utility companies nor the PSC anticipate that demand will exceed installed capacity or planned supply purchases in the forecast period; however, the report indicated that the projected gap between planned capacity and demand is decreasing both regionally and nationally, which could result in an increase in the probability of electrical shortages (PSC, 2001). The report projected that, in general, peak electric demand is anticipated to increase over the forecasted period at approximately 1.7 percent per year.

As shown in Figure 3.12-1, a power transmission right-of-way (ROW) for an existing 69 kV transmission line extends from Rainelle in a northeastern direction along the western boundary of Greenbrier County. The ROW is approximately 4,000 feet (1,200 meters) northwest of the plant site. The ROW is currently owned and operated by AEP and consists of wooden utility poles that, depending on the topography, vary from 40 to 45 ft (12 to 14 meters) in height (Neely, 2005). The transmission line continues northeast for approximately 7 miles (11 kilometers) from the project area before it reaches the McClung substation just south of Quinwood (see Chapter 2, Figure 2.4-9 – Corridor Options). The line then continues north for approximately 11 (18 kilometers) before it reaches the Grassy Falls substation. The total length of the transmission corridor, from Rainelle to the Grassy Falls substation, is approximately 18 miles (29 kilometers).

### 3.12.4 Telecommunications

Verizon West Virginia, Inc. and Frontier Communications of West Virginia are the two main telecommunication providers for Greenbrier County. Verizon WV, Inc. serves approximately 813,000 customers in the state and provides 250,000 miles (400,000 kilometers) of fiber optic lines and digital equipment that link nearly 150 communities in West Virginia, including the community of Rainelle.

### 3.12.5 Solid & Hazardous Waste Management

In response to a 1988 EPA report predicting that 45 percent of all U.S. landfills would be filled to capacity by 1991, the state of West Virginia authorized the creation of regional and county solid waste authorities, established "wasteshed" areas, and implemented other legislative requirements for more stringent control on solid waste management. In West Virginia, the Solid Waste Management Board (SWMB) is the coordinator between the Solid Waste Authorities (SWA) and other state agencies involved in solid waste management, and is mainly responsible for providing technical assistance in the preparation, review, implementation and update of solid waste control plans and facility siting plans.

**Table 3.12-3. Projected Monthly Municipal Solid Waste Tonnage for Wasteshed F**

| County | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|
| Greenbrier | 2,045 | 2,014 | 1,999 | 1,998 | 2,005 |
| Nicholas | 1,590 | 1,572 | 1,562 | 1,559 | 1,559 |
| Pocahontas | 541 | 533 | 530 | 530 | 530 |
| Webster | 563 | 542 | 526 | 514 | 504 |
| Wasteshed F Totals | 4,739 | 4,661 | 4,617 | 4,601 | 4,598 |

*Source: SWMB, 2005*

Due to a variety of demographic and geographic factors, the number and capacity of solid waste management facilities varies from region to region. For this reason, West Virginia has been divided into seven zones, or "wastesheds," determined on the basis of demographic characteristics and local needs for waste management. Greenbrier County is part of Wasteshed F, which also includes Nicholas, Pocahontas and Webster Counties (see Table 3.12-3). In January 2005 the SWMB released the West Virginia Solid Waste Management Plan that includes descriptions and analyses for each of the State's wastesheds. Based on historical data from submitted landfill tonnage reports and demographic projection studies, the SWMB projects the amounts of solid waste that would be generated in each county. Table 3.12-3 summarizes the solid waste projections.

Each of the counties in Wasteshed F has an approved solid waste facility. The Greenbrier County Landfill is a Class B publicly owned-facility located in Lewisburg. The city of Rainelle hauls its solid waste to the Greenbrier County Landfill, approximately 30 miles (50 kilometers) away, and hauls its recyclables to the Rainelle Recycle Center. The Greenbrier County SWA operates the Greenbrier facility, which has a permitted capacity limit of 9,999 tons (9,071 metric tons) per month. Based on 2003 solid waste data, the Greenbrier County Landfill received an average quantity of 3,660 tons (3,320 metric tons) of waste per month, of which 8.3 percent was generated outside the wasteshed. Although a schedule is uncertain at this time, the SWA has plans to expand the Greenbrier County landfill to a state-of-the-art facility that will also serve as a construction/demolition debris landfill, a recycling center, and a composting site (SWMB, 2005).

The EPA separates hazardous waste generators into three categories, based on the quantity of waste generated per month:

- Conditionally exempt small quantity generators (CESQGs) generate less than 220 lbs (100 kg) per month;
- Small quantity generators (SQGs) generate between 220 lbs (100 kg) and 2,200 lbs (1,000 kg) per month; and
- Large quantity generators (LQGs) generate more than 2,200 lbs (1,000 kg) per month.

Specific rules apply to each category of generator. For example, CESQGs must comply with three basic waste management requirements to remain exempt from the full hazardous waste regulations that apply to generators of larger quantities (SQGs and LQGs). They must: (1) identify all hazardous wastes that are generated; (2) not store more than 2,200 lbs (1,000 kg) of hazardous waste on site at any time; and (3) ensure delivery of hazardous waste to an off-site treatment or disposal facility. LQGs and SQGs must obtain and use an EPA identification number. EPA and states use these 12-character numbers to monitor and track hazardous waste activities. SQGs cannot accumulate more than 2,200 lbs (1,000 kg) of waste on-site before properly disposing of the material either on-site or delivering waste to a permitted Treatment, Storage and Disposal (TSD) Facility. In order to maintain this status, a facility must make a hazardous waste determination and document the amount of hazardous waste generated each month.

### 3.12.6 Public School System

The Greenbrier County Public School System maintains 14 public schools, including 10 elementary schools, two middle schools, and two high schools (see Figure 3.12-3 and Table 3.12-4). Based on U.S. Department of Education (DOED) statistics, the Greenbrier County school district serves an approximate student population of 5,492 in pre-kindergarten through 12th grade (DOED, 2002).

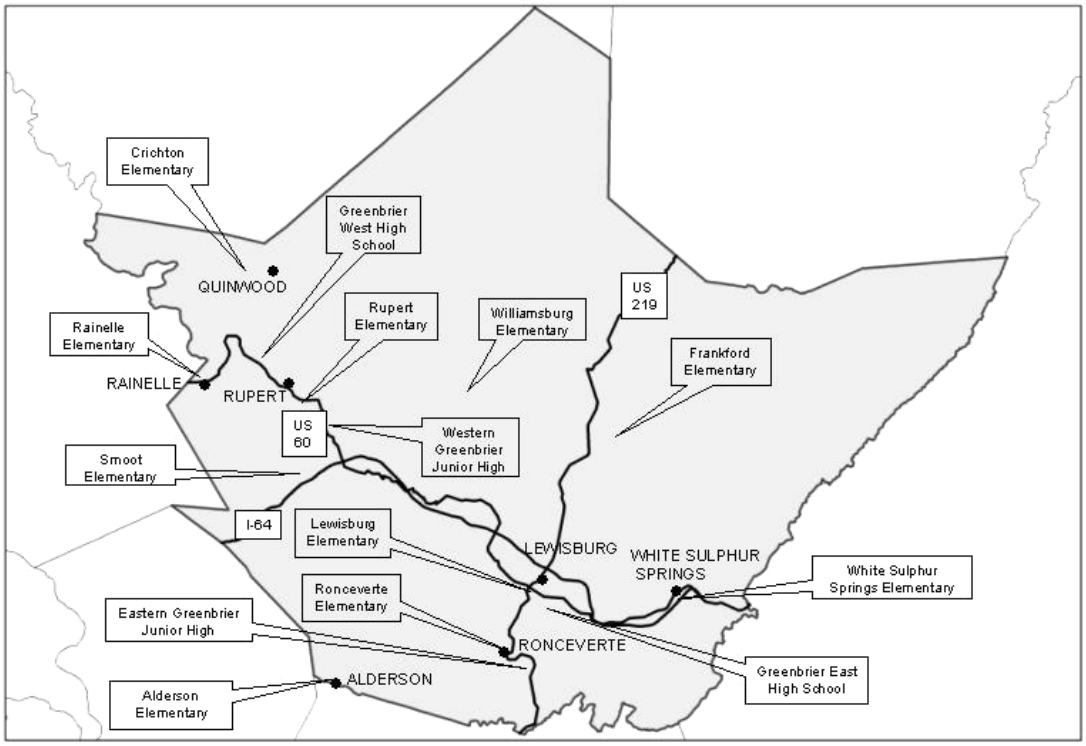


**Figure 3.12-3. Greenbrier County Public School System**

**Table 3.12-4. Greenbrier County Public School System (2002)**

| Key Statistics | | Resources | |
|---|---|---|---|
| Grade Levels | Pre-K to 12 | Pre-K Teachers | 5 |
| Number of Students | 5,492 | Kindergarten Teachers | 22 |
| Full-Time Teachers | 370 | Elementary Teachers | 149 |
| Student/Teacher Ratio | 14.9:1 | Elementary Counselors | 5 |
| Per Pupil Expenditure | $4,662 | Middle/High School Teachers | 153 |
| | | Middle/High School Teachers | 10 |
| | | Librarians | 5 |

*Source: National Center for Education Statistics, 2002*

Figure 3.12-3 and Table 3.12-4 provide an overview of the county's educational resources. Two schools are located within the Rainelle city limits: Rainelle Elementary School (public) and Rainelle Christian Academy (private). The Rainelle Elementary School offers pre-kindergarten to sixth-grade level education. Based on the 2001-2002 school year, the school had 241 students enrolled, 15 full-time teachers, and an average student-to-teacher ratio of 15.6 to 1 (DOED, 2002). Western Greenbrier Middle School in Crawley (grades 6 through 8) and Greenbrier West High School in Charmco (grades 9 through 12) serve surrounding rural communities, including Rainelle.

### 3.12.7 Law Enforcement

The law enforcement agencies that serve Greenbrier County are listed in Table 3.12-5. The Greenbrier County Sheriff's Department is responsible for law enforcement and public safety in the unincorporated areas of the county. The law enforcement departments that serve Rainelle are the West Virginia State Police-Rainelle detachment (Troop 6), Rainelle Police Department, Greenbrier County Sheriff's Department, and West Virginia State Police-Lewisburg detachment. The West Virginia State Police-Rainelle detachment (Troop 6) is located in Rainelle on John Raine Drive and is on call for emergencies throughout the state. There are currently four officers assigned to the Rainelle detachment, with vehicles assigned to each officer.

**Table 3.12-5. Greenbrier County Law Enforcement Agencies**

| Agency | City |
|---|---|
| Alderson Police Department | Alderson |
| Greenbrier County Sheriff's Department | Lewisburg |
| Lewisburg Police Department | Lewisburg |
| Rainelle Police Department | Rainelle |
| Ronceverte Police Department | Ronceverte |
| White Sulphur Springs City Police Department | White Sulphur Springs |

### 3.12.8 Fire Protection

The Rainelle Fire Department is located just south of the Rainelle city limits. The department comprises one station and its members are on a voluntary basis. The department serves a population of approximately 5,500 and covers an area spanning 70 square miles (110 square kilometers). Although their

primary response district includes the communities of Rainelle, Charmco, McRoss, Lilly Park, Bellwood, and Springdale, the department also provides aid to surrounding departments in Greenbrier and Fayette counties, and along major transportation routes such as US 60 and I-64. There are also voluntary fire departments located in the cities of Quinwood and Rupert.

### 3.12.9 Health and Emergency Services

Greenbrier County is served by one hospital, the Greenbrier Valley Medical Center located in Ronceverte, which is approximately 30 miles (50 kilometers) southeast of Rainelle. The facility is a 122-bed hospital with 400 employees, including a medical staff of more than 90 physicians. Triad Hospitals acquired the hospital in 2000, and from 2001 through 2005 the facility was rebuilt and expanded into a 135,000 square-ft (41,000 square-meter) facility. There are also five community clinics across the county providing internal medicine and general healthcare services, including the Rainelle Medical Center located at the intersection of US 60 and WV 20. The medical center is a Federally Qualified Health Center providing health and treatment services through its 30,000 square-foot (9,000 square-meter) main site in Rainelle and two smaller satellite clinics in Rupert and Meadow Bridge, which mainly provide community-oriented primary care, immunization, and preventive programs.

The Rainelle Medical Center's service area covers the western half of Greenbrier County, which includes the cities of Rainelle, Rupert, Meadow Bridge, and several unincorporated communities, as well as adjoining portions of Nicholas, Fayette and Summers Counties. The staff includes six physicians, several nurses, one pharmacist, and miscellaneous staff support. Currently, the main medical center in Rainelle has enough capacity to expand to two more physicians, if needed. The medical center has three ambulance vehicles, and its property also houses additional ambulance vehicles for a separate satellite emergency services company that is headquartered in Quinwood. According to local officials, in addition to the Rainelle Medical Center, the residents of the Rainelle community usually visit the Greenbrier Valley Medical Center.

# 3.13 Transportation and Traffic

This section describes the existing transportation system within the vicinity of the proposed Co-Production Facility and coal refuse sites, including the regional intermodal infrastructure. In addition, current traffic volumes and transportation safety issues are presented in this section. Discussions on road safety and vehicular accidents are presented in Section 4.14 (Public Health and Safety).

## 3.13.1 Regional Transportation System

Figure 3.13-1 illustrates the significant roadways that serve the project region, which include I-64, US 60, US 219, WV 20, CR 1, and WV 12. I-64 is one of the main east-west arterials that serve West Virginia, as well as the bordering states of Virginia and Kentucky. I-64 traverses the southern portion of Greenbrier County and major cities along its route include Richmond, Charleston, Lexington, and St. Louis. US 60, a designated scenic byway, also provides a major east-west alternative. Many of the smaller rural county and State routes that run north-south, for example WV 20, connect to US 60. As a consequence, US 60 provides the main access route to Rainelle as it passes through the center of town. US 219 is a significant north-south arterial for West Virginia, which runs from Canada to Princeton, WV, and crosses Greenbrier County.

Greenbrier Valley Airport is located 5 miles (8 kilometers) north of Lewisburg and is the closest public airport to Rainelle, approximately 30 miles (50 kilometers) driving distance from Lewisburg. The Rainelle Airport is a privately owned airport located 3 miles (5 kilometers) southeast of Rainelle. Public transit services in Greenbrier County are provided by the Mountain Transit Authority (MTA), which provides general public bus transportation to Greenbrier, Fayette, Nicholas, and Webster Counties. Currently there is no local commuter transit system serving Rainelle. The closest MTA transit link is located in Summersville, located about 35 miles (56 kilometers) northwest of Rainelle.

Approximately 420 miles (680 kilometers) of navigable waterways exist in West Virginia, including the Port of Huntington/Tri-State, which is 155 miles (250 kilometers) northwest of Rainelle. There are no navigable waterways in Greenbrier County.

West Virginia is served by two major Class I railroads: CSX Transportation (CSXT) and Norfolk Southern (NS). Railroads are categorized by size, and Class I railroads are those with an annual operating revenue of $250 million or more (BTS, 2005). The CSXT and Nicholas, Fayette & Greenbrier (NF&G) rail lines are the commercial freight lines that operate in Greenbrier County. The closest passenger rail station to Rainelle is Amtrak's station located at Prince, approximately 25 miles (40 kilometers) south of Rainelle.

## 3.13.2 Regional and Local Roadway Network

The roadway network in Greenbrier County consists primarily of rural (less than 16 feet [5-meter] wide) two-lane roads. As shown in Figure 3.13-1, I-64 and US 60 provide the primary east-west access in the county and US 219 provides the primary north-south access. The major arterials are mainly two-lane asphalt roads, except for I-64, which is a four-lane divided highway. Primary roadways into Rainelle include US 60 and WV 20, which provide the town's main link to the regional highway system.

