4 ENVIRONMENTAL CONSEQUENCES

The discussion on environmental consequences summarizes the potential effects on the human, physical, and natural environments that may result from the construction and operation of the Southeast High Speed Rail (SEHSR) project. The existing environment within the project study area was described in Chapter 3. The impacts presented here are based on the proposed preliminary engineering designs for the rail and roadway alignments.

Impacts are identified for each of the three alternative alignments within each of the 26 sections of the project. As discussed in Section 2.2, the endpoints of the 26 sections are in locations where the alternative alignments are in a common location. Therefore, alternatives can be evaluated section by section, with a preferred alternative selected for each section. These will be joined together to determine the "best-fit" preferred alternative for the entire study corridor.

It should be noted that all persons, business, and non-profit organizations displaced as a result of the project would be compensated in a fair and equitable manner in accordance with the Uniform Relocation Assistance and Property Acquisition Policies Act of 1970, as amended, and the North Carolina Relocation Assistance Act (GS-133-5 through 133-18).

4.1 Water Resources

Potential project impacts to streams, wetlands, and other jurisdictional waters are discussed in the following sections, followed by discussion of potential permits required. Clean Water Act Waters of the US, Clean Water Act Permits, Construction Moratoria, Chesapeake Bay Preservation Act regulations, North Carolina River Basin Buffer Rules, and Rivers and Harbors Act Section 10 Navigable Waters are addressed. Stormwater, floodplain, and wild and scenic river impacts are also discussed. Avoidance and minimization of impacts to these resources, and mitigation for unavoidable impacts to wetlands and streams are addressed in Sections 4.1.5 and 4.1.6.

4.1.1 Surface Waters

Impacts to the surface waters described in Section 3.1.1 are likely to result from activities associated with project construction, such as clearing and grubbing on streambanks, riparian canopy removal, in-stream construction, extending or replacing existing pipes and culverts, bridge construction, fertilizer and pesticide application during re-vegetation, and railroad installation.

Erosion associated with construction activities can be 200 times greater than that from cropland and 2,000 times greater than that naturally occurring in woodlands. The majority of the study corridor is located in woodland areas. Erosion problems associated with construction activities include water pollution, flooding, stream channel damage, decreased groundwater storage, slope failures, damage to adjacent and/or downstream properties, and the time and costs associated with addressing these issues.

The following impacts to surface water resources could potentially result from project construction activities:

- Changes in light incidence and water clarity due to forest clearing, necessary for the maintenance of the corridor

- Changes in and destabilization of water temperature due to increased light incidence from vegetation removal

- Increased sedimentation as a result of vegetation removal primarily from access roads and skid trails

- Increased sedimentation from erosion in the project area associated with grading new alignments and repairing old slopes on the existing rail corridor

- Alteration of water levels and flows due to interruptions and/or additions to surface and groundwater flow from construction

- Alteration of stream discharge due to silt loading and changes in surface and groundwater drainage patterns

- Channel alteration from stream crossings because culverts are often under or oversized causing destabilization of the stream channel morphology up and downstream

- Increased siltation downstream of the stream crossings as culverts are repaired or installed

- Increased nutrient loading during construction via runoff from exposed areas

- Increased potential for release of toxic compounds such as fuel and oil from construction equipment and other vehicles

Successful minimization of construction related impacts can be achieved by implementing erosion and sediment control (ESC) measures on construction sites to prevent soil movement/loss in the first place, enhance project aesthetics, reduce complaints, and most importantly, eliminate appreciable damage to off-site receiving channels, property and natural resources.

In order to minimize potential impacts to water resources in the project area, the most recent edition of Virginia Department of Conservation and Recreation's Erosion Sediment Control Handbook and North Carolina Department of Transportation's (NCDOT) Best Management Practices for the Protection of Surface Waters will need to be strictly enforced during the construction phase of the project.

Limiting in-stream activities and re-vegetating streambanks immediately following the completion of grading can further reduce impacts. In addition, whenever possible, bridges or bottomless culverts are recommended to maintain adequate fish passage and stream channel morphological integrity.

4.1.1.1 Streams

Jurisdictional streams in the study area have been designated as warm water streams for the purposes of stream mitigation. Potential project impacts range from 39,079 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 the James, Chowan, and Roanoke River Basins in Virginia are summarized by section for each alternative in Table 4-1.

Table 4-1
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		

Potential project impacts to streams in the James River basin are the same (9,557 linear feet) for each of the three Virginia alternatives. In the Chowan River Basin, potential impacts to jurisdictional stream channels would range from 14,689 linear feet to 16,592 linear feet depending on the combination of alternatives selected for each section. In the Roanoke River Basin, impacts would range from 3,059 linear feet to 5,014 linear feet depending on the combination of alternatives selected for each section.

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

Potential project impacts to streams in the Roanoke, Tar-Pamlico, and Neuse River Basins in North Carolina are summarized by section for each alternative in Table 4-2.

Table 4-2
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

Table 4-2 Potential Impacts to Jurisdictional Stream Channels in North Carolina (linear feet)				
Section	**River Basin**	**NC1**	**NC2**	**NC3**
N		41	41	41
O		53	53	53
P		777	777	777
Roanoke Min. / Max.:		2,236 / 3,764		
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		

Potential project impacts to streams in the Roanoke River Basin in North Carolina would range from 2,236 linear feet to 3,764 linear feet and would be minimized with selection of the NC2 project alternative for Section L and the NC1/NC3 project alternative for Section M (the impacts are the same in Sections N, O, and P).

In the Tar-Pamlico River Basin, potential impacts to streams would range from 5,331 linear feet to 9,212 linear feet, depending on the combination of alternatives selected. The greatest difference between alternatives in North Carolina occurs in the Tar-Pamlico River Basin in Section O. 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.

In the Neuse River Basin, potential stream impacts would range from 4,208 to 5,315 linear feet. The NC2 project alternative would result in minimum impacts for Sections T and U.

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. As discussed in Chapter 4.14.3.1, the three proposed rail alternatives are on common alignment at the crossings of these rivers and major creeks (Cedar Creek and Crabtree Creek in North Carolina).

4.1.1.2 Riparian Areas and Other Jurisdictional Waters

Within Tidewater Virginia, the Chesapeake Bay Preservation Act (CBPA) regulates Chesapeake Bay Preservation Areas that include land areas adjacent to water bodies. Within the project area, the cities of Richmond, Colonial Heights, and Petersburg, as well as Chesterfield County, are subject to the CBPA. Chapter 20 Section 9VAC 10-20-150 of the CBPA, “Nonconformities, exemptions, and exceptions,” excludes public utilities, railroads, public roads, and facilities from the requirements of the CBPA. The SEHSR

project is subject to this exemption, provided that the project and related construction activities follow local, state, and federal water quality regulations. The SEHSR project is committed to complying with all applicable water quality regulations and permit requirements, as well as to minimizing all impacts to water quality as designs are finalized. This includes complying with the Virginia Erosion and Sediment Control Law and the Virginia Stormwater Management Act.

Streamside riparian zones within the study area in North Carolina are protected under provisions of the Tar-Pamlico and the Neuse River Basin Riparian Buffer Rules administered by the North Carolina Division of Water Quality (NCDWQ). The rules protect two riparian zones: Zone 1 extends 30 feet from stream bank and Zone 2 extends from 30 to 50 feet from the stream bank. Table 4-3 summarizes the potential impacts (in square feet) to each riparian buffer zone by project alternative for each section of the project in the Tar-Pamlico and Neuse River Basins.

Table 4-3
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					

The Tar-Pamlico and Neuse River Basin Riparian Buffer Rules provide that:

- Railroad crossings that impact equal to or less than 40 linear feet of riparian buffer are exempt.

- Railroad crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre (14,520 square feet) of riparian buffer are allowable provided that there are no practicable alternatives.

- Railroad crossings that impact greater than 150 linear feet or one-third of an acre of riparian buffer will require mitigation.

Based on the buffer impacts listed in Table 4-3, as well as the linear footages of the corresponding stream impacts (from Table 4-1 and Table 4-2), mitigation will be required for impacts to riparian buffers at each stream crossing. Mitigation for impacted riparian buffers, where required, will be coordinated directly with NCDWQ.

Potential project impacts to other jurisdictional waters (such as lakes, ponds, and reservoirs) would range from 3.08 acres to 7.51 acres depending on the combination of

alternatives selected. Potential project impacts (in acres) to other waters in the Chowan and Roanoke River Basins in Virginia are summarized by section for each project alternative in Table 4-4.

Table 4-4
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 the VA1 project alternative would result in the least impacts to other waters in Virginia for Section DD, with the VA1/VA3 project alternative having least impacts for Sections A and D. The VA2 project alternative would have no impacts for Section L in the Roanoke River Basin.

Potential project impacts (in acres) to other waters in the Roanoke, Tar-Pamlico, and Neuse River Basins in North Carolina are summarized by section for each alternative in Table 4-5.

Table 4-5
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 the NC2 project alternative would have the least impacts to other waters in North Carolina for Sections L and U. Selection of the NC3 project alternative for Section O would result in no impacts for this section, as would the NC1/NC3 project alternative for Section T.

4.1.1.3 Stormwater/Drainage

Increased stormwater runoff from project development can impact stream channel networks and land surfaces through two means: longer-term impacts caused by runoff from increased impervious surface and short-term impacts caused by land disturbance

during construction. These separate impacts are discussed in this section, followed by ways to mitigate them.

The project would increase the amount of impervious surface in the watersheds, which can cause increased stormwater runoff. Stormwater runoff from roadways carries substantial quantities of silt, heavy metals, petroleum products, nitrogen, and phosphorus. These materials can potentially degrade water quality and aquatic habitat integrity. The effects on water quality depend on the size of the waterways crossed and the number of such crossings. In general, additional road runoff as a result of this project will be minimal because the increases in impervious surface are small. Streams with low flow are more severely affected since they have less volume to dilute the runoff.

