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LIST OF ABBREVIATIONS

CWA	Clean Water Act
DACS	Virginia Department of Agriculture and Consumer Services
DCR	Virginia Department of Conservation and Recreation
DEIS	Draft Environmental Impact Statement
DEQ	Virginia Department of Environmental Quality
DGIF	Virginia Department of Game and Inland Fisheries
DMME	Virginia Department of Mines, Minerals and Energy
EPT	Ephemeroptera Plecoptera Trichoptera (RPB water quality test)
FAC	Facultative Plants
FACW-	Facultative Wetland Plants
FACW-	Facultative Wetland Plants (lesser estimated wetland probability)
FACW+	Facultative Wetland Plants (greater estimated wetland probability)
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
MSL	Mean Sea Level
NEPA	National Environmental Policy Act (of 1969)
NPS	Nonpoint Source (Pollution)
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory (Mapping)
OBL	Obligate Wetland Plants
PEM	Palustrine Emergent
PFO	Palustrine Forested
POW	Palustrine Open Waters
PUB	Palustrine, Unconsolidated-Bottom
RPB (1 & 2)	Rapid Biological Assessment (Levels 1 and 2)
TMDL	Total Maximum Daily Load
TSM	Transportation Systems Management (Alternative)
TVA	Tennessee Valley Authority
USCOE	United States Corps of Engineers
EPA	United States Environmental Protection Agency
FWS	United States Fish and Wildlife Service
USGS	United States Geological Service
VDOT	Virginia Department of Transportation

1. INTRODUCTION AND PURPOSE

1.1 INTRODUCTION

The purpose of this technical report is to document natural resources studies undertaken as part of the Draft Environmental Impact Statement (DEIS) for the proposed Coalfields Expressway Location Study in southwest Virginia. Potential project impacts to these resources are estimated and potential compensation concepts are discussed. Identifying protected natural resources during the planning process will aid in evaluating alternatives based on natural resource considerations, and help to avoid and minimize impacts. This report is prepared in accordance with the Federal Highway Administration's (FHWA) Technical Advisory 6640.8A, the National Environmental Policy Act of 1969 (NEPA), and NEPA's implementing regulations.

The report begins with a brief description of the project and reviews the proposed build alternatives. Subsequent sections discuss physical, biotic, and water resources. Topics such as wetlands and protected species, and potential project impacts to these resources, also are examined. (Refer to the DEIS for more detailed project and alternatives information.)

1.2 PROJECT SETTING

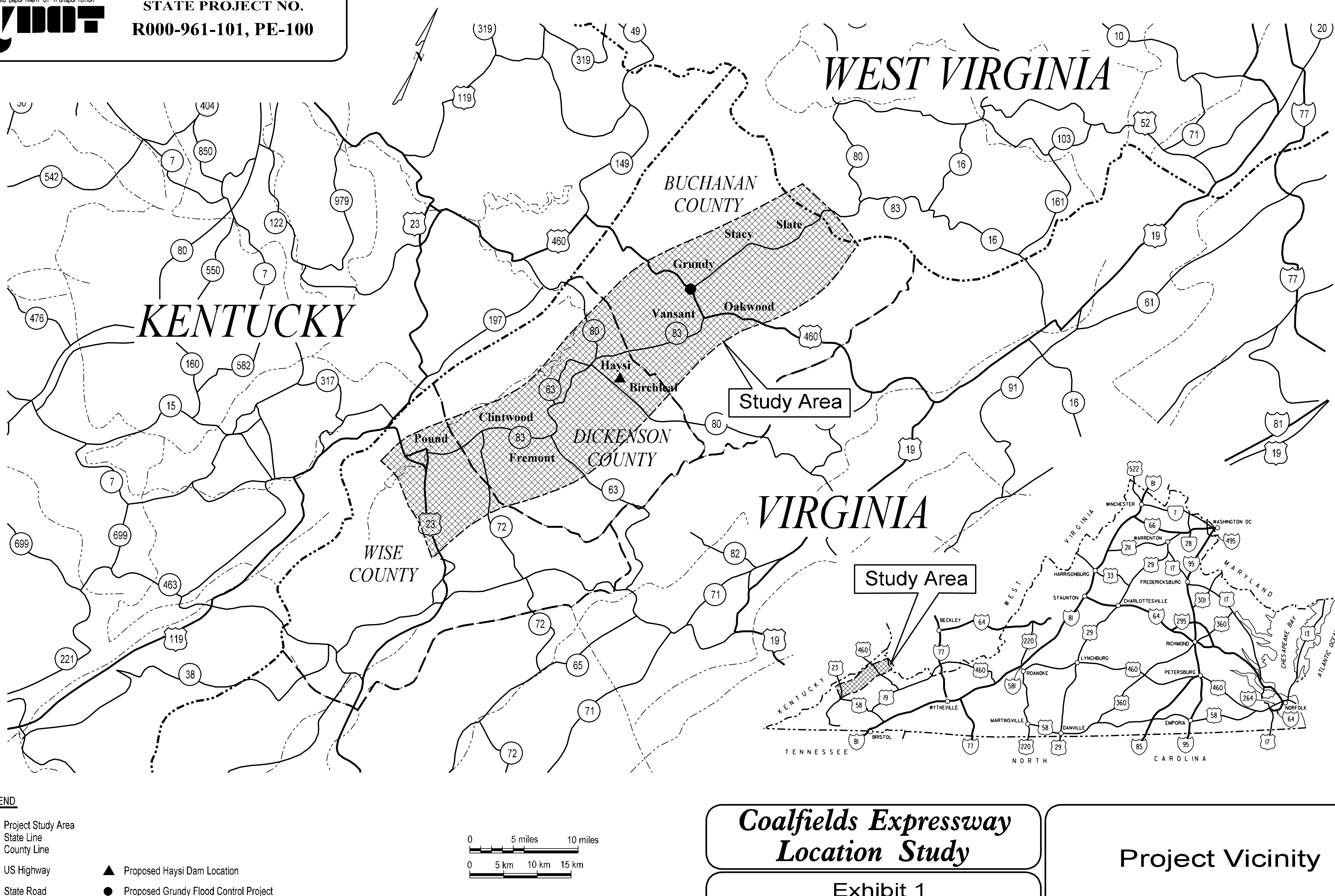
The study area is located in Wise, Dickenson, and Buchanan counties in Southwest Virginia. The study area comprises a portion of the Cumberland Mountain section of the Appalachian Plateau physiographic region, which is characterized by steep slopes, V-shaped valleys, and narrow floodplains. Compared to other mountainous areas of Virginia, elevations in the study area are relatively low. Elevation varies from 295 meters (966 feet) above mean sea level (MSL) near Harmon Junction to 750 meters (2460 feet) above MSL near the West Virginia State line.

The project area is located entirely within the Big Sandy River Subbasin. Major water bodies in the study area include the John W. Flannagan Reservoir, the Pound River, the Russell Fork, and the Levisa Fork.

The study area contains several small communities located within valleys, including Pound, Georges Fork, Clintwood, Fremont, Clinchco, Birchleaf, Haysi, Vansant, Grundy, Harmon Junction, Oakwood, Stacy, and Slate. Populations in these communities are relatively low; Grundy is the most populous with a 1990 population of 1305.

Breaks Interstate Park, one of only two interstate parks in the nation, is located on the Virginia/Kentucky border in Dickenson County, Virginia. The project area falls within the large eastern coalfields region of Kentucky, West Virginia, and Virginia, and coal mining has long-served as the cornerstone of the local economy. Other large employers include government, manufacturing, and truck and rail transportation.

STATE PROJECT NO.
R000-961-101, PE-100



Coalfields Expressway Location Study

Exhibit 1

Project Vicinity

2. BUILD ALTERNATIVES

2.1 INTRODUCTION

Over the course of the project, nine project alternatives were established for consideration. The No-Build Alternative and five Build Alternatives have been retained for further study. For purposes of this report, only the build alternatives (the only alternatives involving significant construction) require discussion.