### *3.13.2.1 Regional Roadway Network*

Over the past several decades, several major roadway improvements have occurred in Greenbrier County, including the completion of I-64, which marked the connection of Greenbrier County with the rest of the interstate system. I-64 is a major east-west, four-lane divided highway that connects the major cities of Huntington, Charleston and Beckley, and the adjoining states of Kentucky and Virginia. Traffic en

route to Rainelle from I-64 westbound can take the US 60 Midland Trail/Sam Black Church interchange (exit 156), while I-64 eastbound traffic can take the WV 20-Sandstone/Hinton interchange (exit 139). Boxley Quarry is located on WV 12 off of US 60, which can be accessed from I-64 at the Alta interchange (exit 161), 5 miles (8 kilometers) east of exit 156. Mill Point Quarry is located approximately 30 miles (50 kilometers) north of the I-64 interchange at US 219-Lewisburg/Ronceverte (exit 169). There are several planning councils that envision the development of a technology corridor on I-64 between White Sulphur Springs/Lewisburg (Greenbrier County) and Beckley (Raleigh County). The I-64 High Technology Corridor program proposes to develop recommendations on the expansion and development of technology assets in the southern region of West Virginia. The I-64 High Technology Corridor program proposes to develop recommendations on the expansion and development of technology assets in the southern region of West Virginia, and would impact seven counties, including Greenbrier County (R4PDC, 2003).

Before the development of I-64, US 60 was the main east-west route through the West Virginia mountains for trucks and automobiles. With the completion of I-64, US 60 was designated a State Scenic Byway, often referred to as the Midland Trail National Scenic Highway. This byway is part of a historic route connecting the Ohio River with the tidewater area in Virginia. In West Virginia, the Midland Trail begins at the State capital, Charleston, and continues southeast through Rainelle for 120 miles (190 kilometers) to the preserved colonial town of Lewisburg and past White Sulphur Springs to the eastern border of the State. From Rainelle to the Virginia border, US 60 runs in a general southeast direction through mostly flat, rural land and gently rolling hills providing scenery and access to historical and recreational attractions.

#### *3.13.2.2 Local Road Network*

US 60 and WV 20 provide the main access to Rainelle, Quinwood, Rupert, and other rural towns in western Greenbrier County. US 60 is an important road, regionally and locally, as it is a designated byway, part of the Coal Resources Transportation System (CRTS), and a primary road that connects the county to the interstate. As US 60 and WV 20 enter Rainelle from the west, they merge and continue through town as the same road (US 60/WV 20). The majority of Rainelle's roads and businesses converge on US 60/WV 20, referred to as Kanawha Avenue in the western part of Rainelle and Main Street in the east. US 60/WV 20 provides access points to minor roads that lead into residential or business areas, which are laid out in small clusters of conventional grid-like patterns on either side of US 60/WV 20. An active CSXT rail line cuts across US 60/WV 20 near the center of town. Access to the project property is via Tom Raine Drive on WV 20, just south of its junction with US 60.

WV 20 and CR 1 are considered a minor arterial and collector, respectively. WV 20 traverses in roughly a north-south manner from Nicholas County to Summers County, providing access to Green Valley in the north and various recreational facilities near Bluestone and New River Gorge National River Park in the south. In the western part of Rainelle, WV 20 joins with US 60 and then separates from US 60 in Charmco, continuing northward into Green Valley, Nicholas County (add distance). Anjean Rd (CR 1) originates in Rupert where it intersects US 60, and approximately 5 miles (8 kilometers) north of Anjean, CR 1 becomes a single-lane road, approximately 10 feet (3 meters) in width with a 3-foot (1-meter) gravel shoulder. The route from Anjean to Donegan consists of taking CR 1 (turns into CR 39 north of Nicholas-Greenbrier County border) and an abandoned access road that was used in the past for hauling coal. The route to Donegan on this access road continues north for approximately 10 miles (16 kilometers) to Donegan. The coal refuse sites are in remote areas and several scattered residential properties are encountered along the roads near these sites.

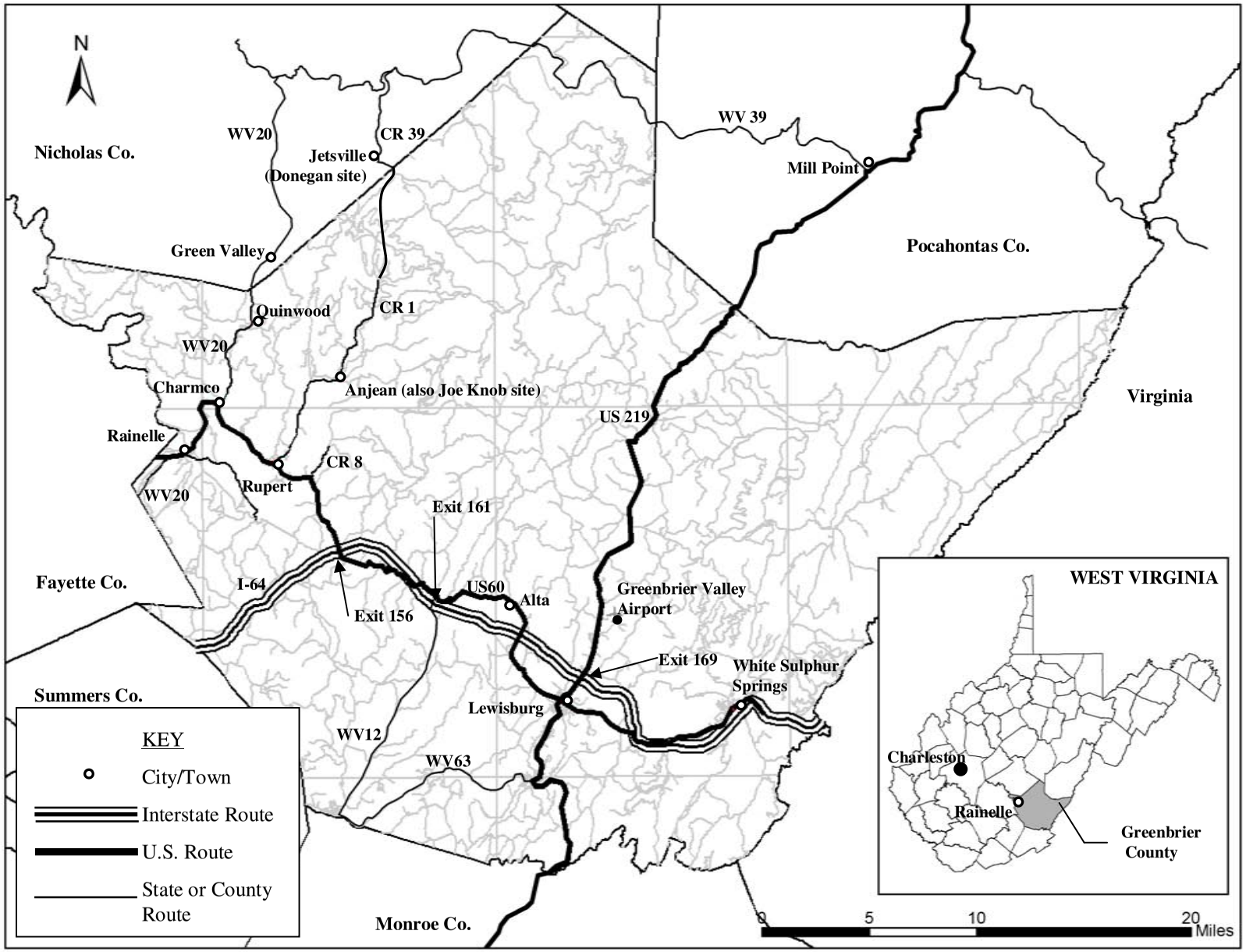


**Figure 3.13-1**
Regional Transportation System, Greenbrier County, WV

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### *3.13.2.3 Legal Limits*

Senate Bill 583, which reorganized and revised West Virginia's weight enforcement laws and resources pertaining to heavy trucks and commercial motor vehicles, went into effect in July 2003. The new law transferred weight enforcement responsibility from the WVDOH to the West Virginia Public Service Commission (PSC). As a result of the bill, the CRTS was established, which allows coal trucks to obtain PSC permits for hauling loads heavier than load limits otherwise allowed on State-maintained public highways. A CRTS-designated road is a road designated by the WVDOT as safe and sufficient to allow vehicles hauling coal to carry a greater gross and axle weight of up to 120,000 lbs (60 tons [54 metric tons]) with a 5 percent allowance. All shippers and receivers of coal transported by truck over any CRTS road are now required to report truck weights electronically to the PSC. CRTS permits are required for annual renewal, with permitting fees funding the maintenance of CRTS roads.

The CRTS applies to almost 2,000 miles (3,000 kilometers) of roadway and 691 bridges throughout 15 southern counties in West Virginia, including Greenbrier County. The maximum allowable weights permitted on the CRTS are determined on a road-by-road basis by WVDOT. Figure 3.13-2 displays the CRTS routes in Greenbrier County that have been established as of March 2005 and the load limits associated with the different types of coal trucks. Figure 3.13-2 also depicts the bridges that are located on the CRTS routes in Greenbrier County. As of March 2005, there are only two bridges on the CRTS within Greenbrier County having weight restrictions, neither of which is on US 60. The maximum load weight that the bridges listed in Figure 3.13-2 can accommodate is 120,000 pounds (54,400 kilograms) with a 5 percent tolerance (WVDOH, 2005b).

The length of US 60 between Rainelle and I-64 (exit 156) runs 14 miles (23 kilometers) as part of the CRTS and encounters six bridges. The route from Rainelle and Green Valley runs 12 miles (19 kilometers) as part of the CRTS and encounters five bridges, while Rainelle to Anjean, also within the CRTS, runs 14 miles (23 kilometers) and encounters four bridges. The route to the Donegan site (approximately 14 miles north of Anjean on CR 1), which partially includes an abandoned access road that was used in the past to haul coal, is currently not part of the CRTS. From Anjean to Donegan there are a few concrete bridges, which are deteriorated and may require upgrades prior to the introduction of new truck traffic. Any consideration for CRTS inclusion would require an application and permit fee paid to the PSC. The miscellaneous allowable limits for vehicles in Greenbrier County are also summarized in Table 3.13-1.

**Table 3.13-1. Maximum Allowable Limits for Roads in Greenbrier County, WV**

| **Gross Weight Load Limit** | |
|---|---|
| Limits for Roads (excluding those included in the CRTS*) | |
| I-64 | 80,000 lbs (40 T) |
| Routes 12, 63, 92, 60, 219 | 80,000 lbs (40 T) |
| Route 1 | 65,000 lbs (32.5 T) |
| Limits for Roads included in the CRTS* (see Figure 3.13-2) | |
| 2-axle Dump Truck (for coal) | 80,000 lbs (40 T), plus 5% tolerance |
| 3-axle Dump Truck (for coal) | 90,000 lbs (45 T), plus 5% tolerance |
| 5-axle Tractor – Semi-trailer (for coal) | 110,000 lbs (55 T), plus 5% tolerance |
| 6-axle Tractor – Semi-trailer (for coal) | 120,000 lbs (60 T), plus 5% tolerance |

**Table 3.13-1. Maximum Allowable Limits for Roads in Greenbrier County, WV (continued)**

| **Vehicle Width** | |
|---|---|
| Non-designated highways (lanes under 10' wide) | 8 ft |
| Designated highways | 8 ft 6 in |
| **Vehicle Length** | |
| Single Unit (inclusive of front and rear bumper) | 45 ft |
| Semi-trailer (non-designated highways) | 48 ft |
| Semi-trailer (designated highways) – Measurement from tractor rear axle to trailer first axle cannot exceed 37') | 53 ft |

*Note: To convert pounds to kilograms, multiply by 0.454. To convert tons (US) to metric tons (Metric), multiply by 0.907. To convert feet to meters, multiply by 0.305. To convert inches to centimeters, multiply by 2.54.*
**CRTS – Coal Resource Transportation System*

*Source: WVDOH, 2005b*

## 3.13.3 Regional and Local Traffic

### *3.13.3.1 Existing Regional Traffic Volumes*

Figure 3.13-3 is based on WVDOH's Average Daily Traffic (ADT) data for the year 2003 and provides a general overview of regional traffic volumes at various locations on or near US 60. The ADT is a typical measure of traffic volume and is defined as the number of vehicles that pass a particular point on a roadway during a period of 24 consecutive hours, averaged over a period of 365 days. These counts were recorded using automatic traffic recorders (ATR). WVDOH has converted the ATR volumes to ADT values using adjustment factors to reflect variations in the season, day-of-the-week, functional class of the road, and number of axles in a truck (WVU, 2002).

Based on conversations with WVDOH and an examination of the adjustment factors, historically there has been more traffic movement in the summer months than winter months for Greenbrier County due to the increased recreational and agricultural traffic in the summer (WVDOH, 2004a). The months of June, July, and August usually witness the highest traffic volumes, especially US 60 due to its scenic byway designation and the many industrial hauling trucks, including coal and lumber transport (WVDOH, 2004b).

On February 4 and 5, 2004 and November 17, 2004, WVDOH also performed nine-hour traffic counts of four intersections key to the project (Intersections 1, 2, 3, and 4 in Figure 3.13-3). Table 3.13-2 summarizes the traffic volumes collected and the percentage of trucks during the nine-hour period for key intersections on US 60 in Rainelle, Charmco, and Rupert; and on US 219 in Mill Point. The ADT values were adjusted from the nine-hour counts.

Although these counts were recorded up to only two days out of the year, they provide general insight on the truck volumes and traffic patterns on US 60 and US 219 in the region. These four intersections essentially act as T-intersections and are controlled by stop signs on the minor streets, with US 60 being the major street for Intersections 1, 2, and 3 and US 219 for Intersection 4. The nine-hour counts at each intersection reflect relatively low automobile and truck volumes, which is expected given the rural nature of the region.

