# EXECUTIVE SUMMARY

## Description of Proposed Project

The Southeast High Speed Rail (SEHSR) project involves the incremental development, implementation, and operation of high speed rail (HSR) service passenger in the approximately 450-mile travel corridor from Washington, DC, through Richmond, VA, and Raleigh, NC, to Charlotte, NC. The North Carolina Department of Transportation Rail Division (NCDOT) and the Virginia Department of Rail and Public Transportation (DRPT), with their federal partners, the Federal Railroad Administration (FRA) and the Federal Highway Administration (FHWA), have been working together since the early 1990s to develop the SEHSR corridor.

A "tiered" approach was adopted for the required environmental studies because of the length of the corridor. The original SEHSR Tier I Environmental Impact Statement (EIS) (2002) covered the entire Washington, DC, to Charlotte, NC, corridor at a program level, establishing the overall project purpose and need, along with the preferred corridor.

This Tier II EIS includes detailed environmental analysis appropriate to the proposed actions planned within the preferred corridor between Richmond, VA, and Raleigh, NC. There is existing freight and passenger rail service operating within the preferred corridor from Petersburg north to Washington, DC, and from Raleigh west to Charlotte, NC. Both states have active rail improvement programs in these portions of the corridor. The planned and anticipated rail improvements in these portions of the corridor are needed for safety, capacity, and congestion management, and thus while they facilitate the overall higher speed rail system, they have independent utility from high speed rail (i.e., they need to be completed whether or not the overall SEHSR system is developed). Each of these projects will have environmental documentation appropriate to the specific action.

## Purpose of the Proposed Project

This proposed action facilitates the previously approved purpose for the SEHSR Tier I EIS, which includes the following:

- Divert trips from air and highway within the travel corridor
- Provide a more balanced use of the corridor's transportation infrastructure
- Increase the safety and effectiveness of the transportation system; and
- Serve both long-distance business and leisure travelers between and beyond Virginia and North Carolina

## Need for the Proposed Project

The Tier I EIS for the SEHSR between Washington, DC, and Charlotte, NC, established the overall need for the project:

- Growth – Population and economic growth rates in Virginia and North Carolina have been consistently higher than national averages and are projected to remain that way. Transportation systems must keep improving in order to maintain a healthy economy under these conditions.

- Congestion – Population growth and economic development have led to increasing vehicle use on interstates and major highways in the region, as well as increasing demand for air travel. Congestion in the corridor has resulted in growing delays in both auto and air travel.
- Travel Time – Current passenger rail travel times are not competitive with travel by airplane or automobile. Reductions in travel time are necessary to effectively divert travelers from other modes of transportation.
- Connectivity – With SEHSR as the north-south spine, and coupled with eastern and western feeder systems, passengers will be effectively connected up and down the entire east coast, as well as regionally.
- Air Quality – The movement of passengers by HSR offers reductions in emissions per passenger mile traveled over other mobile sources.
- Safety –Rail has a safety record similar to air travel, and rail has proven exponentially safer than automobile travel (.04 fatalities per 100 million passenger miles for rail, versus 1.29 fatalities per 100 million passenger miles for autos).
- Energy Efficiency – Intercity rail is 45 percent more energy-efficient than domestic commercial airline service and 76 percent more energy-efficient than general aviation. As well, passengers traveling by rail use 21 percent less BTUs per mile on average than those traveling by automobile.

## Study Corridor

This Tier II EIS is focused between Richmond, VA and Raleigh, NC.

For engineering purposes and discussions of impacts, the project corridor is divided into 26 sections (Figure ES-1).

There are three alternatives in each section, and each rail alternative includes an associated set of highway improvements. In many areas, the alternatives are concurrent.

The endpoints of each of the 26 sections are in locations where the alternative alignments are in a common location. The alternatives will be evaluated section by section, allowing a “best-fit” preferred alternative to be developed for the entire study corridor.

**Figure ES-1**

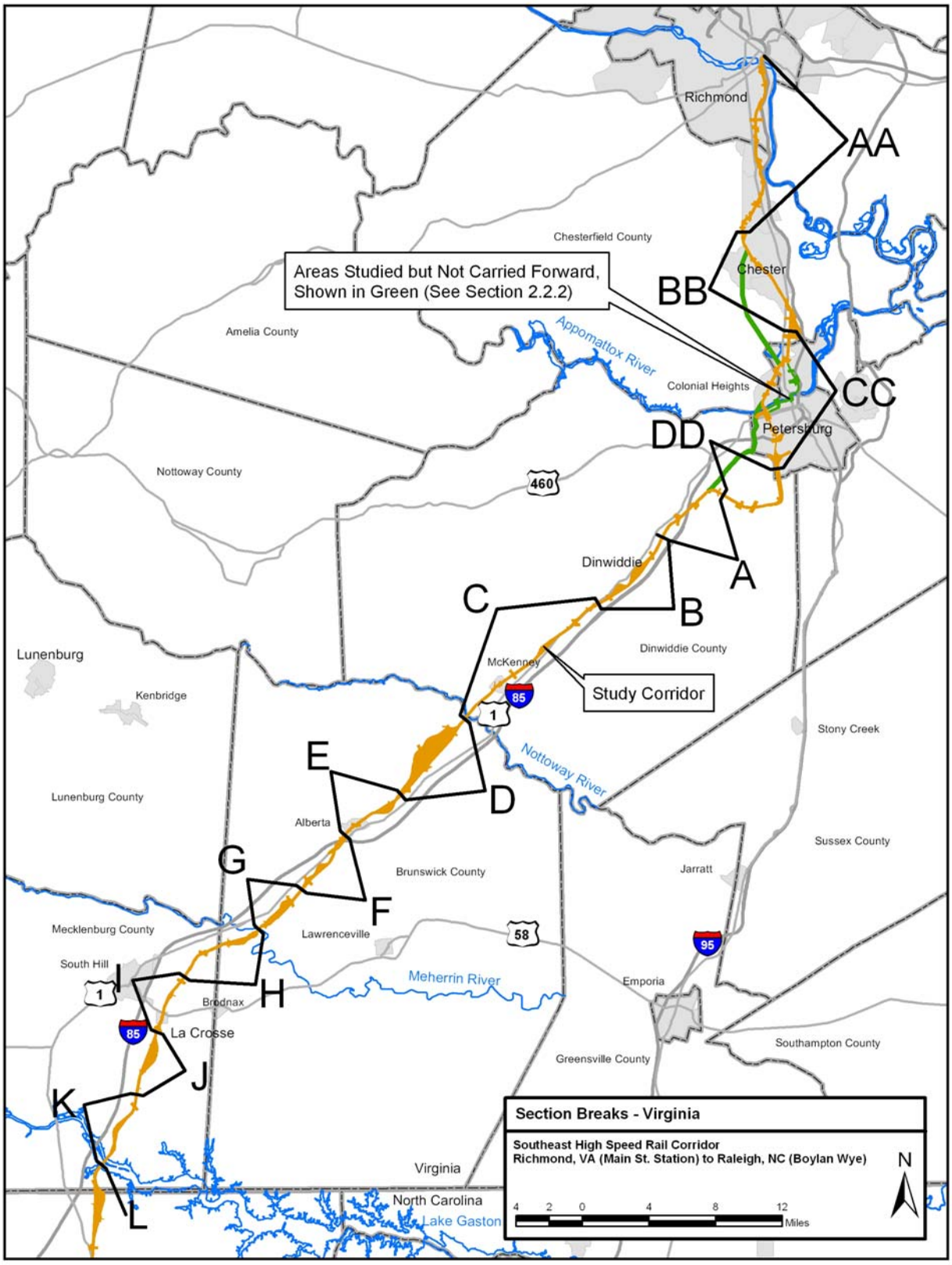


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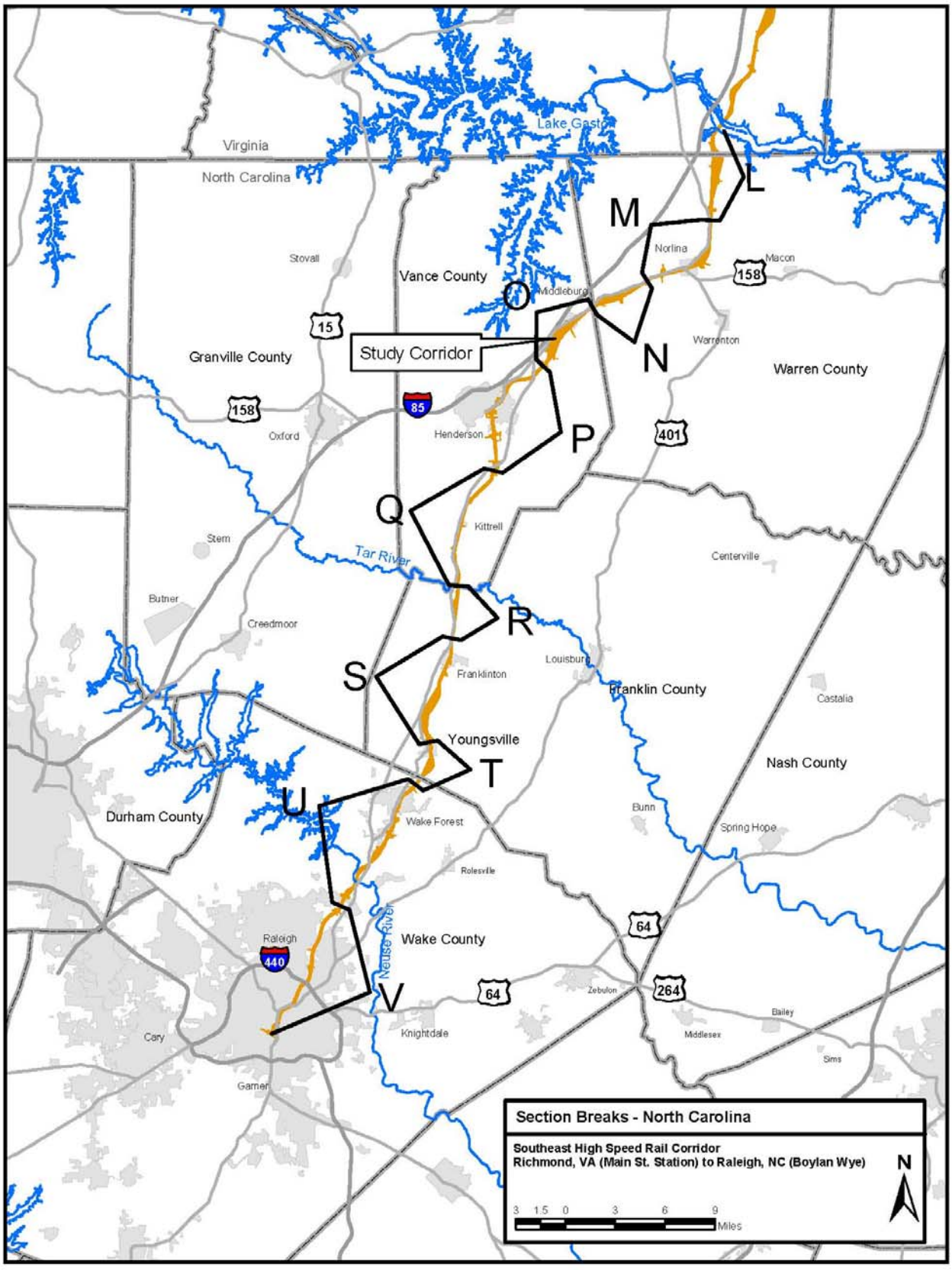
**Figure ES-1 (continued)**



## Alignments

### Rail Alignments

The SEHSR Tier II EIS applies the incremental approach to the development of alternative alignments. The incremental approach utilizes existing rail lines and rail rights of way as much as practicable.

The maximum authorized speed (MAS) is established as 110 miles per hour (mph) using fossil fueled locomotion. To ensure operating efficiency and passenger comfort as the higher speed trains travel through curves and elevation changes, the maximum desired vertical and horizontal curvature is 1 degree. In those areas where it is not possible to fully straighten curves to sustain these speeds, the desired minimum curve speed is 80 mph. To allow full compatibility for mixed use (freight and passenger) in these curves, the super elevation, or difference in height between the two rails, was set at 5 inches of actual super elevation and 4 inches of unbalanced super elevation in order to accommodate slower moving freight trains without compromising passenger comfort in the higher speed passenger trains.

The proposed rail improvements fall into three general categories within the overall project corridor:

1) Richmond to Centralia, VA (approximately 11 miles) - double track, mixed use (freight and passenger) initially at conventional speeds (79 mph) with full grade separation (see discussion below on road alignment)

2) Centralia to Collier, VA (approximately 18 miles) - new track, 30 feet to the east of the existing main line track, MAS 90 mph with full grade separation

3) Collier to Raleigh, NC (approximately 133 miles) - new single track, with 5 mile long sidings every 10 miles (approximate), MAS 110 mph, with full grade separation (Note: Speeds above 90 mph are subject to CSX approval)

Within each of the 26 sections, the three project alternatives are labeled:

In Virginia: **VA1, VA2, and VA3**

In North Carolina: **NC1, NC2 and NC3**

### Road Alignments

For safety and long term operability, the rail design for the project is fully grade separated, which means that all roads crossing the railroad would have either a bridge or underpass. These grade separations were developed to safely and effectively carry automobile traffic either over or under the railroad tracks, and appropriate highway improvements were designed to connect the existing roadways to the new and existing grade separations.

Locations for grade separations were based on input from local officials; connectivity to the existing road network; minimizing impacts to natural and cultural resources; and, constructability.

The proposed roadway improvements associated with each rail alignment are considered part of that alternative.

## Service

Proposed service consists of four round trips per day between Washington, DC, and Charlotte, NC, and four additional round trips between Raleigh, NC, and Charlotte, NC. The round trips to Washington, DC are expected to continue on to New York and Boston.

SEHSR would serve current Amtrak stops at: Richmond, VA; Petersburg, VA; and Raleigh, NC. There has also been strong public support for high speed rail stations in Southside Virginia and northern North Carolina. Evaluation and ridership-revenue modeling support one daily train stop in La Crosse, VA, and Henderson, NC. Specific locations for the stations within these towns will be determined by the towns as appropriate.

In Petersburg, the current Amtrak stop is located at Ettrick. Additionally, three potential station locations were evaluated in terms of accessibility to the larger transportation network. The locations were: Collier, Washington Street, and Dunlop. All three locations offered potentially improved highway access over the current Ettrick Station location. The Washington Street location offered the best connectivity to the new Petersburg Multi-Modal Center.

SEHSR would provide opportunities for conventional passenger service throughout the project corridor. Public interest expressed through the public involvement process indicated strong support for conventional passenger service in the corridor along with the high speed service. The conventional service would allow additional stops in the smaller towns along the corridor.

## Multiuse Greenway Concept

At the request of Virginia's Department of Conservation and Recreation, and the North Carolina Department of Environment and Natural Resources, a Multiuse Greenway Concept is being evaluated with the SEHSR Tier II EIS. This would allow the necessary environmental documentation for the greenway to be prepared so that local municipalities could pursue the construction of the greenway in their jurisdictions.

The Multiuse Greenway will be on separate right of way from the rail system, but in the same study corridor. The location and potential impacts associated with the Greenway Concept will be documented in the Final Environmental Impact Statement (FEIS) for the SEHSR based on the location of the preferred alternative. Impacts associated with the Greenway Concept are anticipated to be too minor to have a bearing on the selection of a preferred alternative for the SEHSR project. This is because the greenway will typically follow the old, unused rail ROW when the rail alignment is on new location. A separate decision document (e.g., Finding of No Significant Impact) will be prepared for the Greenway Concept.