2.2 DESCRIPTION OF BUILD ALTERNATIVES

This section describes the five proposed build alternatives, shown on Exhibit 2. As the study progresses and more information is obtained, portions of different alternatives may be combined to form the final alternative.

Alternative A – Begins at Pound in Wise County with its connection to Route 23 near Horse Gap. It travels east along the northern town limits of Pound to Route 83. It then follows the Route 83 alignment to the vicinity of Route 621 in Dickenson County. Alternative A parallels Route 621 for approximately one mile and heads east north of Clintwood. Traveling along Big Ridge in a northeasterly direction, it passes north of Haysi and crosses the Russell Fork just south of its connection with the Pound River. From there, it travels east to Bull Gap in Buchanan County. From Bull Gap, Alternative A travels in a southeasterly direction and passes close to the Grundy Airport and crosses Route 460 south of Grundy. It continues to the east along the ridge top, paralleling Route 83 approximately one mile to the south, until it ties to Route 83 at the West Virginia State line near Paynesville.

Alternative B – Begins at Pound in Wise County with its connection to Route 23 near Horse Gap. It travels east, paralleling Route 83 an average of one half mile to the north, to Route 621 in Dickenson County. From there, it continues eastward to the north of Clintwood. Traveling along Big Ridge in a northeasterly direction, it passes just to the north of Haysi and crosses the Russell Fork approximately one half-mile north of the Haysi town limits. From there, it travels along Barts Lick Creek, to a point just south of Bull Gap and parallels the Route 609 alignment in Buchanan County. From near the Route 609/Route 460 intersection, Alternative B parallels Route 460 until they cross near the Route 460/Route 656 intersection. It then continues eastward, parallel to Looney Creek. For the remainder, it travels along the ridge top, paralleling

Route 83 an average of one and one-half miles to the north, until it ties to Route 83 at the West Virginia State line near Paynesville.

Alternative C – Begins at Pound in Wise County with its connection to Route 23 near Horse Gap. It travels east along the northern town limits of Pound to Route 83. It follows the Route 83 alignment to the vicinity of Route 621 in Dickenson County. From there, the alignment parallels Route 72 to the south for a short distance, then turns east, traveling on the ridge top along the southern town limits of Clintwood. Alternative C turns and travels in a northeasterly direction close to the Dickenson County Technology Park, until it follows the same alignment as Alternatives A and B. From this point, it travels across Cranes Nest Creek and along Big Ridge in a northeasterly direction and passes north of Haysi, along the town limits. Continuing east, it travels near Poplar Gap, parallels Routes 614 and 615 in Buchanan County and crosses Route 460 in Grundy in the vicinity of Route 615. Alternative C travels east through Grundy along the ridge top and parallels Route 83 approximately one mile to the south until it ties to Route 83 at the West Virginia State line near Paynesville.

Alternative D – Begins just south of the Pound town limits in Wise County, with its connection to Route 23. It travels in a northeasterly direction along the town limits until it meets Route 83 and continues to the east along the Route 83 alignment to the vicinity of Route 621 in Dickenson County. From there, the alignment parallels Route 72 to the south for a short distance, then turns east, traveling on the ridge top along the southern town limits of Clintwood. At the southeastern corner of Clintwood, Alternative D realigns with Route 83 and either follows the alignment or parallels the alignment south of the McClure River to the southern town limits of Haysi. From there, it crosses Routes 80/83, traveling east along the ridge top, to a point near Poplar Gap in Buchanan County. From Poplar Gap, it travels in a southeasterly direction and passes close to the Grundy Airport. It continues east along the ridge top, paralleling Route 83 approximately one mile to the south until it ties to Route 83 at the West Virginia State line near Paynesville.

Alternative E – Begins just south of the Pound town limits in Wise County, with its connection to Route 23. It travels in a northeasterly direction along the town limits, crosses Route 83, and parallels Route 83 one-half mile to the north until it realigns with Route 83 in Dickenson County west of Clintwood. It continues along Route 83 and then turns and parallels Route 72 to the south for a short distance, then turns east, traveling along the southern limits of Clintwood. At the southeastern corner of Clintwood, Alternative E parallels Route 83 south of the McClure River to the southern town limits of Haysi. From there, it crosses Routes 80/83, traveling east to a point near Poplar Gap in Buchanan County. At this point, the alignment turns in a northeasterly direction until it turns east paralleling Route 460. Alternative E crosses Route 460 near its intersection with Route 656. It continues to the east, paralleling Looney Creek and then Route 83 approximately one and one-half miles to the north along the ridge top until it ties to Route 83 at the West Virginia State line near Paynesville.

3. AQUATIC RESOURCES

3.1 WATER QUALITY AND AQUATIC ECOLOGY

The project area is located entirely within the Big Sandy River Subbasin, a drainage located in Virginia's southwestern corner. The Big Sandy River, formed by the junction of the Levisa and Tug Forks in Kentucky, flows north to its confluence with the Ohio River and drains roughly 2,613 square kilometers (1,009 square miles). The western fork of the Big Sandy River, known as the Russell Fork, splits the study area before passing through a deep gorge known as "The Breaks". In 1954, Virginia and Kentucky established the Breaks Interstate Park overlooking the physically dramatic gorge, where it remains one of only two interstate parks in the country. The other is Palisades Interstate Park, located on the border of New Jersey and New York.

3.1.1 Watershed Descriptions

This section briefly describes the study area's major drainage basins, and includes information on such topics as drinking water supply and land use. The watershed descriptions also list the build alternatives that would cross the watershed. Watershed references correspond to the standard hydrologic unit designations used by the US Geologic Service (USGS) and Virginia's natural resource agencies. Exhibit 3 shows watershed locations.

In the watershed descriptions, land uses referred to as strip mining include some areas that were surface mined decades ago and are now vegetated. These areas were not included in the forested category since many strip mined areas remain arrested in an early stage of forest succession. Representatives from Virginia Department of Mines, Minerals and Energy (DMME) attribute this problem to several cause and effect relationships. Surface mining operations grade down to a bedrock layer, thereby removing much of the soil. This lack of soil, coupled with continuing erosion, inhibits new growth of many plant species. Also, some plant species used in reclamation efforts several decades ago (e.g. *lespedeza sp.*) have grown so successfully they have precluded growth of other competing species.

Cranes Nest River Watershed (Q14)
Alternatives A, B, C, D and E

The Cranes Nest River flows northeast toward its confluence with the Flannagan Reservoir, draining a considerable portion of the study area. Land cover and uses consist of approximately 15% urban and agricultural development, 70% forested, and 15% strip mining. The Town of Clintwood and the nearby Happy Valley Industrial Park are located within the watershed. Most of the strip mining has occurred within the past decade in areas to the east of Clintwood. Closer to the reservoir, the US Corps of Engineers (COE) owns much of the property along Cranes Nest River. Major tributaries include Tarpon Branch, Long Branch and Honeycamp Branch. All five alternatives cross the watershed near Clintwood. Farther east, Alternatives A, B, and C help comprise the watershed's eastern boundary.

Pound River Watershed (Q13)
Alternatives A, B, C, D, and E

This watershed drains the northwestern portion of the study area. Its land cover and uses generally consist of approximately 15% urban and agricultural development, 65% forested and 20% strip mining. State secondary roads and adjacent development traverse the ridges of the watershed. The Town of Pound contains mixed land uses.

The watershed includes most of the John W. Flannagan Reservoir, which provides drinking water to most of Dickenson and Buchanan counties. The US Corps of Engineers (COE) developed the John W. Flannagan Reservoir to provide flood control, water quality control, and recreational opportunities to the area. Flannagan Reservoir currently provides whitewater releases in October as part of the fall drawdown.

All five alternatives cross the watershed between Pound and Clintwood—a considerable distance from the water intake located just below the Flannagan Dam. Further east, Alternative A is located less than a mile from the dam. Other major tributaries include Cane Creek, Bearpen Branch, Georges Fork and Camp Creek.