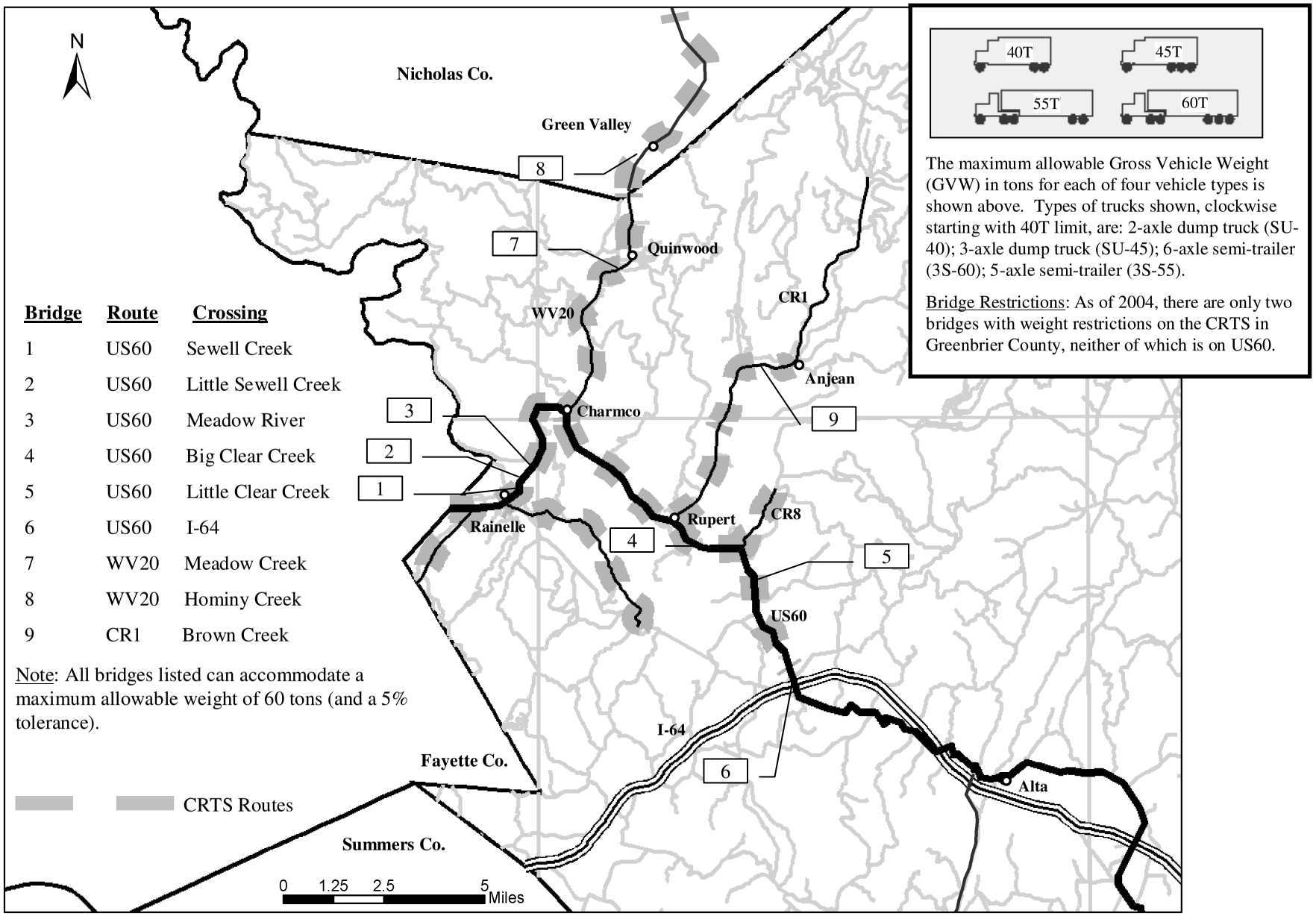


**Figure 3.13-2.**
Coal Resource Transportation System (CRTS) Along Project Routes

Source: WVDOH, 2005b

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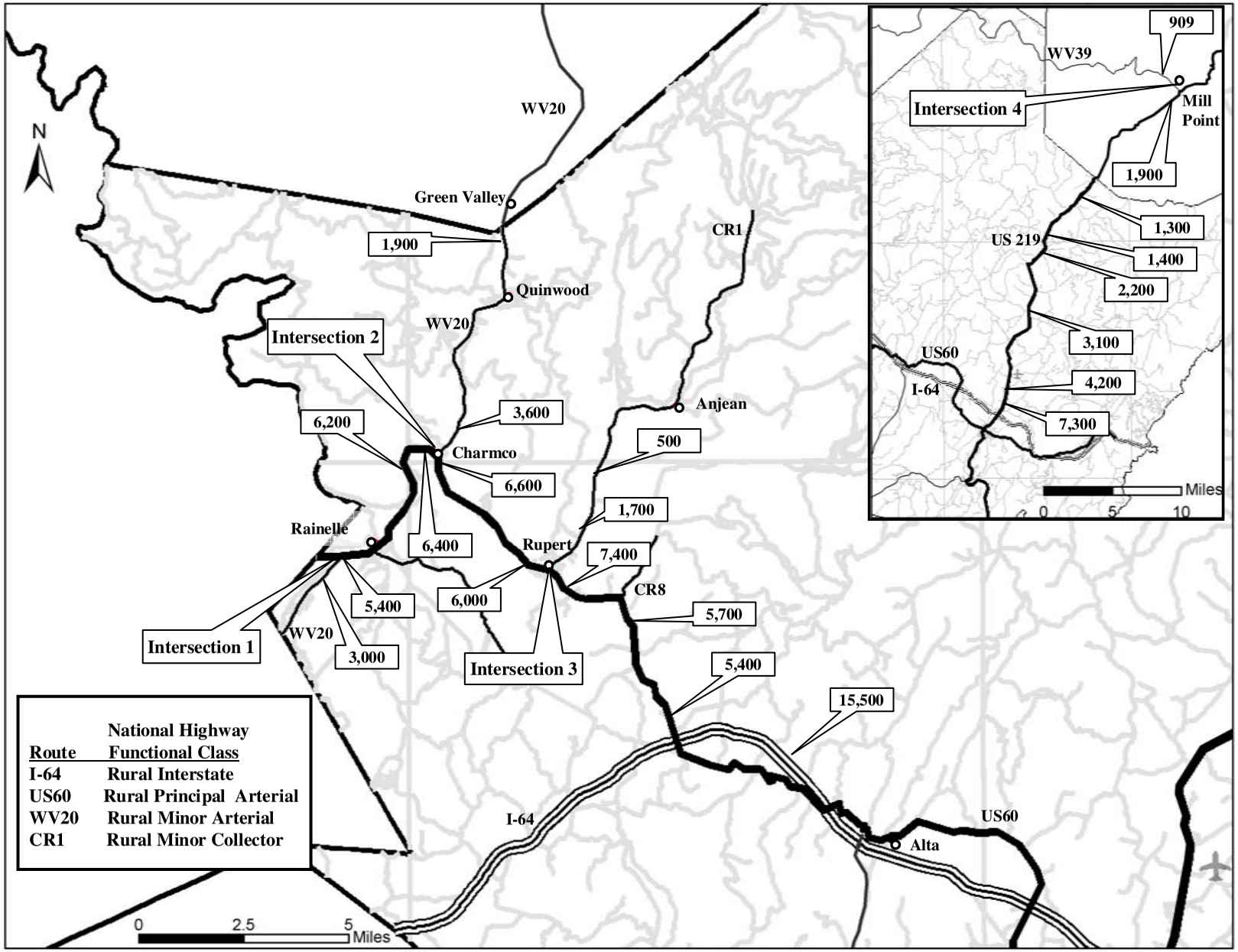


**Figure 3.13-3.**
WVDOT's 2003 Average Daily Traffic (ADT) for US60 in Greenbrier County, WV
Source: WVDOH, 2003a

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**Table 3.13-2. Nine-Hour Traffic Counts*, Key Intersections (February 4 and 5, 2004)**

| | Total # of Vehicles (9-hr count) | # of Commercial Trucks** (9-hr count) | % Commercial Trucks |
|---|---|---|---|
| **Intersection 1: US 60 and WV 20 (Rainelle) – 3,624 ADT*** ** | | | |
| US 60 Eastbound | 907 | 78 | 8.6% |
| US 60 Westbound | 1,936 | 92 | 4.8% |
| WV 20 Northbound | 1,142 | 47 | 4.1% |
| **Intersection 2: US 60 and WV 20 (Charmco) – 2,828 ADT** | | | |
| US 60 Eastbound | 1,339 | 67 | 5.0% |
| US 60 Westbound | 1,341 | 100 | 7.5% |
| WV 20 Southbound | 705 | 60 | 8.5% |
| **Intersection 3: US 60 and CR 1 (Rupert) – 5,541 ADT** | | | |
| US 60 Eastbound | 1,583 | 81 | 5.1% |
| US 60 Westbound | 1,412 | 100 | 7.1% |
| CR 1 Southbound | 612 | 7 | 1.1% |
| **Intersection 4: US 219 and WV 39 (Mill Point) – 4,888 ADT** | | | |
| US 219 Northbound | 623 | 68 | 10.9% |
| US 219 Southbound | 693 | 112 | 16.2% |
| WV 39 Eastbound | 311 | 122 | 39.2% |

**9-hour counts occurred between the hours of: 7am-10am, 11am-1pm, and 2pm and 6pm.*
***Commercial Trucks include: single unit trucks (2- to 4-axle); tractor trailer combinations (3- to 6-axle); and multi-trailer combinations (5- to 6-axle and buses).*
****ADT – Average Daily Traffic is a 24-hour average adjusted from the 9-hour count. ADT has been adjusted using the monthly, daily, functional class, and truck adjustment factors.*

*Source: WVDOH, 2004c*

### *3.13.3.2 Existing Local Traffic Conditions – Study Intersections & Methodology*

Traffic counts were taken during 15-minute intervals within a prescribed 1.5- to 2-hour timeframe for morning (AM), mid-day (MID), and early evening (PM) traffic hours. The timeframes were chosen by assuming typical rush hour schedules that capture peak hour scenarios. For example, morning counts usually included the 6:30 a.m. through 8:30 a.m. time period, because most commuting and school traffic occur during this period. Counts were collected on a Tuesday, Wednesday, or Thursday during the months of May and October 2004. The peak hour traffic volumes for each turning movement at each intersection are shown in Figures 3.13-4 and 3.13-5. Levels of service (LOS) (see Section 3.13.3.3) were calculated based on these traffic counts.

Shortly after US 60 crosses the Fayette-Greenbrier County Line, it enters the municipality of Rainelle and joins WV20 going eastward (see Figure 3.13-4). The project site lies just beyond this intersection, south of a U.S. Army Reserve Center and Sewell Creek. US 60/WV 20 (Kanawha Avenue) provides the main access to the majority of the town's businesses and neighborhood roads, and carries the main flow of local traffic. This route also serves regional industrial and recreational transportation. Currently, US 60/WV 20 in Rainelle operates at an LOS of A and B depending on the time of the day. At the present time, there is only one traffic signal in Rainelle, located at the intersection of 7$^{th}$ Street and US 60/WV 20 (Main Street).

Traffic data on key roads and intersections were obtained through field studies to analyze and describe the baseline traffic conditions in key areas of Rainelle, Charmco, and Rupert. All of the studied intersections are two-way stop-controlled (TWSC) intersections, with the exception of Intersection D, which uses traffic signal lights. Figures 3.13-4 and 3.13-5 display the locations and the existing turning movements for each of the following intersections (photos of the intersections can be found in Appendix J, Traffic Modeling Output and Intersection Photos).

### Intersection A – WV 20 and Tom Raine Drive (in Rainelle)

Tom Raine Drive is a two-lane road with no curbing, sidewalk, or shoulders. It is considered the minor street at this intersection and is controlled by a stop sign, with available width to support separate right and left turn movements onto WV 20. The road is a short dead-end street that provides access to a U.S. Army Reserve Center, the main office of the Greenbrier County Public Service District #2, the Rainelle Industrial Park and the proposed plant site (see Section 3.11, Land Use). Tom Raine Drive also provides access to John Raine Drive, a through street providing a direct route to the Park Center Shopping Complex. Immediately east of the intersection there is an entrance driveway to the U.S. Army Reserve Center. Although there are no posted speed signs, the speed observed for most of the vehicles remained more or less at 15 miles per hour (mph) (24 kilometers per hour [kph]). A rail line that runs parallel to WV 20 intersects Tom Raine Drive approximately three car lengths (30 to 40 feet [9 to 12 meters]) behind the stop sign. The rail cars that pass through are generally infrequent and slow. Only railroad crossing signs are posted to serve as a warning. WV 20, also referred to as South Sewell Street, is considered the major street for this intersection and is a minor arterial for Greenbrier County. It is a two-lane road with no curbing or sidewalk at this intersection. The posted speed limit is 40 mph (64 kph). Fayette Avenue is a one-way westbound residential street located across Tom Raine Drive.

### Intersection B – WV 20 (South Sewell Street) and US 60 (in Rainelle)

Intersection B is located 600 feet (180 meters) north of Intersection A and is where WV 20 merges with US 60 as it enters Rainelle from the west. This intersection also corresponds to Intersection 1 in Figure 3.13-3 and Table 3.13-2. The Rainelle Medical Center is accessed from a one-way driveway at this intersection. The Rainelle Elementary School is located just west of the medical center, and a gas station is located on the southwest corner of this intersection. Intersection B essentially acts as a T-intersection; however, some minor through-traffic from WV 20 (northbound) accessing the medical center driveway was observed. WV 20 is the minor street, and is controlled by stop signs. US 60 is a two-lane road and is the major road at this intersection. The posted speed limit is 35 mph (56 kph); however, in front of the school there are yellow-flashing lights for both directions on US 60 to indicate a 15-mph (24 kph) school zone. The warning lights are set to flash from 7:30 a.m. through 8:15 a.m. and from 2:30 p.m. to 3:15 p.m. There is a yellow-striped area on the west side of the intersection and a separate left-turn lane for westbound traffic on the east side of the intersection.

### Intersection C – US 60/WV 20 (Kanawha Avenue) and Locust Street and access road to the Park Center Shopping Complex (in Rainelle)

From Intersection B to Intersection C, US 60 and WV 20 run as the same route (US 60/WV 20), which is also referred to as Kanawha Avenue. The minor streets at this intersection are Locust Street and a road leading to the Park Center Shopping Complex. Both of the minor streets are controlled by stop signs. Locust Street branches north into a residential area, while the Park Center's road branches southwest, and provides access to a shopping center and eventually becomes John Raine Drive adjacent the proposed power plant site. The rail line crosses this intersection and cuts diagonally across Kanawha Avenue and across Locust Street. The intersection implements passive security measures for train crossings - only warning lights, painted lines, and signs alert vehicles and pedestrians of train traffic. East of the railroad

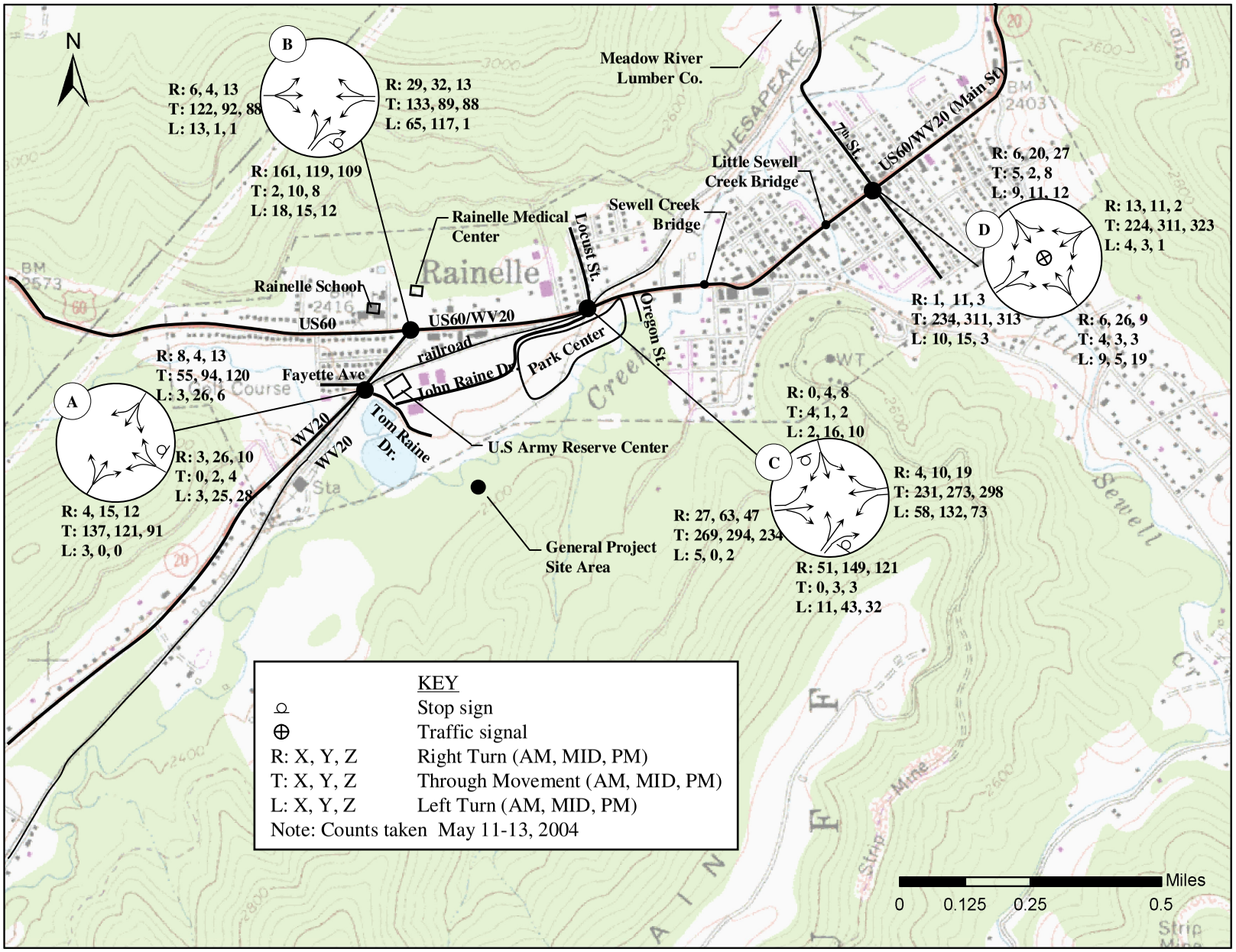


**Figure 3.13-4.**
Existing Turning Movements and Peak Hour Volumes
Intersections A through D (2004)
Map Source: USGS topo (1:24,000) Rainelle (1976)

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tracks, Kanawha Avenue begins a quick descent into a 20 percent slope for about 500 feet (150 meters), which creates a poor line of sight for both eastbound and westbound traffic. Westbound traffic making a left turn into the Park Center road has to reach the railroad tracks before obtaining clear visibility of on-coming traffic. There is an 11-foot- (3-meter-) wide middle lane for left turns on Kanawha Avenue from both directions.