The Multiuse Greenway Concept has potential to be an important feature of the state-wide trail networks in Virginia and North Carolina. Additionally, the Multiuse Greenway Concept may be incorporated into the East Coast Greenway.

## Summary of Impacts for Alternative Alignments

The following is a narrative summary of the primary environmental consequences that may result from the construction and operation of the SEHSR project. The impacts presented here are based on the proposed preliminary engineering designs for the rail and roadway alignments. Specific totals for the alternative alignments are listed in Table ES-23 at the end of this Executive Summary.

## Water Resources

### Surface Water

Total potential steam impacts for the project corridor may range from 36,079 linear feet up to 49,455 linear feet of jurisdictional channel, depending on the combination of alternatives selected.

Potential project impacts (in linear feet) to streams in Virginia are summarized in Table ES-1.

**Table ES-1**
**Potential Impacts to Jurisdictional Stream Channels in Virginia (linear feet)**

| Section | River Basin | VA1 | VA2 | VA3 |
|---|---|---|---|---|
| AA | James | 4,518 | 4,518 | 4,518 |
| BB | | 2,991 | 2,991 | 2,991 |
| CC | | 2,047 | 2,047 | 2,047 |
| James Min./Max | | 9,557 (no difference between alternatives) | | |
| DD | Chowan | 720 | 739 | 720 |
| A | | 2,897 | 2,682 | 2,897 |
| B | | 940 | 496 | 940 |
| C | | 4,025 | 4,025 | 4,025 |
| D | | 2,050 | 2,575 | 2,050 |
| E | | 1,025 | 1,294 | 1,025 |
| F | | 1,185 | 1,185 | 1,185 |
| G | | 654 | 914 | 500 |
| H | | 2,005 | 2,023 | 2,005 |
| Chowan Min. / Max.: | | 14,689 / 16,592 | | |
| I | Roanoke, VA | 6 | 6 | 6 |
| J | | 2,061 | 698 | 2,061 |
| K | | 1,927 | 2,447 | 1,927 |
| L | | 428 | 500 | 428 |
| Roanoke Min. / Max.: | | 3,059 / 5,014 | | |
| VA Min. / Max.: | | 27,304 / 31,163 | | |

In Virginia, the greatest difference between alternatives occurs in the Roanoke River Basin, in Section J. In this section, VA1 and VA3 are on common alignment and would have 2,061 linear feet of impacts, compared to VA2 which has only 698.

Potential project impacts (in linear feet) to streams in North Carolina are summarized in Table ES-2.

**Table ES-2**
**Potential Impacts to Jurisdictional Stream Channels in North Carolina (linear feet)**

| Section | River Basin | NC1 | NC2 | NC3 |
|---|---|---|---|---|
| L | Roanoke, NC | 2,381 | 922 | 2,381 |
| M | | 442 | 511 | 442 |
| N | | 41 | 41 | 41 |
| O | | 53 | 53 | 53 |
| P | | 777 | 777 | 777 |
| Roanoke Min. / Max.: | | 2,236 / 3,764 | | |

| Table ES-2<br>Potential Impacts to Jurisdictional Stream Channels in North Carolina (linear feet) | | | | |
|---|---|---|---|---|
| **Section** | **River Basin** | **NC1** | **NC2** | **NC3** |
| N | Tar-Pamlico | 344 | 674 | 344 |
| O | | 640 | 862 | 3,049 |
| P | | 742 | 742 | 742 |
| Q | | 1,009 | 1,009 | 1,009 |
| R | | 475 | 1,018 | 475 |
| S | | 2,120 | 2,720 | 2,120 |
| Tar-Pamlico Min. / Max.: | | 5,331 / 9,212 | | |
| T | Neuse | 415 | 94 | 415 |
| U | | 3,718 | 3,010 | 3,485 |
| V | | 1,105 | 1,107 | 1,182 |
| Neuse Min. / Max.: | | 4,208 / 5,315 | | |
| NC Min. / Max.: | | 11,774 / 18,292 | | |

In North Carolina, the greatest difference between alternatives occurs in the Tar-Pamlico River Basin in Section O. In this section, the NC1 project alternative would have the least amount of stream impacts with 640 linear feet, compared to the NC3 project alternative with 3,049 linear feet.

The James, Appomattox, Nottoway, Meherrin, and Roanoke Rivers in Virginia; and the Tar and Neuse Rivers in North Carolina are Navigable Waters under Section 10 of the Rivers and Harbors Act. The three proposed rail alternatives are on common alignment at the crossings of these rivers, and the major creeks (Cedar Creek and Crabtree Creek in North Carolina).

Streamside riparian zones in North Carolina are protected under provisions of the Tar-Pamlico and the Neuse River Basin Riparian Buffer Rules. Table ES-3 summarizes the potential impacts (in square feet) to each riparian buffer zone.

| Table ES-3<br>Potential Impacts to Tar-Pamlico and Neuse Riparian Buffers (square feet) | | | | | | |
|---|---|---|---|---|---|---|
| | **Alternative NC1** | | **Alternative NC2** | | **Alternative NC3** | |
| **Section** | **Zone 1** | **Zone 2** | **Zone 1** | **Zone 2** | **Zone 1** | **Zone 2** |
| N | 9,478 | 7,843 | 34,830 | 24,005 | 9,478 | 7,843 |
| O | 25,616 | 18,850 | 27,732 | 25,879 | 178,534 | 115,093 |
| P | 46,090 | 31,643 | 46,090 | 31,643 | 46,090 | 31,643 |
| Q | 70,100 | 54,561 | 70,100 | 54,561 | 70,100 | 54,561 |
| R | 28,117 | 16,419 | 57,313 | 32,569 | 28,117 | 16,419 |
| S | 119,503 | 83,831 | 156,142 | 103,596 | 119,503 | 83,831 |
| Tar-Pam. Min/Max: | 512, 051 / 904,476 | | | | | |
| T | 23,310 | 17,649 | 12,028 | 13,833 | 23,310 | 17,649 |
| U | 225,051 | 149,699 | 190,246 | 133,975 | 212,768 | 143,757 |
| V | 74,637 | 58,218 | 73,001 | 57,711 | 79,626 | 61,476 |
| Neuse Min/Max: | 480,794 / 556,811 | | | | | |
| Total Min/Max: | 992,845 / 1,461,287 | | | | | |

(Note: Zone 1 = 0-30 feet from stream bank, Zone 2 = 30-50 feet from stream bank)

The greatest differences occur in Sections O and R. In Section O, Alternatives NC1 and NC2 would significantly minimize potential impacts over NC3. In Sections R and S, Alternatives NC1 and NC3 would significantly minimize potential impacts over NC2.

Potential project impacts (in acres) to other jurisdictional waters (such as lakes, ponds, reservoirs, etc.) in Virginia are summarized in Table ES-4:

**Table ES-4**
**Potential Impacts to Other Jurisdictional Surface Waters in Virginia (acres)**

| Section | River Basin | VA1 | VA2 | VA3 |
|---|---|---|---|---|
| DD | Chowan | 1.26 | 1.29 | 1.65 |
| A | | 0.13 | 0.54 | 0.13 |
| D | | 0.25 | 0.38 | 0.25 |
| Chowan Min. / Max.: | | 1.64 / 3.37 | | |
| L | Roanoke, VA | 0.3 | 0 | 0.3 |
| VA Min. / Max.: | | 1.64 / 3.67 | | |

Selection of Alternative VA1 would result in the least impacts to other waters in Sections DD and D, with VA1/VA3 having least impacts for Section A. Alternative VA2 would have no impacts for Section L.

Potential project impacts (in acres) to other jurisdictional waters (such as lakes, ponds, reservoirs, etc.) in North Carolina are summarized in Table ES-5:

**Table ES-5**
**Potential Impacts to Other Jurisdictional Surface Waters in North Carolina (acres)**

| Section | River Basin | NC1 | NC2 | NC3 |
|---|---|---|---|---|
| L | Roanoke, NC | 1.63 | 0.34 | 1.63 |
| M | | 0.81 | 0.81 | 0.81 |
| O | | 0.16 | 0.16 | 0.16 |
| P | | 0.03 | 0.03 | 0.03 |
| **Roanoke Min. / Max.:** | | **1.34 / 2.63** | | |
| M | Tar-Pamlico | 0.02 | 0.02 | 0.02 |
| O | | 0.87 | 0.58 | 0 |
| P | | 0.002 | 0.002 | 0.002 |
| S | | 0.01 | 0.01 | 0.01 |
| **Tar-Pamlico Min. / Max.:** | | **0.03 / 0.90** | | |
| T | Neuse | 0 | 0.07 | 0 |
| U | | 0.24 | 0.07 | 0.15 |
| **Neuse Min. / Max.:** | | **0.07 / 0.31** | | |
| **NC Min. / Max.:** | | **1.44 / 3.84** | | |

Selection of Alternative NC2 would have the least impacts to other waters for Sections L and U. Selection of NC3 for Section O would result in no impacts for this section, as would NC1/NC3 for Section T.

## Wetlands

Potential project impacts may range from 23.68 acres up to 36.79 acres of jurisdictional wetlands, depending on the combination of alternatives selected.

Potential project impacts (in acres) to wetlands in Virginia are summarized in Table ES-6:

| Table ES-6<br>Potential Impacts to Jurisdictional Wetlands in Virginia (acres) | | | | |
|---|---|---|---|---|
| **Section** | **River Basin** | **VA1** | **VA2** | **VA3** |
| AA | James | 2.88 | 2.88 | 2.88 |
| BB | | 4.53 | 4.53 | 4.53 |
| CC | | 5.21 | 5.21 | 5.21 |
| James Subtotal: | | 12.62 | | |
| DD | Chowan | 2.28 | 2.19 | 2.32 |
| A | | 2.37 | 2.3 | 2.37 |
| B | | 0.97 | 0.62 | 0.97 |
| C | | 1.51 | 1.51 | 1.51 |
| D | | 0.99 | 7.37 | 0.99 |
| E | | 0.28 | 2.41 | 0.28 |
| F | | 0.6 | 0.6 | 0.6 |
| G | | 0.21 | 0.49 | 0.21 |
| H | | 0.25 | 0.25 | 0.25 |
| Chowan Min. / Max.: | | 8.95 / 18.29 | | |
| I | Roanoke, VA | 0.001 | 0 | 0.001 |
| J | | 0 | 0.1 | 0 |
| K | | 0.46 | 0.47 | 0.46 |
| L | | 0.001 | 0.001 | 0.001 |
| Roanoke Min. / Max.: | | 0.46 / 0.57 | | |
| VA Min. / Max.: | | 22.03 / 31.48 | | |

Selection of the VA2 project alternative would result in the least wetland impacts in the Chowan River Basin for Sections DD, A, and B. Alternatives VA1 or VA2 would best minimize impacts for Sections D, E, and G.

Potential project impacts (in acres) to wetlands in North Carolina are summarized in Table ES-7:

| Table ES-7<br>Potential Impacts to Jurisdictional Wetlands in North Carolina (acres) | | | | |
|---|---|---|---|---|
| **Section** | **River Basin** | **NC1** | **NC2** | **NC3** |
| L | Roanoke, NC | 0.57 | 0.01 | 0.57 |
| P | | 0.49 | 0.49 | 0.49 |
| Roanoke Min. / Max.: | | 0.50 / 1.06 | | |
| N | Tar-Pamlico | 1.25 | 0.18 | 1.25 |
| O | | 0.4 | 1.63 | 0.2 |
| P | | 0.42 | 0.42 | 0.42 |
| Q | | 0.03 | 0.03 | 0.03 |
| S | | 0.55 | 0.07 | 0.55 |
| Tar-Pamlico Min. / Max.: | | 0.89 / 3.88 | | |
| T | Neuse | 0.07 | 0 | 0.07 |
| U | | 0.25 | 0.21 | 0.2 |
| V | | 0.06 | 0.06 | 0.05 |
| Neuse Min. / Max.: | | 0.25 / 0.38 | | |
| NC Min. / Max.: | | 1.65 / 5.31 | | |

Selection of the NC2 project alternative would result in fewer wetland impacts for Sections L, N, S, and T; the NC3 project alternative would minimize impacts for Sections O, U, and V.

## Mitigation

Compensatory mitigation would be accomplished separately for the Virginia and North Carolina portions of the project.

In Virginia, mitigation would be provided through the use of mitigation banks and/or the Virginia Aquatic Resources Trust Fund (VAQRTF). There are currently 128 USACE-approved mitigation banks listed for the Norfolk District (Regional Internet Banking Information System). Several of these banks are listed with available wetland and stream credit for impacts within the Lower James (02080206), Appomattox (02080207), and Nottoway (03010201) hydrologic unit (HU) service areas. Only one bank is listed serving the Meherrin (03010204) HU, and no banks are currently listed serving the Roanoke Rapids (03010106) HU. The VAQRTF pursues stream and wetland mitigation projects throughout Virginia as an in-lieu fee program. It is administered in partnership with the USACE Norfolk District and The Nature Conservancy in Virginia. The use of the VAQRTF as a mitigation option is at the discretion of the appropriate regulatory agencies.

In North Carolina, mitigation would be provided through coordination with the North Carolina Ecosystem Enhancement Program (NCEEP). The USACE, NCDOT and NC Department of Environment and Natural Resources entered into a Memorandum of Agreement in July 2003 that established procedures for providing compensatory mitigation through NCEEP to offset impacts to streams and wetlands from NCDOT projects. The three parties agreed that mitigation for transportation projects should occur before impacts and using a watershed approach. Appropriate compensatory mitigation requirements for wetland and stream impacts from the preferred alternative would be determined in consultation with the appropriate federal and state environmental resource and regulatory agencies.

## Floodplains and Floodways

The number of floodplain crossings is similar for all alternatives in both states as summarized in Table ES-8. The table indicates whether the floodplain crossing would at grade or over a structure that would minimally contact the floodplain (e.g., a wide span bridge).