Exhibit 3

McClure River/Caney Creek Watershed (Q11)
Alternatives C, D, and E

This watershed comprises the portion of the study area drained by the McClure River as it flows northeast into Haysi. Land cover and uses consist of approximately 15% urban development (mostly residential) and agricultural, 70% forested and 15% strip mining. Most of this strip mining has occurred within the past decade, near headwaters that drain into the McClure. Development is mostly located adjacent to watercourses in valley bottoms and ridges–much of it within the communities of Haysi, McClure, and Clinchco.

In the study area, State Route 83 parallels the McClure River. This portion of the river has been classified as impaired (see Section 3.1.2). Also, the COE, in its EIS for the Levisa Fork Flood Control Project, has designated this stretch of the McClure as a mitigation area. This mitigation would entail (if the flood control project is funded) restoration and protection of designated riparian areas. Major tributaries include Road Branch, Mill Creek, and Big Branch. Alternatives D and E traverse a mountainside roughly paralleling the river. Alternative C crosses the watershed near Haysi.

Russell Fork/Russell Prater Creek Watershed (Q12)
Alternatives A, B, C, D and E

This watershed drains the center of the study area and is traversed by all five alternatives. The Russell Fork flows north to Kentucky via the Breaks. Many of the sensitive ecological areas, discussed in Sections 4.2 and 4.3 are located in this watershed, but lower in the watershed than the build alternative locations. The Jefferson National Forest owns much of this land.

The watershed's land cover and uses generally consist of approximately 5% urban development and agricultural, 85% forested, and 10% strip mining. Urban development is generally located in the Town of Haysi and along the Russell Prater Creek/Route 83 corridor. Other major tributaries include Bart Lick Creek, and War Fork.

Russell Fork/Lick Creek/Fryingpan Creek Watershed (Q10)
Alternatives D and E

The Russell Fork flows north into Haysi to its confluence with the McClure River and Russell Prater Creek. Route 80 parallels the river in this area. The watershed drains a small portion of the study area south of Haysi. Its land cover and uses generally consist of approximately 5% urban development and agricultural, 85% forested and 10% strip mining. Development is located mostly within the valley communities of Haysi and Birchleaf, and on ridges. Other major tributaries include Tilda Anderson Branch and Crooked Branch. Alternatives D and E traverse the watershed just south of Haysi.

Levisa Fork/Prater Creek Watershed (Q06)
Alternatives A, C and D

This watershed drains much of Grundy, as well as the area south of Grundy. This includes the Levisa Fork/Route 460 corridor, which contains several small communities, including Vansant. The watershed's land cover and uses generally consist of approximately 15% urban development and agricultural, 80% forested, and 5% strip mining. Commercial, residential, institutional, and heavy industrial (mostly mine related) land uses are located along Route 460 corridor.

The Norfolk and Western Railroad parallels the Levisa Fork in the project area. Major tributaries include Dry Fork, Trace Fork Branch and Cripple Creek.

Levisa Fork/Home Creek/Bull Creek Watershed (Q08)
Alternatives A, B, C, D and E

This watershed drains a large portion of the study area and is traversed by all five alternatives. Its land cover and uses generally consist of approximately 10% urban development (mostly residential) and agricultural, 70% forested and 20% strip mining. Development is almost exclusively located adjacent to water courses in valley bottoms—much of it within the communities of Harman and Harman Junction. The Norfolk and Western Railroad parallels the Levisa Fork and Home Creek in this watershed.

Most of the watershed's extensive strip mining has occurred near the headwaters. Stream impairment in Bull Creek and its tributaries is largely attributed to mining activities. Other major tributaries include Belcher Branch, Connaway Creek and Lynn Camp Creek.

Slate Creek Watershed (Q07)
Alternatives A, B, C, D and E

This watershed lies between the Knox Creek and Dismal Creek watersheds, and drains an eastern portion of the study area. Slate Creek flows westward toward its confluence with the Levisa Fork in Grundy. The watershed's land cover and uses generally consist of approximately 10% urban development and agricultural, 75% forested, and 15% strip mining. Urban development is generally located in the Town of Grundy and along the Route 83 corridor east of Grundy, which roughly parallels Slate Creek. Light industrial and institutional land uses are located along Slate Creek just east of Grundy. Most of the mining activity occurs near the watershed's northern headwaters.

Major tributaries include Elkins Branch, Upper Mill Branch, Nighway Branch, and Hobbs Branch. Alternatives A, C, and D would be located near the watershed's southern boundary, while Alternatives B and E would be located near the northern boundary.

Dismal Creek Watershed (Q05)
Alternatives A, C and D

This watershed drains the southeastern portion of the study area, which is mostly forested. Other land uses include approximately 7% urban development (mostly residential) and agricultural, and 10% strip mining. Development is almost exclusively located adjacent to watercourses in valley bottoms—much of it within the Oakwood community. Much of the mining activity occurs near the headwaters.

In the study area, the Norfolk and Western Railroad and State Route 638 parallel Dismal Creek. Major tributaries include Grapevine Branch, Lower Big Branch, Long Branch, Hale Creek, Spruce Pine Creek, and Linn Camp Branch. Alternatives A, C, and D are located along the watershed's boundary with the Slate Creek Watershed.

Knox Creek Watershed (Q03)
Alternatives B and E

This watershed drains the northeastern portion of the study area. Its land cover and uses generally consist of approximately 5% urban development (mostly residential) and agricultural, 80% forested and 15% strip mining. Development is almost exclusively located adjacent to watercourses—much of it within small valley communities. Most of the mining activity occurs near the headwaters.

Alternatives B and E are located along the watershed's boundary with the Slate Creek Watershed. Other major tributaries include Lester Fork, Straight Fork, Charles Fork and Blackey Fork.

3.1.2 DEQ/DCR Water Quality Assessment

This report relies on existing data to make general statements regarding the water quality in the study area. Specifically, it uses the 1998 Virginia Water Quality Assessment 305(b) report and the draft Total Maximum Daily Load Priority List and Report (the 303(d) report). The Virginia Department of Environmental Quality (DEQ) prepared these reports with assistance from the Virginia Department of Conservation and Recreation (DCR).

DEQ submits the 305(b) and 303(d) reports to the US Environmental Protection Agency (EPA) and Congress to satisfy the federal reporting requirements of the Clean Water Act. The 305(b) report uses monitoring results to pinpoint impaired or sometimes impaired water bodies. Recently, DEQ has revised and improved this document through such measures as improved consistency in station siting, greater stream mile coverage, and expanded pollutant analyses. Chemical, fish tissue, benthic macroinvertebrate, and volunteer stream monitoring are used for data collection. The 303(d) report uses this information to create Total Maximum Daily Load (TMDL) requirements for these water bodies.

The 305(b) report rates water bodies based on their ability to "support" designated uses of the water by human or aquatic life. Impaired waters are designated as partially supporting or not supporting any of the five designated uses: aquatic life; fish consumption; shellfishing; swimming; and drinking water. A stream designated as impaired for aquatic life has a certain number of samples not consistently meeting standards for conventional pollutant parameters such as dissolved oxygen, pH, or temperature. The impaired for swimming use designation typically relates to high fecal coliform readings.

In the entire Big Sandy River Basin, DEQ has designated approximately 3,643 kilometers (2,264 miles), or 45%, as "monitored". If interpretive statements can be made regarding a stream segment's water quality based on water quality data from a nearby monitoring station, it is considered monitored.

Exhibit 3 shows stream segments designated impaired or partially impaired, as well as the 21 stream monitoring stations located in or near the study area. The following tables provide summary information for each impaired stream segment. This information includes the Clean Water Act (CWA) goal the stream does not meet, and its priority as listed by DEQ and DCR. The priority ranking is based on two factors: severity of the impairment and the availability of tools to develop the impairment designation. The former includes such factors as the number of beneficial uses lost, numbers of pollutants responsible for the impairment, and the presence of endangered species in the impaired waters. The availability of tools involves such variables as on-going data acquisition activities in the watershed; the existence of current data, public interest and cooperation, and other programmatic requirements.