Stormwater runoff from railways is less pronounced than that from roadways because much of the rail corridor is permeable to rainfall (i.e., ballast and side slopes). However, some runoff will collect in ditches adjacent to the rail corridor. This runoff may carry similar pollutants to and have similar impacts to surface waters as runoff from roadways.

Short-term impacts on water quality within the project study area may result from soil erosion and sedimentation due to land-disturbing activities during construction. Land-disturbing activities include construction of the tracks, bridges, communication facilities, and other related structures and facilities of the railroad, including road crossings and alterations, as well as clearing of right of way (ROW), staging areas, access roads, and borrow/spoil areas. Construction-related impacts are likely to be similar for road and rail. Uncontrolled erosion and sedimentation can potentially destroy aquatic algae, eliminate benthic macroinvertebrate habitat, eradicate fish spawning habitat, and remove food resources for many stream species.

The project will be designed and constructed to meet all current federal, state, and local requirements for water quality and stormwater management. These requirements include permits, plans, and temporary best management practices (BMPs) to manage stormwater runoff during construction, as well as design criteria for permanent rail and road runoff control and treatment measures. Temporary construction impacts due to erosion and sedimentation would be minimized through implementation of stringent erosion control practices and use of BMPs. The regulations and their requirements are discussed below for both Virginia and North Carolina.

Long-term impacts on water quality are also possible due to particulates, heavy metals, organic matter, pesticides, herbicides, nutrients, and bacteria that are often found in highway and railway runoff.

The following mitigation measures to eliminate or reduce short-term and long-term water quality impacts would be incorporated wherever practicable:

- Development of roadway and railway alignments that avoid streams and ponds to the extent possible

- Use of design measures to protect water quality, including avoiding stormwater discharge into public water supplies, minimizing stream crossings, and minimizing segments of roadway or railway that closely parallels streams

- Use of grass shoulders, grass lined ditches, and vegetative buffers to intercept highway/railway runoff
- Implementation of construction practices that protect stream bottom habitat from siltation by sedimentation control, retention of riparian vegetation buffers, and restoration of stream bottom habitat taken by construction
- Countersink culverts to allow unimpeded passage by fish and other aquatic organisms
- Avoid installation of bridge bents in creeks
- Avoid placing sediment and erosion control measures in wetlands or streams
- Restricting the use of scuppers (bridge deck drains) in bridges.

4.1.2 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 the James, Chowan, and Roanoke River Basins in Virginia are summarized by section for each project alternative in Table 4-6.

Table 4-6
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; however, the VA2 project alternative would result in most impacts for Sections D, E, and G. The VA2 project alternative would result in

no impacts for Section I within the Roanoke River Basin of Virginia, but most impacts for Sections J and K in North Carolina.

Potential project impacts to wetlands (in acres) in the Roanoke, Tar-Pamlico, and Neuse River Basins in North Carolina are summarized by section for each alternative in Table 4-7.

Table 4-7
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.

4.1.3 Floodplains and Floodways

This section discusses the potential for floodplain impacts along the SEHSR corridor. Floodplain areas were defined in Section 3.1.1 and shown in Figures 3-2 and 3-3. Data from Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were analyzed and the FEMA zone designations were determined for the 100-year FEMA floodplains crossed by the high speed rail corridor. The three SEHSR alignment alternatives were reviewed to determine the number of times each might encroach on a FEMA floodplain within each section of the project. Specific designs (i.e., including elevations) in each case were not considered, only whether the ROW for the alternative crosses a FEMA designated floodplain. Also, the analysis considered whether the floodplain crossing was at grade or over a structure that would minimally contact the floodplain (e.g., a wide span bridge).

Table 4-8 lists the number of FEMA floodplain crossings tabulated by section and alternative. The number of floodplain crossings was similar for the three alternatives within all project sections.

Reviewing the impacts at each crossing allows for determination of specific acreages of potential impact. This will be completed for the preferred alternative in the final environmental impact statement (FEIS). Some of the structures may have piers on the floodplain. Placement of the structure piers will not be decided until final design so it is not possible to assess the floodplain impact of piers at this stage. These floodplain crossings will be re-examined once the final designs have been completed.

Mitigation includes designing the proposed floodplain crossing to minimize or eliminate an increase in the base flood elevation. Mitigation measures include right angle crossings and typical section reductions.

The SEHSR will coordinate with FEMA and local authorities in the final design to ensure compliance with applicable floodplain management ordinances. Also, the NCDOT Hydraulics Unit and Virginia Department of Rail and Public Transportation (DRPT) will coordinate with FEMA to determine if a Conditional Letter of Map Revision (CLOMR) and a subsequent final Letter of Map Revision (LOMR) are required for the project.

Table 4-8
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
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

4.1.4 Wild and Scenic Rivers

As stated in Section 3.1.4, there are four rivers in the study area designated as Virginia Scenic Rivers: the James River, Nottoway River, Appomattox River, and Meherrin River. The Nottaway River and Meherrin Rivers are listed in the Nationwide Rivers Inventory (NRI) (see Table 3-5). In North Carolina, the Tar River is listed on the NRI through the project area. For all of the proposed crossings, the project alternatives cross the listed rivers on common alignments, and the river will be spanned by a bridge.

In Virginia, the alternatives would cross the James River on a new single track bridge adjacent to the existing single track bridge. At the Appomattox River, a new parallel single track bridge is proposed for high speed passenger trains, located to the east of the existing single track bridge. The project alternatives propose to utilize the existing bridge piers and substructure of the bridges at the Nottaway and Meherrin Rivers. The superstructure (girders, decking and track) would be replaced at the Nottoway River, while the existing girders and decking would be retained at the Meherrin River. There is no conflict with the Wild and Scenic Rivers Act of 1968; however, coordination with the Virginia Scenic Rivers Board will be required to comply with the Virginia Scenic Rivers Act of 1970 for the new structures on the James and Appomattox Rivers.

In North Carolina, the Tar River would be crossed on the existing single track bridge. The substructure would be utilized, as well as the superstructure (girders and decking).

4.1.5 Permits

A discussion of permitting requirements for impacts to wetlands and surface waters is provided below, and is followed by a discussion of permitting requirements for waters over which the US Coast Guard has jurisdiction. As discussed in Section 4.1.1, the SEHSR project is exempt from the CBPA, provided that the project complies with all applicable local, state, and federal water quality regulations and permit requirements.

4.1.5.1 Section 404/401 Permits

Wetlands and surface waters fall under the broad category of "Waters of the United States" as defined in 33 CFR 328.3 and in accordance with provisions of Section 404 of the Clean Water Act (CWA) (33 USC 1344). These waters are regulated by the US Army Corps of Engineers (USACE). Any action that proposes to dredge or place fill material into surface waters or wetlands is subject to these provisions.

The USACE issues either general or individual permits. An individual permit (IP) is generally reserved for projects with potential for substantial environmental impacts. An IP requires a full public interest review, including public notices and coordination with involved agencies, interested parties, and the general public. A general permit, either through the Nationwide Permit and the Regional General Permit programs, is reserved for only the most minor impacts to streams, wetlands, and other waters. An IP is required for impacts greater than 1/2-acre of wetlands and/or 300 linear feet streams. Impacts to jurisdictional wetlands and perennial streambed or important intermittent streambed that result from activities authorized under an IP require compensatory mitigation.

Due to the placement of fill associated with crossing over and filling in of jurisdictional waters (i.e., wetlands and surface waters), it will be necessary to obtain permits for the

SEHSR project from the USACE, Virginia Department of Environmental Quality (VDEQ), and NCDWQ. A final permitting strategy cannot be developed until an alignment footprint has been determined and construction impacts are quantified. Section 401 of the CWA requires each state to certify that state water quality standards will not be violated for activities that either involve issuance of a federal permit or license, or require discharges to waters of the United States. The USACE cannot issue a Section 404 permit until a Section 401 certification is issued. Therefore, the SEHSR project must apply to VDEQ and NCDWQ for Section 401 Water Quality Certification as part of the permit process. Based on the assessments summarized in Sections 4.1.1 and 4.1.2, it is likely that a Section 404 IP requiring mitigation will be required for the SEHSR project. Temporary activities such as stream dewatering, work bridges, or temporary causeways that are often used during bridge construction or rehabilitation should also be included in the permit application. The USACE will determine what permit(s) will be required to authorize project construction.

In Virginia, the SEHSR project would complete a Joint Permit Application to apply for a Section 404 permit, Section 401 certification, and a subaqueous permit from the Virginia Marine Resources Commission (VMRC). The subaqueous permit is needed to encroach upon or over bottomlands under VMRC jurisdiction, which include submerged lands (beds of lakes, rivers, and streams) including non-tidal, perennial tributaries draining five square miles or greater. To issue the permit, the VMRC must determine that the project is necessary, that there are no reasonable alternatives requiring less environmental disruption, and that adverse effects do not unreasonably interfere with other private and public rights to the use of waterways and bottomlands.

The Virginia Coastal Zone Management Program was established in 1986 to protect and manage Virginia's coastal areas. This program is part of national coastal preservation effort authorized under the Coastal Zone Management Act of 1972. Virginia's Coastal Zone Management area consists mostly of Tidewater Virginia as defined by the Code of Virginia §28.2-100. In particular, several localities within the study area are within Virginia's coastal zone, including; City of Richmond, Chesterfield County, City of Colonial Heights and City of Petersburg. As a result, final design plans for the SEHSR will be subject to a Federal Consistency Review, which outlines any affects to the land, water, or natural resources within Virginia's coastal zone. Regulations pertaining to the Chesapeake Bay Preservation Act are discussed in Section 4.1.1.2.