**Table ES-8**
**FEMA Mapped 100-Year Floodplain Crossings**

| Section | Crossings by Type (# in Floodplain / # on Structure) | | |
|---|---|---|---|
| **Alternatives** | **VA1** | **VA2** | **VA3** |
| AA | 18 / 3 | 18 / 3 | 18 / 3 |
| BB | 7 / 0 | 7 / 0 | 7 / 0 |
| CC | 7 / 2 | 7 / 2 | 7 / 2 |
| DD | 0 / 0 | 0 / 0 | 0 / 0 |
| A | 1 / 0 | 1 / 0 | 1 / 0 |
| B | 2 / 0 | 2 / 0 | 2 / 0 |
| C | 1 / 0 | 1 / 0 | 1 / 0 |
| D | 0 / 2 | 4 / 0 | 0 / 2 |
| E | 1 / 1 | 2 / 0 | 1 / 1 |
| F | 2 / 1 | 2 / 1 | 2 / 1 |
| G | 1 / 0 | 1 / 0 | 1 / 0 |

| Table ES-8<br>FEMA Mapped 100-Year Floodplain Crossings | | | |
|---|---|---|---|
| **Section** | **Crossings by Type<br>(# in Floodplain / # on Structure)** | | |
| **Alternatives** | **VA1** | **VA2** | **VA3** |
| H | 0 / 1 | 0 / 1 | 0 / 1 |
| I | 0 / 0 | 0 / 0 | 0 / 0 |
| J | 0 / 0 | 0 / 0 | 0 / 0 |
| K | 0 / 1 | 0 / 1 | 0 / 1 |
| L (VA) | 0 / 0 | 0 / 0 | 0 / 0 |
| **Alternatives** | **NC1** | **NC2** | **NC3** |
| L (NC) | 0 / 0 | 0 / 0 | 0 / 0 |
| M | 0 / 0 | 0 / 0 | 0 / 0 |
| N | 0 / 0 | 0 / 0 | 0 / 0 |
| O | 0 / 0 | 0 / 0 | 0 / 0 |
| P | 0 / 0 | 0 / 0 | 0 / 0 |
| Q | 0 / 0 | 0 / 0 | 0 / 0 |
| R | 0 / 1 | 0 / 1 | 0 / 1 |
| S | 1 / 1 | 1 / 1 | 1 / 1 |
| T | 0 / 0 | 0 / 0 | 0 / 0 |
| U | 1 / 0 | 1 / 0 | 1 / 0 |
| V | 4 / 0 | 4 / 0 | 3 / 0 |

### Wild and Scenic Rivers

There are four rivers in the study area designated as Virginia Scenic Rivers: James River, Nottoway River, Appomattox River, and Meherrin River. The Nottaway River and Meherrin Rivers are listed in the Nationwide Rivers Inventory (NRI). In NC, the Tar River is listed on the NRI through the project area.

All project alternatives cross the listed rivers on common alignments, and in each case the river would be spanned by a bridge.

There is no conflict with the Wild and Scenic Rivers Act of 1968.

## Soils

Within each section there is little difference in soil types between the project alternatives.

## Prime and Other Important Farmlands

As required by the Farmland Protection Policy Act (FPPA) of 1981 (7 CFR Part 658) and State Executive Order Number 96, coordination with the Natural Resources Conservation Service (NRCS) for this project was initiated by submittal of Form AD-1006, requesting the Farmland Conversion Impact Rating for each county in the project study area. Based on the assessment, no mitigation for farmland loss is required for the project. Potential farmland impacts are summarized in Table ES-9.

| Table ES-9<br>Prime and Other Important Farmland Acres Impacted by Section | | | |
|---|---|---|---|
| **Section** | **Prime / Statewide** | **Prime / Statewide** | **Prime / Statewide** |
| **Alternatives** | **VA1** | **VA2** | **VA3** |
| AA | 25.00 / 1.16 | 25.00 / 1.16 | 25.00 / 1.16 |
| BB | 11.21 / 1.38 | 11.21 / 1.38 | 11.21 / 1.38 |
| CC | 54.21 / 3.35 | 54.21 / 3.35 | 54.21 / 3.35 |
| DD | 20.30 / 3.15 | 19.67 / 3.15 | 29.59 / 3.15 |
| A | 42.51 / 1.20 | 54.60 / 2.50 | 42.51 / 1.20 |
| B | 44.08 / 21.32 | 26.90 / 13.23 | 44.08 / 21.32 |
| C | 87.27 / 7.20 | 87.27 / 7.20 | 87.27 / 7.20 |
| D | 71.16 / 9.29 | 40.83 / 13.62 | 71.16 / 9.29 |
| E | 50.84 / 8.06 | 54.07 / 6.64 | 50.84 / 8.06 |
| F | 19.17 / 2.48 | 19.17 / 2.48 | 19.17 / 2.48 |
| G | 23.91 / 1.11 | 21.96 / 3.00 | 28.80 / 0.18 |
| H | 45.11 / 34.76 | 48.24 / 31.96 | 45.11 / 34.76 |
| I | 36.92 / 20.62 | 41.95 / 24.00 | 36.92 / 20.62 |
| J | 55.96 / 24.47 | 46.00 / 25.69 | 55.96 / 24.47 |
| K | 12.10 / 25.45 | 10.71 / 30.69 | 12.10 / 25.45 |
| L (VA) | 14.80 / 17.37 | 14.24 / 16.54 | 14.80 / 17.37 |
| **Alternatives** | **NC1** | **NC2** | **NC3** |
| L (NC) | 76.85 / 13.72 | 90.26 / 4.91 | 76.85 / 13.72 |
| M | 90.79 / 0.01 | 84.99 / 0.01 | 90.79 / 0.01 |
| N | 64.91 / 0.48 | 73.90 / 0.48 | 64.91 / 0.48 |
| O | 82.07 / 24.15 | 85.66 / 22.47 | 83.62 / 42.16 |
| P | 83.92 / 3.81 | 83.92 / 3.81 | 83.92 / 3.81 |
| Q | 80.75 / 14.03 | 74.68 / 9.62 | 80.75 / 14.03 |
| R | 25.83 / 0 | 12.72 / 0 | 25.83 / 0 |
| S | 63.43 / 31.45 | 70.91 / 34.74 | 63.43 / 31.45 |
| T | 32.31 / 9.59 | 31.83 / 6.62 | 32.31 / 9.59 |
| U | 36.68 / 50.52* | 34.19 / 50.37* | 36.41 / 49.60* |
| V | 4.8 / 21* | 4.8 / 21* | 4.8 / 21* |

* Includes farmland of local importance

## Mineral Resources

There are seven mine sites in the project study area, but there are no significant impacts anticipated to any of the mine sites and no significant differences among the alternatives.

## Hazardous Material

Sites found within the project study area consist of underground storage tanks (USTs), dry cleaner sites, hazardous waste disposal sites, and similar hazardous sites. The vast majority of these sites are USTs.

There is one Resource Conservation and Recovery Act (RCRA) Corrective Action Facility site, and one polychlorinated biphenyl (PCB) site. Both sites impacted by all three project alternatives.

It is not expected that any of these sites would preclude the construction of any project alternative. Sites are summarized in Table ES-10.

**Table ES-10**
**Hazardous Waste Sites by Section**

| Section | VA1 | VA2 | VA3 |
|---|---|---|---|
| AA | 59 | 59 | 59 |
| BB | 10 | 10 | 10 |
| CC | 20 | 20 | 20 |
| DD | 1 | 1 | 1 |
| A | 1 | 1 | 1 |
| B | 0 | 2 | 0 |
| C | 2 | 2 | 2 |
| D | 0 | 1 | 0 |
| E | 0 | 0 | 0 |
| F | 0 | 0 | 0 |
| G | 0 | 0 | 0 |
| H | 0 | 0 | 0 |
| I | 2 | 2 | 2 |
| J | 1 | 0 | 1 |
| K | 0 | 0 | 0 |
| L (VA) | 0 | 0 | 0 |
| **Section** | **NC1** | **NC2** | **NC3** |
| L (NC) | 1 | 1 | 1 |
| M | 0 | 0 | 0 |
| N | 1 | 1 | 1 |
| O | 2 | 2 | 0 |
| P | 22 | 22 | 22 |
| Q | 4 | 4 | 4 |
| R | 0 | 0 | 0 |
| S | 6 | 5 | 6 |
| T | 1 | 2 | 1 |
| U | 10 | 10 | 10 |
| V | 76 | 58 | 58 |

## Air Quality

Air quality impacts associated with the SEHSR project were assessed for both the proposed railroad engine operations and affected (i.e., diverted) motor vehicles. Air quality impacts from the project are not expected to substantially vary by alternative due to the similarity in operation and design.

### Locomotive Operations

An air quality analysis was performed for the locomotive operations subject to federal air quality conformity regulations (40 CFR 51.853). The calculated emissions for CO, $NO_X$, PM, and HC are summarized in Table ES-11. For all alternatives, the predicted annual emissions are well below the de minimis levels established in 40 CFR 51.853.

**Table ES-11**
**Predicted Locomotive Emissions**

| County/Area | Annual Emissions (tons/year) | | | |
|---|---|---|---|---|
| | CO | $NO_X$ | PM | HC |
| Richmond-Chesterfield * (Virginia) | 3.55 | 13.02 | 0.47 | 0.71 |
| Colonial Heights-Petersburg-Dinwiddie (Virginia) | 5.98 | 21.94 | 0.80 | 1.20 |
| Brunswick (Virginia) | 4.11 | 15.09 | 0.55 | 0.82 |
| Mecklenburg (Virginia) | 3.37 | 12.34 | 0.45 | 0.67 |
| Warren (North Carolina) | 2.62 | 9.60 | 0.35 | 0.52 |
| Vance (North Carolina) | 3.93 | 14.40 | 0.52 | 0.79 |
| Franklin-Wake ** (North Carolina) | 5.80 | 21.25 | 0.77 | 1.16 |
| *De minimis* (allowable) levels in the various counties/areas according to 40 CFR 51.853, as applicable | 100.00 | 100.00 | 100.00 | 100.00 |

*Source: Michael Baker Jr., Inc., Motive Power, Inc.*

* Within the Richmond Regional Planning District
** Within the North Carolina Capital Area Metropolitan Planning Organization

Currently there is no federally approved model to perform a quantitative mobile source air toxics (MSAT) hot-spot analysis.

### Highway Vehicle Operations

An air quality analysis was performed to estimate the maximum one-hour carbon monoxide (CO) concentrations caused by the worst-case traffic conditions forecasted for the project alternatives (based on traffic modeling). Concentrations of CO were determined using USEPA-approved models and were compared to National Ambient Air Quality Standards (NAAQS) for existing (base) year, interim (opening) year, and design year periods.

Comparison of the predicted carbon monoxide concentrations with the NAAQS indicates no exceedances of these standards in 2008, 2010, or 2030. Based on these results, no mitigation is required and additional analysis is not recommended. The results are presented in Table ES-12.

**Table ES-12**
**Predicted CO Concentrations (Including background)**

| Worst-Case Intersection | Analysis Scenario | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2008-Existing | | 2010-No Build | | 2010-Build | | 2030-No Build | | 2030-Build | |
| | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr |
| Centralia/Chester: Chesterfield County, VA | 3.5 | 2.4 | 3.5 | 2.4 | 4.5 | 3.1 | 3.8 | 2.6 | 4.4 | 3.0 |
| New Hope Church/Atlantic: Wake County, NC | 7.7 | 6.1 | 7.1 | 5.6 | 7.1 | 5.6 | 6.9 | 5.5 | 6.9 | 5.5 |

### NAAQS: 35 ppm (1-hour) and 9 ppm (8-hour)

Currently, there is no federally approved method for conducting quantitative PM or MSAT hot-spot analyses. In relation to highway vehicles, the proposed SEHSR improvements are likely exempt from further study since there are no meaningful (negative) impacts on traffic volumes or vehicle mix as a result of the positive impacts from the reduction of vehicle miles traveled (VMT). Additionally, the diversion of some traffic as a result of railroad/roadway at-grade closures is minimal and the microscale analysis for CO showed little or no change in those concentrations for the worst-case intersections.

## Noise

Noise impacts associated with rail operations were assessed for the SEHSR project. Noise impacts associated with the proposed road work for the project (i.e., associated with the creation of the grade-separated crossings and the diversion of traffic to these crossings) will be assessed after selection of a preferred alternative because it is not anticipated to affect the selection of a preferred alternative for two reasons. First, of the new grade separations proposed, approximately 50 percent are common to all alternatives. Second, given the estimated traffic volumes, the predicted diverted volumes, and the rural land use at most crossings, it is highly unlikely that these changes will result in noise impacts according to state noise policies.

The criteria in the Federal Railroad Association's *High Speed Ground Transportation Noise and Vibration Impacts Assessmen*t were used to assess existing ambient noise levels and future noise impacts from train operations. The summary of predicted noise impacts is shown in Table ES-13. Category 1 land uses are tracts of land where quiet is an essential element in their intended purpose. Category 2 land uses are residences and buildings where people normally sleep. Category 3 land uses are institutional land uses with primarily daytime and evening use. Severe noise impacts are considered "significant" as this term is used in the National Environmental Policy Act (NEPA) and implementing regulations. Noise mitigation will normally be specified for severe impact areas unless there is no practical method of mitigating the noise. For non-severe "impacts", other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost-effectiveness of mitigating noise to more acceptable levels.

**Table ES-13**
**Summary of Noise Impacts**

| Section | Category 1 | | Category 2 | | Category 3 | | Category 1 | | Category 2 | | Category 3 | | Category 1 | | Category 2 | | Category 3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact | Impact | Severe Impact |
| **Alternative** | **VA1** | | | | | | **VA2** | | | | | | **VA3** | | | | | |
| **AA** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **BB** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CC** | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 |
| **DD** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **A** | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 |
| **B** | 0 | 0 | 13 | 0 | 0 | 0 | 1 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 |
| **C** | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 |
| **D** | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 |
| **E** | 0 | 0 | 22 | 6 | 1 | 0 | 0 | 0 | 21 | 6 | 1 | 0 | 0 | 0 | 22 | 6 | 1 | 0 |
| **F** | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 |
| **G** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| **H** | 0 | 0 | 18 | 2 | 0 | 0 | 0 | 0 | 24 | 2 | 0 | 0 | 0 | 0 | 18 | 2 | 0 | 0 |
| **I** | 0 | 0 | 49 | 5 | 1 | 0 | 0 | 0 | 49 | 5 | 1 | 0 | 0 | 0 | 49 | 5 | 1 | 0 |
| **J** | 0 | 0 | 11 | 1 | 0 | 0 | 0 | 0 | 21 | 1 | 0 | 0 | 0 | 0 | 11 | 1 | 0 | 0 |
| **K** | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 |
| **L (VA)** | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| **Alternative** | **NC1** | | | | | | **NC2** | | | | | | **NC3** | | | | | |
| **L (NC)** | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 25 | 2 | 4 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| **M** | 0 | 0 | 41 | 6 | 0 | 0 | 0 | 0 | 48 | 1 | 0 | 0 | 0 | 0 | 41 | 6 | 0 | 0 |
| **N** | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |
| **O** | 0 | 0 | 24 | 6 | 2 | 0 | 0 | 0 | 24 | 6 | 2 | 0 | 0 | 0 | 10 | 5 | 0 | 0 |
| **P** | 0 | 0 | 77 | 11 | 1 | 0 | 0 | 0 | 77 | 11 | 1 | 0 | 0 | 0 | 77 | 11 | 1 | 0 |
| **Q** | 0 | 0 | 12 | 5 | 1 | 0 | 0 | 0 | 12 | 5 | 1 | 0 | 0 | 0 | 12 | 5 | 1 | 0 |
| **R** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **S** | 0 | 0 | 22 | 1 | 0 | 0 | 0 | 0 | 23 | 1 | 0 | 0 | 0 | 0 | 22 | 1 | 0 | 0 |
| **T** | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 |
| **U** | 0 | 0 | 159 | 17 | 0 | 0 | 0 | 0 | 161 | 17 | 0 | 0 | 0 | 0 | 159 | 17 | 0 | 0 |
| **V** | 0 | 0 | 92 | 0 | 0 | 0 | 0 | 0 | 92 | 0 | 0 | 0 | 0 | 0 | 92 | 0 | 0 | 0 |

## Vibration

The criteria in *High Speed Ground Transportation Noise and Vibration Impact Assessment* were used to evaluate vibration impacts from train operations. The analysis indicated that the building damage criteria of 0.50 inch per second would not be exceeded at any building along the corridor. Therefore, the project is not expected to cause vibration damage to any buildings in the project corridor.

Table ES-14 provides a summary of the number and type of vibration sensitive structures that would be impacted.