1. South Fork-Pound River

CWA Goal & Use Support: Aquatic Life Use—Not Supporting

Watershed:: Q13	*Priority*: Medium
Initial Listing: 1994	
Impairment Cause: General Standard (Benthic)	*Impairment Source:* Resource Extraction
Three of six biological monitoring assessments were ranked as moderately impaired—the remaining as severely impaired. Low density of organisms is cited as the reason for the severe impairment. The habitat assessment notes there is a high degree of embeddedness and channel alterations, deposition, lack of riffles, and moderately unstable banks.	The predominant land use in the watershed is coal mining. DCR rates this watershed as medium for urban impairment potential.

2. North Fork-Pound River

CWA Goal & Use Support: Aquatic Life Use—Partially Supporting

Watershed:: Q13	*Priority*: Medium
Initial Listing: 1996	
Impairment Cause: General Standard (Benthic)	*Impairment Source*: Urban NPS
Biological monitoring results indicate the stream is moderately impaired on four of the six sampling events. The remaining two sampling events resulted in a *not* impaired ranking. These results include a low Ephemeroptera Plecoptera Trichoptera (EPT) index and moderate taxa richness score.	This stream receives runoff from development near Pound and the Route 23 corridor. DCR ranks the watershed medium for urban impairment potential.

3. McClure River

CWA Goal & Use Support: Swimmable Use—Partially Supporting

Watershed:: Q11

Priority: Medium

Initial Listing: 1994

Impairment Cause: Fecal Coliform

Impairment Source: Urban NPS

Four of 13 samples violated water quality standards for fecal coliform at the ambient monitoring station in this reach over the last five years.

DCR ranks urban nonpoint sources as having a medium potential to impact the watershed. Land uses also include coal mining and forestry operations. This reach parallels Route 83, where dense development is located along floodways. Clinchco is constructing a sanitary sewer collection line to the Haysi STP that may reduce fecal violations.

4. Russell Prater Creek

CWA Goal & Use Support: Aquatic Life Use—Partially Supporting

Watershed:: Q12

Priority: Low

Initial Listing: 1996

Impairment Cause: General Standard (Benthic)

Impairment Source: Resource Extraction

Two samples taken in the last five year cycle indicate moderate impairment. The biologist observed coal mining activity and habitat degradation.

Significant coal mining in watershed may have resulted in aquatic habitat impacts.

5. Bull Creek and its tributaries

CWA Goal & Use Support: Aquatic Life Use—Not Supporting

Watershed:: Q08

Priority: Medium

Initial Listing: 1998

Impairment Cause: General Standard (Benthic)

Impairment Source: Resource Extraction

Two biological monitoring samples were assessed as severely impaired. One was based on Rapid Biological Assessment Level 1(RPB1) protocol; the other was RPB2.

Predominant land uses in watershed include coal mining and forest. The DEQ biologist observed and noted trash in the stream.

6. Slate Creek

CWA Goal & Use Support: Aquatic Life Use—Partially Supporting	
Watershed:: Q07	*Priority*: Low
Initial Listing: 1994	
Impairment Cause: General Standard (Benthic) Fecal Coliform	*Impairment Source*: Urban NPS
Three biological monitoring samples yielded moderately impaired ratings and one was rated as severely impaired. The DEQ biologist noted poor habitat resulting from embeddedness, few riffles, channel alterations and bank instability. Three of 14 samples violated the fecal coliform standard.	Much of the watershed has been coal mined. This stream segment parallels the Route 83 corridor, which contains residential and other types of development along the stream banks. Abrupt elevation changes from narrow floodways to steep mountains characterize the watershed, and increases urban impacts to stream.

Source: DEQ/DCR Draft 1998 305(b) and Draft 1998 303(d) reports

DEQ considers only 45% of streams in the Tennessee/Big Sandy Drainage Basin as monitored, of the 21 monitoring stations located at or near the study area, data from 11 stations have led to impairment designations along their respective stream reaches. In Virginia, impaired streams comprise approximately 14% of all assessed streams and rivers. Therefore, the area's water quality does not compare favorably to overall water quality in the state.

The 305 (b) and 303 (d) reports attribute much of the water quality problems in the study area to coal mining and untreated sewage discharges. Coal mining can adversely affect water quality in several ways. First, strip mining often results in severe erosion and sedimentation. Sediment entering water bodies is responsible for reduced storage capacity, habitat destruction, reduced biological oxygen demand, and pollutant transport. Also, runoff from surface coal mines, deep shaft mines, and coal storage heaps is highly acidic. Water reacts with the sulfur in the coal to produce sulfuric acid which, when it enters drainage systems, acidifies streams beyond the point at which many forms of life can exist.

3.1.3 Aquatic Ecology

The aquatic ecology of the project area reflects the existing physical and chemical conditions of its watersheds. Much of the study area has marginal water quality (see Section 3.1.2), thus generally limiting aquatic populations to the more pollution tolerant species.

In 1985, as part of the Levisa Fork Basin/Haysi Dam study, R.T. Bay and D.B. Winford conducted a mussel survey at 18 sites along the Levisa Fork within the study area. Nineteen species of mussels were collected, none of which are federal or state protected species.

Also for the Levisa Fork project, J. M. Morton and C.R. Armani conducted a study in May and September 1991 that found 51 invertebrate families in 13 streams, many of which are located in the study area. Some streams had moderately high species richness, while others had low species richness, which often indicates heavy sedimentation in streams. Sediment deposits fill interstitial spaces, thus limiting the requisite habitat for larger species of benthic macroinvertebrates. Also, sediment fills crevices in the substrate used for fish spawning. These conditions are found throughout the watersheds in the project area and are caused by the impact of development and extractive industries on highly erodible soils (see Section 3.1.2).

Fish distribution within the study area is determined by physical and chemical factors such as substrate type and complexity, water velocity, temperature, streambank characteristics, seasonal drainage patterns, turbidity and water quality. The study area offers a wide variety of habitats from whitewater boulder and gravel creeks to sluggish, sand and silt rivers. In the study area, rivers and their tributaries are generally considered warm water streams. Sport fish in the Big Sandy Drainage include: spotted bass (*Micropterus punctulatus*); smallmouth bass (*Micropterus dolomieui*); channel catfish (*Letalurus punctatus*); flathead catfish (*Pylodictis olivaris*); rock bass (*Ambloplites rupestris*); bluegill (*Lepomis macrochirus*); long ear sunfish (*Lepomis megalotis*); and green sunfish (*Lepomis cyanellus*). The Flannagan Reservoir has a good walleye (*Stizostedion vitreum*) population. Also, for the past 10 years, the Virginia Department of Game and Inland Fisheries (DGIF) has stocked the Flannagan Reservoir with McConaughy rainbow trout and Crawford brown trout, hoping to engender natural trout reproduction. Since spawning has not occurred, a DGIF representative said the agency will probably discontinue trout stocking in the reservoir. Appendix A lists fish species found in the study area. Compiled by US Forest Service staff, this inventory contains 68 fish species, as well as 25 amphibians, 24 reptiles, 51 mammals, and 150 birds. These species have been previously located in the drainage.

3.1.4 Potential Water Quality Impacts

Project construction would likely result in short-term impacts to nearby water resources from sedimentation. As discussed above, sediment entering waterways degrades water quality and damages aquatic life and habitat. VDOT will minimize these impacts by adhering to the Virginia Erosion and Sediment Control Act and Regulations.

After project completion, spills from vehicles transporting hazardous materials or petroleum products could impair water resources. Highway projects also can lead to nonpoint source pollution entering streams. Typical pollutants associated with roadways include heavy metals, asbestos, grease, and hydrocarbons. This threat is made more serious when public drinking water sources are located nearby. Degradation or contamination of drinking water sources can lead to expensive treatment upgrades or source replacement.