4.1.5.2 Stormwater Permits

Since the SEHSR project would disturb more than 10,000 square feet, it must obtain a Virginia Stormwater Management Program (VSMP) general National Pollutant Discharge Elimination System (NPDES) permit through the Virginia Department of Conservation and Recreation (VDCR). A site-specific Stormwater Pollution Prevention Plan (SWPPP) will need to be prepared and implemented. The SWPPP outlines the steps and techniques the operator will take to comply with the terms and conditions of the permit, including water quality and quantity requirements that are consistent with the VSMP permit regulations, to reduce pollutants in the stormwater runoff from the construction site. The SWPPP also includes a description of post development stormwater management measures to be installed, including design calculations.

In North Carolina, the SEHSR may also need to obtain an NPDES permit from NCDWQ. Although NCDOT has a statewide NPDES permit for roads, the railroad portion of the

project is potentially subject to NPDES permitting within urban areas. NCDWQ will determine if such a permit is required. The requirements for this permit include public education, illicit discharge identification, and post-construction stormwater management.

In North Carolina, a sediment and erosion control permit also must be obtained from the NC Division of Land Quality. The SEHSR project would implement the appropriate sediment and erosion control measures as detailed in the most recent version of the North Carolina Erosion and Sediment Control Planning and Design Manual. During final design of the preferred alternative, the SEHSR project would investigate and implement appropriate stormwater treatment measures as detailed in the most recent version of NCDWQ Stormwater Best Management Practices Manual, which may include grassed swale treatment, preformed scour holes, other energy dissipater devices, stormwater detention basins, pipe-end treatments, and level spreaders to the extent practicable. In addition, the SEHSR project would develop a stormwater management plan and obtain a State Stormwater Permit prior to construction.

The contractor(s) constructing the project would also be required to follow contract specifications pertaining to erosion control measures (as outlined in 23 CFR Part 650, Subpart B and Article 107-13) entitled Control of Erosion, Siltation, and Pollution. These measures include the following:

- Use of dikes, berms, silt basins, and other containment measures to control runoff during construction. Regular maintenance and inspection of these structures is recommended to insure effectiveness.

- Elimination of construction staging areas in floodplains or adjacent to streams and tributaries to help reduce the potential for petroleum contamination or discharges of other hazardous materials into receiving waters.

- Rapid re-seeding of disturbed sites to help alleviate sediment loading and reduce runoff. Increased runoff from new highway surfaces can be partially mitigated by providing for grassed road shoulders and limited use of ditching.

- Careful management and use of herbicides, pesticides, de-icing compounds, or other chemical constituents to minimize potential negative impacts on water quality. Roadside maintenance crews should be well versed in the use of these chemicals.

- Avoidance of direct discharges into streams whenever feasible. Runoff effluent should be allowed to filter through roadside vegetation in order to remove contaminants and to minimize runoff velocities.

4.1.5.3 US Coast Guard Permits

A US Coast Guard (USCG) permit will be required for the SEHSR crossing of the James River near I-95 in Richmond, VA, which is subject to tidal influence. Permits are not required for the crossings of the Appomattox River, Nottoway River, Meherrin River, Neuse River, or Tar River because these waterways are not subject to tidal influence nor are they used for interstate commerce (see Section 3.1.5). In addition, a permit is not required for the crossing of Lake Gaston because the project would use the existing bridge

piers; work would involve upgrading the deck of the bridge to the SEHSR design standards.

The SEHSR alternatives are concurrent at the crossing of the James River. The VA1, VA2, and VA3 project alternatives would all construct a new rail bridge immediately adjacent to the existing rail bridge located between the South 14th Street and I-95 roadway bridges in Richmond, VA. The new bridge will provide an additional track that is necessary to accommodate the high speed trains associated with the SEHSR project. The bridge would provide approximately the same vertical and horizontal clearance for boats that the existing bridge provides (within one to two feet, depending on the deck material). The existing bridge is at an elevation of 26.3 feet above the average water surface.

The bridge permit will be prepared as the bridge design is developed, and a more detailed discussion of bridge permits will be included in the FEIS. Coordination with the USCG has been initiated and will continue throughout the development of the project.

4.1.6 Avoidance, Minimization, and Mitigation Evaluation

Mitigation is defined in National Environmental Policy Act (NEPA) regulations (40 CFR Section 1508.20 and 40 CFR Part 230) as efforts that a) avoid, b) minimize, c) rectify, d) reduce or eliminate, or e) compensate for adverse impacts to the environment. Mitigation of wetland impacts is recommended in accordance with CWA Section 404(b)(1) Guidelines (40 CFR Part 230), mitigation policy mandates articulated in the USACE/ USEPA Memorandum of Agreement (MOA; Page and Wilcher 1990), Executive Order 11990 (42 FR 26961 [1977]), US Fish and Wildlife Service (USFWS) mitigation policy directives (46 FR 7644-7663 [1981]), and the USACE/USEPA New Mitigation Rule (Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR Parts 325 and 332 and 40 CFR Part 230, effective on June 6, 2008).

Section 404(b)(1) Guidelines, the USACE/USEPA MOA, and Executive Order 11990 stress avoidance and minimization as primary considerations for protection of Waters of the US. These efforts, and other measures that may be implemented later in the design process in consultation with the USACE, are described below.

4.1.6.1 Avoidance and Minimization

During the development of the preliminary engineering designs for each SEHSR project alternative, efforts were made to avoid and minimize impacts to wetlands and streams wherever practicable. Where stream crossings were unavoidable, they were located, within design constraints, as perpendicular as practicable, in order to minimize the length of stream impacted.

4.1.6.2 Other Avoidance and Minimization Measures

Jurisdictional impacts could be further minimized by reducing, where applicable, fill slopes at stream and wetland crossings. Conservative use of culverts and sensitive placement of drainage structures would minimize degradation of water quality and reduce adverse impacts on aquatic habitat viability in streams and tributaries. These measures, including a review of recommended bridges and culverts, will be evaluated in detail during design of

the preferred alternative as part of the FEIS process in consultation with the USACE. The results of this evaluation will be documented in the FEIS.

4.1.6.3 Compensatory Mitigation

The purpose of compensatory mitigation is to replace the lost functions and values from the impact of a project to Waters of the US. Mitigation could include restoration, creation, enhancement, or preservation of wetlands and streams. The amount of mitigation required is determined on a case-by-case basis. Typical mitigation ratios (amount of mitigation required compared to amount impacted) for wetland mitigation are 2:1 for restoration (meaning 2 acres must be restored for every 1 acre impacted), 3:1 for creation, 4:1 for enhancement, and 10:1 for preservation. Typical ratios for stream mitigation are 2:1 (2 feet of mitigation for every 1 foot impacted) for restoration, 4:1 for enhancement, and 10:1 for preservation.

Compensatory mitigation would be accomplished separately for the Virginia and North Carolina portions of the project according to 33 CFR Parts 325 and 332. This rule creates a flexible preference for the use of mitigation bank credits to satisfy requirements for mitigation, since banks can help reduce many of the risks and uncertainties associated with compensatory mitigation. The watershed approach to mitigation also provides for application of in-lieu fee programs and permittee-responsible mitigation.

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) within the same HU as the potential impacts to jurisdiction waters occur. The USACE, NCDOT, and NC Department of Environment and Natural Resources entered into a Memorandum of Agreement (MOA) 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.

4.2 Topography, Geology, and Soils

4.2.1 Topography

Due to the close proximity of the three project alternatives, the differences in topography are negligible. Therefore, the minor differences in existing topography between the alternatives will not change the type and frequency of impacts.

4.2.2 Geology

There is little difference in the geology along the three project alternatives through the project study area. All alternatives pass through coastal plain sediments in Richmond, VA, and Piedmont igneous and metamorphic complexes from Petersburg, VA, through Raleigh, NC, with some isolated areas of sedimentary rock.

Within a specific section of the project, soil and subsurface geology may influence the levels of ground-borne vibration, especially the stiffness and internal damping of the soil and the depth to bedrock (Federal Transit Administration, 2006). See Section 4.7 for more information on specific vibration impacts.

4.2.3 Soils

There is little difference in soil types between the project alternatives. The soils in the project area will affect the constructability of the various project sections. Soil drainage characteristics, shrink-swell potential, and erodibility vary depending on soil types. Generally, well drained soils with low shrink swell potential and low erodibility are best suited for rail transport.

4.3 Prime and Other Important Farmlands

As stated in Section 3.3 and shown in Table 3.7, there are substantial Prime and Important Farmlands as well as farmlands of statewide and local importance in the SEHSR study area. As required by the Farmland Protection Policy Act (FPPA) of 1981 (7 U.S.C. 4202(a)) and North Carolina 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. This coordination effort served as the basis for determining the farmland impacts of the project alternatives. The NRCS responded by completing their portions of this form and providing a relative value of farmland that may be affected (converted) by the proposed project. Land that was owned by CSX railroad prior to 1981 is exempt from consideration as prime or important farmland, as defined by the regulation.

The NRCS assigns ratings to potential farmland impacts in order to determine the level of significance of these impacts. The ratings are comprised of two parts. The Land Evaluation Criterion Value represents the relative value of the farmland to be converted and is determined by the NRCS on a scale from 0 to 100 points. The Corridor Assessment, which is rated on a sale of 0 to 160 points, evaluates farmland soil based on its use in relation to the other land uses and resources in the immediate area. The two ratings are combined for a possible total rating of up to 260 points. Sites receiving a total score of less than 160 should

be given a minimal level of protection, and sites receiving a total score of 160 or more are given increasingly higher levels of consideration for protection (7 CFR Section 658.4).