### Intersection D – US 60/WV 20 (Main Street) and 7th Street (in Rainelle)

This intersection uses a pre-timed traffic signal and is the only signalized intersection in Rainelle. 7th Street is a two-lane road and has approximately 30 feet (9-meter) of pavement. The posted speed limit is 25 mph (40 kph). For southbound traffic on 7th Street there is a "No Turn On Red" sign at the traffic light. The Meadow River Hardwood Lumber Company is located approximately half a mile (1 kilometer) north of this intersection on 7th Street. US 60/WV 20 in this area is also referred to as Main Street. Although Main Street comprises mainly commercial properties, most of the areas extending from either side of Main Street are residential. The posted speed limit is 35 mph (56 kph). There is a separate left turn lane for eastbound traffic on Main Street.

### Intersection E – US 60 and CR 1 (in Rupert)

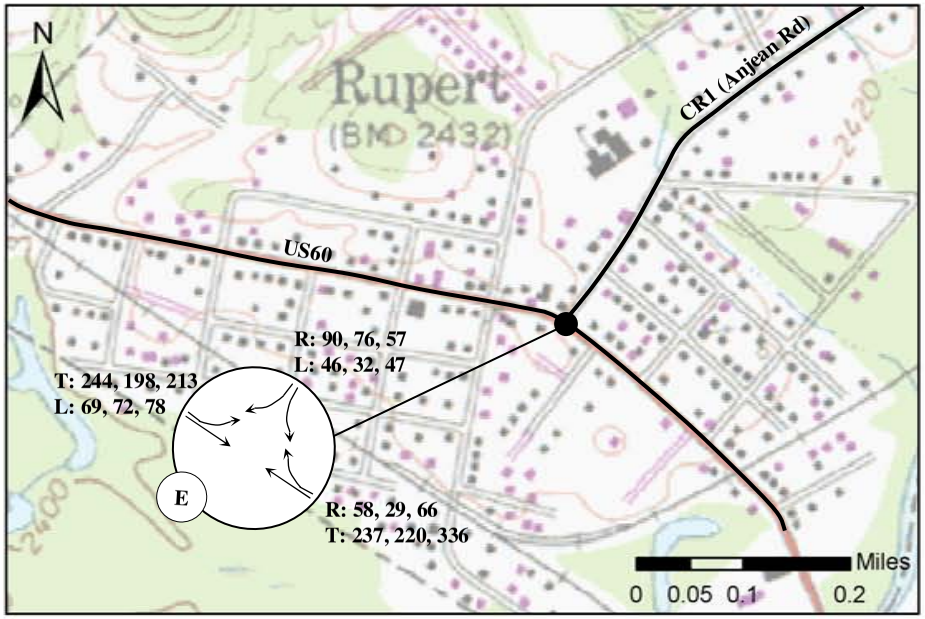
Intersection E is located in Rupert, approximately 8 miles (13 kilometers) east of Rainelle on US 60. This intersection also corresponds to Intersection 3 in Figure 3.13-3 and Table 3.13-2. CR 1 is also referred to as Anjean Road or Church Street, and further north, as McClung Avenue. It extends 6 miles (10 kilometers) from this intersection before encountering the location of the Anjean mining area. Intersection E is essentially a T-intersection, with CR 1 as the two-lane minor road. CR 1 has available width to support separate right and left turn lanes onto US 60. As of May 2006, there was no stop sign for southbound traffic on CR 1. The posted speed limit is 35 mph (56 kph). There is a parking lot for a bank located on US 60, across from CR 1. The lot introduces minor traffic onto US 60. US 60 is a two-lane road and is considered the major street at this intersection. The posted speed limit is 35 mph (56 kph).

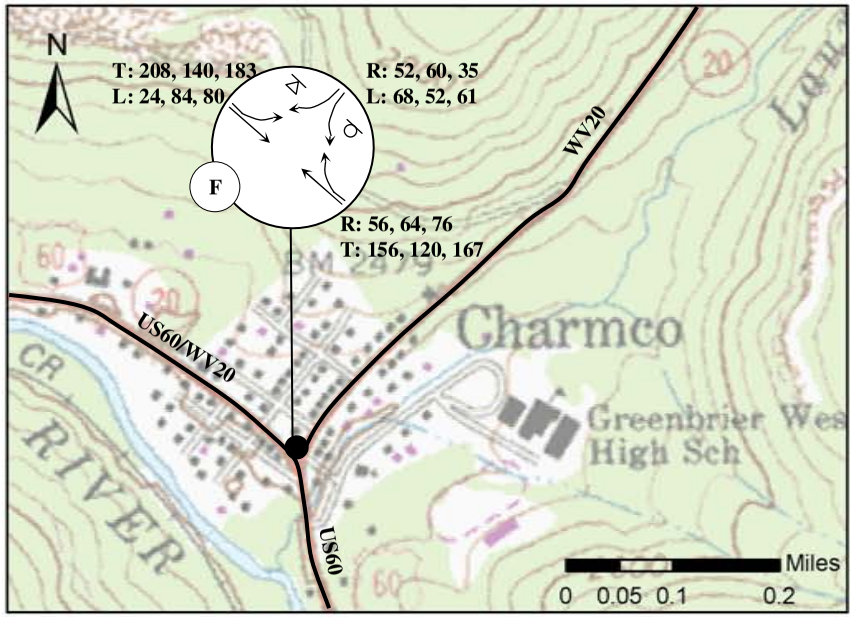
### Intersection F – US 60 and WV 20 (in Charmco)

Intersection F is located in Charmco, halfway between Rainelle and Rupert. This intersection also corresponds to Intersection 2 in Figure 3.13-3 and Table 3.13-2. At this intersection, WV 20 (eastbound) separates from US 60 and runs north through Quinwood. It continues toward the location of the Green Valley coal refuse resource, located 8 miles (13 kilometers) north of this intersection. Intersection F, like Intersection E, is essentially a T-intersection, where WV 20 is the two-lane minor road. WV 20's southbound lane has available width to support separate right and left turn lanes onto US 60, controlled by a yield sign and a stop sign, respectively. The posted speed limit is 35 mph (56 kph). There is a post office located on US 60 across from WV 20, which introduces minor traffic onto US 60. US 60 is a two-lane road with that includes a median for which eastbound traffic turning left can queue.

### *3.13.3.3 Level of Service (LOS)*

All references to levels of service (LOS) are defined by the 2000 Highway Capacity Manual (HCM2000) published by Transportation Research Board. For analysis purposes, HCM2000 defines six levels of service (LOS) that reflect the level of traffic congestion and qualify the operating conditions of an intersection. The six levels are given letter designations ranging from "A" to "F," with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays) (TRB, 2000). Various factors that influence the operation of an intersection include speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.




| | KEY |
|---|---|
| ○ | Stop sign |
| ▽ | Yield sign |
| R: X, Y, Z | Right Turn (AM, MID, PM) |
| T: X, Y, Z | Through Movement (AM, MID, PM) |
| L: X, Y, Z | Left Turn (AM, MID, PM) |

Note: Counts taken for E and F taken May 2004 and October 2004, respectively.

**Figure 3.13-5.**
Existing Turning Movements and Peak Hour Volumes for Study Intersections E and F (2004)
Map Source: USGS topo (1:24,000) Rainelle (1976), Quinwood (1981), Rupert (1981)

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The quantifying value that is computed and used to qualify signalized and unsignalized intersections is the 'average control delay.' Control delay for TWSC intersections, which have stop signs on only the minor street approaches, is per vehicle, but is only determined for the stop-controlled or minor street movements because, theoretically, the through movements on a major street are not experiencing any delay. Consequently, there is no intersection LOS as a whole for TWSCs, instead only an LOS for the individual minor movements. The minor movements are generally the separate lefts on the major street approaches and all movements on both minor street approaches. For signalized intersections, "the average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersections as a whole" (TRB, 2000). Therefore, the LOS for a signalized intersection is based on the aggregated intersection delay, and the LOS qualifies the intersection as a whole. Table 3.13-3 summarizes the operating conditions associated with each LOS designation and the corresponding ranges of average control delay for both unsignalized and signalized intersections.

**Table 3.13-3. Intersection Level of Service (LOS) Criteria**

| LOS | Operating Conditions | Unsignalized* - Delay (s/veh)** | Signalized - Delay (s/veh) |
|---|---|---|---|
| A | Very short delays; progression is extremely favorable and most vehicles arrive during the green light phase. | ≤ 10 | ≤ 10 |
| B | Generally good progression, short cycle lengths, or both; but more vehicles stop than with LOS A. | > 10.0 to 15.0 | > 10.0 to 20.0 |
| C | The number of vehicles stopping is significant, although many still pass through the intersection without being required to stop. | > 15.0 to 25.0 | > 20.0 to 35.0 |
| D | Many vehicles must stop, and the proportion of vehicles not stopping declines; individual cycle failures are noticeable. | > 25.0 to 35.0 | > 35.0 to 55.0 |
| E | Poor progression, long cycle lengths, and/or high volume to capacity (v/c) ratios; individual cycle failures occur frequently; considered by many agencies to be the limit of acceptable delay. | > 35.0 to 50.0 | > 55.0 to 80.0 |
| F | Intersection over-saturation; high v/c ratios with many individual cycle failures; poor progression and long cycle lengths may also be contributing causes; considered to be unacceptable to most drivers. | > 50.0 | > 80.0 |

**s/veh = seconds per vehicle; **Unsignalized includes TWSC (two-way stop-controlled)*
*Source: TRB, 2000*

Intersection LOSs were calculated using the 2000 Highway Capacity Software (HCS2000), which is an industry standard for traffic analysis. The HCS2000 software is based on the HCM2000 methodology, which is also an industry standard. The intersection LOS modeling output for existing conditions is included in Appendix J. Table 3.13-4 summarizes the LOSs determined for the intersections of concern.

**Table 3.13-4. Intersection Level of Service (LOS) during Peak Hours – Existing Conditions (2004)**

| Intersection | AM LOS | MID LOS | PM LOS |
|---|---|---|---|
| A: WV 20 (S. Sewell Street) & Tom Raine Drive | A | A | A |
| B: US 60 & WV 20 (S. Sewell Street) in Rainelle | ***B*** | A | A |
| C: US 60 & Locust Street & Park Center Shopping Complex | B | ***C*** | B |
| D: US 60 & 7th St | B | B | B |
| E: US 60 & CR 1 (Anjean Rd) | ***B*** | ***B*** | B |
| F: US 60 & WV 20 in Charmco | ***B*** | ***B*** | B |

*Note: All intersections are two-way stop-controlled (TWSC), except for Intersection D which is signalized.*

In general, Rainelle's traffic can be described as relatively slow due to the rural nature of the region. Multiple trips for a single vehicle were often observed. Although traffic was fairly busy for the size of Rainelle, no distinct peak hours were detected during the field studies. Traffic volumes steadily increased at the beginning of the day, with general peaks during typical rush hour periods, and steadily decreased after the PM rush hour. In general, peak periods were observed to be from 7:30 a.m. through 8:30 a.m., 11:45 a.m. through 12:45 p.m., and 4:45 p.m. through 5:45 p.m. Very little, if any, pedestrian traffic was observed at any of the study intersections.

Because Rainelle is characteristically a small rural town, it has not adopted any comprehensive LOS standards. Generally, outside the spheres of influence for cities, roadways in characteristically rural communities operate at LOS C or better. In Rainelle, the major streets (US 60) for all of the intersections are currently operating at LOS ***C or better*** as summarized in Table 3.13-4. US 60 plays an important role in the regional transportation network, as it provides an important access route to the southeastern region of West Virginia for various industries. Consequently, this adds to the very minor congestion of US 60 in Rainelle during its peak periods. Traffic on US 60 was considerably heavier during the lunch and PM rush hours, especially during train crossings.

Intersection A received relatively little traffic onto Tom Raine Drive. However, peak traffic activity was observed from approximately 6:30 a.m. through 7 a.m., 12 p.m. through 1 p.m., and 3:30 p.m. through 4 p.m., as a result of personnel exiting and entering the U.S. Army Reserve Center. Approximately 50 feet (15 meters) north of Intersection A, there is a driveway to AEP facilities on WV 20, which also houses its facility trucks that periodically enter and exit throughout the day.

Intersection B was characterized by steady streams of traffic in between lengthy gaps of no traffic during the early mornings. Because Rainelle Elementary School is located nearby this intersection, there were several school buses observed on US 60, and vehicles entering and leaving the school to drop off children during morning school hours, approximately 7:45 a.m. to 8:15 a.m. Minor traffic derived from school also occurred during the afternoons from 2:30 p.m. through 3 p.m. The Rainelle Medical Center contributed some minor traffic, as its driveway entrance (one-way northbound) is part of Intersection B.

Intersection C was the busiest in this study owing to the commercial land uses that center around this area. The Park Center Shopping Complex produced the majority of the turning movements on and off US 60/WV 20 (Kanawha Avenue). Although a steady stream of traffic slowly increased from the morning and remained fairly busy during the day, there were no significant traffic delays observed on a regular basis. Congestion occurred during train crossings, with the crossings lasting approximately 10 to 15 minutes at a time. The most difficult turning movement at this intersection was the left turn movement from Locust Street, which is a small residential road; however, few vehicles were observed making this turn during the traffic counts.

Intersection D, like Intersection C, saw a steady stream of traffic slowly increase from the morning and remained fairly busy during the day. There are a few businesses located near this intersection; however, most of the traffic slowdown was caused by the traffic light. Some of the heavier trucks that crossed this intersection came from Meadow River Hardwood Lumber Company, located 1 mile (2 kilometers) north on 7$^{th}$ Street. According to a company representative, between 7 a.m. and 4 p.m. (Monday through Friday), approximately six to eleven flatbed or container trucks leave daily with lumber and logs. Consequently, the company's trucks go through the signalized intersection.

The traffic patterns at Intersections E and F were comparable due to their similarity. Both intersections were observed to have a steady rise in traffic from morning to late afternoon, with typical peaks at noon and late afternoon. No significant traffic congestion was observed at either of these intersections. At Intersection E, the route to the Anjean/Joe Knob and Donegan sites continues north on CR 1 and there are very few scattered residential properties near the coal refuse sites. The same situation occurs for the Green

Valley site – from Intersection F, the route to Green Valley continues north on WV 20 and very few residential areas exist near the coal refuse site.