The John W. Flannagan Reservoir provides most of Dickenson and Buchanan counties with drinking water, and serves as a major boating and fishing amenity. All five proposed build alternatives cross the Pound River and Cranes Nest River watersheds (which drain into the reservoir) for similar distances. However, Alternatives A, B, and C would cross Cranes Nest River approximately 3.2 kilometers (two miles) downstream from the crossings of Alternatives D and E. Since Alternatives A, B, and C would be located closer to the water intake at the reservoir, they would pose a greater threat to the drinking water supply. Further east, Alternative A would travel within 1.2 kilometers (0.75 miles) from the water intake located near the Flannagan Dam. However, this section of Alternative A would drain into the Upper Cane Branch subwatershed, which drains into the Pound River below the dam and intake. Both Dickenson and Buchanan counties have public safety personnel and equipment trained in hazardous spills remediation and cleanup.

3.1.5 Water Quality Impacts Avoidance And Minimization

VDOT would avoid and minimize project impacts to water resources through sensitive design. Where stream crossings are required, the type of structure used can greatly influence stream impacts. For example, structures that span the stream bank limits such as bridges and bottomless culverts would greatly reduce or eliminate impacts. Due to the study area's severe topography, construction of any of the build alternates would require a number of bridges over major streams. (Section 3.3.3 further addresses stream impacts). If a build alternative were selected as the preferred alternative, later and more detailed designs would again prioritize water resource avoidance and minimization. This could involve design modifications such as minor alignment shifts to avoid streams or the use of retaining walls.

VDOT could use other design and construction measures to avoid and minimize impacts. These include:

- Countersinking culverts a minimum of 91 centimeters (6 inches) below the stream bottom elevation to facilitate the re-establishment of a natural stream bottom within the culvert and to facilitate fish passage.
- Ensuring multiple barrel culverts maintain low flow depths and high flow conveyances to avoid impairing stream hydraulics and assure fish passage during low flow periods.
- Minimizing channel losses when aligning and placing culverts.
- Conducting stream relocations in the dry as much as possible.
- Minimizing disturbance of stream bottoms and minimize turbidity when dredging or filling.
- Conducting earthwork operations and deposition of dredged or excavated materials in such a manner as to prevent erosion of the material and preclude its entry into water bodies.
- Using every reasonable precaution to prevent spills of fuels, lubricants, or other pollutants into water bodies.
- Avoiding impacts to significant riparian corridors.

Design, construction, and maintenance of the project must also comply with the Virginia Stormwater Management Regulations. These regulations are intended to reduce nonpoint source pollution entering waterways, usually by using Best Management Practices (BMPs). For highway projects, the most commonly used BMPs are detention or retention basins. VDOT commits to properly maintain its BMPs by removing accumulated sediment and performing other measures to help insure their proper functioning.

3.2 WETLANDS

Section 404 of the Federal Water Pollution Control Act, more commonly known as the Clean Water Act, provides protection for waters of the US, including wetlands. Wetlands provide valuable habitat for fish and wildlife, improve water quality, regulate storm flow, and may support rare and endangered species. Other waters of the US not meeting wetland criteria (e.g. streams, creeks, etc.) are discussed in Section 3.3.

The COE *1987 Wetlands Delineation Manual* contains the definition of wetlands used in this study. The manual defines wetlands as:

> Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.

The study area contains few wetland areas compared to other parts of Virginia. Many wetlands that once existed in floodplain areas have been impacted by urban development. Among other adverse affects, the disturbance of floodplain wetlands has reduced storm flow retention and has increased the area's susceptibility to flooding.

3.2.1 Wetland Determination Methods

Wetland scientists identified potential wetland areas by reviewing several mapping resources and conducting field investigations. Mapping resources include the following:

- 1:3600 scale orthophotos prepared for the project;
- 1:24 000 scale, orthophoto quadrangle maps from the US Geological Survey;
- National Wetland Inventory Mapping (NWI) from the US Department of Fish and Wildlife (FWS); and
- Flood Insurance Rate Mapping from the Federal Emergency Management Agency.

Field reviews were conducted to verify the existence of potential wetlands and to identify dominant vegetation. To classify wetlands, this report uses an abbreviated version of the classification system used by the FWS for its NWI mapping. (For more information, refer to *Wetlands and Deepwater Habitat of the United States* [Cowardin, et al., 1977]).

3.2.2 Wetland Determination Results

Wetlands investigations revealed the existence of 73 wetland systems located within the 750' corridors established for each proposed segment. Of these, 35 wetland systems are located within their respective segment's construction limits. Table 1 lists the dominant species observed in each of the three wetland types, along with each species' wetland indicator status. Exhibit 4 shows approximate wetland locations, while Appendix B contains site maps for those wetlands having potential impacts.

Table 1
Plant Species in Wetland Systems

Scientific Name	Common Name	Vegetative Layer	Indicator Status*
Palustrine Forested (PFO)			
Acer rubrum	red maple	Canopy	FACW+
Platanus occidentalis	sycamore	Canopy	FACW-
Nyssa sylvatica	black gum	Canopy	FAC
Salix nigra	black willow	Understory	FACW+
Acer rubrum	red maple	Understory	FACW+
Lindera benzoin	spicebush	Shrub	FACW-
Impatiens capensis	jewelweed	Herbaceous	FACW
Boehmeria cylindrica	false nettle	Herbaceous	FACW+
Saururus cernus	lizard's tail	Herbaceous	OBL
Sphagnum spp.	sphagnum spp.	Herbaceous	OBL
Rudbeckia laciniata	tall coneflower	Herbaceous	FACW
Palustrine Emergent (PEM)			
Salix nigra	black willow	Understory	FACW+
Acer rubrum	red maple	Understory	FACW+
Typha latifolia	broad-leaved cattail	Herbaceous	OBL
Carex spp.	sedges	Herbaceous	
Juncus effusus	common rush	Herbaceous	OBL
Eleocharis spp.	spikerush	Herbaceous	
Eupatorium fistulosum	common joe-pye weed	Herbaceous	FACW
Eupatorium purpureum	wide-leaved joe-pye weed	Herbaceous	FAC
Phalaris arundinacea	reed canary grass	Herbaceous	FACW
Alisma subcordatum	common water-plantain	Herbaceous	OBL
Vernonia spp.	ironweed	Herbaceous	
Rhynchospora spp.	beakrush	Herbaceous	
Mimulus ringens	common monkey-flower	Herbaceous	OBL
Sphagnum spp.	sphagnum spp.	Herbaceous	OBL
Impatiens capensis	jewelweed	Herbaceous	FACW
Palustrine Unconsolidated Bottom (PUB)			
Typha latifolia	broad-leaved cattail	Herbaceous	OBL
Carex spp.	sedges	Herbaceous	
Juncus effusus	common rush	Herbaceous	OBL
Eleocharis spp.	spikerush	Herbaceous	
Phalaris arundinacea	reed canary grass	Herbaceous	FACW
Impatiens capensis	jewelweed	Herbaceous	FACW

*Source: Revision of The National List of Plant Species That Occur in Wetlands
Note: FAC+ species are considered to be wetter (i.e., have a greater estimated probability of occurring in wetlands) than FAC species, while FAC- species are considered to be drier (i.e., have a lesser estimated probability of occurring in wetlands) than FAC species. Plants identified to genus lacked taxonomic features needed for species identification. Therefore, indicator statuses could not be determined.

Exhibit 4

Wetlands found in the study area include palustrine, unconsolidated-bottom (PUB), palustrine emergent (PEM), and palustrine forested (PFO) systems. PUB wetlands are the most common, accounting for 23 of the total 35 systems within proposed construction limits. These human-induced systems are often farm ponds—the others usually come from previous mining operations. Wetlands located in former strip mine areas typically differ based on when they were created. In 1977, Congress passed legislation that created stricter mine reclamation regulations. Prior to the act, strip mining operations sometimes inadvertently created poorly-drained areas on benches located at bases of cut slopes. Many of these areas eventually became PUB or PEM wetlands.

The reclamation regulations now require treatment of mining runoff with sediment basins. The mined areas are therefore graded with good drainage as a priority, which has reduced the amount of incidental wetland creation. However, sediment basins that are abandoned often begin to exhibit wetland characteristics and sometimes evolve into PUB or PEM wetlands.