Completed AD-1006 Farmland Conversion Rating Forms for each section and county in the project study area are provided in Appendix E. Farmland ratings are not required for areas designated as urban. Based on 2000 Census data, there are two urban areas in the SESHR study area: Richmond, VA (which includes Richmond, Colonial Heights, and Petersburg) and Raleigh, NC (which includes Raleigh, Wake Forest, and Youngsville). There is one urban cluster (Henderson, NC).

For SEHSR project Sections AA through C, the NRCS did not provide the Land Evaluation Criterion Values requested by the project in September 2009. The 45-day review period passed; therefore, it is presumed that no mitigation is required for farmland losses in these sections. The NRCS provided the values for the remainder of the project study area. Based on the completed forms, none of the proposed Detailed Study Alternatives resulted in an average site assessment score greater than 160 points (Table 4-9). Therefore, in accordance with the FPPA, no compensation for farmland loss is required for the project.

The amount of Prime and State Important Farmland converted will vary slightly for each section, depending on the Detailed Study Alternative selected. Sections C, L (NC), M, O and P have the highest amount of Prime Farmland impacts, while Sections BB, K, and L (VA) have the least amount of Prime Farmland impacts.

Table 4-9
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

Table 4-9 Prime and Other Important Farmland Acres Impacted by Section			
Section	**Prime / Statewide**	**Prime / Statewide**	**Prime / Statewide**
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

4.4 Mineral Resources

As stated in Section 3.4, the main non-fuel resources in Virginia and North Carolina are crushed stone, sand and gravel, and lime. The project alternatives pass over areas that contain bedrock as well as sand and gravel resources; however, there are only seven mine sites in the project study area:

- Carter Sand and Gravel Company, located in Richmond, VA (listed as past producer)
- McGowan Quarry, located in Richmond, VA (listed as past producer)
- Rawlings Quarry, located in Brunswick County, VA (listed as past producer)
- Vulcan-Greystone Quarry, located in Vance County, NC
- Franklin Quarry, located in Franklin County, NC
- Raleigh Quarry, located in Wake County, NC
- Rowland Mine in Wake County, NC (listed as past producer) (USGS, 2008)

Of these sites, five are in areas where rail alternatives remain within existing railroad ROW, and where there would be no direct impacts from proposed rail or roadway designs:

- Carter Sand and Gravel Company, located in Richmond, VA
- McGowan Quarry, located in Richmond, VA
- Franklin Quarry, located in Franklin County, NC
- Raleigh Quarry, located in Wake County, NC
- Rowland Mine in Wake County, NC

There is a separation between the VA1/VA3 and VA2 project alternatives in the area of the Rawlings Quarry. However, there is no active mine pit, so no impacts are anticipated.

At the Vulcan-Greystone Quarry, all three alternatives are on common alignment. A road realignment associated with the project would require the acquisition of mine ROW. However, the realigned road would be relocated further away from the current pit, so there should be no impacts to mine operations.

4.5 Hazardous Material

As stated in Section 3.5 and listed in Appendix J, there are a number of hazardous waste sites in the project study area, particularly in the urban areas of Virginia and North Carolina. These sites were located based on data in publicly available databases that have varying degrees of data quality. 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.

During the impact assessment, if a construction alternative crossed any part of a parcel listed in the hazardous waste summary, it was counted as a potentially impacted site. This allowed for a conservative, defensible assessment of potential impacts. Potential impacts to hazardous waste sites are included in Table 4-10. This project would not impact Superfund sites in Virginia or North Carolina. There is one Resource Conservation and Recovery Act (RCRA) Corrective Action Facility site, in Virginia. This site, the First Energy Corporation (FEC) Bioremediation Facility, is located in Section AA and is impacted by all three build alternatives. There is one polychlorinated biphenyl (PCB) site, in North Carolina. This site, owned by the Town of Wake Forest, is located in Section U and is impacted by all three project alternatives.

If any potential hazardous waste sites cannot be avoided as the preferred alternative is designed and avoidance and minimization steps are undertaken, further assessments of the properties will be conducted. The results of these assessments will be reported in the FEIS. These assessments will evaluate the properties for specific types and amounts of hazardous materials and will include ROW acquisition recommendations. Based on current knowledge, it is not expected that any of these sites would preclude the construction of any of the project alternatives.

Table 4-10
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

Table 4-10 Hazardous Waste Sites by Section			
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

4.6 Air Quality

This section analyzes criteria pollutant air emissions associated with the proposed railroad engine operations and affected (i.e., diverted) motor vehicles. While mobile source air toxics (MSATs) are not a criteria pollutant nor subject to conformity requirements, they are also considered in this section in accordance with USEPA guidance. Potential air quality impacts of the proposed SEHSR project include:

- Changes in rail-related emissions due to an increase in train operations each day and a change in equipment
- Changes in the overall regional emissions
- Changes in local (microscale) emissions, including changes at various crossings that could handle additional traffic due to nearby highway-railroad crossing closures, and changes in vehicular delay due to increased traffic resulting from increased ridership

The analysis guidance was provided by the Federal Railroad Administration (FRA), Federal Highway Administration (FHWA), NCDOT, Virginia Department of Transportation (VDOT), and US Environmental Protection Agency (USEPA). Model data sources for the project level analysis in Virginia included VDOT and project traffic data. Model data sources for the project level analysis in North Carolina included NCDOT, NCDENR (Division of Air Quality) Capital Area Metropolitan Planning Area (CAMPO), Triangle Air Quality Partnership (air quality conformity documents), and project traffic data.

4.6.1 Locomotive Operations - CO, NOx, HC, and PM

Locomotive operations are subject to federal air quality conformity regulations (40 CFR 51.853). In 2008, USEPA proposed a comprehensive program to dramatically reduce emissions from locomotives, including line-haul, switch, and passenger engines (see 73 Federal Register 25097 (May 6, 2008) and 40 CFR Parts 9, 85, et al.). The program establishes emission standards with applicability dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) applies to most locomotives originally

manufactured before 2001. The most stringent set of standards (Tier 4) applies to locomotives originally manufactured in 2015 and later.

Locomotives contribute to air pollution by generating notable emissions of fine particulate matter ($PM_{2.5}$) and nitrogen oxides (NO_X). USEPA estimates that by using the new standards to control the exhaust emission standards and idle reduction requirements of diesel locomotives of all types (line-haul, switch, and passenger), that PM reductions of 90 percent and NO_X reductions of 80 percent would be possible by the year 2030, as compared to the engine emissions that would be encountered under the previous guidance.

To advance this goal, Motive Power (located in Boise, ID) designed and developed the MP40 locomotive, which is anticipated to be used for SEHSR service and, therefore, was used for the SEHSR corridor air quality analysis. With improved fuel efficiency, a diesel oxidation catalyst, and a diesel particulate filter, this locomotive provides the advanced emissions reduction technology currently required to be Tier 2 compliant and the company estimates that their engines will be Tier 3 compliant by either 2014 or 2015.

Tier 2 emission rates for this locomotive are assumed to be the following (in grams/brake horsepower-hour) as referenced in the Federal Register listed above.

- CO - 1.5*
- PM - 0.2
- NO_X - 5.5
- HC - 0.3

*USEPA did not propose new standards for CO. Emissions of CO are relatively low in diesel engines compared to non-diesel pollution sources. Locomotives are already subject to relatively stringent CO standards in Tier 2 compared to the former heavy-duty highway diesel engine CO standard of 15.5. Additionally, even though USEPA did not set more stringent standards for CO (for Tier 4), note that after-treatment devices using precious metal catalysts projected to be employed to meet Tier 4 PM, NOX and HC standards will provide meaningful reductions in CO emissions as well.

Based on the above calculations, the emission rates are expressed as grams emitted per gallon of fuel consumed by multiplying the Tier 2 emission rates by a conversion factor. USEPA has estimated the appropriate conversion factor to be 20.8 bhp-hr/gal (USEPA Technical Highlights: Emission Factors for Locomotives USEPA420-F-97-051, December, 1997). These converted emission factors (in grams/gallon) are shown here:

- CO - 31.20
- PM - 4.16
- NO_X - 114.40
- HC - 6.24

The next step in developing air quality impacts is to estimate the amount of fuel that the diesel engines will consume. At a conservative Notch 6 throttle setting, the fuel consumption rate is approximately 146.5 gallons/hr. This is based on Motive Power, Inc., fuel consumption measured at their Federal Test Procedures (FTP) emissions test facility in Boise, ID. Therefore, for an approximate 2-hour trip for the SEHSR, the total fuel consumed during a one-way trip is 293 gallons and 586 gallons for a round trip. Currently, the SEHSR trains are estimated to complete four round trips a day between Richmond, VA, and Raleigh, NC.

Table 4-11 presents calculated emissions for CO, NO_X, PM, and HC for SEHSR locomotive emissions in the Raleigh-Richmond corridor based on the collected data.

Table 4-11
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

Note that the above emissions are conservative because of the Notch 6 setting and that actual pollutant emission rates are lower than the Tier 2 standards (according to Motive Power, Inc.). However, these rates have not been certified; therefore, the conservative rates were used in the analysis.

Nonetheless, the predicted annual emissions are well below the *de minimis* levels established in 40 CFR 51.853 for the respective areas and no further action or mitigation is necessary.

Additionally, note that the above emissions are for the proposed SEHSR operations only. Between Richmond and Petersburg, VA, there is currently a mixture of freight trains and Amtrak passenger trains. There are currently no trains operating in the corridor between Petersburg, VA, and Norlina, NC. Between Norlina and Raleigh, NC, there is some limited existing freight service. It is estimated that with the SEHSR project, there would be eight additional intermodal trains between Petersburg and Raleigh with improvements made to the rail infrastructure, along with two to four additional freight trains. (Two freight trains per day are assumed between Petersburg, VA, and Youngsville, NC, and four freight trains per day are assumed between Youngsville, NC and Raleigh, NC. Between Richmond and Petersburg, growth in freight and Amtrak is projected but is not anticipated as a result of this project.)