**Table ES-14**
**Summary of Vibration Human Annoyance Impacted Areas Along The High Speed Rail Operation Corridor**

| Section | Number of Sensitive Structures Impacted by Land Use Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Single Family Residence | Multi-Family Residence | Commercial Property | Single Family Residence | Multi-Family Residence | Commercial Property | Single Family Residence | Multi-Family Residence | Commercial Property |
| **Alternative** | **VA1** | | | **VA2** | | | **VA3** | | |
| **AA** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| **BB** | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| **CC** | 7 | 7 | 1 | 7 | 7 | 1 | 7 | 7 | 1 |
| **DD** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **A** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **B** | 1 | 0 | 1 | 1 | 0 | 4 | 1 | 0 | 1 |
| **C** | 6 | 0 | 5 | 6 | 0 | 5 | 6 | 0 | 5 |
| **D** | 1 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 2 |
| **E** | 9 | 0 | 0 | 11 | 0 | 0 | 9 | 0 | 0 |
| **F** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G** | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| **H** | 4 | 0 | 1 | 6 | 0 | 1 | 4 | 0 | 1 |
| **I** | 15 | 0 | 9 | 12 | 0 | 9 | 15 | 0 | 9 |
| **J** | 5 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 |
| **K** | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 |
| **L (VA)** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| **Alternative** | **NC1** | | | **NC2** | | | **NC3** | | |
| **L (NC)** | 6 | 0 | 0 | 13 | 0 | 0 | 6 | 0 | 0 |
| **M** | 25 | 0 | 5 | 20 | 0 | 8 | 25 | 0 | 5 |
| **N** | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| **O** | 11 | 0 | 3 | 11 | 0 | 0 | 6 | 0 | 0 |

| Table ES-14<br>Summary of Vibration Human Annoyance Impacted Areas Along The High Speed Rail Operation Corridor | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Section | Number of Sensitive Structures Impacted by Land Use Type | | | | | | | | |
| | Single Family Residence | Multi-Family Residence | Commercial Property | Single Family Residence | Multi-Family Residence | Commercial Property | Single Family Residence | Multi-Family Residence | Commercial Property |
| Alternative | NC1 | | | NC2 | | | NC3 | | |
| P | 30 | 0 | 44 | 30 | 0 | 44 | 30 | 0 | 44 |
| Q | 16 | 0 | 4 | 16 | 0 | 4 | 16 | 0 | 4 |
| R | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 |
| S | 17 | 0 | 5 | 18 | 0 | 4 | 17 | 0 | 5 |
| T | 2 | 0 | 3 | 3 | 0 | 7 | 2 | 0 | 3 |
| U | 24 | 0 | 21 | 24 | 0 | 21 | 24 | 0 | 21 |
| V | 2 | 0 | 46 | 2 | 0 | 46 | 2 | 0 | 46 |

## Energy

The difference in energy use between the alternatives is negligible.

There is an overall positive impact on energy use from the SEHSR project, due to a reduction in energy per passenger mile traveled within the corridor. Comparing the alternatives per passenger mile traveled, the shortest alternative will use the least amount of energy.

Table ES-15 displays the length of rail alternatives. Of the twenty six sections, twenty four have a mileage difference between 0 and 0.25 miles; and two have mileage differences between 0.25 and 0.5 miles.

**Table ES-15**
**Length of Rail Alternative by Section (in Miles)**

| Section | VA1 | VA2 | VA3 | Longest | Shortest | Difference |
|---|---|---|---|---|---|---|
| AA | 11.31 | 11.31 | 11.31 | 11.31 | 11.31 | 0.00 |
| BB | 6.91 | 6.91 | 6.91 | 6.91 | 6.91 | 0.00 |
| CC | 8.91 | 8.91 | 8.91 | 8.91 | 8.91 | 0.00 |
| DD | 5.66 | 5.63 | 5.66 | 5.66 | 5.63 | 0.03 |
| A | 4.93 | 4.95 | 4.93 | 4.95 | 4.93 | 0.02 |
| B | 5.71 | 5.80 | 5.71 | 5.80 | 5.71 | 0.09 |
| C | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 | 0.00 |
| D | 6.07 | 6.41 | 6.07 | 6.41 | 6.07 | 0.34 |
| E | 4.21 | 4.29 | 4.21 | 4.29 | 4.21 | 0.08 |
| F | 4.28 | 4.28 | 4.28 | 4.28 | 4.28 | 0.00 |
| G | 3.61 | 3.66 | 3.55 | 3.66 | 3.55 | 0.11 |
| H | 5.53 | 5.58 | 5.53 | 5.58 | 5.53 | 0.05 |
| I | 3.77 | 3.77 | 3.77 | 3.77 | 3.77 | 0.00 |
| J | 3.99 | 4.10 | 3.99 | 4.10 | 3.99 | 0.11 |
| K | 4.96 | 4.94 | 4.96 | 4.96 | 4.94 | 0.02 |
| L (VA) | 1.75 | 1.87 | 1.75 | 1.75 | 1.87 | 0.12 |
| **Section** | **NC1** | **NC2** | **NC3** | **Longest** | **Shortest** | **Difference** |
| L (NC) | 4.00 | 4.09 | 4.00 | 4.09 | 4.00 | 0.09 |
| M | 6.14 | 5.97 | 6.14 | 6.14 | 5.97 | 0.17 |
| N | 3.71 | 3.77 | 3.71 | 3.77 | 3.71 | 0.06 |
| O | 5.09 | 5.16 | 4.70 | 5.16 | 4.70 | 0.46 |
| P | 7.99 | 7.99 | 7.99 | 7.99 | 7.99 | 0.00 |
| Q | 7.70 | 7.73 | 7.70 | 7.73 | 7.70 | 0.03 |
| R | 3.21 | 3.23 | 3.21 | 3.23 | 3.21 | 0.02 |
| S | 6.88 | 6.71 | 6.88 | 6.88 | 6.71 | 0.17 |
| T | 2.83 | 2.96 | 2.83 | 2.96 | 2.83 | 0.13 |
| U | 8.88 | 8.89 | 8.88 | 8.89 | 8.88 | 0.01 |
| V | 9.89 | 9.91 | 9.97 | 9.97 | 9.89 | 0.08 |

## Visual Impacts

There is no significant difference among the alternatives regarding visual impacts. The assessment of visual impacts used the following ratings:

- Low Visual Impacts: If rail or roadway features of the alignment are consistent with the existing line, form, texture, and color of other elements in the landscape and do not stand out
- Moderate Visual Impacts: If rail or roadway features of the alignment are obvious but do not dominate the landscape or detract from existing visual features
- High Visual Impacts: If the rail or roadway features of the alignment are obvious, thereby dominating the landscape and detracting from the existing landscape characteristics or scenic qualities

Results of the visual impact analysis are summarized in Table ES-16.

**Table ES-16**
**Visual Impacts (Low, Moderate, High)**

| Section | Communities | VA1 Alternative | VA2 Alternative | VA3 Alternative |
|---|---|---|---|---|
| AA | Richmond, Chesterfield County | Low to Moderate | Low to Moderate | Low to Moderate |
| BB | Chesterfield County, Centralia, Chester | Low to Moderate | Low to Moderate | Low to Moderate |
| CC | Colonial Heights, Ettrick, Petersburg | Low | Low | Low |
| DD | Dinwiddie County | Low to Moderate | Low to Moderate | Low to Moderate |
| A | Dinwiddie County | Low to Moderate | Low to Moderate | Low to Moderate |
| B | Dinwiddie County, Dinwiddie Courthouse | Low to Moderate | Low to Moderate | Low to Moderate |
| C | Dinwiddie County, McKenney | Moderate | Moderate | Moderate |
| D | Brunswick County | Low | Low | Low |
| E | Brunswick County, Alberta | Low to Moderate | Low to Moderate | Low to Moderate |
| F | Brunswick County | Low | Low | Low |
| G | Brunswick County | Low | Low | Low |
| H | Brunswick County, Mecklenburg County | Low to Moderate | Low to Moderate | Low to Moderate |
| I | Mecklenburg County, La Crosse | Low to Moderate to High | Low to Moderate to High | Low to Moderate to High |
| J | Mecklenburg County | Low to Moderate | Low to Moderate | Low to Moderate |

| Table ES-16<br>Visual Impacts (Low, Moderate, High) | | | | |
|---|---|---|---|---|
| **Section** | **Communities** | **VA1 Alternative** | **VA2 Alternative** | **VA3 Alternative** |
| K | Mecklenburg County | Low to Moderate | Low to Moderate | Low to Moderate |
| L (VA) | Mecklenburg County, Lake Gaston area | Low to Moderate | Low to Moderate | Low to Moderate |
| **Section** | **Communities** | **NC1 Alternative** | **NC2 Alternative** | **NC3 Alternative** |
| L (NC) | Warren County | Moderate to High | Moderate to High | Moderate to High |
| M | Warren County, Norlina | Low to Moderate to High | Low to Moderate to High | Low to Moderate to High |
| N | Warren County | Low to Moderate | Low to Moderate | Low to Moderate |
| O | Vance County, Middleburg | Low to Moderate | Low to Moderate | Low to Moderate |
| P | Vance County, Henderson | Low to Moderate | Low to Moderate | Low to Moderate |
| Q | Vance County, Kittrell | Low to Moderate to High | Low to Moderate to High | Low to Moderate to High |
| R | Franklin County | High | Low | High |
| S | Franklin County, Franklinton | Low | Low | Low |
| T | Franklin County, Youngsville | Low to Moderate | Low to Moderate | Low to Moderate |
| U | Wake County, Wake Forest, Raleigh | Low to Moderate to High | Low to Moderate to High | Low to Moderate to High |
| V | Wake County, Raleigh | Low to Moderate to High | Low to Moderate to High | Low to Moderate |

## Biological Resource Impacts

### Terrestrial Communities

Natural terrestrial community impacts will be minimized by selection of alternatives that include the lowest acreages of mixed forested habitats for each section. The VA2 project alternative best minimizes for Sections DD, A, B, H, I, J, and K; and the VA1project alternative best minimizes for Section G.

Alternative NC2 would minimize forested impacts for Sections L, O, Q, R, T, and U. Differences between the alternatives in the other sections are negligible.

The estimated impacts are presented in Table ES-17.

| Table ES-17<br>Potential Project Impacts to Natural Communities (acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mixed Forest | Pine Forest | Maint-ained/ Disturbed | Mixed Forest | Pine Forest | Maint-ained/ Disturbed | Mixed Forest | Pine Forest | Maint-ained/ Disturbed |
| **Section** | **VA1** | | | **VA2** | | | **VA3** | | |
| AA | 31.21 | 12.49 | 171.21 | 31.21 | 12.49 | 171.21 | 31.21 | 12.49 | 171.21 |
| BB | 55.64 | 1.76 | 77.07 | 55.64 | 1.76 | 77.07 | 55.64 | 1.76 | 77.07 |
| CC | 44.74 | 6.90 | 132.39 | 44.74 | 6.90 | 132.39 | 44.74 | 6.90 | 132.39 |
| DD | 42.28 | 10.86 | 42.24 | 41.65 | 11.80 | 39.65 | 48.50 | 10.86 | 47.13 |
| A | 44.63 | 26.22 | 41.89 | 38.93 | 29.34 | 41.07 | 44.63 | 26.22 | 41.89 |
| B | 44.95 | 37.43 | 16.53 | 38.71 | 39.09 | 17.79 | 44.95 | 37.43 | 16.53 |
| C | 65.43 | 91.13 | 53.54 | 65.43 | 91.13 | 53.54 | 65.43 | 91.13 | 53.54 |
| D | 34.59 | 56.41 | 23.66 | 35.12 | 57.11 | 24.43 | 34.59 | 56.41 | 23.66 |
| E | 28.70 | 23.32 | 37.36 | 31.76 | 25.32 | 32.79 | 28.70 | 23.32 | 37.36 |
| F | 34.07 | 32.94 | 25.82 | 34.07 | 32.94 | 25.82 | 34.07 | 32.94 | 25.82 |
| G | 15.87 | 29.67 | 14.00 | 19.85 | 24.74 | 7.27 | 24.41 | 19.18 | 14.06 |
| H | 77.55 | 33.12 | 38.09 | 67.24 | 34.21 | 39.95 | 77.55 | 33.12 | 38.09 |
| I | 16.42 | 19.09 | 60.78 | 16.35 | 23.73 | 65.46 | 16.42 | 19.09 | 60.78 |
| J | 40.89 | 23.38 | 23.46 | 29.70 | 31.93 | 16.48 | 40.89 | 23.38 | 23.46 |
| K | 36.60 | 42.62 | 6.88 | 35.53 | 44.40 | 2.65 | 36.60 | 42.62 | 6.88 |
| L (VA) | 10.94 | 13.12 | 11.28 | 13.03 | 11.05 | 14.17 | 10.94 | 13.12 | 11.28 |
| **Section** | **NC1** | | | **NC2** | | | **NC3** | | |
| L (NC) | 38.29 | 28.97 | 37.70 | 24.63 | 24.47 | 61.69 | 38.29 | 28.97 | 37.70 |
| M | 26.65 | 21.48 | 108.14 | 27.64 | 25.06 | 97.12 | 26.65 | 21.48 | 108.14 |
| N | 18.74 | 23.87 | 31.80 | 19.05 | 25.27 | 35.85 | 18.74 | 23.87 | 31.80 |
| O | 12.91 | 12.35 | 84.75 | 12.00 | 8.91 | 96.68 | 22.27 | 23.94 | 81.36 |
| P | 9.57 | 6.50 | 145.23 | 9.57 | 6.50 | 145.23 | 9.57 | 6.50 | 145.23 |
| Q | 24.78 | 24.11 | 59.89 | 23.42 | 19.99 | 59.16 | 24.78 | 24.11 | 59.89 |
| R | 12.97 | 20.81 | 3.39 | 9.20 | 12.75 | 3.69 | 12.97 | 20.81 | 3.39 |
| S | 52.47 | 42.13 | 49.22 | 55.66 | 45.78 | 48.23 | 52.47 | 42.13 | 49.22 |
| T | 6.56 | 15.06 | 32.00 | 4.18 | 15.98 | 38.33 | 6.56 | 15.06 | 32.00 |
| U | 28.78 | 42.08 | 68.70 | 26.68 | 43.39 | 65.89 | 26.97 | 44.09 | 67.67 |
| V | 6.34 | 10.58 | 144.21 | 6.34 | 10.58 | 137.12 | 6.34 | 10.70 | 156.77 |

### Aquatic Communities

There is no significant difference between project alternatives in impacts to aquatic communities.

### Threatened and Endangered Species

A population of an endangered plant, Michaux's sumac (*Rhus michauxii*), was identified within the existing rail ROW in Brunswick County, VA, in Section D of the project.

The VA2 project alternative avoids the area containing the Michaux's sumac population, with the limits of construction being approximately 80 feet from the closest extent of the population.

The limits of construction for the VA1 and VA3 project alternatives are less than 20 feet from the nearest stem and selection of these alternatives could result in direct impacts to individual plants due to potential temporary construction activity within 30 feet of the railway footprint.

### Bald Eagle and Golden Eagle Protection Act

Two potential eagle nests were found in mature loblolly pine trees along the north bank of the Appomattox River, outside of the project study area. Because all project alternatives will be located more than 1,000 feet from the nests, it is anticipated that this project will have no effect on the bald eagle.