Only five of the 35 systems with potential impacts constitute PFO systems. Most of these are relatively narrow and are located in steep valley or ravine bottoms—the side slopes of which are usually densely populated with rosebay rhododendron (*Rhododendron maximum*), purple laurel *(Rhododendron catawbiense*), and mountain laurel (*Kalmia latifolia*). Also, these systems seem more likely to exist in valley bottoms having relatively low channel slopes.

3.2.3 Wetland Impact Avoidance and Minimization

The preliminary engineering design of the build alternatives prioritized wetland avoidance and minimization. To allow for this, information on wetland locations was provided to designers early in the process. However, due to the scale of the study area, the linear nature of its drainage systems, and the linear nature of all highway alignments, this project will result in unavoidable wetland impacts. When possible, linear wetland systems were crossed at perpendicular or near perpendicular angles to minimize impacts.

If a build alternative is selected as the preferred alternative, later and more detailed designs would again prioritize wetland avoidance and minimization. This could involve such design modifications as minor alignment shifts to avoid wetlands, the use of bridges instead of culverts, or the use of retaining walls.

3.2.4 Wetland Impacts

Table 2 shows estimated wetland impacts in hectares and acres. For each wetland site, the corresponding wetland type, station number, and impact by build alternative is provided. Appendix B contains site maps for those wetlands having potential impacts based on estimated construction limits from the preliminary design. Although these limits will likely change during more-detailed design stages, the preliminary construction limits provide a means to compare wetland impacts for different alternatives.

Table 2 indicates that Alternative D would impact the most wetlands, with 2.945 hectares (7.278 acres) of impacts. Alternative B would impact the least, having 0.605 hectares (1.494 acres) of associated impacts. Alternative E would have the next highest amount (1.914 hectares [4.729 acres]), followed by Alternative C (2.286 hectares [5.649 acres]), and Alternative A (2.512 hectares [6.208 acres]).

These comparisons combine impacts to different types of wetland systems to determine total impacts for each alternative. However, from ecological and environmental standpoints, the PFO systems are more valuable than the PUB and PEM systems. The different compensation ratios typically used for these wetland types reflect the relative importance of each. Therefore, comparison of each alternative's total estimated compensation requirement perhaps serves as a better means to evaluate and compare the alternatives. The following section discusses wetland compensation and compares the alternatives' compensation estimates.

3.2.5 Wetland Compensation

VDOT may be required to provide wetland compensation for unavoidable and necessary wetland impacts from the project. If a build alternative with wetland impacts is chosen as the preferred alternative, VDOT will discuss compensation options in more detail in the Final Environmental Impact Statement (FEIS).

Wetland compensation can take several forms, ranging from construction of new wetlands to enhancement of existing wetlands. Due to the characteristics of many of the study area's wetlands, considerable opportunities may exist for wetlands enhancement and/or restoration. As mentioned previously, most of the wetlands are human-induced systems. Some of these systems, such as a former sediment basin from a strip mining operation, could be enhanced through plantings of indigenous hydrophytic species. Grading a basin's side slopes to create gentler side slopes would increase the wetland area and improve slope stability.

Table 2

Although wetland restoration and other compensation options may be viable, it might still be necessary to create or construct new wetlands. For created wetlands compensation, this report assumes the following compensation ratios:

Palustrine Forested (PFO)	2:1
Palustrine Emergent (PEM)	1:1

These ratios are typically used for VDOT projects. Compensation ratios for PUB wetlands are not shown since the COE generally does not require compensation for these types at wetlands. However, the COE approves compensation plans on a case-by-case basis, and compensation requirements (including ratios) may vary.

Tables 3 and 4 show wetland compensation estimates for each alternative in hectares and acres, respectively. Because of Alternative A's relatively high amount of PFO impacts, it has the greatest compensation estimate at 1.754 hectares (4.333 acres). Alternative E has the smallest compensation estimate—0.359 hectares (0.886 acres). Compensation estimates for the five alternatives average 0.923 hectares (2.281 acres).

3.3 WATERS OF THE US

Section 404 of the Clean Water Act establishes wetlands as a subset of all protected waters of the US. Other waters include such features as streams, creeks, lakes, and ponds. This report uses the common practice of referring to these systems simply as waters. Recent and proposed changes to Section 404's implementing regulations place stricter permitting requirements on impacts to waters. Therefore, these types of impacts have received greater attention in the past several years.

As mentioned previously, drainage is usually restricted to the many incised creeks and streams that traverse the study area, and relatively few wetlands exist. Therefore, the project would impact more waters than wetlands. This section discusses potential project impacts on waters of the US, excluding wetlands.

3.3.1 Methods for Waters Determinations

Wetland scientists identified jurisdictional waters of the US by reviewing 1:3600 scale orthophotos prepared for the project and 1:24,000 scale orthophoto

Tables 3 and 4

quadrangle maps from the USGS. Field investigations were conducted on many sites in conjunction with wetlands surveys. Due to the scale of the project, however, each potential waters location was not visited. This report assumes each perennial and intermittent stream shown on USGS quadrangle maps meets the COE criteria for jurisdictional waters. Wetland scientists base this assumption on their knowledge of the area and field observations.

For each proposed segment, waters of the US impact estimates were determined by alternative. Estimates include impacts from proposed connector roads that would link the Coalfields Expressway with nearby state roads. Also, according to the *Draft Hydrology/Hydraulics Report* prepared for the project, the build alternatives would require relocations of 12 streams. Estimates include these stream relocation impacts.

This report shows waters of the US impacts in linear units, rather than by area. Some of the systems designated as PUBs in this report may not meet the COE's wetland vegetation or soils criteria, and might be better referred to as Open Waters. However, impacts to Open Waters would be determined by area. To simplify matters, these systems are designated PUB wetlands and their impacts are calculated by area.

This report also considers all waters located within proposed construction limits as impacted. This approach results in very conservative or high impact estimates, since many of these impacts would be temporary.

3.3.2 Waters Impact Avoidance and Minimization

The project's preliminary engineering design avoided and minimized impacts to waters of the US. Whenever possible, segments cross streams and creeks at perpendicular or near perpendicular angles to minimize impacts. Also, findings from the project's preliminary hydraulics and hydrology report led to alignment shifts to avoid stream and floodplain impacts. Later in the process, more detailed designs may further reduce impacts to waters. These modifications could include further alignment shifts or the use of retaining walls. However, due to the scale of the study area and the linear nature of watercourses and roadways, a build alternative would impact these resources. If a build alternative is selected as the preferred alternative, more detailed designs would again prioritize waters avoidance and minimization.

3.3.3 Waters Impacts

Due to the extreme topography in the area, many of the stream crossings would require the use of bridges. Although costly, bridging will significantly reduce the project's impacts to waters of the US. For example, waters impacts without bridging would range from 10.41 LK (6.47 LM) to 18.58 LK (11.55 LM). The impact estimates discussed below, which consider bridging, are considerably lower. These estimates assume bridged waters would not be impacted, although bridges can sometimes cause impacts.

As Table 5 shows, Alternatives A, C, and D have similar total estimated impacts to waters of the US. Alternative D has the highest amount, with 15.35 linear kilometers (LK) or 9.54 linear miles (LM) of impacts. Alternative A has the second highest amount of impacts, with 14.13 LK (8.78 LM). Alternative E has the lowest amount of total impacts with 7.14 LK (4.44 LM).

3.3.4 Waters Compensation

As discussed previously, most development has occurred in bottom areas adjacent to streams. This practice encroaches on the streams and their floodplains, creating unstable streams with high erosion rates, reduced habitat and water quality, and inadequate flood conveyance. Compensation for project impacts to waters of the U.S. could involve various methods of enhancement or restoration to streams and riparian areas. VDOT will assess the flow patterns and morphology of impacted streams to determine if enhancement or restoration is needed if a build alternative is selected.