From an air quality perspective, the additional intermodal and freight trains would likely result in a regional efficiency improvement as a result of freight providers switching from long haul trucking to intermodal and freight rail. Quantification of the reductions and re-routing of truck hauling was determined to be outside the scope of this project. The intermodal and freight trains are not considered to be induced by the project, but rather represent an improved and more efficient transfer from other fuel-consumption sources. Regardless, even if they were hypothetically 100% induced by the SEHSR project, the intermodal and freight emissions could be triple the high speed rail locomotive operation emissions (conservatively) and still not exceed the *de minimis* levels.

4.6.2 Locomotive Operations - MSATs

Currently there is no federally approved model to perform a quantitative MSAT hot-spot analysis. A hot-spot analysis is known as a “microscale” analysis because it focuses on a relatively small geographic area. In the absence of a microscale model, regional MSAT impacts from locomotives are discussed qualitatively.

Effective April 27, 2007, USEPA adopted controls on MSATs, including locomotives. At that time, USEPA proposed more stringent standards for large diesel engines used in locomotives.

In May 2008, USEPA published the final rule adopting a comprehensive program to dramatically reduce pollution from locomotives, applying to all types of locomotives. This final rule strengthened the locomotive and marine diesel programs proposed in April 2007. When fully implemented, the programs will reduce harmful diesel engine emissions to a small fraction of their previous levels.

On a nationwide annual basis, these reductions will amount to 800,000 tons of NO_X and 27,000 tons of PM by the year 2030. For locomotives, the reduction from existing standards in PM Tiers 0 through 4 locomotives will be approximately 60, 50, 50, 50, and 90 percent, respectively. The reduction in NO_X for range year Tiers 0 through 4 will be approximately 20, 20, 20, 20, and 80 percent, respectively. All Tier idle emissions are predicted to be reduced by 50 percent for both PM and NO_X.

4.6.3 Highway Vehicle Operations - CO

CO emissions are associated with large volumes of slow-moving traffic, such as highly congested intersections. Areas experiencing high levels of CO are referred to as CO “hot

spots." The purpose of a CO hot-spot analysis is to determine if CO emissions generated by a proposed project would cause or contribute to an exceedance of the air quality standard for CO as promulgated by USEPA.

The state and federal ambient air quality standards for CO are 35 ppm (1-hour) and 9 ppm (8-hour). A computer model was run to determine the CO concentrations at the two worst-case intersections along the project corridor (one in North Carolina and one in Virginia). These concentrations were evaluated at locations (receptors) just outside the roadway's mechanical and meteorological turbulence mixing zones. These receptors were placed where the general public has access and at 25 and/or 50 foot intervals along the intersection roadway approach and departure links.

Based on traffic modeling (see Section 4.14.2), the two intersections with the worst-case levels of service (LOS) are predicted to be:

- Centralia Road & Chester Road in Chesterfield County, VA, and
- New Hope Church Road & Atlantic Avenue in Wake County, NC.

The CO hot-spot analysis compared the 2008 Existing (Base), 2010 Interim (Opening) Build and No-Build, and 2030 Design Year Build and No-Build scenarios.

The CAL3QHC dispersion model was used to estimate CO concentrations. It is the standard model used by USEPA. Model input parameters included MOBILE 6.2 emissions factors, CO background levels, persistence factors, peak-hour volumes, free-flow speeds, and traffic signal operations data provided by the SYNCHRO 7 intersection analysis software results. The analysis was conducted under simulated meteorological conditions designed to yield worst-case concentrations as per NCDOT Human Environment Unit, Air Quality Specialist guidance and as per VDOT's Environmental Division, Air Section, and Consultant Guide for Air Quality Project Level Analysis (May 2009).

The results of the analyses indicated that the 1-hour and 8-hour concentrations for both intersections in any scenario were well below the NAAQS. Based on these results, no mitigation is required and additional analysis is not recommended. The results are presented in Table 4-12.

Table 4-12
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)*

4.6.4 Highway Vehicle Operations - $PM_{2.5}$

Currently, there is no federally approved method for conducting quantitative PM analyses. Federal guidance concerning qualitative $PM_{2.5}$ hotspot analyses was issued March 29, 2006 by USEPA and FHWA. The appropriate level of analysis can be determined based on that guidance.

The SEHSR project is in an area that is currently designated as being in attainment of the $PM_{2.5}$ (15 µg/m^3 annual mean, 35 µg/m^3 24-hour average) standards. These standards were also not exceeded at any of the study area monitoring stations during 2008. For projects within $PM_{2.5}$ attainment areas, quantitative and/or qualitative analyses are not required. Therefore, no mitigation is proposed and further analysis is not recommended.

4.6.5 Highway Vehicle Operations - MSAT

Currently there is no federally approved model to perform a quantitative MSAT hot-spot analysis. On September 30, 2009, FHWA issued an update to their guidance concerning MSATs, which included a three-tiered approach to determine the level of analysis. The project was assessed for mobile source (highway vehicle) MSATs following this guidance.

(1) Projects with No Meaningful Potential MSAT Effects or Exempt Projects

The types of projects included in this category are:

- Any project qualifying as a categorical exclusion under 23 CFR 771.117(c);
- Any project exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or
- Any other project with no meaningful impacts on traffic volumes or vehicle mix

Additionally, the guidance indicates that, "[f]or projects with no negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is required." It is further noted in the guidance that "[t]he types of projects categorically excluded under 23 CFR 771.117(d) or exempt from conformity rule under 40 CFR 93.127 do not warrant an automatic exemption from an MSAT analysis, but they usually will have no meaningful impact."

Projects in this category do not require either a qualitative or a quantitative analysis for MSATs, although documentation of the project category is required.

(2) Projects with Low Potential MSAT Effects

The types of projects included in this category are those that serve to improve operations of highway, transit or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase emissions. This category covers a broad range of projects. Examples of these types of projects are minor road widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where design year traffic is not projected to meet the 140,000 to 150,000 AADT criteria.

Projects in this category are to be addressed with a qualitative analysis following the guidance provided by FHWA.

(3) Projects with Higher Potential MSAT Effects

The types of projects in this category must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or

- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000, or greater, by the design year, AND;

- Be proposed to be located in proximity to populated areas or in rural areas, in proximity to concentrations of vulnerable populations (i.e., schools, nursing homes, hospitals)

Projects in this category would be more rigorously assessed for impacts.

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. Further information on highway vehicle MSATs for the SEHSR is included in Appendix P.

4.6.6 Construction Impacts

Construction activities will result in temporary increases in air pollution. The greatest increases are likely to occur in the areas where new bridges are proposed for construction. At this time, it is not known over what time frame the bridges will be constructed. However, it is not expected that increased pollutants from trucks and site equipment will cause violations of the National Ambient Air Quality Standards.

Generally, air quality along detour routes may be affected by an increase in vehicle idling or miles traveled during crossing closures. These will be temporary and it is suggested that the proposed road improvements be constructed prior to the diversion of the traffic.

Particulate emissions (e.g., fugitive dust) during construction activities are expected to be controlled by BMPs typically observed or recommended by NCDOT and VDOT. Operators of fugitive dust sources are expected to take reasonable precautions to prevent airborne dust such as requiring the appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel to reduce exhaust emissions.

In conclusion, the predicted project-level and regional level values are below either the de minimis levels established in 40 CFR 51.853, the NAAQS, and or do not require a formal detailed analysis for the respective area conditions. As a result, no mitigation is required and no further action is necessary.

4.7 Noise and Vibration

The noise and vibration analysis was undertaken to identify and evaluate the potential noise and vibration impacts of this project. Impacts were assessed in accordance with the

guidelines set forth in the FRA *High Speed Ground Transportation Noise and Vibration Impact Assessment* manual (USDOT, 2005). The evaluation methods in the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment* manual (USDOT, 2006) were also used for estimating noise and vibration levels attributable to freight trains since the FRA manual does not address this issue. The goals of this noise and vibration analysis were to identify the potential for impacts and to determine their order of magnitude. After a preferred alternative is selected and during the design phase, more detailed evaluation can be conducted in areas where significant impacts were identified.

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% 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.

Between Richmond and Petersburg, VA, there is a mixture of freight trains (up to 29 per day) and Amtrak trains (up to 10 per day) operating. There are currently no trains operating in the corridor between Petersburg, VA, and Norlina, NC. The CSX Railroad took this section out of service in the mid 1980s and removed all of the track and signals. Between Norlina and Raleigh, there is some limited existing freight service. The proposed action would include the provision of four high speed passenger round trips per day, operating at speeds up to 90 mph between Richmond and Petersburg and up to 110 mph between Petersburg and Raleigh. Additionally, with improvements made to the rail infrastructure, it is assumed that up to eight additional intermodal trains and two to four additional freight trains could operate daily within the corridor between Petersburg and Raleigh. Between Richmond and Petersburg, growth in freight and Amtrak is projected but is not anticipated as a result of this project. Intermodal trains would operate at speeds up to 60 mph; freight trains would operate at speeds up to 50 mph.

4.7.1 Impact Criteria

This section presents the guidelines, criteria, and regulations used to assess noise and vibration impacts associated with the proposed project.