## Socio-Economic Impacts

The SEHSR project is anticipated to have a positive impact on both the short and long term economies of Virginia and North Carolina, and the surrounding regions. There is negligible difference between the alternatives.

Based on economic projections for Virginia, as presented in the SEHSR Tier I DEIS and updated to 2008 dollars, for every $121,400 spent implementing high speed rail, one new permanent job would be created. Each new permanent job would, in turn, generate an approximate $49,600 in increased gross regional product; $1,919 in new state, county, and local tax revenues; and $780 in new annual real estate tax revenues.

An example of potential economic and fiscal impacts using North Carolina factors is provided in Table ES-18.

| Table ES-18<br>Estimate of Economic and Fiscal Impacts | | | |
|---|---|---|---|
| | | **1996 Dollars** | **2008 Dollars** |
| **Economic Impacts** | Earning Income | $10,507,629,189 | $14,275,665,016 |
| **Fiscal Impacts** | State Income Taxes | $332,041,082 | $451,111,014 |
| | Corporate Income Taxes | $62,873,699 | $85,420,207 |
| | State Sales Tax | $204,898,768 | $278,375,466 |
| | Property Taxes / Recordation Fees | $44,874,257 | $60,966,166 |
| | Franchise Taxes | $2,124,158 | $2,885,881 |
| | Employment Security Taxes | $72,230,023 | $98,131,709 |
| | Sum of Fiscal Impacts | $719,041,987 | $976,890,444 |
| **Total Economic and Fiscal Impacts** | | **$11,226,671,176** | **$15,252,555,460** |

*Source: KPMG Economic Impact Analysis, 1995 for NC only; updated to 2008 $s based on the Consumer Price Index - South Urban Region. Bureau of Labor Statistics, http://data.bls.gov/PDQ/servlet/SurveyOutputServlet. Accessed 7/09/09*

Transportation investments like SEHSR can provide specific locations with improvements to attract growth. The Southeastern Economic Alliance (SEA), a coalition of sixteen chambers of Commerce from across six Southeastern states, cite the following points on why the SEHSR program would have a positive impact on the economy.

- Full implementation of the Southeast High Speed Rail Corridor would drive billions of dollars in new economic development
- Freight-rail commerce would benefit by improving speed of service, enhancing safety of rail crossings and relieving truck congestion on interstates
- Productivity of business travel would increase through consistently reliable and comfortable travel combined with the potential for reduced business-travel expenses
- Enhanced economic development and revitalization of urban areas around stations would occur
- Overall, investments in capital and operation expenses in the Southeast corridor are estimated to return $2.54 in benefits for every dollar invested
- Since development and capital investment seek advantaged locations, all alternatives would provide Virginia and North Carolina the infrastructure to remain competitive

## Community Impacts

Impacts to communities along the SEHSR project corridor were assessed in terms of concerns expressed by project stakeholders, changes to the transportation network, impacts to community facilities (e.g., schools; places of worship; and police, fire and emergency services), and compatibility with land use plans.

### Community Concerns

Because the SEHSR project maximizes the use of existing rail corridors, neighborhood disruptions and relocations have been minimized to the greatest extent practicable. Along active rail lines, overall impacts to neighborhoods and communities from the operation of SEHSR trains are expected to be minor because residents are used to the sights and sounds of trains through their communities. The introduction of high speed passenger rail would not substantially alter their current quality of life.

Fencing will be evaluated as necessary, especially in the more urban areas along the corridor. While the fencing could be seen as a physical barrier between communities on either side of the tracks, public input overwhelmingly saw fencing as a necessary measure of safety to keep vehicles, pedestrians, and animals off of the tracks.

Grade-crossing related train horn noise would be eliminated in locations with active rail traffic under the SEHSR project as a result of grade-separating all rail crossings within the corridor. Communities without active rail would not experience any new grade-crossing related horn noise for the same reason.

### Impacts to Community Facilities

All efforts have been made to minimize the impact of the project on community facilities. As a result, there is very little difference in impacts between the project alternatives.

### Changes to the Transportation Network

In general, public road and private drive closings and consolidations could result in slightly longer travel distances and time but not to the extent that the impact would be considered adverse.

### Police, Fire, and EMS

To determine the effect changes in access across the railroad would have on emergency services, an analysis was completed that approximated the service area that could be reached within about five minutes from existing emergency service facilities, both with and without the project. In most cases, there was a negligible change in service area with any of the project alternatives. However, the analysis identified two locations where the five-minute service area would decrease compared to current conditions:

- Bensley-Bermuda Volunteer Rescue Squad, South Station (Chesterfield County, VA) – Despite the reduction in the five-minute service area, the affected area could still be reached within the six-minute response time that is the established standard in Chesterfield County. However, a six-minute response time

represents an increase in response time over current conditions, except in cases where a freight train would block the station from crossing the railroad tracks

- Ridgeway Volunteer Fire Department (Warren County, NC) - The overall service area for the Ridgeway Volunteer Fire Department is about one-third smaller with the project than without it. Warren County has budgeted to construct additional EMS satellite facilities to improve emergency response times throughout the county, which may alleviate the impact of proposed SEHSR crossing consolidations

## Land Use and Transportation Planning

SEHSR is compatible with the multimodal transportation plans for the cities, counties, Metropolitan Planning Organizations (MPOs), Planning District Commissions (PDCs), and Rural Planning Organizations (RPOs) located along the study area.

These jurisdictions have incorporated the SEHSR into their future planning processes. This indicates planning organizations have a multimodal planning perspective and are considering how this project could:

- Spur economic development
- Improve socioeconomic conditions
- Improve the current transportation system
- Improve / increase transportation choices
- Assist with congestion management issues

Collectively, the planning organizations see the SEHSR as a vital part of the future in both Virginia and North Carolina.

## Environmental Justice

No disproportionately high and adverse effects on low-income and minority populations are anticipated within the overall SEHSR corridor, and there is a reasonable expectation that minority and low-income populations would share in the benefit of the proposed rail improvements.

## Relocations

The number of relocations does not vary significantly by alternative. Table ES-19 presents a summary of the potential residential and business relocation impacts associated with each of the alternatives, by section. The highest number of relocations would occur in Section AA in Richmond, VA, and Section CC, in Petersburg, VA.

| Table ES-19<br>Residential/Business Relocations by Section | | | |
|---|---|---|---|
| **Section** | **VA1** | **VA2** | **VA3** |
| AA | 40/6 | 40/6 | 40/6 |
| BB | 6/1 | 6/1 | 6/1 |
| CC | 44/1 | 44/1 | 44/1 |
| DD | 2/0 | 0/0 | 0/0 |
| A | 0/0 | 0/0 | 0/0 |
| B | 4/0 | 2/1 | 4/0 |
| C | 1/8 | 1/8 | 1/8 |
| D | 3/2 | 2/0 | 3/2 |
| E | 2/7 | 9/0 | 2/7 |
| F | 0/0 | 0/0 | 0/0 |
| G | 0/0 | 0/0 | 2/0 |
| H | 1/0 | 1/0 | 1/0 |
| I | 14/0 | 8/0 | 14/0 |
| J | 6/0 | 5/0 | 6/0 |
| K | 0/5 | 1/2 | 0/5 |
| L (VA) | 1/0 | 0/0 | 1/0 |
| **Table ES-19<br>Residential/Business Relocations by Section** | | | |
| **Section** | **NC1** | **NC2** | **NC3** |
| L (NC) | 11/1 | 17/1 | 11/1 |
| M | 21/4 | 20/4 | 21/4 |
| N | 2/0 | 7/0 | 2/0 |
| O | 9/0 | 9/0 | 3/0 |
| P | 18/6 | 18/6 | 18/6 |
| Q | 17/0 | 14/0 | 17/0 |
| R | 0/0 | 1/0 | 0/0 |
| S | 6/0 | 8/0 | 6/0 |
| T | 3/0 | 2/0 | 3/0 |
| U | 10/17 | 8/17 | 10/16 |
| V | 0/23 | 1/20 | 0/54 |

*Source: VA DRPT, 2006, 2009; NCDOT, 2008.*

## Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to take into account the effects of their undertakings on historic resources that are included in the NRHP or that meet the criteria for the NRHP:

- Criterion A - associated with events that have made a significant contribution to the broad patterns of our history; or

- Criterion B - associated with the lives of persons significant in our past; or
- Criterion C - embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D - have yielded or may be likely to yield, information important in prehistory or history.

The federal agency, in consultation with the state historic preservation office, makes an assessment of the effects of the project on the identified historic properties. The following determinations may be made: no effect, no adverse effect, or adverse effect.

Where the SEHSR project has been determined to have an adverse effect on historic resources, Section 106 requires that efforts be undertaken to avoid, minimize, or mitigate the adverse effects. As part of this process, consultation has taken place and is ongoing with VDHR, North Carolina State HPO, and other "consulting parties," such as the National Park Service, local historic societies, and property owners. This consultation will result in Memorandums of Agreement (MOAs) for both Virginia and North Carolina, which outline the agreed-upon measures that the SEHSR project will take to avoid, minimize, or mitigate the adverse effects. In some cases, the consulting parties may agree that no such measures are possible, but that the adverse effects must be accepted in the public interest. The MOAs will be included in the FEIS for the SEHSR project.

### Archaeological Resources

The effects of the SEHSR project on archaeological resources will be determined after the selection of the preferred alternative per 36 CFR 800.4(b)(2). This regulation permits a phased process to conduct identification and evaluation efforts on projects where alternatives under consideration consist of corridors or large land areas. Both the Virginia Department of Historic Resources (VDHR) and North Carolina State Historic Preservation Office (HPO) have agreed with this approach for the SEHSR project. The results of this evaluation will be included in the final environmental impact statement.

### Historical Resources

In Virginia, there are 47 historic properties and 10 battlefields within the Area of Potential Effects (APE) determined to be eligible for listing or listed on the National Register of Historic Places (NRHP). In North Carolina, there are 58 properties within the APE determined to be eligible for listing or listed on the NRHP.

Per Section 106 of the National Historic Preservation Act, recommendations of the effect of the project on resources in Virginia are listed in Tables ES-20 and ES-21. The final determination of effects for resources in Virginia will be completed after all archaeological surveys and effect determinations have been completed (i.e., after selection of the preferred alternative). The effects of the project on resources in NC have been determined and are shown in Table ES-22. Resources in Tables ES-20 through ES-22 are presented from north to south as they appear in the project corridor.

| Table ES-20<br>Effect Recommendations for Historic Architecture Resources - Virginia | | | |
|---|---|---|---|
| **Resource Name** | **VA1 Section 106 Effect** | **VA2 Section 106 Effect** | **VA3 Section 106 Effect** |
| Seaboard Air Line Railroad Corridor | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| C. & O. & Seaboard Railroad Depot | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Shockoe Valley & Tobacco Row Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Shockoe Slip Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| James River and Kanawha Canal Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Atlantic Coast Line Railroad Corridor | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Manchester Warehouse Historic District | No Effect | No Effect | No Effect |
| Williams Bridge Company | Adverse Effect | Adverse Effect | Adverse Effect |
| Lucky Strike/RJ Reynolds Tobacco | No Effect | No Effect | No Effect |
| Transmontaigne Product Services, Inc. | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Davee Gardens Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Dupont Spruance | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Sheffields; Auburn Chase; Bellwood; Building 42 - DSCR Officer's Club; New Oxford | No Effect | No Effect | No Effect |
| USDOD Supply Center Historic District; Bellwood-Richmond Quartermaster Depot Historic District | No Effect | No Effect | No Effect |
| Richmond & Petersburg Electric Railway | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| House at 3619 Thurston Rd | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Centralia Post Office | Adverse Effect | Adverse Effect | Adverse Effect |
| Ragland House/4626 Centralia Road | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Circle Oaks/4510 Centralia Road | Adverse Effect | Adverse Effect | Adverse Effect |
| Chester Historic District | Adverse Effect | Adverse Effect | Adverse Effect |
| Chester #94 Masonic Lodge | No Effect | No Effect | No Effect |
| Pretlow House | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Eichelberger House | Adverse Effect | Adverse Effect | Adverse Effect |
| Ellerslie | No Effect | No Effect | No Effect |
| Battersea | No Adverse Effect | No Adverse Effect | No Adverse Effect |

| Table ES-20<br>Effect Recommendations for Historic Architecture Resources - Virginia | | | |
|---|---|---|---|
| **Resource Name** | **VA1 Section 106 Effect** | **VA2 Section 106 Effect** | **VA3 Section 106 Effect** |
| North Battersea/Pride's Field Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Defense Road | Adverse Effect | Adverse Effect | Adverse Effect |
| Dimmock Line/Earthwork | Adverse Effect | Adverse Effect | Adverse Effect |
| Bridge over Defense Road | Adverse Effect | Adverse Effect | Adverse Effect |
| Evergreen | No Effect | No Effect | No Effect |
| Courtworth | No Effect | No Effect | No Effect |
| Bowen House | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| W. Boisseau's Store, Warehouse, Dwelling | No Effect | No Effect | No Effect |
| Bank Building | No Effect | No Effect | No Effect |
| Mayton House | No Effect | No Effect | No Effect |
| Honeymoon Hill Farm | No Effect | No Effect | No Effect |
| Wynnhurst | Adverse Effect | No Effect | Adverse Effect |
| Blick's Store | No Effect | No Adverse Effect | No Effect |
| Tourist Guest House | No Effect | No Effect | Adverse Effect |
| Oak Shades | Adverse Effect | No Adverse Effect | No Effect |
| Evans House | No Effect | No Effect | No Effect |
| Smelley House | No Effect | No Effect | No Effect |
| La Crosse Commercial Historic District | Adverse Effect | Adverse Effect | Adverse Effect |
| Wright Farmstead | Adverse Effect | No Effect | Adverse Effect |
| Sardis Methodist Church | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Bracey Historic District | No Effect | Adverse Effect | No Effect |
| Granite Hall/Fitts House | No Effect | Adverse Effect | No Effect |

| Table ES-21<br>Effect Recommendations for Battlefields - Virginia | | | |
|---|---|---|---|
| **Resource Name** | **VA1 Section 106 Effect** | **VA2 Section 106 Effect** | **VA3 Section 106 Effect** |
| Proctor's Creek | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Port Walthall Junction | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Swift Creek/Arrowfield Church | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Petersburg III/The Breakthrough | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Weldon Railroad/GlobeTavern | No Adverse Effect | No Adverse Effect | No Adverse Effect |

| Table ES-21<br>Effect Recommendations for Battlefields - Virginia | | | |
|---|---|---|---|
| **Resource Name** | **VA1 Section 106 Effect** | **VA2 Section 106 Effect** | **VA3 Section 106 Effect** |
| Peebles Farm | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Boydton Plank Road | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Hatcher's Run | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Lewis Farm | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Dinwiddie Courthouse | No Adverse Effect | No Adverse Effect | No Adverse Effect |