## Rail Access

West Virginia is served by NS and CSXT, both Class I railroads. CSXT is the predominant rail carrier in southern West Virginia and operates over 1,500 miles (2,400 kilometers) of track throughout West Virginia. CSXT provides service to the port of Huntington and Charleston. The CSXT lines going through West Virginia connect to Baltimore, Norfolk and Newport News. The CSXT lines from West Virginia also connect with Toledo to the north and New Orleans to the south. Both CSXT and NS have numerous branch lines running into coal producing areas.

Figure 3.13-6 illustrates the rail network that exists in and around Rainelle. There is an active rail line in the southwest corner of Rainelle that parallels WV 20 and cuts across town as it continues northeast and passes through the Meadow River Hardwood Lumber Company (formerly Georgia-Pacific Corp.), located on the northern outskirts of town. The rail line in Rainelle is owned and operated by CSXT and only carries light rail traffic at the present time. The line runs west and north of the project site. Approximately 2,000 feet (600 meters) west of the site area, and just north of Sewell Creek, there is a CSXT rail yard that is sometimes used as a holding station for passing railcars transporting coal. Railcar speeds were observed to be approximately 15 to 20 mph. As shown in Figure 3.13-6, the rail line continues north out of Rainelle and approaches Meadow River and branches into two lines. One line travels north and includes a rail line to the Green Valley coal mine, while the other line follows the sinuous path of the Meadow River to the east, and provides rail spurs to the Anjean and Rader Run coal mines.

Currently, the rail lines in Rainelle serve two coalmines and a lumberyard. The two coalmines are Massey Energy's Green Valley Coal Mine and Midland Trail Resource's Rader Run Mine near Rupert. Coal is transported through Rainelle from Green Valley. As coal is transported from Green Valley, the rail cars either park in a rail yard located a half mile (1 kilometer) west of the project site, or continue south to Meadow Creek's interchange yard in Summers County. Based on conversations with a representative at Green Valley, they schedule on average three roundtrip runs per day. However, it should be noted that the coal transport does not operate on a fixed schedule; rather it is based on meeting mining production rates. The rail line from Rader Run to Rainelle is approximately 13 miles (21 kilometers) in distance with rail transport scheduling also being highly variable due to mining production rates. In general, Rader Run delivers four to five roundtrip runs per month. For both Green Valley and Rader Run, coal-loaded trains are typically made up of 75 railcars at 100 tons (90 metric tons) each. The Meadow River Hardwood Lumber Company property includes a rail spur; however, rail usage has been limited to only three to five fully loaded log cars per year, as hauling trucks provide most of their lumber transport at this time. The lumber is transported by rail through Rainelle and continues west. Approximately 10 miles (16 kilometers) of rail line owned by CSXT exists between the project site and Anjean. Transportation on the rail line from Rupert to Anjean has been abandoned since 2002; however, part of the rail line may be upgraded transporting coal from new mining operations at Anjean that is not associated with the WGC project. The rail line from Rupert to Anjean ends at the bottom of Anjean Mountain – there is no rail spur for transferring coal from the source to the railcars.

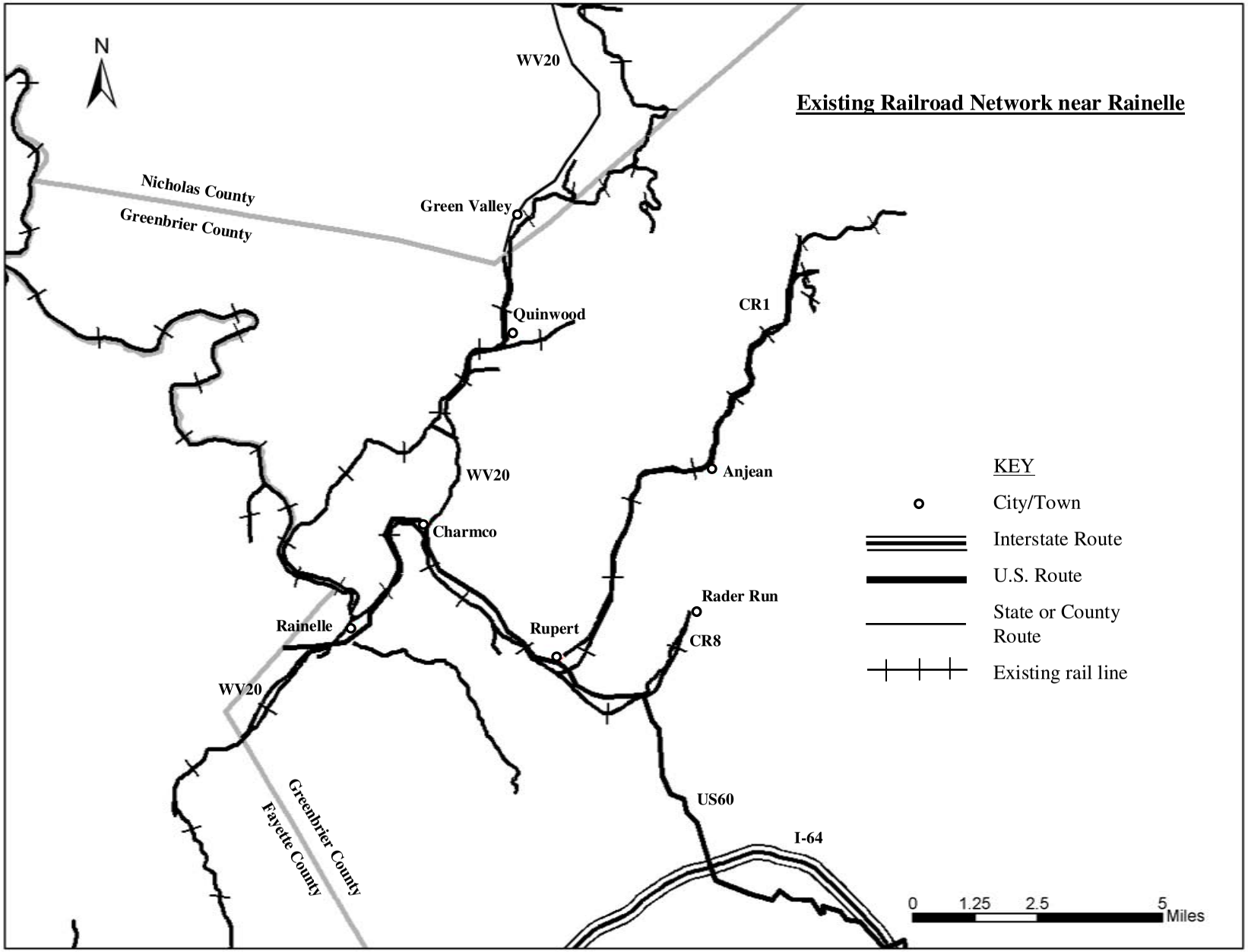


**Figure 3.13-6.**
Existing Rail System near Rainelle, 2004

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

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# 3.14 Public Health and Safety

The region of influence for public health and safety consists of the persons residing within a 30-mile (50-kilometer) radius of the proposed Co-Production Facility site in Rainelle, West Virginia. The area encompasses the towns of Rainelle, Quinwood, and Rupert, as well as several other smaller communities that are located in portions of Greenbrier and Nicholas County. However, the area in and around Rainelle, and those areas in the immediate vicinity of other routine project activities (e.g., coal refuse sites and transportation routes) are more likely to be affected by the Proposed Action. Therefore, the focus of discussions in this section is on baseline data in these areas including locations of sensitive receptors and cancer incidences that are specific to Greenbrier County.

## 3.14.1 Health Profiles

Information from health profiles for Greenbrier County were compiled by the West Virginia Department of Health and Human Resources (WVDHHR), Bureau for Public Health (BPH), Office of Epidemiology and Health Promotion in the 2000 edition of the West Virginia County Health Profiles. The health profiles comprise an overview of the health status of West Virginia residents on the state and county levels. For Greenbrier County, Table 3.14-1 presents county indicators that are categorized as better than, similar to, or worse than the U.S., on average.

As indicated in Table 3.14-1, Greenbrier County had a higher incidence of lung cancer and chronic obstructive pulmonary disease when compared to the remainder of the U.S. As presented in Table 3.14-2, West Virginia had the highest median age at 38.0 years when compared to the median of all states combined in the year 2000. As is the case with the remainder of the U.S., heart disease is the number one cause of death for people over the age of 65, but the cancer death rate for West Virginia was 10.9 percent higher than the national rate for 1999. Among both men and women during 1996-2000, the leading cause of cancer-related mortality was, by far, cancer of the lung and bronchus. According to the American Cancer Society, tobacco use accounts for 87 percent of lung cancers (WVDHHR, 2004).

In 2000, West Virginia was the leading state in age-adjusted mortality for chronic lower respiratory disease (CLRD), which is a significant contributing cause of death in older age groups. Chronic bronchitis and emphysema (collectively referred to as chronic obstructive pulmonary disease or COPD) are also notably higher for West Virginia. Tobacco smoking is the most important risk factor for COPD, accounting for approximately 80 percent of the cases. Other factors include occupational exposures from dusts, fumes, and molds, as well as other environmental air pollutants (WVDHHR, 2004). Cancer incidences specific to Greenbrier County between 1994 and 1998 are presented in Table 3.14-3.

## 3.14.2 Receptors

Exposure to certain chemicals, or chemicals of potential concern (COPCs), can adversely affect human health through either toxic and/or carcinogenic effects. Chemical exposure can occur as a result of a variety of human activities ranging from the use of household chemicals and products to the fueling of a motor vehicle. In addition, exposure can result from chemicals that could be present in the air, water, soil, or the food chain through air emissions or other discharges from industrial sources to the environment.

The USEPA has developed cancer and non-cancer toxicity values for COPCs that serve as the basis for many of the regulatory standards for emission and exposure limits that have been established to protect human health and the environment. In addition, EPA has established standards for evaluating risks of exposure to chemicals related to specific project and site conditions. For a chemical exposure to occur at a specific site, several conditions must be met, including: (1) a chemical or exposure source, (2) a release mechanism, (3) a migration pathway, (4) an exposure route, and (5) a receptor population. Consequently,

there is no unacceptable carcinogenic risk (or non-carcinogen hazard) if either a chemical-specific (toxic) effect or exposure pathway is not present.

**Table 3.14-1. Greenbrier County –Health Profiles Overview (In Comparison to the U.S)**

| Better* | Similar | Worse* |
|---|---|---|
| Breast Cancer | Diseases of the Heart | Lung Cancer |
| Births to Unwed Mothers | Cancer - All Causes | Chronic Obstructive Pulmonary Disease |
| Late (3rd Trimester)/No Prenatal Care | Colon Cancer | Unintentional Injuries |
| | Prostate Cancer | Motor Vehicle Accidents |
| | Cancer - All Other Causes | Years of Potential Life Lost - All Causes |
| | Diabetes | Physical Inactivity |
| | Cerebrovascular Disease | Seatbelt Non-use |
| | Pneumonia and Influenza | Smokeless Tobacco Use |
| | Non-Motor Vehicle Accidents | Difficulty Seeing Doctor Because of Cost |
| | Suicide | |
| | Homicide** | |
| | Teen Fertility Rate | |
| | Low-Birthweight Births | |
| | Infant Deaths** | |
| | Fetal Deaths** | |
| | Obesity | |
| | Hypertension | |
| | Cigarette Smoking | |
| | Binge Drinking** | |
| | No Health Insurance, Ages 18-64 | |

**A statistically significant difference from the U.S.*
*** Number is too small for a valid comparison*

**Table 3.14-2. Median Age by Gender, West Virginia and the U.S., 1950-2000**

| Year | Total | | Male | | Female | |
|---|---|---|---|---|---|---|
| | WV | US | WV | US | WV | US |
| 1950 | 25.1 | 25.2 | 25.2 | 24.9 | 25.0 | 25.5 |
| 1960 | 28.5 | 29.5 | 27.6 | 28.7 | 29.2 | 30.3 |
| 1970 | 30.0 | 28.1 | 28.4 | 27.5 | 31.5 | 28.8 |
| 1980 | 30.4 | 30.0 | 29.1 | 28.8 | 31.7 | 31.2 |
| 1990 | 35.4 | 32.9 | 34.0 | 31.7 | 36.7 | 34.1 |
| 2000 | 38.0 | 35.3 | 37.5 | 34.0 | 40.2 | 36.5 |

**Table 3.14-3. Cancer Incidence Specific to Greenbrier County[a]**

| Site | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | Total, 1994-98 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Rate[b] | Number | Rate[b] | Number | Rate[b] | Number | Rate[b] | Number | Rate[b] | Number | Rate[b] |
| Total, All Sites | 190 | 364.9 | 217 | 401.7 | 195 | 382.4 | 213 | 392.2 | 188 | 345.9 | 1,003 | 376.6 |
| Lung and Bronchus | 28 | 53.0 | 41 | 77.0 | 42 | 81.3 | 36 | 60.3 | 45 | 83.1 | 192 | 70.7 |
| Prostate[c] | 25 | 104.5 | 41 | 169.7 | 21 | 88.3 | 30 | 129.3 | 24 | 99.3 | 141 | 118.1 |
| Female Breast[d] | 30 | 108.8 | 35 | 116.6 | 23 | 92.1 | 33 | 111.9 | 20 | 69.3 | 141 | 99.5 |
| Colon and Rectum | 18 | 29.8 | 20 | 41.9 | 24 | 42.0 | 17 | 29.3 | 20 | 34.8 | 99 | 35.5 |
| All Other Sites | 89 | 178.7 | 80 | 146.3 | 85 | 171.6 | 97 | 185.8 | 79 | 148.1 | 430 | 165.8 |

*a. Data supplied by the West Virginia Cancer Registry.*
*b. Rates are per 100,000 and are adjusted by age to the 1970 U.S. population.*
*c. Based upon the male population.*
*d. Based upon the female population.*

For the project area, the primary receptor population is located in and around Rainelle; however, due to the nature of the project and the potential for air dispersion of contaminants, the receptor population includes populations within a 30-mile (50-kilometer) radius of the project. The general location of the proposed Co-Production Facility is on the outskirts of town, and is in close proximity to several residential areas and an elderly care facility (see Figure 3.11-1, Land Uses Within the Vicinity of the Project Site, in Section 3.11). Residential areas also exist along the primary transportation corridors between the coal refuse sites and the proposed Co-Production Facility location. However, there are few receptors in the immediate vicinity of the coal refuse sites, as these sites are in fairly remote areas.

To calculate potential risks associated with chemical exposures, categories of sensitive receptor populations are defined. These populations reflect persons with potentially high exposure rates due to the frequency and duration of exposure, or increased sensitivity due to health or age. For the Proposed Action, risk calculations were performed (and presented in Section 4.14) for the following most susceptible populations to ascertain potential health impacts: Resident/home gardener (adult and child), subsistence farmer (adult and child), nursing infants, subsistence fishers, school/day care child, and hospital patient/extended care residents. All these populations (i.e., receptors) are expected to be present in the region of influence.

## 3.14.3 Safety

### *3.14.3.1 Worker Safety*

Worker fatalities and injuries are generally a concern in construction and in industrial facility operation. The Occupational Safety and Health Administration (OSHA) regulates worker safety in both construction and industrial settings. OSHA has promulgated a number of regulations that are codified under Title 29 of the Code of Federal Regulations (CFR) that are designed to protect workers from potential construction and industrial accidents, as well as to minimize exposure to work place hazards (e.g.,

noise, chemicals, etc.). Although these regulations and protections exist, work place injuries can and still do occur. Table 3.14-4 summarizes safety statistics from the Bureau of Labor for industry categories that are relevant to the Proposed Action.