4.7.1.1 Operation Noise Impact Criteria

The criteria in *High Speed Ground Transportation Noise and Vibration Impacts Assessment* (USDOT, 2005) were used to assess existing ambient noise levels and future noise impacts from train operations. They are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. The amount that high speed rail projects are allowed to change the overall noise environment is reduced with increasing levels of existing noise. The FRA noise impact criteria are applicable to three categories of land use and are summarized in Table 4-13.

Table 4-13 Land Use Categories and Metrics for High Speed Rail Noise Impact Criteria		
Land Use Category	**Noise Metric (dBA)**	**Description of Land Use Category**
1	Outdoor $L_{eq}(h)$*	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)$*	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

Source: USDOT, 2005.

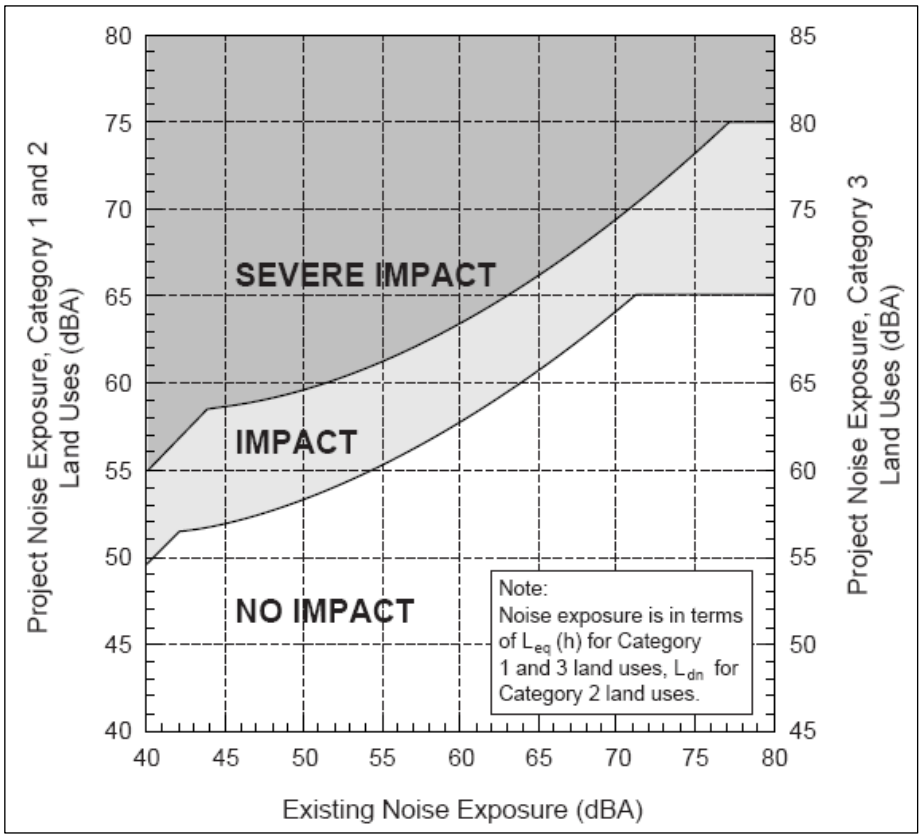
* L_{eq} for the noisiest hour of rail-related activity during hours of noise sensitivity.

L_{dn} is used to characterize noise exposure for residential areas and hotels (Category 2). The maximum 1-hour L_{eq} during the period that the facility is in use is used for other noise sensitive land uses such as National Historic Landmarks with significant outdoor use (Category 1) or schools (Category 3). There are two levels of impact included in the FRA criteria, as shown in Figure 4-1. The interpretation of these two levels of impact is summarized below:

- **Severe**: 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.

- **Impact**: In this range, 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.

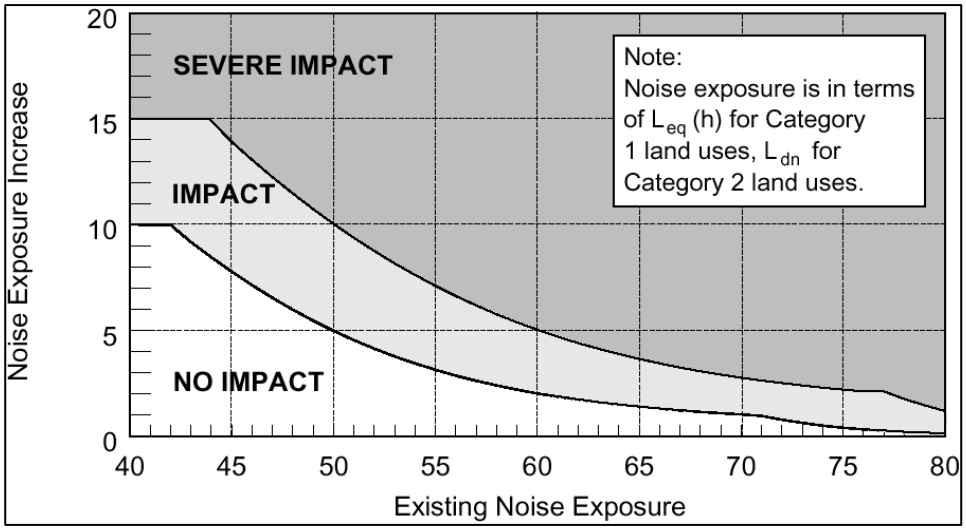
Figure 4-1
Noise Impact Criteria for High Speed Rail Projects



Source: USDOT, 2005.

Although the curves in Figure 4-1 are defined in terms of the project noise exposure and the existing noise exposure, it is important to emphasize that the increase in the cumulative noise – when the project noise is added to existing noise – is the basis for the criteria. Figure 4-2 shows the noise impact criteria for Category 1 and 2 land uses in terms of cumulative noise exposure increase.

Figure 4-2
Increase in Cumulative Noise Levels Allowed by Criteria



Source: USDOT, 2005.

Figure 4-2 shows that the criterion for impact allows a noise exposure increase of 10 dBA if the existing noise exposure is 42 dBA or less but only a 1 dBA increase when the existing noise exposure is 70 dBA. As the existing level of ambient noise increases, the allowable level of project noise increases, but the total allowable increase in community noise exposure is reduced. As a result, project noise exposure levels that are less than the existing noise exposure can still cause an impact.

4.7.1.2 Operation Vibration Impact Criteria

The criteria in *High Speed Ground Transportation Noise and Vibration Impact Assessment* (USDOT, 2005) were used to evaluate vibration impacts from train operations. The evaluation of vibration impacts can be divided into two categories: (1) human annoyance, and (2) building damage.

4.7.1.2.1 Human Annoyance Criteria

Table 4-14 presents the criteria for various land use categories as well as the frequency of events. The criteria are related to ground-borne vibration causing human annoyance or interfering with the use of vibration sensitive equipment. The criteria for acceptable ground-borne vibration are expressed in terms of RMS velocity levels in VdB and are based on the maximum levels for a single event (L_{max}).

All of the sensitive receptors within the project area, (i.e., residences, churches, historical buildings, and cemeteries) fall under Land Use Category 2 or 3. Train activity varies throughout the corridor. However, since both the existing and projected number of trains operating in the corridor are less than 70 per day, the FTA criteria for "Infrequent Events" will be used (See Table 4-14). Therefore, the vibration impact criteria for land use categories 2 and 3 will be 80 VdB and 83 VdB, respectively.

Table 4-14 Ground-Borne Vibration Impact Criteria for Human Annoyance		
Land Use Category	**Ground-Borne Vibration Impact Levels (dB re 1 micro-inch/sec)**	
	Frequent[1] Events	**Infrequent[2] Events**
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[3]	65 VdB[3]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB

Source: USDOT, 2005

Notes:

1. "Frequent Events" is defined as more than 70 vibration events per day.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day.
3. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

4.7.1.2.2 Building Damage Criteria

Normally, vibration resulting from a train passby would not cause building damage. However, damage to fragile historic buildings located near the ROW can be a concern.

Vibrations generated by surface transportation are mainly in the form of surface or Rayleigh waves. Studies have shown that the vertical component of transportation-generated vibrations is the strongest, and that peak particle velocity (PPV) correlates best with building damage and complaints.

The FRA provides a vibration damage threshold criterion of 13 mm/s (0.50 in/sec, approximately 102 VdB) PPV for fragile buildings and 3 mm/s (0.12 in/sec, approximately 90 VdB) PPV for extremely fragile historic buildings, for typical construction equipment operation (USDOT, 2005). The FRA recommends these criteria be used as a damage threshold for the fragile structures located near the ROW of a high speed rail project.

4.7.2 Impact Assessment

Noise and vibration impacts from construction and operation activities related to the proposed project are presented in this section.

4.7.2.1 Operation Noise

Train noise impacts were evaluated based on projected noise level increases relative to existing conditions at noise-sensitive receptors. Depending upon the land use, this increase was measured in terms of either one-hour equivalent sound level ($L_{eq}(h)$) or the

day-night sound level L_{dn}. The SEHSR Project noise exposure was calculated based on the operating characteristics listed in Table 4-15.

Table 4-15
Projected Train Operating Characteristics

Operating Characteristic	HSR Passenger Trains	Intermodal Trains	Freight Trains
Richmond to Petersburg (1)			
Total Number of Daily Trains	14	--	--
Number of Trains - Day	14	--	--
Number of Trains – Night (2)	0	--	--
Number of Peak Hour Trains	2	--	--
Maximum Operating Speed (mph)	79-90 (3)	--	--
Petersburg to Raleigh			
Total Number of Daily Trains	8	8	2-4 (4)
Number of Trains - Day	8	5	2-4
Number of Trains – Night (2)	0	3	0
Number of Peak Hour Trains	1	2	0
Maximum Operating Speed (mph)	110	60	50

Note: (1) Since there is existing freight train traffic between Richmond and Petersburg, VA, project noise exposure is only calculated for projected HSR trains in this section.
(2) Night trains are those that operate between 10:00 p.m. and 7:00 a.m.
(3) 79 mph – Richmond to Chester; 90 mph – Chester to Petersburg, VA.
(4) Two freight trains per day (one round trip) are planned between Petersburg, VA and Youngsville, NC, and four freight trains per day (two round trips) are planned between Youngsville, NC and Raleigh, NC.