| Table ES-22<br>Effect Determinations for Historic Architecture Resources – North Carolina | | | |
|---|---|---|---|
| **Resource Name** | **NC1 Section 106 Effect** | **NC2 Section 106 Effect** | **NC3 Section 106 Effect** |
| Warren County Training School | No Effect | No Effect | No Effect |
| Wise School | No Effect | No Effect | No Effect |
| House (East side of US 1, Wise, NC) | No Effect | No Effect | No Effect |
| Holtzmann Farm | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Chapel of the Good Shepherd | Adverse Effect | Adverse Effect | Adverse Effect |
| Dr. Thomas B. Williams House and Office | No Effect | No Effect | No Effect |
| William J. Hawkins House | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Middleburg Community House (Middleburg Steakhouse) | No Effect | No Effect | No Effect |
| House (Allison Cooper Rd, Middleburg vicinity) | No Effect | No Effect | No Effect |
| Holloway Farm | Adverse Effect | Adverse Effect | No Effect |
| William Haywood Harris Farm | No Effect | No Effect | No Effect |
| Forrest Ellington Farm | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| R. B. Carter House | No Effect | No Effect | No Effect |
| Henderson Historic District and Proposed Boundary Expansion | Adverse Effect | Adverse Effect | Adverse Effect |
| Houses (2 bungalows on E Young Ave) | No Effect | No Effect | No Effect |
| Mistletoe Villa | No Effect | No Effect | No Effect |
| South Henderson Industrial Historic District | Adverse Effect | Adverse Effect | Adverse Effect |
| Vance Flour Mill (Sanford Milling Co.) | No Effect | No Effect | No Effect |

| Table ES-22<br>Effect Determinations for Historic Architecture Resources – North Carolina | | | |
|---|---|---|---|
| **Resource Name** | **NC1 Section 106 Effect** | **NC2 Section 106 Effect** | **NC3 Section 106 Effect** |
| Houses (5 worker houses on 1400 block of Nicholas St) | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Houses (3 side gable houses on 1500 block of Nicholas St) | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Esso Gasoline Station | No Effect | No Effect | No Effect |
| Confederate Cemetery | No Effect | No Effect | No Effect |
| Saint James Episcopal Church | No Effect | No Effect | No Effect |
| Hedgepetch and Finch Store | No Effect | No Effect | No Effect |
| Person-McGhee Farm | No Effect | No Effect | No Effect |
| Raleigh and Gaston Railroad Bridge Piers (Tar River) | No Effect | No Effect | No Effect |
| Franklinton Historic District (Includes Sterling Mill Historic District) | Adverse Effect | Adverse Effect | Adverse Effect |
| Church (within proposed Franklinton Historic District) | No Effect | No Effect | No Effect |
| Sterling Cotton Mill | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Cedar Creek Railroad Bridge Piers | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Youngsville Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| J. B. Perry House | No Effect | No Effect | No Effect |
| Glen Royall Mill Village Historic District | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Wake Forest Historic District | No Effect | No Effect | No Effect |
| Downtown Wake Forest Historic District | No Effect | No Effect | No Effect |
| Powell House | No Effect | No Effect | No Effect |
| Neuse Railroad Station | No Effect | No Effect | No Effect |
| Crabtree Creek Railroad Bridge Pier | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Raleigh Bonded Warehouse | No Effect | No Effect | No Effect |
| Mordecai Place Historic District | No Effect | No Effect | No Effect |
| Pilot Mill | No Effect | No Effect | No Effect |
| Roanoke Park Historic District | No Effect | No Effect | Adverse Effect |
| Noland Plumbing Company Building | No Effect | No Effect | No Adverse Effect |
| John A. Edwards and Company Building | No Effect | No Effect | No Effect |
| Glenwood-Brooklyn Historic District | No Effect | No Effect | No Adverse Effect |
| Seaboard Railway Station | No Adverse Effect | No Adverse Effect | No Effect |
| Seaboard Railway Warehouses | No Adverse Effect | No Adverse Effect | No Effect |

| Table ES-22<br>Effect Determinations for Historic Architecture Resources – North Carolina | | | |
|---|---|---|---|
| **Resource Name** | **NC1 Section 106 Effect** | **NC2 Section 106 Effect** | **NC3 Section 106 Effect** |
| Raleigh Cotton Mills | No Adverse Effect | No Adverse Effect | No Effect |
| Pine State Creamery | No Effect | No Effect | No Effect |
| Melrose Knitting Mill | No Effect | No Effect | No Effect |
| Raleigh Electric Company Power House | Adverse Effect | Adverse Effect | No Effect |
| Carolina Power and Light Company Car Barn and Automobile Garage | Adverse Effect | Adverse Effect | No Effect |
| National Art Interiors | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| North Carolina School Book Depository | No Effect | No Effect | No Effect |
| Raleigh Hosiery Company Building | No Effect | No Effect | No Effect |
| Boylan Heights Historic District | No Effect | No Effect | No Effect |
| Depot Historic District | No Effect | No Effect | No Effect |
| Raleigh and Gaston Railroad Corridor | Adverse Effect | Adverse Effect | Adverse Effect |

## Parklands, Recreational Areas, and Refuges

The SEHSR project is not anticipated to have any adverse impacts to national parks, state parks, greenways, natural area preserves, forests or recreation areas, city/county parks.

The location of the SEHSR Multiuse Greenway Concept will be determined by DRPT and NCDOT after the preferred alternative for the SEHSR project is selected. The potential impacts associated with the Greenway Concept will be documented in the FEIS for the SEHSR.

## Transportation

### Roads

The SEHSR is designed to be completely grade separated for safety and operability. The SEHSR project uses existing structures (bridges and underpasses) whenever practicable, and provides new bridges and underpasses along the length of the project as appropriate to maintain connectivity, along with appropriate roadway improvements.

The project alternatives are not anticipated to significantly impact east-west connectivity in any of the communities throughout the corridor.

Details about the proposed improvements at railroad crossings and associated roadwork, by alternative, are included in Appendix F.

### Rail

Throughout the project corridor, all three rail alternatives provide opportunity for a combination of high speed passenger service, conventional passenger service,

conventional freight, and intermodal freight. The designs anticipate all existing rail to be rebuilt to the same standards as the newly constructed sections.

All the project alternatives provide for current and future capacity for both freight and passenger service. The level of increased capacity is expected to be the same for all three rail alternatives.

All alternatives would also provide adequate separation of high speed train operations from highway traffic in a fully grade separated corridor.

Within each section of the project, specific alternatives vary slightly in the number and degree of curves, with accompanying speeds.

### Stations

In the Richmond to Raleigh corridor, current Amtrak service is provided in Richmond, Petersburg, and Raleigh and will be maintained. Based on feedback from the public involvement process and on the size of the accessible population, DRPT and NCDOT recommend La Crosse, VA, and Henderson, NC, for the placement of additional stops for certain trains. Specific station sites will be determined by the municipalities designated to have a stop, and impacts associated with the future development of these stations will be evaluated under separate environmental documents as appropriate.

In Petersburg, this document evaluates three potential station locations (Collier, Washington Street, and Dunlop) for accessibility to the larger transportation network as compared to the current Ettrick station. All three locations would provide improved highway access over the current Ettrick location.

## Utilities

There are no significant differences among the three alternatives related to utility impacts.

## Indirect and Cumulative Effects (ICEs)

There is the potential for some negative impact due to noise and vibration caused by the reintroduction of service along the S-line in Virginia where there is presently no rail service, but the net indirect and cumulative effects for SEHSR are anticipated to be positive at both the national and regional level. There is no significant variation between the alternatives regarding indirect and cumulative effects.

### Other Planned Actions

Development of the SEHSR program takes into account other planned actions by local, state, and federal authorities within the study area. Long-range planning data was incorporated into the SEHSR program. The SEHSR would not adversely impact the ability of these projects to be constructed. Overall, the SEHSR project would have a beneficial impact on these planned transportation projects, and these separate, planned projects are anticipated to have a positive, synergistic effect with the SEHSR.

## Section 4(f)

Section 4(f) of the Department of Transportation Act of 1966 protects publicly owned parks, recreation areas, and wildlife/waterfowl refuges, as well as historic sites listed or eligible for listing in the National Register of Historic Places (NRHP). These lands can only be used for a federally-funded transportation project if there is no other feasible and prudent alternative, and the project incorporates all possible planning to minimize harm.

### Parks, Recreation Areas, Wildlife Refuges

The project would cross five publicly-owned trails in six locations, require a small amount of ROW from three public parks (two local and one national park), and come in close proximity to additional three public parks and a school playground. None of the impacts associated with the project would adversely affect the activities, features, and attributes that qualify the resources for protection under Section 4(f). Therefore, the project would not require a Section 4(f) use of any park lands.

### Historic Resources

Of the 115 historic resources within the SEHSR corridor that are eligible for or listed on the NRHP, 24 would be adversely affected by one or more of the project alternatives under Section 106 of the National Historic Preservation Act.

Extensive design efforts resulted in the development of avoidance alternatives for six of the resources with adverse impacts.

Three of the resources with adverse impacts would have only proximity impacts from the project alternatives (i.e., no right of way required). The project alternatives were determined to have no Section 4(f) use on these resources.

There remain 15 resources for which there is no feasible and prudent alternative to a Section 4(f) use, and these are addressed in the Section 4(f) evaluation. The project team has coordinated with state historic preservation offices in Virginia and North Carolina, individual resource owners, and local historic societies in an effort to identify measures to minimize harm to these resources. This coordination will continue throughout the development of the project.

## Table ES-23
## Section AA- All Alternatives on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION AA | | | | SECTION AA | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 11.31 | 11.31 | 11.31 |
| Number of Stream Crossings | 20 | 20 | 20 | Limiting Speed** | 80 | 80 | 80 |
| Impacts to Streams (linear feet) | 4,518 | 4,518 | 4,518 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 2.88 | 2.88 | 2.88 | Roadwork (miles) | 4.6 | 4.6 | 4.6 |
| FEMA Floodplain Crossings | 18 | 18 | 18 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 26.16 | 26.16 | 26.16 | | | | |
| Forested uplands (acres) | 43.7 | 43.7 | 43.7 | Rail and Road Construction Cost (millions $) | $191.60 | $191.60 | $191.60 |
| Hazardous Materials Sites | 59 | 59 | 59 | Utility Relocation Cost (millions $) | $20.47 | $20.47 | $20.47 |
| Residential Relocations | 40 | 40 | 40 | Right-of-Way Cost (millions $) | $28.11 | $28.11 | $28.11 |
| Business Relocations | 6 | 6 | 6 | **TOTAL COSTS** (millions $) | $240.18 | $240.18 | $240.18 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 0 | 0 | 0 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 9 | 9 | 9 | | | | |
| Section 4(f) De Minimis- Parks * | 2 | 2 | 2 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section BB- All Alternatives on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION BB | | | | SECTION BB | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 6.91 | 6.91 | 6.91 |
| Number of Stream Crossings | 17 | 17 | 17 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 2,991 | 2,991 | 2,991 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 4.53 | 4.53 | 4.53 | Roadwork (miles) | 2.2 | 2.2 | 2.2 |
| FEMA Floodplain Crossings | 7 | 7 | 7 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 12.59 | 12.59 | 12.59 | | | | |
| Forested uplands (acres) | 57.39 | 57.39 | 57.39 | Rail and Road Construction Cost (millions $) | $70.40 | $70.40 | $70.40 |
| Hazardous Materials Sites | 10 | 10 | 10 | Utility Relocation Cost (millions $) | $3.87 | $3.87 | $3.87 |
| Residential Relocations | 6 | 6 | 6 | Right-of-Way Cost (millions $) | $11.04 | $11.04 | $11.04 |
| Business Relocations | 1 | 1 | 1 | **TOTAL COSTS** (millions $) | $85.31 | $85.31 | $85.31 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 0 | 0 | 0 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 2 | 2 | 2 | | | | |
| Section 4(f) Uses- Historic * | 2 | 2 | 2 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 6 | 6 | 6 | | | | |
| Section 4(f) De Minimis- Parks * | 1 | 1 | 1 | | | | |
| Section 106 Adverse Effects * | 4 | 4 | 4 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section CC- All Alternatives on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION CC | | | | SECTION CC | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 8.91 | 8.91 | 8.91 |
| Number of Stream Crossings | 18 | 18 | 18 | Limiting Speed** | 80 | 80 | 80 |
| Impacts to Streams (linear feet) | 2,047 | 2,047 | 2,047 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 5.21 | 5.21 | 5.21 | Roadwork (miles) | 3.8 | 3.8 | 3.8 |
| FEMA Floodplain Crossings | 7 | 7 | 7 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 57.56 | 57.56 | 57.56 | | | | |
| Forested uplands (acres) | 51.64 | 51.64 | 51.64 | Rail and Road Construction Cost (millions $) | $113.20 | $113.20 | $113.20 |
| Hazardous Materials Sites | 20 | 20 | 20 | Utility Relocation Cost (millions $) | $4.49 | $4.49 | $4.49 |
| Residential Relocations | 44 | 44 | 44 | Right-of-Way Cost (millions $) | $26.14 | $26.14 | $26.14 |
| Business Relocations | 1 | 1 | 1 | **TOTAL COSTS** (millions $) | $143.83 | $143.83 | $143.83 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 11 | 11 | 11 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 15 | 15 | 15 | | | | |
| Section 4(f) Uses- Historic * | 3 | 3 | 3 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 9 | 9 | 9 | | | | |
| Section 4(f) De Minimis- Parks * | 3 | 3 | 3 | | | | |
| Section 106 Adverse Effects * | 3 | 3 | 3 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section DD- Alternatives VA1, VA2, VA3 on Different Alignments