Table 5

Table 5 continued

4. PROTECTED SPECIES

Under the Endangered Species Act (ESA) of 1973, any federal action that would likely result in a negative impact to federally protected plants or animals is subject to review by the FWS. Even in the absence of federal actions, the FWS has the power, through the provisions of Section 9 of the ESA, to exercise jurisdiction on behalf of a protected plant or animal. The FWS and other wildlife resource agencies also exercise jurisdiction in accordance with the Fish and Wildlife Coordination Act (48 Statute 401, as amended: 16 U.S.C. 661 et seq.).

The Commonwealth of Virginia also designates plant and animal species deemed threatened and endangered within the state. Based solely on statewide populations, these designations do not consider total populations of these species throughout its geographic range.

4.1 METHODS FOR PROTECTED SPECIES RESEARCH

Early in the planning process, VDOT began coordinating with agencies involved with federal and state listed species. The following agencies received scoping letters requesting their comments on the project:

- US Fish and Wildlife Service (FWS);
- Virginia Department of Conservation and Recreation (DCR);
- Virginia Department of Game and Inland Fisheries (DGIF); and
- Virginia Department of Agriculture and Consumer Services (DACS).

Scoping responses from the agencies served as a basis for further work. This work included database searches, further agency coordination, review of mapping resources, and collection and research of Nature Conservancy recovery plans. (In discussing this report's information sources, the following section provides more information on research methods used.)

Table 6 lists federal and state threatened and endangered species identified through agency coordination. These species are listed by county, however, and they may not occur within the study area. This section also discusses resources used for the table and provides information on each of the federally listed species.

Using mapping of the five build alternatives, DCR mapped potential habitat areas for Virginia spiraea and small whorled pagonia to create a methodology for field surveys. In October 1998, under contract from VDOT, DCR's Division of

Natural Heritage conducted a field survey to determine potential project impacts to the Virginia spiraea (see Section 4.2.2).

The presence of the small whorled pagonia in the project area is unlikely, and surveying for the species would require considerable time and resources. However, to ensure the project would not impact the pagonia, VDOT will conduct a field survey on the final alignment if a build alternative is selected as the preferred alternative. If discovered, VDOT will take the necessary measures to ensure the project would not impact the pagonia.

4.2 RESULTS FROM PROTECTED SPECIES RESEARCH

4.2.1 Database and Literature Search

Table 6
Federal and State Status of Species
Identified through Agency Coordination (by County)

Common Name	Scientific Name	Federal	State	County
Gray bat[2]	*Myotis grisenscens*	Endangered	None	Wise
Peregrine falcon[3]	*Falco peregrinus*	Endangered	None	Wise
Indiana bat[0123]	*Myotis sodalis*	Endangered	Endangered	Dickenson
Virginia spiraea[0123]	*Spiraea Virginiana*	Threatened	Endangered	Dickenson, Wise
Shiny pigtoe[23]	*Fusconaia cor*	Endangered	Endangered	Wise
Fine-rayed pigtoe[23]	*Fusconaia cuneolus*	Endangered	Endangered	Wise
Birdwing pearlymussel[23]	*Lemoix rimosus*	Endangered	Endangered	Wise
Appalachian bewicks wren[23]	*Thryomanes bewickii altus*	None	Endangered	Dickenson
Brown supercoil[4]	*Paravitrea septadens*	None	Endangered	Dickenson
Small whorled pagonia[2]	*Isotria medeoloides*	Threatened	Endangered	Wise

[0] DCR January 13, 1998 correspondence.
[1] DCR October 21, 1997 scoping response
[2] FWS February 10, 1998 scoping response
[3] DGIF February 2, 1998 database search
[4] DCR Interagency Coordination Meeting Response

Resources

[0]In its October 21, 1997 scoping response, the Natural Heritage Division of DCR searched its Biological and Conservation Data System for occurrences of natural heritage resources for the study area. The agency notes that an absence of data may indicate the project area has not been surveyed, rather than confirm the area lacks natural heritage resources.

[1]In order to evaluate concept alternatives, VDOT requested DCR to provide more detailed information on occurrence locations for natural heritage resources. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations. DCR obtains information on documented resource locations through field inventory, review of pertinent scientific literature, review of museum and herbarium collections, and contributions from private individuals engaged in similar inventory work.

DCR provided locations of two Virginia spiraea communities and one Indiana bat community. It also provided locations and descriptions of ten conservation sites (see Section 4.3). This term refers to a natural area that includes one or more occurrence of natural heritage resources, and is notable for its diversity. None of the build alternatives would impact the conservation sites.

[2]In its February 10, 1998 scoping response, FWS provided a listing of federally protected species in Wise, Dickenson, and Buchanan counties.

[3]As part of an information sharing agreement, VDOT has access to the DGIF database for endangered and threatened species The database search, which included both federal and state species (excluding insects), was done by USGS quadrangle. The search included the fifteen quadrangles covering the study area, as well as adjacent quadrangles (32 total). VDOT’s correspondence of February 2, 1998 contains the search results.

[4]In its Interagency Coordination Meeting on October 20, 1998, VDOT solicited comments from agencies regarding the project. In comments it provided later, DCR provided information on species added to the Biological and Conservation Data System since the October 21, 1997 scoping response.

4.2.2 Federally Protected Species

Virginia spiraea (Spiraea virginiana)

Spiraea virginiana is currently distributed in isolated populations in Georgia, Tennessee, North Carolina, Virginia, West Virginia and Kentucky. Virginia spiraea is a large perennial shrub (1 – 3 m) that is characterized by narrow elliptic leaves that are remotely toothed and glaucous beneath. Virginia spiraea is a deciduous shrub with yellowish/greenish petals that flowers in late May to late June. Virginia spiraea can be distinguished from common associates by profuse branching patterns, flower color, and inflorescence.

Virginia spiraea spreads clonally and forms dense clumps, which spread in rock crevices and ground boulders. The root system and vegetative characteristics allow it to thrive under appropriate disturbance regimes, such as along rocky, flood-scoured riverbanks in gorges or canyons. This plant is noted as a disturbance-adapted shrub that can tolerate flooding, inundation, erosion, scouring, deposition, and human interventions.

Virginia spiraea grows vigorously in full sun on sandstone substrates and acidic moist soils along the banks of second and third order streams or on depositional point bars. Periodic flooding and scouring of the area is essential to this plant's survival because it eliminates arboreal competitors, herbaceous vegetation, and creates riverwash deposits. Frequent inundation of the area allows dispersal of seeds to colonize new sites.

A Virginia spiraea community has been discovered near the Russell Fork River near Breaks Gorge and another near the Pound River downstream of John W. Flannagan Dam. None of the build alternatives would impact these communities.

Field Survey

The study area contains areas that match the habitat requirements described above. Therefore, under contract from VDOT, DCR's Division of Natural Heritage conducted a field survey to determine potential impacts to the Virginia spiraea from the proposed build alternatives. In October 1998, a DCR staff botanist visited 12 sites identified as potentially containing suitable habitat for the Virginia spiraea. No Virginia spiraea or any other state or federal listed plant species were found at the survey sites, although suitable spiraea habitat did exist at several locations. The sites surveyed and a summary of each are listed below. Exhibit 5 shows these survey locations.

Exhibit 5

Site 1: Pound River

The river channel is 3.3 –4.9 meters (10-15 feet) wide and moderately sunny banks with few shoals or gravel bars and with relatively steep forested banks. There is no suitable habitat for spiraea at this location.

Site 2: Freemont

The channel is wider than Site 1, some cobble shoals and islands exist, but the area is moderately to heavy shaded with thick growth of the exotic plant *Polygonum cupidatum.* Marginal habitat for the spiraea exists at this location.

Sites 3 and 4: McClure River

There is some open cobble bar and island habitat at these sites, but it is well shaded along much of the stream reach. Some isolated but thick patches of *Polygonum cupidatum* and extensive growth of kudzu along the steep roadbank exists. Overall, these sites offer poor habitat, but some small areas are moderately suitable.

Site 5: Haysi High School

This area contains a pool and riffle stream with few depositional areas. There is no suitable habitat for spiraea at this site.