In addition to the operating assumptions listed above, it was also assumed that the track would consist of continuously welded rail and would generally be in good condition. Based on these assumptions, distance-to-impact contours were developed for the different land use categories and existing noise levels. These distances were then used to tabulate the noise impacts that would occur as a result of the SEHSR Project. A summary of projected noise impacts for this project is provided in Table 4-16. The results in Table 4-16 represent a fairly conservative estimate in terms of the number of projected impacts. This is mainly due to the fact that maximum operating speed was assumed throughout the corridor. During the design phase of the project, when more detailed analysis will be conducted, operating speeds through certain impacted areas will be evaluated further prior to making a final determination on mitigation.

Table 4-16
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

4.7.2.2 Operation Vibration

The FRA procedures provide a calculation method for predicting vibration levels for a generalized assessment, but recommend field measurements for detailed analyses. Within the SEHSR Corridor, freight, intermodal, Amtrak, and high speed passenger trains will operate. This means that there are different vibration sources that need to be analyzed for vibration impact.

Currently, there are freight trains operating in the northern and southern portions of the project area. Field measurements of train passbys were taken at eight locations along the project corridor. At least one train passby was measured at each site. Measured results for the high speed passenger train were not taken because there are no high speed trains currently operating through the project area. The measured freight train values were compared to the generalized ground surface vibration curves presented in *Transit Noise and Vibration Impact Assessment*. The vibration levels listed in the FTA manual are higher than the measured data. The vibration levels in the FTA manual are also higher than those presented for high speed trains in the FRA manual (Table 4-17). After reviewing the data, it was determined that the FTA generalized ground surface vibration curve for a typical freight train should be used for operation impact assessment between Petersburg and Raleigh since the improvements that will be provided as part of this project will not only add high speed passenger trains, it will also allow for freight traffic where it currently does not exist. Between Richmond and Petersburg, the FRA generalized curve should be used since freight traffic currently operates through this area.

Table 4-17
Comparison of Ground Vibration Impact Curves

Ground Vibration Estimation Techniques	Distance to Human Annoyance (feet)	
	Residential	Commercial
Measured Freight Train Passby	60	40
FTA Generalized Curve for Freight Trains (1)	80	64
FRA Generalized Curve for High Speed Passenger Trains (2)	47	30

Notes:
(1) The selected distances used to determine impacts between Petersburg and Raleigh.
(2) The selected distances used to determine impacts between Richmond and Petersburg.

Based on the FTA generalized curve, annoyance vibration impacts (i.e., where vibration levels will be 80 VdB or higher) would occur at residences located 47 feet or closer to the proposed track between Richmond and Petersburg and 80 feet or closer to the proposed track between Petersburg and Raleigh. For commercial and institutional uses, annoyance vibration impacts (i.e., where vibration levels will be 83 VdB or higher) would occur at structures located 30 feet or closer to the proposed track between Richmond and Petersburg and 64 feet or closer to the proposed track between Petersburg and Raleigh. The annoyance impact criteria for residences and commercial/institutional property established by the FRA apply to vibrations inside building structures. Table 4-18 provides a summary of the number and type of vibration sensitive structures that would be impacted.

The building damage criteria of 0.50 inch per second would not be exceeded at any building along the corridor due to train passbys. Therefore, the project is not expected to cause damage, due to vibration, to any buildings in the project corridor.

Throughout the corridor, the vibration levels would be 5 to 10 VdB higher when there are crossovers, turnouts, jointed track, switches, or other special trackwork present. These conditions can cause annoying transients in the vibratory level characterized by a repetitive sounding, “thump-thump…thump-thump” that one would experience during a train passby. Vibration mitigation may be required for the areas were these conditions exist.

Table 4-18
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
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

Table 4-18
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**		
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

4.7.2.3 Construction Noise

Trucks and machinery used for construction produce noise that may affect some land uses and activities during the construction period. Individuals inhabiting the homes along the project corridor would at some time experience perceptible construction noise from implementation of the project.

4.7.2.4 Construction Vibration

Two types of construction vibration impact were analyzed: (1) human annoyance and (2) building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Fragile buildings such as historical structures are generally more susceptible to damage from ground vibration. Normal buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet based on typical construction equipment vibration levels. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. The potential for vibration annoyance and building damage was analyzed for major vibration producing construction equipment that would be used on this project.

Vibration levels produced by construction equipment were obtained from *High Speed Ground Transportation Noise and Vibration Impact Assessment* (USDOT, 2005) and from field measurements (Table 4-19). Based on the typical vibration levels listed in Table 4-19, calculations were performed to determine the distances at which vibration impacts would occur according to the criteria discussed in Section 4.7.1.2. Table 4-20 shows the results of those calculations. The distances shown in Table 4-20 are the maximum distances at which short-term construction vibration impacts may occur. Mitigation measures would need to be considered if construction equipment were to operate near wood-framed buildings within the distances shown in Table 4-20.

Table 4-19
Vibration Source Levels for Construction Equipment

Equipment	PPV [1] at 25 feet (in/sec)	Approximate Velocity Level [2] at 25 ft (VdB)
Large bulldozer	0.089	87
Loaded trucks	0.076	86
Vibratory compactor/roller	0.210	94

Source: USDOT, 2006.

1. Peak particle ground velocity measured at 25 feet unless noted otherwise.
2. RMS ground velocity in VdB referenced to 1 micro-inch/second.

Table 4-20 Construction Equipment Vibration Impact Distances		
Equipment	**Distance to Vibration Annoyance [1] feet**	**Distance to Vibration Building Damage [2] feet**
Large bulldozer	43	15
Loaded trucks	40	13
Small bulldozer	--	--
Auger/drill rigs	45	--
Vibratory hammer	130	25
Vibratory compactor/roller	73	26

1. This is the distance at which the RMS velocity level is 80 VdB or less at the inside of the building structure. When propagating from the ground surface to the building structure foundation, there is a vibratory coupling loss of approximately 5 dB; however, this loss is offset by the building amplification in light-frame construction. Thus, no additional adjustments are applied.
2. This is the distance at which the peak particle velocity is 0.20 inch/sec or less.

4.7.3 Mitigation

This section discusses the possible mitigation measures that can be implemented to either reduce or mitigate the impacts generated by the construction and operation of the proposed project.

4.7.3.1 Mitigation during Construction

Noise and vibration impacts caused by construction activities are temporary. However, standard construction mitigation measures may be required to minimize these impacts. Construction activities conducted during daytime hours will have a lesser impact than nighttime construction. However, there may be locations where nighttime construction would be unobtrusive, such as commercial areas where the land use is unoccupied during nighttime hours, or industrial areas that are generally not sensitive to noise and vibration. Nighttime construction may be necessary to avoid unacceptable disruptions to current rail operations or street traffic during daytime hours. Once details of the construction activities become available, the contractor would need to work with local authorities to develop an acceptable approach to minimize interference with the business and residential communities, traffic disruptions, and the total duration of the construction.

There are a number of measures that can be taken to minimize intrusion without placing unreasonable constraints on the construction process or substantially increasing costs. These include noise and vibration monitoring to ensure that contractors take all reasonable steps to minimize impacts when near sensitive areas; noise testing and inspection of equipment to ensure that all equipment on the site is in good condition and effectively muffled; and an active community liaison program. The community liaison program should keep residents informed about construction plans so they can plan around periods of particularly high noise or vibration levels and should provide a conduit for residents to express any concerns or complaints.

The following are possible control measures that can be implemented in order to minimize noise and vibration disturbances at sensitive areas during construction:

- Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).

- Perform all construction in a manner to minimize noise and vibration. Utilize construction methods or equipment that will provide the lowest level of noise and ground vibration impact, e.g., avoid impact pile driving near residences and consider alternative methods that are also suitable for the soil condition. The contractor should be required to select construction processes and techniques that create the lowest noise levels.

- Perform independent noise and vibration monitoring to demonstrate compliance with the noise limits, especially in particularly sensitive areas. Require contractors to modify and/or reschedule their construction activities if monitoring determines that maximum limits are exceeded at residential land uses.

- Conduct truck loading, unloading and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest extent possible.

- Construction lay-down or staging areas should be selected in industrially zoned districts. If industrially zoned areas are not available, commercially zoned areas may be used, or locations that are at least 100 feet from any noise sensitive land use such as residences, hotels and motels. Ingress and egress to and from the staging areas should be on collector streets or greater (higher street designations are preferred).

- Turn off idling equipment.

- Minimize construction activities during evening, nighttime, weekend, and holiday periods. Permits may be required in some cities before construction can be performed in noise sensitive areas between 7:00 p.m. and 7:00 a.m.

- The construction contractor should be required by contract specification to comply with all local noise and vibration ordinances and obtain all necessary permits and variances.

It is expected that ground-borne vibration from construction activities would cause only intermittent localized intrusion along the rail corridor. Processes such as earth moving with bulldozers, the use of vibratory compaction rollers, and the operation of vibratory pile drivers can create annoying vibration. There are cases where it may be necessary to use this type of equipment in close proximity to residential buildings. Following are some procedures that can be used to minimize the potential for annoyance or damage from construction vibration:

- When possible, limit the use of construction equipment that creates high vibration levels, such as vibratory rollers and hammers, operating within 130 feet of building structures.

- Require vibration monitoring during vibration-intensive activities.