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION DD | | | | SECTION DD | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 5.66 | 5.63 | 5.66 |
| Number of Stream Crossings | 6 | 6 | 6 | Limiting Speed** | 75 | 70 | 75 |
| Impacts to Streams (linear feet) | 720 | 739 | 720 | Operability/Constructability*** | neutral | negative | positive |
| Impacts to Wetlands (acres) | 2.28 | 2.19 | 2.32 | Roadwork (miles) | 1.5 | 1.5 | 1.5 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 23.45 | 22.82 | 32.74 | | | | |
| Forested uplands (acres) | 53.14 | 53.46 | 59.36 | Rail and Road Construction Cost (millions $) | $77.10 | $76.90 | $57.60 |
| Hazardous Materials Sites | 1 | 1 | 1 | Utility Relocation Cost (millions $) | $2.59 | $2.41 | $2.42 |
| Residential Relocations | 2 | 0 | 0 | Right-of-Way Cost (millions $) | $2.72 | $2.66 | $2.45 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $82.41 | $81.97 | $62.47 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 0 | 0 | 0 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 5 | 5 | 5 | | | | |
| Section 4(f) De Minimis- Parks * | 1 | 1 | 1 | | | | |
| Section 106 Adverse Effects * | 0 | 0 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section A- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION A | | | | SECTION A | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 4.93 | 4.95 | 4.93 |
| Number of Stream Crossings | 12 | 12 | 12 | Limiting Speed** | 80 | 95 | 80 |
| Impacts to Streams (linear feet) | 2,897 | 2,682 | 2,897 | Operability/Constructability*** | negative | neutral | negative |
| Impacts to Wetlands (acres) | 2.37 | 2.30 | 2.37 | Roadwork (miles) | 2.4 | 2.4 | 2.4 |
| FEMA Floodplain Crossings | 1 | 1 | 1 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 43.71 | 57.10 | 43.71 | | | | |
| Forested uplands (acres) | 70.85 | 68.26 | 70.85 | Rail and Road Construction Cost (millions $) | $54.60 | $56.10 | $54.60 |
| Hazardous Materials Sites | 1 | 1 | 1 | Utility Relocation Cost (millions $) | $0.42 | $0.42 | $0.42 |
| Residential Relocations | 0 | 0 | 0 | Right-of-Way Cost (millions $) | $0.51 | $0.51 | $0.51 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $55.53 | $57.03 | $55.53 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 4 | 4 | 4 | | | | |
| Noise (Severely Impacted Receptors) | 1 | 1 | 1 | | | | |
| Vibration (Impacted Structures) | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 3 | 3 | 3 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 0 | 0 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section B- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION B | | | | SECTION B | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 5.71 | 5.80 | 5.71 |
| Number of Stream Crossings | 11 | 9 | 11 | Limiting Speed** | 110 | 90 | 110 |
| Impacts to Streams (linear feet) | 940 | 496 | 940 | Operability/Constructability*** | neutral | negative | neutral |
| Impacts to Wetlands (acres) | 0.97 | 0.62 | 0.97 | Roadwork (miles) | 1.5 | 1 | 1.5 |
| FEMA Floodplain Crossings | 2 | 2 | 2 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 65.40 | 40.13 | 65.40 | | | | |
| Forested uplands (acres) | 82.38 | 77.8 | 82.38 | Rail and Road Construction Cost (millions $) | $66.70 | $61.20 | $66.70 |
| Hazardous Materials Sites | 0 | 2 | 0 | Utility Relocation Cost (millions $) | $0.26 | $0.30 | $0.26 |
| Residential Relocations | 4 | 2 | 4 | Right-of-Way Cost (millions $) | $1.54 | $1.30 | $1.54 |
| Business Relocations | 0 | 1 | 0 | **TOTAL COSTS** (millions $) | $68.50 | $62.80 | $68.50 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 13 | 16 | 13 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 2 | 5 | 2 | | | | |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 0 | 0 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section C- All Alternatives on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION C | | | | SECTION C | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 10.75 | 10.75 | 10.75 |
| Number of Stream Crossings | 21 | 21 | 21 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 4,025 | 4,025 | 4,025 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 1.51 | 1.51 | 1.51 | Roadwork (miles) | 4 | 4 | 4 |
| FEMA Floodplain Crossings | 1 | 1 | 1 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 94.47 | 94.47 | 94.47 | | | | |
| Forested uplands (acres) | 156.56 | 156.56 | 156.56 | Rail and Road Construction Cost (millions $) | $108.40 | $108.40 | $108.40 |
| Hazardous Materials Sites | 2 | 2 | 2 | Utility Relocation Cost (millions $) | $1.87 | $1.87 | $1.87 |
| Residential Relocations | 1 | 1 | 1 | Right-of-Way Cost (millions $) | $4.34 | $4.34 | $4.34 |
| Business Relocations | 8 | 8 | 8 | **TOTAL COSTS** (millions $) | $114.61 | $114.61 | $114.61 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 9 | 9 | 9 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 11 | 11 | 11 | | | | |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 0 | 0 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section D- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION D | | | | SECTION D | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 1 | 0 | 1 | Mainline Track Length (miles) | 6.07 | 6.41 | 6.07 |
| Number of Stream Crossings | 14 | 12 | 14 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 2,050 | 2,575 | 2,050 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 0.99 | 7.37 | 0.99 | Roadwork (miles) | 1.6 | 1.5 | 1.6 |
| FEMA Floodplain Crossings | 0 | 4 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 80.45 | 54.45 | 80.45 | | | | |
| Forested uplands (acres) | 90.99 | 92.24 | 90.99 | Rail and Road Construction Cost (millions $) | $67.20 | $53.40 | $67.20 |
| Hazardous Materials Sites | 0 | 1 | 0 | Utility Relocation Cost (millions $) | $1.28 | $0.66 | $1.28 |
| Residential Relocations | 3 | 2 | 3 | Right-of-Way Cost (millions $) | $1.82 | $1.00 | $1.82 |
| Business Relocations | 2 | 0 | 2 | **TOTAL COSTS** (millions $) | $70.30 | $55.06 | $70.30 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 2 | 3 | 2 | | | | |
| Noise (Severely Impacted Receptors) | 2 | 1 | 2 | | | | |
| Vibration (Impacted Structures) | 3 | 1 | 3 | | | | |
| Section 4(f) Uses- Historic * | 1 | 0 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 1 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 0 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section E- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION E | | | | SECTION E | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 4.21 | 4.29 | 4.21 |
| Number of Stream Crossings | 6 | 6 | 6 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 1,025 | 1,294 | 1,025 | Operability/Constructability*** | positive | neutral | positive |
| Impacts to Wetlands (acres) | 0.28 | 2.41 | 0.28 | Roadwork (miles) | 1.8 | 1.8 | 1.8 |
| FEMA Floodplain Crossings | 1 | 2 | 1 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 58.90 | 60.71 | 58.90 | | | | |
| Forested uplands (acres) | 52.02 | 57.07 | 52.02 | Rail and Road Construction Cost (millions $) | $60.30 | $59.50 | $60.30 |
| Hazardous Materials Sites | 0 | 0 | 0 | Utility Relocation Cost (millions $) | $0.77 | $0.77 | $0.77 |
| Residential Relocations | 2 | 9 | 2 | Right-of-Way Cost (millions $) | $1.53 | $1.39 | $1.53 |
| Business Relocations | 7 | 0 | 7 | **TOTAL COSTS** (millions $) | $62.60 | $61.66 | $62.60 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 23 | 22 | 23 | | | | |
| Noise (Severely Impacted Receptors) | 6 | 6 | 6 | | | | |
| Vibration (Impacted Structures) | 9 | 11 | 9 | | | | |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 1 | 1 | 1 | | | | |
| Section 106 Adverse Effects * | 0 | 0 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section F- All Alternatives on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION F | | | | SECTION F | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 4.28 | 4.28 | 4.28 |
| Number of Stream Crossings | 6 | 6 | 6 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 1,185 | 1,185 | 1,185 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 0.60 | 0.60 | 0.60 | Roadwork (miles) | 1.6 | 1.6 | 1.6 |
| FEMA Floodplain Crossings | 2 | 2 | 2 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 21.65 | 21.65 | 21.65 | | | | |
| Forested uplands (acres) | 67.01 | 67.01 | 67.01 | Rail and Road Construction Cost (millions $) | $47.10 | $47.10 | $47.10 |
| Hazardous Materials Sites | 0 | 0 | 0 | Utility Relocation Cost (millions $) | $0.41 | $0.41 | $0.41 |
| Residential Relocations | 0 | 0 | 0 | Right-of-Way Cost (millions $) | $0.27 | $0.27 | $0.27 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $47.78 | $47.78 | $47.78 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 6 | 6 | 6 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 0 | 0 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section G- Alternatives VA1, VA2, VA3 on Different Alignments

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION G | | | | SECTION G | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 3.61 | 3.66 | 3.55 |
| Number of Stream Crossings | 7 | 7 | 6 | Limiting Speed** | 110 | 90 | 110 |
| Impacts to Streams (linear feet) | 654 | 914 | 500 | Operability/Constructability*** | neutral | negative | positive |
| Impacts to Wetlands (acres) | 0.21 | 0.49 | 0.21 | Roadwork (miles) | 0.7 | 0.3 | 0.6 |
| FEMA Floodplain Crossings | 1 | 1 | 1 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 25.02 | 24.96 | 28.98 | | | | |
| Forested uplands (acres) | 45.54 | 44.59 | 43.58 | Rail and Road Construction Cost (millions $) | $35.90 | $29.00 | $36.20 |
| Hazardous Materials Sites | 0 | 0 | 0 | Utility Relocation Cost (millions $) | $0.19 | $0.16 | $0.19 |
| Residential Relocations | 0 | 0 | 2 | Right-of-Way Cost (millions $) | $0.37 | $0.31 | $0.53 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $36.46 | $29.47 | $36.92 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 0 | 1 | 2 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 1 | 0 | 1 | | | | |
| Section 4(f) Uses- Historic * | 1 | 0 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 1 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 0 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section H- Alternatives VA1, VA3 on Common Alignment

**Summary of Potential Human and Natural Impacts By Section**

| Topic | SECTION H | | |
|---|---|---|---|
| | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 |
| Number of Stream Crossings | 6 | 7 | 6 |
| Impacts to Streams (linear feet) | 2,005 | 2,023 | 2,005 |
| Impacts to Wetlands (acres) | 0.25 | 0.25 | 0.25 |
| FEMA Floodplain Crossings | 0 | 0 | 0 |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 |
| Impacts to Prime and Other Important Farmland (acres) | 79.87 | 80.20 | 79.87 |
| Forested uplands (acres) | 110.67 | 101.45 | 110.67 |
| Hazardous Materials Sites | 0 | 0 | 0 |
| Residential Relocations | 1 | 1 | 1 |
| Business Relocations | 0 | 0 | 0 |
| Public Schools Impacted | 0 | 0 | 0 |
| Noise (Impacted Receptors) | 18 | 24 | 18 |
| Noise (Severely Impacted Receptors) | 2 | 2 | 2 |
| Vibration (Impacted Structures) | 5 | 7 | 5 |
| Section 4(f) Uses- Historic * | 0 | 0 | 0 |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 |
| Section 106 Adverse Effects * | 0 | 0 | 0 |

**Summary of Operational & Physical Characteristics By Section**

| Topic | SECTION H | | |
|---|---|---|---|
| | VA1 | VA2 | VA3 |
| Mainline Track Length (miles) | 5.53 | 5.58 | 5.53 |
| Limiting Speed** | 110 | 110 | 110 |
| Operability/Constructability*** | positive | neutral | positive |
| Roadwork (miles) | 4.7 | 4.1 | 4.7 |
| | | | |
| | | | |
| | | | |
| Rail and Road Construction Cost (millions $) | $78.80 | $74.50 | $78.80 |
| Utility Relocation Cost (millions $) | $0.73 | $0.71 | $0.73 |
| Right-of-Way Cost (millions $) | $1.14 | $1.11 | $1.14 |
| **TOTAL COSTS** (millions $) | $80.67 | $76.32 | $80.67 |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section I- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION I | | | | SECTION I | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 3.77 | 3.77 | 3.77 |
| Number of Stream Crossings | 0 | 0 | 0 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 6 | 6 | 6 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 0.00 | 0.00 | 0.00 | Roadwork (miles) | 2.6 | 3.8 | 2.6 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 57.54 | 65.95 | 57.54 | | | | |
| Forested uplands (acres) | 35.51 | 40.08 | 35.51 | Rail and Road Construction Cost (millions $) | $36.40 | $46.60 | $36.40 |
| Hazardous Materials Sites | 2 | 2 | 2 | Utility Relocation Cost (millions $) | $0.99 | $0.92 | $0.99 |
| Residential Relocations | 14 | 8 | 14 | Right-of-Way Cost (millions $) | $1.93 | $2.25 | $1.93 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $39.32 | $49.77 | $39.32 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 50 | 50 | 50 | | | | |
| Noise (Severely Impacted Receptors) | 5 | 5 | 5 | | | | |
| Vibration (Impacted Structures) | 24 | 21 | 24 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 2 | 2 | 2 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section J- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION J | | | | SECTION J | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 3.99 | 4.10 | 3.99 |
| Number of Stream Crossings | 5 | 3 | 5 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 2,061 | 698 | 2,061 | Operability/Constructability*** | positive | neutral | positive |
| Impacts to Wetlands (acres) | 0.00 | 0.10 | 0.00 | Roadwork (miles) | 2.5 | 2.7 | 2.5 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 80.43 | 71.69 | 80.43 | | | | |
| Forested uplands (acres) | 64.27 | 61.63 | 64.27 | Rail and Road Construction Cost (millions $) | $42.10 | $40.60 | $42.10 |
| Hazardous Materials Sites | 1 | 0 | 1 | Utility Relocation Cost (millions $) | $0.41 | $1.00 | $0.41 |
| Residential Relocations | 6 | 5 | 6 | Right-of-Way Cost (millions $) | $1.16 | $1.42 | $1.16 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $43.67 | $43.02 | $43.67 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 11 | 21 | 11 | | | | |
| Noise (Severely Impacted Receptors) | 1 | 1 | 1 | | | | |
| Vibration (Impacted Structures) | 5 | 5 | 5 | | | | |
| Section 4(f) Uses- Historic * | 1 | 0 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 0 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section K- Alternatives VA1, VA3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION K | | | | SECTION K | | |
| Topic | VA1 | VA2 | VA3 | Topic | VA1 | VA2 | VA3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 4.96 | 4.94 | 4.96 |
| Number of Stream Crossings | 10 | 10 | 10 | Limiting Speed** | 110 | 100 | 110 |
| Impacts to Streams (linear feet) | 1,927 | 2,447 | 1,927 | Operability/Constructability*** | neutral | negative | neutral |
| Impacts to Wetlands (acres) | 0.46 | 0.47 | 0.46 | Roadwork (miles) | 0.2 | 0 | 0.2 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 36.55 | 41.40 | 36.55 | | | | |
| Forested uplands (acres) | 79.22 | 79.94 | 79.22 | Rail and Road Construction Cost (millions $) | $82.80 | $77.00 | $82.80 |
| Hazardous Materials Sites | 0 | 0 | 0 | Utility Relocation Cost (millions $) | $0.40 | $0.40 | $0.40 |
| Residential Relocations | 0 | 1 | 0 | Right-of-Way Cost (millions $) | $1.57 | $0.90 | $1.57 |
| Business Relocations | 5 | 2 | 5 | **TOTAL COSTS** (millions $) | $84.77 | $78.30 | $84.77 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 9 | 8 | 9 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 1 | 2 | 1 | | | | |
| Section 4(f) Uses- Historic * | 0 | 1 | 0 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 0 | 1 | 0 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section L- Includes Areas in Virginia and North Carolina
## Alternatives VA1/NC1 and VA3/NC3 on Common Alignment

**Summary of Potential Human and Natural Impacts By Section**

| Topic | SECTION L | | |
|---|---|---|---|
| | VA1/NC1 | VA2/NC2 | VA3/NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 |
| Number of Stream Crossings | 14 | 9 | 14 |
| Impacts to Streams (linear feet) | 2,809 | 1,422 | 2,809 |
| Impacts to Wetlands (acres) | 0.57 | 0.01 | 0.57 |
| FEMA Floodplain Crossings | 0 | 0 | 0 |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 |
| Impacts to Prime and Other Important Farmland (acres) | 122.74 | 125.95 | 122.74 |
| Forested uplands (acres) | 91.32 | 73.19 | 91.32 |
| Hazardous Materials Sites | 1 | 1 | 1 |
| Residential Relocations | 12 | 17 | 12 |
| Business Relocations | 1 | 1 | 1 |
| Public Schools Impacted | 0 | 0 | 0 |
| Noise (Impacted Receptors) | 20 | 32 | 20 |
| Noise (Severely Impacted Receptors) | 1 | 3 | 1 |
| Vibration (Impacted Structures) | 7 | 13 | 7 |
| Section 4(f) Uses- Historic * | 0 | 1 | 0 |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 |
| Section 106 Adverse Effects * | 0 | 1 | 0 |