The highest rate of recordable injury cases is in the construction field followed closely by the trucking industry. However, mining activities result in the highest rate of fatalities. The rates of injuries and lost workdays in the utility sector are much lower than the other listed categories.

**Table 3.14-4. Statistics for Work Place Hazards**

| Industry | Total recordable incidents (rate per 100 FTEs*) | Lost workday cases (rate per 100 FTEs) | Fatalities (rate per 100,000 FTEs) |
|---|---|---|---|
| Construction | 8.4 | 4.2 | 14.0 |
| Mining | 6.7 | 5.5 | 21.7 |
| Trucking | 7.0 | 3.1 | 12.7* |
| Utilities | 1.8 | 0.3 | |

**FTE – full-time-equivalent workers*

***This fatality statistic is found under the sector "Transportation and Public Utilities." Most fatalities in this group are in the truck driver category.*

*Source: BLS, 2005*

Although power plants are much safer than they once were, plant employees can still encounter workplace hazards. Among the most common hazards to power plant workers are electrical shocks, burns, boiler fires and explosions, and contact with hazardous chemicals (Hansen, 2005). According to the National Board of Boiler and Pressure Vessel Inspectors, between 1999 and 2003 there were 1,477 reported boiler accidents, resulting in 143 injuries and 26 deaths (power boilers include utility boilers as well as boilers used by other industries for cogeneration and on-site power production) (Hansen, 2005). Many power plant workers are also routinely exposed to dangerous chemicals such as corrosives (acids and bases), oxidizers and solvents. Comprehensive training, detailed pre-job planning, and proper and well-maintained safety equipment are key to accident prevention, regardless of the hazard (Hansen, 2005).

### *3.14.3.2 Road Safety*

The West Virginia Division of Highways (WVDOH) provided a listing of reported vehicle accidents in Rainelle and Rupert over a five-year period (1999-2003). Table 3.14-5 highlights the accidents that occurred on roads relevant to the project. As indicated in Table 3.14-5, the number of accidents on key roads remained fairly steady or declined as the years progressed.

During this five-year period, 1.5 percent and 3.2 percent of these accidents in Rainelle and Rupert, respectively, involved trucks greater than 8,000 pounds. This indicates that during the five-year span approximately two accidents that involved trucks greater than 8,000 pounds occurred for each town, which is relatively low in that US 60 is a major thoroughfare for haul trucks. There were no recorded fatal accidents during this five-year period for either town.

**Table 3.14-5. Five-Year Traffic Accident History for Rainelle and Rupert in Key Areas**

| Street | 1999 | 2000 | 2001 | 2002 | 2003 | Average Number of Accidents per Year |
|---|---|---|---|---|---|---|
| **Rainelle (Total # of Accidents 1999-2003 = 107)** | | | | | | |
| Kanawha Ave (US 60) | 6 | 13 | 8 | 6 | 3 | 7.2 |
| Main St (US 60) | 8 | 12 | 8 | 6 | 5 | 7.8 |
| S. Sewell Street (WV 20) | 2 | 1 | 0 | 0 | 0 | 0.6 |
| Total | 16 | 26 | 16 | 12 | 8 | 21.4 |
| **Rupert (Total # of Accidents 1999-2003 = 64)** | | | | | | |
| Nicholas St (US 60) | 15 | 11 | 12 | 3 | 12 | 10.6 |
| Greenbrier St (US 60) | 0 | 0 | 0 | 0 | 2 | 0.4 |
| Anjean Rd (CR 1) | 0 | 0 | 1 | 1 | 0 | 0.4 |
| Total | 15 | 11 | 13 | 4 | 14 | 12.8 |

*Source: WVDOH, 2004d*

Table 3.14-6 summarizes citations that were given to overweight trucks over an 18-month period (January 2000 – June 2002). The table includes Greenbrier County and its surrounding areas. As mentioned in Section 3.13.2.3, the West Virginia Public Service Commission (PSC) is responsible for commercial truck weight enforcement on roads included in the Coal Resources Transportation System (CRTS). Since then, the PSC has developed a reporting system for tracking coal loads hauled on the CRTS. The PSC has also established a citizen's hotline to report speeding and reckless driving by haulers. According to more recent truck citation records obtained from the PSC, there were 52 commercial truck citations in Greenbrier County during a one-year period (October 2003 through October 2004). Of the 52 citations, 45 were related to over-weight truck issues, and of these 45, three involved coal trucks and 16 were cited on US 60 (PSC, 2004).

**Table 3.14-6. Citations Issued to Overweight Trucks by Weight Range and Coal Production in Greenbrier and Surrounding Counties (Jan 2000-June 2002)**

| County | Number of Overweight Trucks (non-coal) Cited | Number of Overweight Coal Trucks Cited | Coal Trucks 80,000 lbs or less | Coal Trucks between 80,000 lbs and 100,000 lbs | Coal Trucks between 100,000 lbs and 120,000 lbs | Coal Trucks over 120,000 lbs | Avg Weight of Coal Trucks Cited (lbs) |
|---|---|---|---|---|---|---|---|
| Greenbrier | 47 | 14 | 3 | 3 | 7 | 4 | 117,221 |
| Nicholas | 59 | 35 | 0 | 6 | 7 | 16 | 116,977 |
| Raleigh | 110 | 69 | 6 | 6 | 20 | 43 | 133,270 |
| Fayette | 43 | 76 | 0 | 5 | 19 | 49 | 136,216 |

*Note: To convert pounds to kilograms, multiply by 0.454.*

*Source: WVDOH, 2003*

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# 3.15 Noise

This section presents the current noise conditions at and in the vicinity of the proposed Co-Production Facility and coal refuse sites. It provides background information about noise principles, noise measurement methods and criteria, and noise regulations and guidelines. Existing noise levels and sources for Rainelle and the project region are also provided. In addition, information about blasting activities and regulations is presented.

## 3.15.1 Noise, Blast, and Vibration Principles

### *3.15.1.1 Noise Principles*

Noise is defined as any unwanted sound. The human ear experiences sound as a result of pressure variations or vibrations in the air. If the variations, or oscillations, in pressure occur between 20 and 20,000 times per second, then they are audible to humans. This rate of variation or oscillation per second is called frequency and the unit of measurement is called Hertz (Hz). Sound pressure is the physical force from a sound wave that affects the human ear, and is typically discussed in terms of decibels (dB), which is a logarithmic unit of the sound pressure level (SPL). Zero dB represents the threshold of hearing.

The human ear is designed to function in the frequency range of 20 to 20,000 Hz. Humans are less sensitive to low frequencies (less than [<] 250 Hz) than mid-frequencies (500-1,000 Hz) and most sensitive to higher frequencies in the 1,000 to 5,000 Hz range. High frequency noise is generally more annoying to people than low or mid frequency noise. To account for variations in the way humans perceive noise, a weighted scaling system is often used (referred to as the A-weighted scale and expressed as dBA) to give less importance to the low frequencies. Typical noise levels for a variety of indoor and outdoor noise sources expressed on the A-weighted scale are presented in Table 3.15-1.

The SPL that humans experience typically varies from moment to moment. Therefore, a variety of descriptors are used to evaluate noise levels over time. Some typical descriptors are defined below:

- Leq is the continuous equivalent sound level. The sound energy from the fluctuating sound pressure levels is averaged over time to create a single number to describe the average energy or intensity level. High noise levels during a monitoring period will have greater effect on the Leq than low noise levels. The Leq has an advantage over other descriptors because Leq values from different noise sources can be added and subtracted to determine cumulative noise levels.
- $L_{dn}$ is the day-night equivalent sound level. It is similar to a 24-hour $L_{eq}$, but with 10 dBA added to SPL measurements between 10 pm and 7 am to reflect the greater intrusiveness of noise experienced during these hours. $L_{dn}$ is also termed DNL.
- $L_{min}$ is the lowest SPL measured during a given period of time and $L_{max}$ is the highest.
- $L_{10}$ is the SPL exceeded 10 percent of the time. Similar descriptors are the $L_{50}$, $L_{01}$, and $L_{90}$.

**Table 3.15-1. Sound Pressure Level and Loudness of Typical Noises**

| Noise Level (dBA) | Subjective Impression | Typical Sources: Outdoor | Typical Sources: Indoor | Relative Loudness (Human Response) |
|---|---|---|---|---|
| 120-130 | Uncomfortably loud | Air raid siren at 50 feet (threshold of pain) | Oxygen torch | 32 times as loud |
| 110-120 | Uncomfortably loud | Turbo-fan aircraft at take-off power at 200 feet | Riveting machine, Rock band | 16 times as loud |
| 100-110 | Uncomfortably loud | Jackhammer at 3 feet | | 8 times as loud |
| 90-100 | Very loud | Gas lawn mower at 3 feet, Subway train at 30 feet, Train whistle at crossing, Wood chipper shredding trees, Chain saw cutting trees at 10 feet | Newspaper press | 4 times as loud |
| 80-90 | Very loud | Passing freight train at 30 feet, Steamroller at 30 feet, Leaf blower at 5 feet, Power lawn mower at 5 feet | Food blender, Milling machine, Garbage disposal, Crowd noise at sports event | 2 times as loud |
| 70-80 | Moderately loud | Typical turnpike at 50 feet, Truck idling at 30 feet, Traffic in downtown urban area | Loud stereo, Vacuum cleaner, Food blender | Reference loudness (70 dBA) |
| 60-70 | Moderately loud | Residential air conditioner at 100 feet, Gas lawn mower at 100 feet, Waves breaking on beach at 65 feet | Cash register, Dishwasher, Theater lobby, Normal speech at 3 feet | 1/2 as loud |
| 50-60 | Quiet | Large transformers at 100 feet, Traffic in suburban area | Living room with TV on, Classroom, Business office, Dehumidifier, Normal speech at 10 feet | 1/4 as loud |
| 40-50 | Quiet | Bird calls, Trees rustling, Crickets, Water flowing in brook | Folding clothes, Using computer | 1/8 as loud |
| 30-40 | Very quiet | | Walking on carpet, Clock ticking in adjacent room | 1/16 as loud |
| 20-30 | Very quiet | | Bedroom at night | 1/32 as loud |
| 10-20 | Extremely quiet | | Broadcast and recording studio | |
| 0-10 | Threshold of hearing | | | |

*Note: To convert feet to meters, multiply by 0.305.*

*Sources: Noise Assessment Guidelines Technical Background; Highway Noise Fundamentals; Handbook of Environmental Acoustics*

Noise levels for combinations of sounds are added and subtracted based on a logarithmic scale. As a result, the addition of two noises, such as a garbage truck (100 dBA) and a lawn mower (95dBA), would result in a cumulative sound level of 101.2 dBA, not 195 dBA. In most cases, where the addition of decibels only needs to be accurate by +/- 1 dB, the following rule of thumb can be used to add decibels:

| When two decibel values differ by: | Add the following amount to the higher value: |
|---|---|
| 0 or 1 dB | 3 dB |
| 2 or 3 dB | 2 dB |
| 4 or 9 dB | 1 dB |
| 10 dB or more | 0 dB |

Because the decibel scale is logarithmic, a relative increase of 10 decibels represents a sound pressure level that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder; they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- 3 dBA change is the threshold of change detectable by the human ear, in ambient environments;
- 5 dBA change is readily noticeable; and
- 10 dBA increase is perceived as a doubling of noise level.

The SPL heard in the environment typically is composed of many different frequencies, and it can be broken down into numerous individual frequencies. These frequencies are grouped into octave bands. An octave band is a group of frequencies in the interval between a given frequency (such as 350 Hz) and twice that frequency (e.g., 700 Hz). The standard octave bands are each named by their center frequencies. Octave bands can be used to differentiate components of a noise source. For example, a truck traveling downhill will have a different set of sound frequencies than a truck traveling uphill.

Noise from a given source attenuates (diminishes) with distance. A roadway or railway is considered a line source because a motor vehicle or diesel engine moves from one point to another along a fixed linear route, and the receiver experiences noise from all points along the line. Noise from a line source typically attenuates at the rate of 3 dBA per distance doubling based on a reference distance of 50 feet (15 meters). Thus, traffic noise level of 65 dBA at a distance of 50 feet (15 meters) from a roadway would be 62 dBA at a distance of 100 feet (30 meters) from the roadway, and it would be 59 dBA at a distance of 200 feet (60 meters) from the roadway. The 3-dBA attenuation rate is used for noise traveling through the air or over a hard surface. Noise traveling over a soft surface, such as grass or other vegetation, may attenuate at a more rapid rate of about 4.5 dBA.

Noise from a fixed location (e.g.; industrial equipment) is termed a stationary or point source. Point sources of noise attenuate at a rate of 6 dBA per doubling of distance when traveling through air over a hard surface and up to 7 or 8 dBA when traveling over a soft surface. These attenuation rates are general rules for total noise levels from a given source. For the individual octave bands that comprise the total noise, the attenuation rate is greater for high frequencies (4000 – 8000 Hz) than for lower frequencies. Noise in the octave bands of 500 and lower are of particular concern in the analysis of noise from industrial sources due to their slower attenuation rate with distance.

### *3.15.1.2 Blasting and Vibration Principles*

Rock blasting activities include planning, execution, and closure phases. As part of the planning for construction work, specifications are usually developed to ensure blasting is done safely and in

conformance to the requirements of the project. Before blasting begins in new areas, it is important to define how blasting might impact neighbors, animals, structures, utilities and the environment in general.

Ground vibration is commonly viewed as the major concern for off-site damage resulting from blasting (ODOT, 2005). The measurement of ground vibration is Peak Particle Velocity (PPV), which is the maximum speed (measured in inches/second or mm/second) at which a particle in the ground is moving relative to its inactive state. The U.S. Bureau of Mines and the Office of Surface Mining have conducted extensive research over the last 40 years to develop acceptable vibration standards, vibration damage criteria, and techniques to predict and control blast vibrations that greatly reduce the risk of off-site impacts from blasting. The principal factors that affect ground vibration levels at a given point are:

- Weight of the explosive fired per delay period
- Distance from blast to point of concern (house, well, etc.)
- Blast configuration (existence of a free face, trench, confined area, etc.)
- Geology (sites with a thick layer of soil have been known to produce vibrations 10 times as great as locations with a thin layer of soil over rock)

The first two factors are the most influential to ground vibration. The distance from the blast to the point of concern cannot necessarily be controlled by the blasting contractor, but the weight of the explosives fired per delay is a controllable variable.

The OSM initially found that if PPV were limited to 1 inch/second (2.5 centimeters/second), then 95% of the damage to surrounding houses and structures would be prevented. After more recent research, the PPV limit was changed to 0.5 inches/second (1.2 centimeters/second) to avoid off-site damage. A PPV of 0.5 is generally equivalent to the vibration caused by a loaded truck or bus passing by 50 to 100 feet (15 to 30 meters) away. As a general rule, a person will begin to feel blast vibrations at levels as low as 0.02 inches/second (0.05 centimeters/second). This is well below the level at which research has shown that damage may occur.

## 3.15.2 Noise and Blasting Legislation and Guidelines

### *3.15.2.1 Federal Guidelines*

**U.S. Department of Interior, Bureau of Mines** – The former U.S. Bureau of Mines recommended a safe blasting limit of 5 millimeters/second (2 inches/second) peak particle velocity (PPV). However, based on more recent research, as stated above, the current PPV limit is 0.5 inches/second (approximately 1.2 centimeters/second).