Sites 6 and 7: Russell Fork

These sites are open and sunny with a wide stream channel and extensive gravel bars. This is suitable habitat, although some kudzu is growing along the steep roadbank.

Site 8: Hills Mill Tunnel

This site contains a relatively wide channel and is open and sunny with extensive gravel bars. This is good habitat, particularly on the island located at the center of the proposed corridor.

Site 9: Cedar Grove School

This site contains mostly deep pools with steep, shaded banks, with a considerable amount of kudzu. This is not good habitat for the spiraea.

Site 10: Looney Creek

This site has some gravel bars, but is well shaded. The habitat for the spiraea at this site is very marginal.

Site 11: Grundy

This site contains some gravel bars along banks, some kudzu, and is open to partially shaded. This is marginal habitat for the spiraea.

Site 12: Turkey Pen Branch
This site has a wide river channel and is open and sunny. There are extensive gravel shoals along the banks. Although this site has good habitat, kudzu infestation has occurred along a portion of the east bank.

Indiana bat (Myotis sodalis)
Myotis sodalis is medium sized with a forearm length of 35-41 mm and a head and a body length of 41-49 mm. Weights range from 6 to 9 grams. The pelage (the hairy or furry covering) is fine and fluffy; the upper parts are a dull, grayish chestnut. This species closely resembles the little brown bat *(Myotis lucifungus)*. This species occupies much of the eastern half of the United States. Populations and individual records have been reported in Virginia. This bat is know to be found in state owned or managed lands throughout its entire range.

Myotis sodalis is very uncommon in Virginia, found in only eight caves in five counties, including Wise County. As recently as 1995, one community was documented in the north-central portion of the study area. None of the build alternatives would impact this community.

Small whorled pogonia (Isotria medeoloides)
Isotria medeoloides is currently distributed in isolated populations in 15 states. Flowering plants are 4 – 10 inches high and the vegetative plants are shorter. The stems are robust, hollow, smooth, pale green and glaucous. The leaves are pale green, glaucous, and borne in a single whorl of 5 or 6 at the top of the stem. One or two flowers form in the center of the whorl.

In Virginia, the small whorled pogonia has been documented from eight counties on the Piedmont and Coastal Plain and from Lee County in southwest Virginia. The plant occurs in very ordinary looking third growth upland forests on terrain that is almost level or gently to moderately sloping in northerly or easterly directions. The understory is distinctly open. Many of the colonies occur on land that has been previously cultivated. Soils are acidic sandy loams with low to very low nutrient contents by agricultural standards.

Flowering typically occurs in late-April to mid-May. Flowering is so synchronized that the total flowering period within a colony occurs within two and one-half weeks. Some colonies are composed of mostly vegetative plants, others mostly of flowering plants. Small whorled pogonia is self-pollinated and rarely produces more than one stem per plant.

Populations of small whorled pogonia in Virginia are particularly threatened by the development of housing subdivisions. Large deer populations also are a threat because the plant usually does not reappear the next year when its whorl is grazed early in the season. Some colonies have survived selected timbering, but clearcutting and other practices resulting in drastic changes in light factors or significant increase in interspecific competition would likely cause a colony to decline.

The FWS listed *Isotria medeoloides* for Wise County in its scoping response. However, as Exhibit 1 shows, the study area only comprises a small portion of Wise County. This portion lies in a different drainage than the rest of the county, and shares physical characteristics of neighboring Dickenson and Buchanan counties more than the rest of Wise County. The more specific research conducted by DCR indicated that the study area contains no known communities of small whorled pogonia. Impacts to this species are not anticipated.

Gray bat (Myotis grisenscens)

In 1978, numbers of *Myotis grisenscens* were estimated at 1000 to 2000. Subsequent exploration of caves, supported by DGIF, has resulted in discovery of new colonies and in a new estimate of 4000 to 8000 individuals.

FWS listed this species for Wise County in its scoping response. The more specific research DCR conducted for the study area did not indicate the presence of gray bat communities in the study area. Therefore, impacts to this species are not anticipated.

American peregrine falcon (Falco peregrinus anatum)

The DGIF database search listed *Falco peregrinus anatum*, a migratory species that can occur anywhere in Virginia. The project area contains no known nesting sites and reduction in habitat for the species would be negligible.

Birdwing pearly mussel, Shiny pigtoe mussel, Fine-rayed pigtoe mussel (Lemiox rimosus, Fusconaia cor and Fusconaia cuneolus)

FWS listed *Lemiox rimosus, Fusconaia cor* and *Fusconaia cuneolus* for Wise County in its scoping response. Although these mussel species are located in Wise County, they are not found in the Big Sandy Drainage Basin. A 1985 mussel survey conducted at 18 sites along the Levisa Fork did not find any of these species. Impacts to these species are not anticipated.

4.3 AVOIDANCE AND MINIMIZATION OF PROTECTED SPECIES IMPACTS

Early in the planning process, VDOT began studying the potential for federal and state listed species in the study area, and began coordinating with appropriate agencies. The information collected helped to evaluate project segments and to avoid impacts. This section discusses specific steps VDOT has taken to avoid and minimize impacts.

As mentioned previously, DCR provided occurrence locations of two federally listed species near the project's concept alternatives, as well as 10 conservation sites. Two Virginia spiraea communities and one Indiana bat community were last documented within or near the study area in 1995. None of the concept alternatives would have impacted the Virginia spiraea communities or the conservation sites. One concept alternative could have impacted the Indiana bat community, but it was eliminated from consideration for this reason. A 1998 field survey conducted by DCR's Division of Natural Heritage confirmed the project would not impact Virginia spiraea communities (see Section 4.2.2).

4.4 PROTECTED SPECIES IMPACTS

Based on the information presented above, impacts to federally protected species are not anticipated.

5. REFERENCES

Cumberland Planning District Commission and Cumberland Plateau Planning District Commission. *Buchanan County Comprehensive Plan.* 1994.

Cumberland Planning District Commission and Cumberland Plateau Planning District Commission. *Dickenson County Comprehensive Plan.* 1994.

Environmental Laboratory. *1987 Corps of Engineers Wetland Delineation Manual.* Technical Report Y-87-1. Washington, D.C. 1987

Frye, K. *Roadside Geology of Virginia.* Mountain Press Publishing Company, Missoula, MT. 1986.

Wise County Planning Commission and Lenowisco Planning District Commission. *Wise County Comprehensive Plan.* 1994.

Tennessee Valley Authority. *Wise County Soil Survey*. 1940.

Terwilliger, K. (Coord.). *Virginia Endangered Species.* The McDonald and Woodward Publishing Company, Blacksburg, VA. 1991.

United States Army Corps of Engineers, Huntington District. *Draft Environmental Impact Statement for the Levisa Fork Basin/Haysi Dam Project.* 1997.

United States Army Corps of Engineers, Huntington District. *Supplement #4, Design Memorandum Number 10C for the John W. Flannagan Dam and Reservoir, Pound River, VA Master Plan.* 1991.

United States Army Corps of Engineers, Huntington District. *Grundy Flood Protection Highway Upgrade Final Environmental Impact Assessment.* 1995.

United States Department of Transportation, Federal Highway Administration. *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* – T6640.8A. Washington, D.C. 1987.

United States Fish and Wildlife Service, Region 5. *Virginia Spiraea Recovery Plan – Technical/Agency Draft.* 1991.

United States Fish and Wildlife Service, Region 5. *Small Whorled Pagonia Recovery Plan, First Revision*. 1992.

Virginia Department of Environmental Quality and the Virginia Department of Conservation and Recreation. *Virginia Water Quality Assessment – Draft 305(b) Report*. 1998.

Virginia Department of Environmental Quality and the Virginia Department of Conservation and Recreation. *Total Maximum Daily Load Priority List and Report, Draft 303(D) Report.* 1998.

Virginia Department of Conservation and Recreation. *Virginia Outdoors Plan.* 1996.

Wagner, David, Natural Resources Conservation Service. *Buchanan County Soil Survey,* Draft Information. 1998.