**Summary of Operational & Physical Characteristics By Section**

| Topic | SECTION L | | |
|---|---|---|---|
| | VA1/NC1 | VA2/NC2 | VA3/NC3 |
| Mainline Track Length (miles) | 5.75 | 5.96 | 5.75 |
| Limiting Speed** | 110 | 100 | 110 |
| Operability/Constructability*** | neutral | negative | neutral |
| Roadwork (miles) | 6.5 | 8.1 | 6.5 |
| | | | |
| | | | |
| | | | |
| Rail and Road Construction Cost (millions $) | $63.00 | $71.30 | $63.00 |
| Utility Relocation Cost (millions $) | $1.00 | $1.34 | $1.00 |
| Right-of-Way Cost (millions $) | $5.42 | $5.36 | $5.42 |
| **TOTAL COSTS** (millions $) | $69.42 | $78.00 | $69.42 |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section M- Alternatives NC1, NC3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION M | | | | SECTION M | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 6.14 | 5.97 | 6.14 |
| Number of Stream Crossings | 2 | 4 | 2 | Limiting Speed** | 110 | 80 | 110 |
| Impacts to Streams (linear feet) | 442 | 511 | 442 | Operability/Constructability*** | neutral | negative | neutral |
| Impacts to Wetlands (acres) | 0.00 | 0.00 | 0.00 | Roadwork (miles) | 7.5 | 7 | 7.5 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 90.80 | 85.00 | 90.80 | | | | |
| Forested uplands (acres) | 48.12 | 52.7 | 48.12 | Rail and Road Construction Cost (millions $) | $76.10 | $74.30 | $76.10 |
| Hazardous Materials Sites | 0 | 0 | 0 | Utility Relocation Cost (millions $) | $1.34 | $1.34 | $1.34 |
| Residential Relocations | 21 | 20 | 21 | Right-of-Way Cost (millions $) | $5.77 | $5.10 | $5.77 |
| Business Relocations | 4 | 4 | 4 | **TOTAL COSTS** (millions $) | $83.21 | $80.74 | $83.21 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 41 | 48 | 41 | | | | |
| Noise (Severely Impacted Receptors) | 6 | 1 | 6 | | | | |
| Vibration (Impacted Structures) | 30 | 28 | 30 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 2 | 2 | 2 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section N- Alternatives NC1, NC3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION N | | | | SECTION N | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 3.71 | 3.77 | 3.71 |
| Number of Stream Crossings | 3 | 4 | 3 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 385 | 715 | 385 | Operability/Constructability*** | positive | neutral | positve |
| Impacts to Wetlands (acres) | 1.25 | 0.18 | 1.25 | Roadwork (miles) | 2.5 | 2.8 | 2.5 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 65.39 | 74.38 | 65.39 | | | | |
| Forested uplands (acres) | 42.61 | 44.32 | 42.61 | Rail and Road Construction Cost (millions $) | $40.70 | $42.60 | $40.70 |
| Hazardous Materials Sites | 1 | 1 | 1 | Utility Relocation Cost (millions $) | $0.51 | $0.46 | $0.51 |
| Residential Relocations | 2 | 7 | 2 | Right-of-Way Cost (millions $) | $2.08 | $2.57 | $2.08 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $43.29 | $45.63 | $43.29 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 4 | 6 | 4 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 1 | 0 | | | | |
| Vibration (Impacted Structures) | 2 | 2 | 2 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section O- Alternatives NC1, NC2, NC3 on Different Alignments

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION O | | | | SECTION O | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 5.09 | 5.16 | 4.70 |
| Number of Stream Crossings | 5 | 6 | 12 | Limiting Speed** | 90 | 80 | 110 |
| Impacts to Streams (linear feet) | 693 | 915 | 3,102 | Operability/Constructability*** | negative | negative | neutral |
| Impacts to Wetlands (acres) | 0.40 | 1.63 | 0.20 | Roadwork (miles) | 5 | 5.9 | 4.9 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 106.22 | 108.13 | 125.78 | | | | |
| Forested uplands (acres) | 25.26 | 20.91 | 46.21 | Rail and Road Construction Cost (millions $) | $69.60 | $65.50 | $66.80 |
| Hazardous Materials Sites | 2 | 2 | 0 | Utility Relocation Cost (millions $) | $0.20 | $0.20 | $0.19 |
| Residential Relocations | 9 | 9 | 3 | Right-of-Way Cost (millions $) | $3.56 | $4.19 | $3.84 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $73.36 | $69.89 | $70.83 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 26 | 26 | 10 | | | | |
| Noise (Severely Impacted Receptors) | 6 | 6 | 5 | | | | |
| Vibration (Impacted Structures) | 14 | 11 | 6 | | | | |
| Section 4(f) Uses- Historic * | 2 | 2 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 2 | 2 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section P- All Alternatives on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION P | | | | SECTION P | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 7.99 | 7.99 | 7.99 |
| Number of Stream Crossings | 7 | 7 | 7 | Limiting Speed** | 80 | 80 | 80 |
| Impacts to Streams (linear feet) | 1,520 | 1,520 | 1,520 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 0.91 | 0.91 | 0.91 | Roadwork (miles) | 10 | 10 | 10 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 87.73 | 87.83 | 87.73 | | | | |
| Forested uplands (acres) | 16.07 | 16.07 | 16.07 | Rail and Road Construction Cost (millions $) | $105.30 | $105.30 | $105.30 |
| Hazardous Materials Sites | 22 | 22 | 22 | Utility Relocation Cost (millions $) | $2.68 | $2.68 | $2.68 |
| Residential Relocations | 18 | 18 | 18 | Right-of-Way Cost (millions $) | $6.97 | $6.97 | $6.97 |
| Business Relocations | 6 | 6 | 6 | **TOTAL COSTS** (millions $) | $114.95 | $114.95 | $114.95 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 78 | 78 | 78 | | | | |
| Noise (Severely Impacted Receptors) | 11 | 11 | 11 | | | | |
| Vibration (Impacted Structures) | 74 | 74 | 74 | | | | |
| Section 4(f) Uses- Historic * | 3 | 3 | 3 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 2 | 2 | 2 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 3 | 3 | 3 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section Q- Alternatives NC1, NC3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION Q | | | | SECTION Q | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 7.70 | 7.73 | 7.70 |
| Number of Stream Crossings | 9 | 9 | 9 | Limiting Speed** | 110 | 90 | 110 |
| Impacts to Streams (linear feet) | 1,009 | 1,009 | 1,009 | Operability/Constructability*** | neutral | negative | neutral |
| Impacts to Wetlands (acres) | 0.03 | 0.03 | 0.03 | Roadwork (miles) | 4.4 | 4.2 | 4.4 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 94.78 | 84.30 | 94.78 | | | | |
| Forested uplands (acres) | 48.89 | 43.41 | 48.89 | Rail and Road Construction Cost (millions $) | $77.40 | $78.30 | $77.40 |
| Hazardous Materials Sites | 4 | 4 | 4 | Utility Relocation Cost (millions $) | $0.68 | $0.68 | $0.68 |
| Residential Relocations | 17 | 14 | 17 | Right-of-Way Cost (millions $) | $7.94 | $6.74 | $7.94 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $86.02 | $85.72 | $86.02 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 13 | 13 | 13 | | | | |
| Noise (Severely Impacted Receptors) | 5 | 5 | 5 | | | | |
| Vibration (Impacted Structures) | 20 | 20 | 20 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section R- Alternatives NC1, NC3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION R | | | | SECTION R | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 3.21 | 3.23 | 3.21 |
| Number of Stream Crossings | 2 | 2 | 2 | Limiting Speed** | 110 | 110 | 110 |
| Impacts to Streams (linear feet) | 475 | 1,018 | 475 | Operability/Constructability*** | positive | neutral | positive |
| Impacts to Wetlands (acres) | 0.00 | 0.00 | 0.00 | Roadwork (miles) | 0.3 | 0.3 | 0.3 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 25.83 | 12.72 | 25.83 | | | | |
| Forested uplands (acres) | 33.78 | 21.95 | 33.78 | Rail and Road Construction Cost (millions $) | $22.80 | $21.30 | $22.80 |
| Hazardous Materials Sites | 0 | 0 | 0 | Utility Relocation Cost (millions $) | $0.02 | $0.02 | $0.02 |
| Residential Relocations | 0 | 1 | 0 | Right-of-Way Cost (millions $) | $3.18 | $0.71 | $3.18 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $26.00 | $22.03 | $26.00 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 1 | 1 | 1 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 3 | 2 | 3 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section S- Alternatives NC1, NC3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION S | | | | SECTION S | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 6.88 | 6.71 | 6.88 |
| Number of Stream Crossings | 11 | 11 | 11 | Limiting Speed** | 95 | 95 | 95 |
| Impacts to Streams (linear feet) | 2,120 | 2,720 | 2,120 | Operability/Constructability*** | neutral | neutral | neutral |
| Impacts to Wetlands (acres) | 0.55 | 0.07 | 0.55 | Roadwork (miles) | 4.2 | 4.1 | 4.2 |
| FEMA Floodplain Crossings | 1 | 1 | 1 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 94.88 | 105.65 | 94.88 | | | | |
| Forested uplands (acres) | 94.61 | 101.43 | 94.61 | Rail and Road Construction Cost (millions $) | $87.00 | $85.20 | $87.00 |
| Hazardous Materials Sites | 6 | 5 | 6 | Utility Relocation Cost (millions $) | $1.05 | $1.01 | $1.05 |
| Residential Relocations | 6 | 8 | 6 | Right-of-Way Cost (millions $) | $6.80 | $8.35 | $6.80 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $94.85 | $94.56 | $94.85 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 22 | 23 | 22 | | | | |
| Noise (Severely Impacted Receptors) | 1 | 1 | 1 | | | | |
| Vibration (Impacted Structures) | 22 | 22 | 22 | | | | |
| Section 4(f) Uses- Historic * | 2 | 2 | 2 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) De Minimis- Parks * | 1 | 1 | 1 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section T- Alternatives NC1, NC3 on Common Alignment

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION T | | | | SECTION T | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 2.83 | 2.96 | 2.83 |
| Number of Stream Crossings | 3 | 3 | 3 | Limiting Speed** | 110 | 95 | 110 |
| Impacts to Streams (linear feet) | 415 | 94 | 415 | Operability/Constructability*** | neutral | negative | neutral |
| Impacts to Wetlands (acres) | 0.07 | 0.00 | 0.07 | Roadwork (miles) | 0.2 | 1.1 | 0.2 |
| FEMA Floodplain Crossings | 0 | 0 | 0 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 41.90 | 38.45 | 41.90 | | | | |
| Forested uplands (acres) | 21.61 | 20.16 | 21.61 | Rail and Road Construction Cost (millions $) | $50.00 | $53.60 | $50.00 |
| Hazardous Materials Sites | 1 | 2 | 1 | Utility Relocation Cost (millions $) | $0.90 | $0.34 | $0.90 |
| Residential Relocations | 3 | 2 | 3 | Right-of-Way Cost (millions $) | $2.96 | $2.52 | $2.96 |
| Business Relocations | 0 | 0 | 0 | **TOTAL COSTS** (millions $) | $53.86 | $56.46 | $53.86 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 25 | 25 | 25 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 5 | 10 | 5 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section U- Alternatives NC1, NC2, NC3 on Different Alignments

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION U | | | | SECTION U | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 8.88 | 8.89 | 8.88 |
| Number of Stream Crossings | 19 | 19 | 19 | Limiting Speed** | 85 | 80 | 85 |
| Impacts to Streams (linear feet) | 3,718 | 3,010 | 3,485 | Operability/Constructability*** | neutral | negative | neutral |
| Impacts to Wetlands (acres) | 0.25 | 0.21 | 0.20 | Roadwork (miles) | 4 | 4 | 4 |
| FEMA Floodplain Crossings | 1 | 1 | 1 | | | | |
| Federal/State Designated Rivers (crossings) | 1 | 1 | 1 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 87.20 | 84.56 | 86.01 | | | | |
| Forested uplands (acres) | 70.87 | 70.07 | 71.06 | Rail and Road Construction Cost (millions $) | $88.70 | $84.40 | $86.40 |
| Hazardous Materials Sites | 10 | 10 | 10 | Utility Relocation Cost (millions $) | $2.11 | $2.11 | $2.11 |
| Residential Relocations | 10 | 8 | 10 | Right-of-Way Cost (millions $) | $26.25 | $24.61 | $25.76 |
| Business Relocations | 17 | 17 | 16 | **TOTAL COSTS** (millions $) | $117.06 | $111.12 | $114.27 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 159 | 161 | 159 | | | | |
| Noise (Severely Impacted Receptors) | 17 | 17 | 17 | | | | |
| Vibration (Impacted Structures) | 45 | 45 | 45 | | | | |
| Section 4(f) Uses- Historic * | 1 | 1 | 1 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Parks * | 0 | 0 | 0 | | | | |
| Section 106 Adverse Effects * | 1 | 1 | 1 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).

## Table ES-23
## Section V- Alternatives NC1, NC2, NC3 on Different Alignments

| Summary of Potential Human and Natural Impacts By Section | | | | Summary of Operational & Physical Characteristics By Section | | | |
|---|---|---|---|---|---|---|---|
| | SECTION V | | | | SECTION V | | |
| Topic | NC1 | NC2 | NC3 | Topic | NC1 | NC2 | NC3 |
| Federally Listed T&E Species Impacted | 0 | 0 | 0 | Mainline Track Length (miles) | 9.89 | 9.91 | 9.97 |
| Number of Stream Crossings | 16 | 16 | 15 | Limiting Speed** | 45 | 45 | 45 |
| Impacts to Streams (linear feet) | 1,105 | 1,107 | 1,182 | Operability/Constructability*** | negative | negative | positive |
| Impacts to Wetlands (acres) | 0.06 | 0.06 | 0.05 | Roadwork (miles) | 3 | 3.1 | 2.7 |
| FEMA Floodplain Crossings | 4 | 4 | 3 | | | | |
| Federal/State Designated Rivers (crossings) | 0 | 0 | 0 | | | | |
| Impacts to Prime and Other Important Farmland (acres) | 25.80 | 25.80 | 25.80 | | | | |
| Forested uplands (acres) | 16.92 | 16.92 | 17.04 | Rail and Road Construction Cost (millions $) | $148.20 | $149.40 | $157.50 |
| Hazardous Materials Sites | 76 | 58 | 58 | Utility Relocation Cost (millions $) | $2.64 | $2.64 | $2.45 |
| Residential Relocations | 0 | 1 | 0 | Right-of-Way Cost (millions $) | $53.34 | $56.47 | $90.24 |
| Business Relocations | 23 | 20 | 54 | **TOTAL COSTS** (millions $) | $204.18 | $208.51 | $250.19 |
| Public Schools Impacted | 0 | 0 | 0 | | | | |
| Noise (Impacted Receptors) | 92 | 92 | 92 | | | | |
| Noise (Severely Impacted Receptors) | 0 | 0 | 0 | | | | |
| Vibration (Impacted Structures) | 48 | 48 | 48 | | | | |
| Section 4(f) Uses- Historic * | 3 | 3 | 2 | | | | |
| Section 4(f) Uses- Parks * | 0 | 0 | 0 | | | | |
| Section 4(f) De Minimis- Historic * | 2 | 2 | 3 | | | | |
| Section 4(f) De Minimis- Parks * | 1 | 1 | 1 | | | | |
| Section 106 Adverse Effects * | 3 | 3 | 2 | | | | |

* Note that several resources protected under Section 106 and/or Section 4(f) span one or more project sections; impacts are reported for each project section. Therefore, the total number of impacts reported across all sections exceeds the total number of protected resources described in Chapter 3 and Chapter 5.

** Limiting Speed is the maximum train speed through the most restrictive curve within the section based on current design assumptions; average running speed through the section would be greater.

*** Positive-negative-neutral denotes significant differences in operability or constructability between the alternatives (see Section 2.2.1.3 for more details).