**EPA –** Studies carried out by the Environmental Protection Agency (EPA) on the effects of noise are the basis of standards and legislation at federal, state, and local levels of government. For the purposes of hearing conservation, EPA determined that a Leq (24) of 70 dBA would be sufficient to protect people. EPA's recommended 70 dBA criterion for public health and welfare is not low enough to prevent people from being annoyed by noise. EPA found that when the background noise level is 55 dBA, conversation between two individuals is 95 percent intelligible at a distance of about 10 feet (3 meters). As background noise increases, they must move closer to maintain 95 percent intelligibility. EPA determined that an indoor $L_{dn}$ of 45 dBA permits normal speech communication in the home. At night, an indoor background noise level of 32 dBA is needed for most people to sleep without interference. Most homes can provide an exterior to interior noise level reduction of 15 dBA, even if the windows are partially open. Thus, an outdoor noise level of 60 dBA would result in an indoor noise level of 45 dBA. However, EPA allowed for a 5 dBA margin of safety resulting in a recommended outdoor noise level of 55 dBA in residential areas. These EPA recommendations are not laws, but they have guided other agencies in establishing legislation.

**HUD –** Based on the EPA reports, the Department of Housing and Urban Development (HUD) published regulations establishing standards for HUD-assisted projects in 1979. HUD categorized noise levels for proposed residential development as Acceptable, Normally Unacceptable, and Unacceptable, as shown in Table 3.15-2. The assumption is that standard construction provides an average of 20 $L_{dn}$ of attenuation. At 65 $L_{dn}$ or below, this amount of attenuation would be sufficient to meet an interior level of 45 $L_{dn}$. These standards normally apply to projects where HUD funding is involved.

**Table 3.15-2. HUD Acceptability Standards for Noise**

| Category | Noise Level ($L_{dn}$) |
|---|---|
| Acceptable | < 65 dBA |
| Normally Unacceptable | >65 dBA < 75 dBA |
| Unacceptable | > 75 dBA |

*Source: U.S. Department of Housing and Urban Development (HUD), March 1985*

**FHWA –** The Federal Highway Administration (FHWA) has standards that govern the analysis and definition of impacts from traffic noise for highway projects using Federal-aid funds. FHWA's Noise Abatement Criteria (NAC) are shown in Table 3.15-3. An impact is defined when projected traffic noise levels: 1) approach or exceed the NAC, or 2) substantially exceed existing noise levels. The FHWA regulations do not specify noise levels that approach or exceed the NAC; state DOTs develop their own definitions. However, state DOTs must use a definition of "approach" that is at least 1 dBA less than the applicable NAC. State DOTs also develop their own criteria for determining a "substantial" increase in noise levels. FHWA standards are typically applicable when federal highway funds are involved in a proposed project.

**Table 3.15-3. FHWA Noise Abatement Criteria**

| Activity Category | Hourly Sound Level (dBA) | | Description of Activity Category |
|---|---|---|---|
| | $L_{eq}$(h) | L10(h) | |
| A | 57 (Exterior) | 60 (Exterior) | Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve it |
| B | 67 (Exterior) | 70 (Exterior) | Picnic areas, recreation areas, playgrounds, sports acres, parks, residences, motels, hotels, schools, churches, libraries, and hospitals |
| C | 72 (Exterior) | 75 (Exterior) | Developed lands, properties, or activities not included in Categories A or B above |
| D | -- | -- | Undeveloped lands |
| E | 52 (Interior) | 55 (Interior) | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums |

**Either L10 (h) or $L_{eq}$ (h) (not both) may be used on a project. Hourly sound levels are expressed in dBA (decibels on the A-weighted scale), which correlate with human perception of loudness.*

*Source: 23 CFR 772*

**FERC –** The Federal Energy Regulatory Commission has published a Guidance Manual for Environmental Report Preparation in August 2002. In it, the Commission recommended that compressor facilities not exceed an $L_{dn}$ of 55 dBA at noise sensitive areas.

### *3.15.2.2 State Guidelines*

The West Virginia Department of Environmental Protection (WVDEP) does not currently have guidelines that address noise emitted from large industrial facilities or power plants. However, the Public Service Commission (PSC) of West Virginia is in the process of promulgating new regulations for some types of power plants under Title 150 of the West Virginia Code: Rules Governing Siting Certificates for Exempt Wholesale Generators. These new regulations are expected to include requirements and standards relating to noise generated by these types of facilities.

The West Virginia Department of Transportation (WVDOT), division of Highways, has a design directive (DD-207) dated February 6, 1998 entitled, "Noise Analysis and Abatement Guidelines." Applicable to highway projects, it states that an impact would occur when predicted noise levels approach (are within 1 dBA ($L_{eq}$)) of the FHWA NAC or substantially exceed the existing noise levels by at least 16 dBA.

Blasting activities are required to comply with the Citizens Guide to Blasting published by the WV Department of Environmental Protection (WVDEP) in March 2002. WVDEP's Office of Explosives and Blasting (OEB) is responsible for regulating surface mine blasting operations. Some of the main provisions of the OEB regulations are listed below. However, because the proposed blasting does not relate to mining, the OEB's regulations do not strictly apply to the power plant site.

- Blasting may not be conducted with 300 feet (approximately 90 meters) of a dwelling unless permission is granted by the owner of the structure.
- Blasting may not be conducted within 300 feet (approximately 90 meters) of a school, church, or hospital and not within 100 feet (approximately 30 meters) of a cemetery.
- The blaster will define and control access to all areas (blast area) where flyrock may injure people.
- A pre-blast survey must be offered prior to initiation of blasting. This includes contacting owners and/or occupants of dwellings within 0.5 miles (approximately 1 kilometer) of the permitted area.
- Operators that will detonate 5 pounds (approximately 2.3 kilograms) or more of explosives at any given time must publish a blasting schedule in a newspaper of general circulation in all the counties of the proposed blasting area. Copies of the schedule shall be distributed by certified mail to local governments, public utilities and each resident within 0.5 miles (approximately 1 kilometer) of the permit area.
- Unless otherwise specified by the DEP, detonation blasts may only occur between the hours of sunrise and sunset, Monday through Saturday.

### *3.15.2.3 Local Ordinances*

Neither Greenbrier County nor the Town of Rainelle has a local ordinance that addresses noise from new development or construction activities. Noise from traffic volumes on State and county roadways is outside the jurisdiction of local noise ordinances. In addition, neither Greenbrier County nor Rainelle has ordinances that cover blasting activities. A Zoning Ordinance for the City of Lewisburg has provisions covering blasting operations (Section 55) (Lewisburg, 2005). Although it is not applicable to Rainelle, it is presented here for informational purposes. Blasting is considered in compliance with the Lewisburg ordinance if the following measures are followed:

1. The weight in pounds of explosive charge detonated at any one time shall conform with the following scaled distance formula: $W = (D/50)^2$, where W = weight in pounds of explosive detonated at any one instant time, D = distance in feet from the nearest point of blast to nearest residence, building or

structure, that explosive charges shall be considered to be detonated at one time if their detonation occurs within eight milliseconds of each other.

2. Where blast size would be exceeded under Subdivision (1) of this ordinance, blast shall be detonated by the use of delay detonators to provide detonation times separated by nine milliseconds or more for each of the blasts complying with the scaled distance of the formula.

3. A plan of each blasting operation's methods for compliance with this section (blast delay design) for typical blast, which shall be adhered to in all blasting within the City of Lewisburg, shall be submitted to the City of Lewisburg with the application for a permit. It shall be accepted if it meets the scaled distance formula established in Subdivision (1) of this ordinance.

4. Records of each blast shall be kept in a log to be maintained for at least 3 years, which will show for each blast other than secondary (boulder breaking) blasts the following information:

a. Date and time of blast;

b. Number of holes;

c. Typical explosive weight per delay;

d. Total explosives and blast at any one time;

e. Number of delays used;

f. Weather conditions; and

g. Signature of operator/employee in charge of the blast.

### 3.15.3 Noise Monitoring

To establish and characterize the baseline noise environment, a noise monitoring program was developed and implemented. The program focused on potential noise sensitive receptor sites in an area along potential transportation corridors and in areas around proposed project activities. Program components related to the proposed project site were developed in consultation with the West Virginia PSC. Noise sensitive receptors are defined as homes, schools, hospitals, etc., which are especially sensitive to high noise levels. The noise monitoring program was carried out over several monitoring events that included the following periods:

- May 11, 2004 through May 13, 2004;
- October 19, 2004 through October 21, 2004;
- January 12, 2005 through January 17, 2005; and
- November 3, 2005.

Additional details on noise monitoring activities are provided in Appendix K (Noise Study).

Monitoring sites along affected arterial roadways were selected to represent worst-case sensitive receptor points in the affected municipalities, while sites in the vicinity of the proposed power plant site were selected to identify baseline conditions in noise sensitive areas that were not dominated by traffic noise (see Figures 3.15-1 and 3.15-2). Monitoring locations along roadways are summarized in Table 3.15-4. Monitoring areas "A" through "F" also represent study intersections for the traffic analysis that was discussed in Section 3.13 (Traffic and Transportation).

Sensitive receptors that could be affected by noise from the proposed Co-Generation Facility include homes that currently experience low levels of noise due to their distances from highways and rail tracks. A

radius of 1,000 feet (300 meters) from the proposed plant site was used to define the study area to characterize baseline noise levels in the immediate vicinity of the proposed power plant site. Preliminary review of information on plant equipment indicated that, beyond this distance, site-generated noise would attenuate to a noise level that is below existing background levels. Within the 1,000-foot (300-meter) study radius, the primary focus for obtaining baseline noise data was on noise levels at the site boundaries and at nearby homes.

Both short-term and long-term (LT) monitoring were carried out at locations representing sites that could be affected by noise around the proposed site. The locations of these noise monitoring sites are shown in Figure 3.15-1. Monitoring sites C7 through C10, also shown in Figure 3.15-1, represent short-term monitoring locations in the vicinity of Area C. These sites are in a quiet residential area that is generally not affected by highway noise. Long-term monitoring of ambient noise was carried out at six sites at the boundaries of the power plant site, as well as at nearby residences. These long-term monitoring locations are also shown in Figure 3.15-1.

**Table 3.15-4. Noise Monitoring Sites Along Roadways**

| Area | Description | Monitored Sites |
|---|---|---|
| A | North and west of the power plant site. Sites represent noise levels along WV 20 between the intersection with US 60 near the Rainelle Medical Center and the CSXT railroad facility further to the south on WV 20 | A1 - WV State Police barracks<br>A3 - Playground<br>A5 - Golf Course<br>A6 - Greenbrier Avenue<br>A7 - Walnut Street<br>A8 - Grace Baptist Church |
| B | North and west of the power plant site near the Rainelle Medical Center at the intersection of routes WV 20 and US 60 | B1 - Rainelle Medical Center<br>B2 - Rainelle School |
| C | Intersection of WV 20/US 60 (Kanawha Avenue) and Locust/North Sewell Streets | C1 – N. Sewell Street &WV 20/US 60<br>C4 - Cherry Street<br>C5 - Nicholas Street |
| D | Represents noise levels in downtown Rainelle | D1 - Seventh Street at Main St. |
| E | Representative of Rupert | E - CR 1 @ US 60 |
| F | Charmco | F- US 60 at WV 20 |
| G | Green Valley | G - WV 20 at Green Valley |
| H | Representative of Quinwood | H - WV 20 in Quinwood |
| I | Representative of WV 20/60 outside of Rainelle | I - WV 20/US 60, Youth Park |
| J | Representative of Anjean Road | J - CR 1, Anjean mining site |

## 3.15.4 Existing Noise Levels

### *3.15.4.1 Transportation Corridor Monitoring Results*

Table 3.15-5 presents noise levels for existing conditions along affected highways based on the TNM model for all sites except for: 1) Walnut Street, where the monitored value was used due to the influence of local traffic rather than highway traffic; and 2) the peak PM period in Hillsboro, where the monitored value was used because the low traffic volumes resulted in modeled values that would have been below background values. Typical peak hour traffic volumes established for the roadways were used with the TNM model. The locations shown in the table are the sites where noise monitoring was carried out. Except for the golf course, traffic noise is the dominant source of noise at these sites. Noise levels varied with a site's distance from the roadway noise source. For each site, noise levels for the weekday AM, Midday, and PM peaks were similar. Generally, for sites dominated by traffic noise, peak period $L_{eqs}$ are approximately equivalent to an $L_{dn}$.

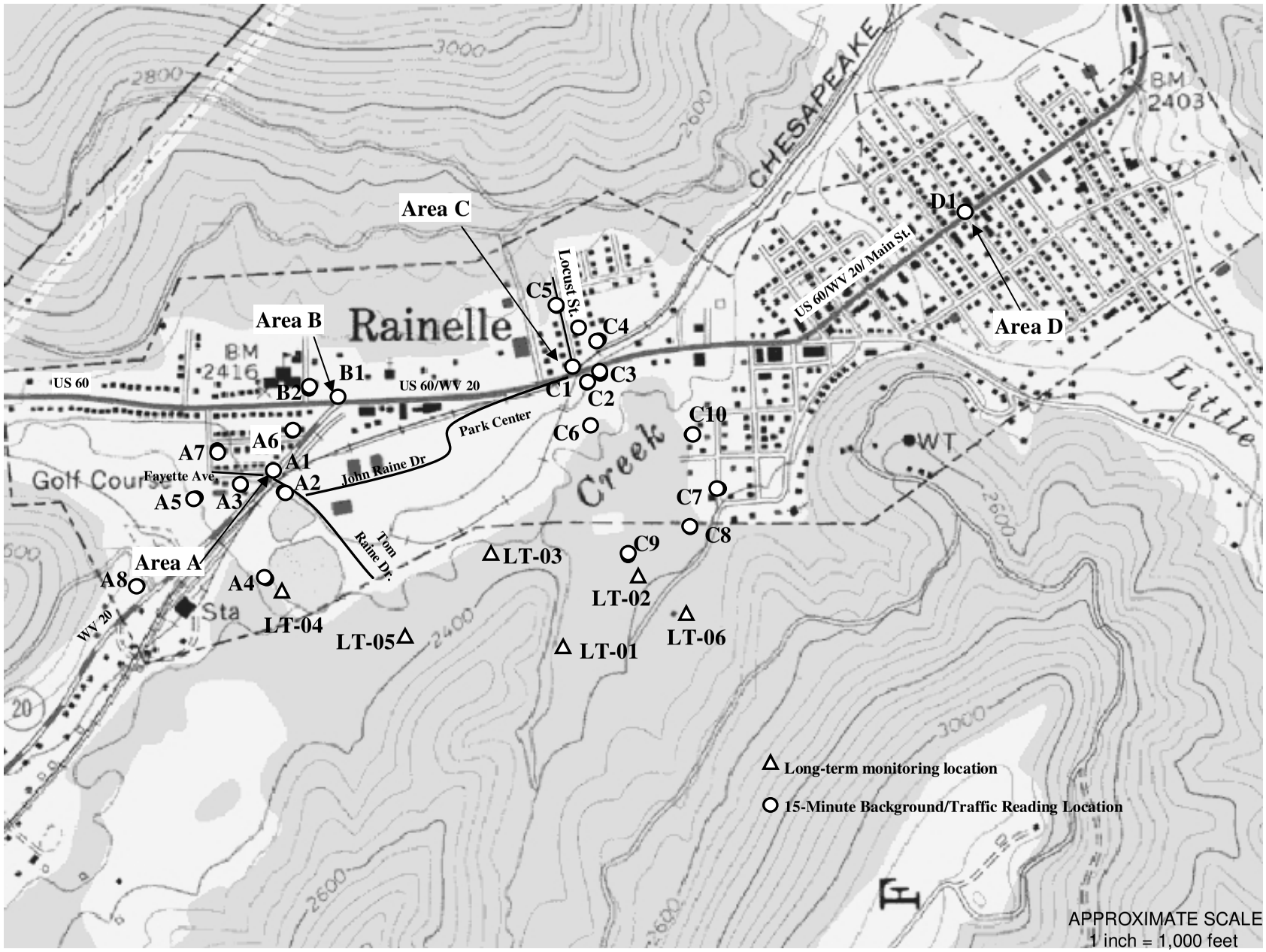


**Figure 3.15-1.**
Noise Monitoring Locations – A through D and Long-Term (LT)
Map Source: USGS Topo (1:24,000) Rainelle (1976)

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

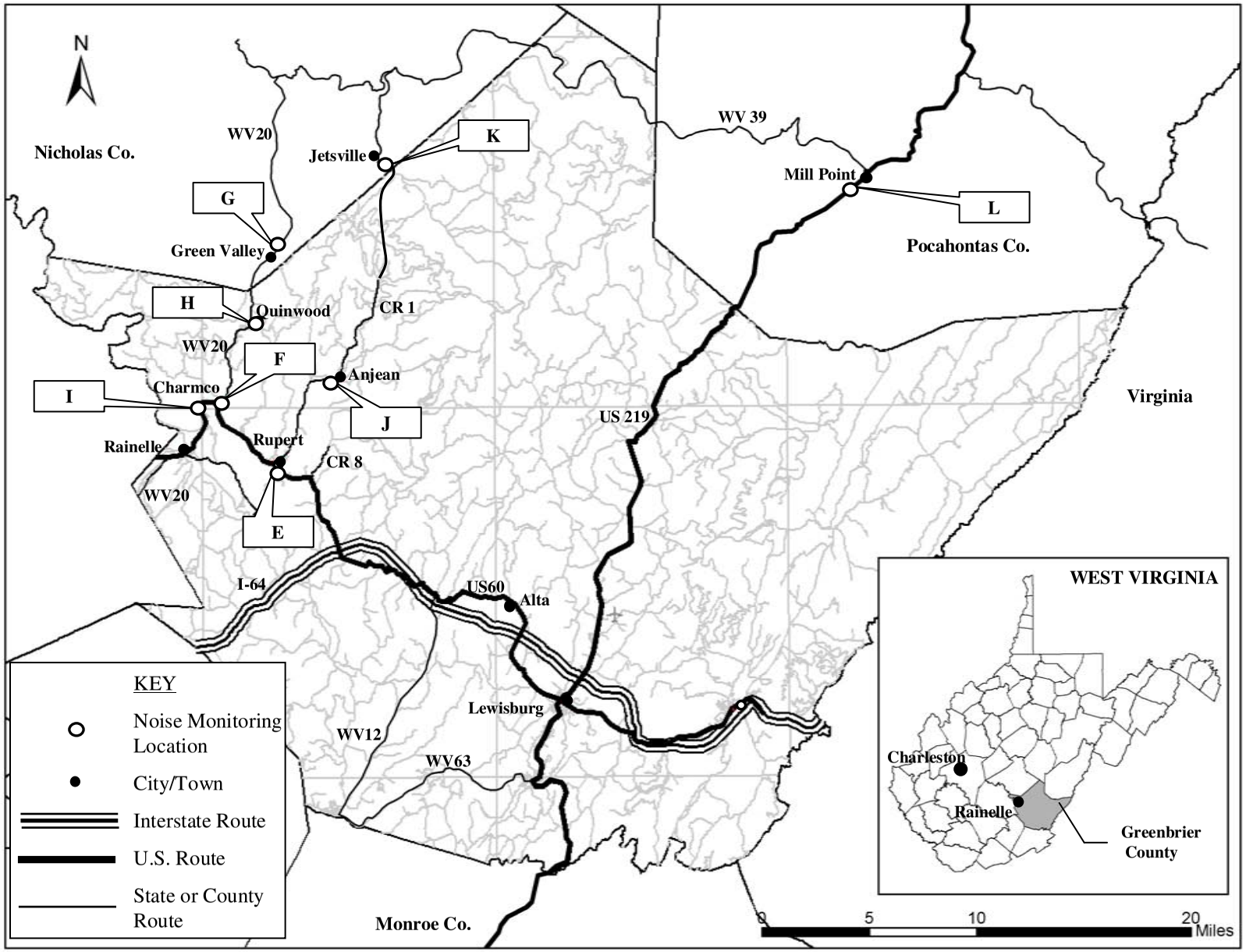


**Figure 3.15-2**
Noise Monitoring Locations – Areas E through L
Map Source: USGS, 1976

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

**Table 3.15-5. Existing Noise Levels at Traffic Sites**

| Area | ID | Location/Landmark | Peak Periods Leq (dBA) | | |
|---|---|---|---|---|---|
| | | | AM | MID | PM |
| A | 1 | State Police Barracks | 60.3 | 60.2 | 60.7 |
| A | 3 | Playground | 58.2 | 58.2 | 58.8 |
| A | 5 | Golf Course | 36.3 | 34.3 | 34.4 |
| A | 6 | Greenbrier Avenue | 64.0 | 63.4 | 62.6 |
| A | 7 | Walnut Street | - | 51.7 | - |
| A | 8 | Grace Baptist Church | 49.6 | 48.5 | 49.6 |
| B | 1 | Rainelle Medical Center | 61.9 | 62.4 | 60.6 |
| B | 2 | Rainelle Elementary | 62.0 | 61.8 | 60.4 |
| C | 1 | North Sewell Street at WV 20/US 60 | 63.9 | 64.0 | 63.4 |
| C | 4 | Cherry Street | 52.4 | 51.8 | 50.6 |
| C | 5 | Nicholas Street | 55.9 | 51.5 | 52.4 |
| D | 1 | Seventh Street at Main St. | 67.8 | 68.6 | 67.3 |
| E | | Route 1 @ US 60, Rupert | 69.1 | 69.1 | 68.0 |
| F | | US 60 at WV 20, Charmco | 66.1 | 65.3 | 65.3 |
| G | | WV 20, Green Valley | 64.7 | 67.3 | 65.7 |
| H | | WV 20, Quinwood | 68.1 | 67.9 | 66.3 |
| I | | WV 20/US 60, Youth Park, Rainelle | 59.3 | 59.8 | 58.3 |
| J | | CR 1, Anjean | 60.5 | 62.1 | 58.7 |
| K | | Donegan, Euke Rd, north of Anjean | 60.5 | 62.1 | 58.7 |
| L | | Hillsboro, Route 219 north of Lewisburg (Mill Point) | 52.9 | 63.5 | 59.3 |

*Peak Period – Time frames 7-9 a.m., 11-1 p.m., or 4-6 p.m., Monday through Thursday*

Noise levels at monitored sites in Area A vary with their distance from the roadway and range from an $L_{eq}$ of 34.3 dBA at the golf course (A5) to 64.0 on Greenbrier Avenue (A6), which is only 7.5 feet (2.3 meters) from WV 20. Homes along WV 20 in Area A are generally close to the roadway, and noise levels at their property lines would be typical of the noise levels shown for the Greenbrier Avenue (A6) and Police Barracks (A1) sites. Homes on side streets and interior streets would have lower noise levels due to distance from the highway and intervening buildings, as represented by the Walnut Street (A7) site. The TNM model addresses traffic noise. It does not model noise from background sources such as trees, birds, insects, etc. The golf course site (A5) is sufficiently distant from the highway that the modeled traffic noise falls below monitored background levels. Thus, the noise level modeled by TNM is unrealistically low. Noise levels at Grace Baptist Church (A8) are about 8 dBA lower than the modeled noise levels at other sites due to topographic differences and distance between the site and roadway (both the church and monitoring site are situated on a hillside above WV 20).

Homes in Area B are also close to the highway, although site conditions generally allowed the noise monitor to be placed 15 to 25 feet (5 to 8 meters) from the roadway. Near the driveway to the Rainelle Medical Center, WV 20 northbound and US 60 eastbound merge. Thus, noise levels in the vicinity of the intersection are slightly higher, due to the higher traffic volume, than noise levels a little further west. The peak period $L_{eqs}$ for both Area B sites are in the low 60s.

The monitoring location for the home at C1 was approximately 12 feet (4 meters) from the roadway. This is a busy intersection due to the Park Center Shopping Complex traffic. The peak period $L_{eqs}$ ranged

from 63.4 to 64.0 dBA. Noise levels at the C4 and C5 monitoring locations are lower because homes in this neighborhood are protected from highway noise by both distance and topography.

The monitoring location at D1 is at the corner of Main and South Streets. It is nearly 12 feet (4 meters) from the roadway, and would be typical of homes and apartments in downtown Rainelle. Peak period $L_{eqs}$ ranged from 67.3 to 68.6 dBA.

Noise levels at Areas E through H are similar to those for D1 in downtown Rainelle. These sites are generally 15 feet (5 meters) from the road. Peak period $L_{eqs}$ are in the mid to upper 60s. The highest noise levels would occur at the intersections with Main Street. Homes along the side streets would have lower noise levels.

For the Western Greenbrier Youth Park (Area I), the modeled site is approximately 100 feet (30 meters) from the edge of the roadway due to the sloping terrain close to the road. Peak period $L_{eqs}$ were 58.3 to 59.8 dBA.

The monitoring locations at areas J, K, and L represent special circumstances. Area J is on CR 1 at the Anjean site near the entrance to the mining site, and it represents property lines for an office and several remote residences at this location. At area J, the monitor was approximately 15 feet (5 meters) from the roadway. The comparatively low traffic volumes at Area J resulted in $L_{eqs}$ of 58.7 to 62.1 dBA. The Donegan site is located approximately 14 miles (23 kilometers) north of Anjean with very few residential properties located between Anjean and Donegan. Homes along the route between Anjean and Donegan are approximately 15 feet (5 meters) from the road, and traffic was assumed to be similar to that at the Anjean site. Thus, existing noise levels would be the same, if not less. Area L represents homes about 15 feet (5 meters) from WV 219, which provides access to the Mill Point Quarry. $L_{eq}$ levels here ranged from 52.9 to 63.5 dBA.

### *3.15.4.2 Monitoring Results at the Proposed Site*

Existing noise levels for the four short-term monitoring sites, C7 through C10, are presented in Table 3.15-6. These locations are affected by local traffic and background noise levels rather than by highway noise. Local traffic has a much lower volume than highway traffic and it travels at speeds of about 25 miles per hour (mph) (40 kilometers/hour [kph]). Thus, traffic noise from local roads is lower than from highways. Local traffic may not correspond to commuter traffic patterns. Consequently, the noise levels for typical "peak" traffic periods are similar to the various off-peak periods. The $L_{eqs}$ at these sites are generally in the mid-30 dBAs to upper-40 dBAs. Because the peak and off-peak readings are similar, the estimated $L_{dns}$ for these sites would be higher than the peak $L_{eqs}$, but well below 60 dBA.

**Table 3.15-6. Existing Noise Levels at Short-Term Monitoring Sites in the Vicinity of the Co-Production Facility Site**

| Area | ID | Location/Landmark | Peak Periods | | | Off-Peak Periods | | |
|---|---|---|---|---|---|---|---|---|
| | | | AM | MID | PM | OP | LN | WE |
| C | 7 | Retirement Community | - | 35.2 | - | 42.7 | 38.0 | - |
| C | 8 | Nursing Home | - | 47.0 | - | 46.4 | 45.3 | 48.2 |
| C | 9 | Sewell Landing Apts (ADA housing) | - | 38.9 | - | 41.6 | 43.5 | 40.2 |
| C | 10 | Mobile Home Park | - | - | - | 45.6 | 43.7 | 39.1 |

*Peak Period – Time frames 7-9 a.m., 11-1 p.m., or 4-6 p.m., Monday thru Thursday*
*OP (Off Peak) – Time frames 7 a.m.-10 p.m., Monday thru Thursday, not within the peak period*
*LN (Late Night) – Time frames after 10 p.m., Monday through Thursday*
*WE (Weekend) – Time frames during Off-Peak periods on the weekend*
*"-" – no monitoring performed*

Table 3.15-7 provides the results of the consecutive 24-hour monitoring periods at six sites in the vicinity of the proposed project site that were collected in January of 2005. The noise monitors recorded $L_{eqs}$ and other parameters at 15-minute intervals. This data was reduced by placing the data in a spreadsheet and calculating 24-hour $L_{eqs}$ and $L_{dns}$. Where possible, the 24-hour period ran from midnight to midnight. Information for both weekday and weekend days is shown in Table 3.15-7.

**Table 3.15-7. Existing Noise Conditions (dBA), Long-Term Monitoring Sites**

| Site ID | Location | Date | Time | Day | Min. | Max. | $L_{eq}$ (24) | $L_{dn}$ |
|---|---|---|---|---|---|---|---|---|
| LT-01 | Plant - Southeast Side | 1/12/05 | 3:00p - 3:00p | Wed.-Thurs. | 27.1 | 66.3 | 39.3 | 42.6 |
| | | 1/15/05 | 12:00a - 12:00a | Saturday | 29.1 | 68.2 | 37.0 | 41.4 |
| | | 1/16/05 | 12:00a - 12:00a | Sunday | 27.7 | 60.5 | 39.7 | 44.6 |
| | | 1/17/05 | 12:00a - 12:00a | Monday | 31.0 | 64.3 | 42.2 | 48.7 |
| LT-02 | Plant - East Side** | 1/16/05 | 12:00a - 12:00a | Sunday | 26.2 | 69.9 | 41.7 | 46.7 |
| | | 1/17/05 | 12:00a - 12:00a | Monday | 30.0 | 70.3 | 45.8 | 51.6 |
| LT-03 | Plant - North Side | 1/14/05 | 10:15p - 10:15p | Fri.-Sat. | 28.0 | 66.9 | 38.8 | 41.9 |
| | | 1/17/05 | 12:00a - 12:00a | Monday | 31.5 | 71.6 | 41.2 | 46.5 |
| LT-04 | Plant - West Side | 1/15/05 | 12:00a - 12:00a | Saturday | 30.4 | 64.9 | 42.0 | 46.1 |
| | | 1/16/05 | 12:00a - 12:00a | Sunday | 30.1 | 68.3 | 42.9 | 48.0 |
| | | 1/17/05 | 12:00a - 12:00a | Monday | 31.0 | 70.2 | 44.8 | 51.3 |
| LT-05 | EcoPark* | 1/12/05 | 4:30p - 4:30p | Wed.-Thurs. | 24.9 | 73.1 | 44.4 | 45.9 |
| | | 1/15/05 | 12:00a - 12:00a | Saturday | 24.0 | 60.9 | 36.5 | 39.6 |
| | | 1/16/05 | 12:00a - 12:00a | Sunday | 24.3 | 67.9 | 42.0 | 47.3 |
| | | 1/17/05 | 12:00a - 12:00a | Monday | 28.0 | 73.4 | 45.2 | 52.6 |
| LT-06 | Pennsylvania Avenue | 1/15/05 | 12:00a - 12:00a | Saturday | 33.0 | 73.9 | 40.8 | 45.2 |
| | | 1/16/05 | 12:00a - 12:00a | Sunday | 31.2 | 65.4 | 43.5 | 49.2 |
| | | 1/17/05 | 12:00a – 12:00a | Monday | 36.0 | 70.5 | 47.4 | 54.0 |

** No rail traffic observed over the weekend monitoring event*
***Residence to be acquired by Western Greenbrier is no longer outside power plant site boundary*

As shown in Table 3.15-7, noise levels at LT-01 through LT-06 are low in comparison to readings observed in the downtown area and at sites influenced by roadway traffic. The 24-hour $L_{eqs}$ are generally in the mid 30s to mid 40s, while the calculated $L_{dns}$ are in the upper 30s to low 50s. Weekend levels appear to be lower than weekdays. The $L_{eqs}$ for these sites are approximately 20 dBA lower than the noise levels for the traffic sites. However, it is important to note that the long-term monitoring was conducted during the winter months, and that baseline noise levels would be expected to be higher from spring through fall when wildlife and insects (e.g., chirping birds, crickets, and cicadas) would be active noise sources. It is also important to note that no rail traffic was observed over the weekend during these monitoring periods, which is atypical for this area.

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