- Restrict the hours of vibration-intensive equipment or activities such as vibratory rollers so that impacts to residents are minimal (e.g., weekdays during daytime hours only when as many residents as possible are away from home).

A combination of the mitigation techniques for equipment noise and vibration control as well as administrative measures, when properly implemented, can be selected to provide the most effective means to minimize the effects of construction activity impacts. Application of the mitigation measures will reduce the construction impacts; however, temporary increases in noise and vibration would likely occur at some locations.

4.7.3.2 Mitigation during Operation

4.7.3.2.1 Train Noise Mitigation

Once the final design of the project has been established, a more detailed noise analysis will be performed according to the procedures outlined in FRA's High-Speed Ground Transportation Noise and Vibration Assessment (USDOT, 2005). This analysis will be completed by DRPT and NCDOT prior to the construction of the project. It will also reassess the potential impact of new intermodal and freight train service between Petersburg, VA, and Raleigh, NC. As part of the analysis summarized in this document, it has been assumed that new freight and intermodal train traffic will occur south of Petersburg, VA, as a result of the SEHSR project. This projected freight and intermodal train traffic dominates the project noise impact exposure. If only the new high speed rail trains were included in the project noise impact exposure (as was modeled north of Petersburg, VA), the number of projected noise impacts would be reduced substantially.

During the final design study, the following mitigation measures should be considered and applied as appropriate:

- **Wheel Treatments** – A major source from steel-on-steel high speed train systems is the wheel-rail interaction. Various wheel designs and other mitigation measures to reduce the wheel noise include: resilient or damped wheels, spin-slide control systems, and maintenance

- **Rail Treatments** – Rail surfaces that are degraded over time due to wear generate noise levels that are significantly higher than those produced by a well-maintained system. Roughness of rail surfaces can be eliminated by grinding rails

- **Vehicle Treatments** – Vehicle noise mitigation measures can be applied to various mechanical systems associated with ventilation and passenger comfort. Fan noise can be a major noise source. Fan quieting can be accomplished by installation of one of several new designs of quiet, efficient fans. The vehicle body design can also provide shielding and absorption of noise generated by the vehicle components

- **Building Insulation** – In cases where rights-of-way are restricted, the only practical noise mitigation measure may be to provide sound insulation for the building. The most effective treatments are to caulk and seal gaps in the building and to install windows that are specially designed to meet acoustical transmission-loss requirements

- **Noise Barriers** – Noise reduction can be achieved by using noise barrier walls in areas along the corridor where significant train noise impacts have been identified. If the noise barrier walls are implemented prior to project construction, the walls could then also serve as an effective means of mitigating construction noise impacts as well. The cost-effectiveness and optimum height of the walls would need to be determined by specific acoustical analysis for each area of impact identified. An important consideration in determining areas where noise mitigation might be questionable is whether the railroad corridor existed many years before any of the residential developments that have encroached upon the ROW. Sensitive land uses may be less sensitive to train noise because of its established, long history in the communities, and because of the services the rail operation provides to the communities. The U.S. Environmental Protection Agency (EPA, 1974) has indicated that these considerations would likely reduce community reactions to noise. Before implementation of a mitigation measure such as noise barrier walls, the FRA guidelines recommend that the community's agreement should be obtained. Some communities would rather not have a wall because of adverse visual effects

VDOT and NCDOT have traffic noise abatement policies that address impacts related to highway noise. While impacts associated with this project will be a result of rail activity, review of these abatement policies is useful in understanding how noise abatement is evaluated to determine if it will be cost-effective. Table 4-21 provides a summary of the noise abatement policies of the respective states.

Table 4-21
Summary of Highway Noise Abatement Policies

Noise Abatement Criteria	Virginia	North Carolina
Required Insertion Loss (1)	5 dBA minimum	5 dBA minimum, prefer 8 dBA for "design receiver" (first row receiver)
Required cost per benefiting receiver (2)	$30,000	$25,000

1. Required Insertion Loss is the minimum noise level reduction required for a noise abatement option to be considered feasible.
2. Required cost per benefiting receiver is the maximum cost per benefiting receiver (i.e., where a 5 dBA or greater insertion loss is achieved) for a noise abatement option to be considered reasonable.

4.7.3.2.2 Train Vibration Mitigation

Once the final design of the project has been established, a more detailed vibration analysis would be required to determine:

- the soil characteristics and the efficiency at which the vibration propagates through the ground at various locations along the alignment,

- the most appropriate method of vibration mitigation, and

- the extent where mitigation would be required at specific locations

In order to ensure that vibration is reduced to an acceptable level, the following mitigation measures should be considered and applied according to the results of the final design study:

- **Maintenance** – Wheel and rail surfaces that are degraded over time due to wear generate vibration levels that are significantly higher than those produced by a well-maintained system. However, these conditions are not uncommon on rail systems. Up to 20 VdB of vibration reduction can be gained when comparing new or well-maintained rail systems to older systems showing wear. The following measures would help to minimize vibration impacts if done regularly:

1. Rail grinding on a regular basis, especially on rails that tend to develop corrugations

2. Wheel truing to re-contour the wheel and remove wheel flats. This can result in a dramatic vibration reduction. However, significant improvements can be gained from simply smoothing the running surface. Install wheel-flat detector systems to identify vehicles that are most in need of wheel truing

3. Implement vehicle reconditioning programs, particularly with components such as suspension systems, brakes, wheels, and slip-slide detectors

- **Relocation of Special Trackwork** – Crossovers, turnouts, and other special trackwork that cause an irregular rail surface should be considered for relocation to less vibration sensitive areas when feasible. The use of special "spring-loaded rail frogs" should be considered at turnouts and crossovers that cannot be relocated away from residential and commercial structures. The special frogs incorporate mechanisms that close the gaps between running rails. Frogs with spring-loaded mechanisms and frogs with movable points can significantly reduce vibration levels near crossovers

- **Ballast Mats** – Ballast mats are rubber or another type of elastomer pads that are placed under the ballast. The mat must be placed on a concrete pad to be effective. They will not be effective if placed on the soil or the sub-ballast. Ballast mats can provide up to 10 to 15 VdB of reduction at frequencies above 35 to 40 hertz, but are generally ineffective at frequencies below 35 hertz

- **Resiliently Supported Ties** – This is a system that consists of concrete ties supported by rubber pads. The rails are fastened directly to concrete ties using standard rail clips. This measure can provide a 10 VdB reduction at frequencies in the 15 to 40 hertz range

- **High Resilience Fasteners** – These are used in conjunction with a concrete slab base. The fastener must be very compliant (resilient) in the vertical direction. If standard resilient fasteners are used (vertical stiffness of 200,000-lbs/inch; stiffness refers to the compressibility of the resilient material), little or no improvement in the vibration level would be achieved. Special soft fasteners with a vertical stiffness in the 30,000-lbs/inch range would reduce vibration levels as much as 5 to 10 VdB at frequencies above 30 to 40 Hz

- **Floating Slab Trackbed** – This type of trackbed consists of a concrete base with 5-foot long floating concrete slabs supported above the base using resilient isolation elements such as rubber or similar elastomeric pads. The effectiveness of this method depends on the resonant frequency of the resilient pads and the mass of the concrete slab. These have been shown to be very effective at frequencies in the 5 to 20 hertz range. However, this method is very expensive and would normally be considered only in areas where irregular surfaces exist

4.8 Energy

There is a positive impact on energy use from the SEHSR project. This improvement is due to a reduction in energy per passenger mile traveled within the corridor. Generally speaking, rail is more energy efficient than both vehicular and air travel. Comparing the alternatives per passenger mile traveled, the shortest alternative will use the least amount of energy.

Table 4-22 displays the length of rail alternatives by section, and highlights the longest and shortest alternatives within each section. Table 4-22 demonstrates that the mileage differences between alternatives are relatively small. Of the 26 sections, 24 have a mileage difference between 0 and 0.25 miles, and 2 have mileage differences between 0.25 and 0.5 miles. Because the difference in length between alternatives is so small, the difference in impact related to energy will be negligible.

Table 4-22
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

Table 4-22 Length of Rail Alternative by Section (in Miles)						
Section	**NC1**	**NC2**	**NC3**	**Longest**	**Shortest**	**Difference**
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

4.9 Visual Environment

The regional landscape establishes the general visual environment of a project area (USDOT, 1981). Regional landscape is defined by the area's landform (topography) and landcover, including vegetation, water, and manmade development. Overall, the visual environment of the SEHSR study corridor ranges from undeveloped natural areas to large expanses of agricultural areas and small towns to large-scale industrial development and vibrant urban districts. Section 3.9 identifies the visual elements of the SEHSR study corridor.

This visual analysis examines the potential changes related to the implementation of the SEHSR into the existing viewshed of the SEHSR study corridor. The FRA's Procedures for Considering Environmental Impacts states that an EIS should identify any significant changes likely to occur in the natural landscape and in the developed environment (FRA, 1999). The methodology for this analysis focused on potential visual changes to cities, towns, communities, and scenic or visually sensitive resources along the SEHSR corridor, as identified in Section 3.9. Visual impacts relative to Section 106 historic resources are addressed in more detail in Section 4.12. Potential changes to the visual environment are described and ranked as either low, moderate, or high depending on the degree of visual change. Visual Impact Ratings are defined below.

- 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.

The visual elements of the proposed SEHSR project include single or multiple sets of tracks, the supporting rock ballast, vegetated ROW, trains, and associated grade-separated bridge and road crossings. The actual configuration of the tracks often would be unnoticeable by the train passenger or bystander. A rail corridor is most visible when trains pass and or when one train is waiting on a siding for the other to pass. Passing siding improvements allow trains to

pass more quickly through the view of the onlooker. The SEHSR rail alternatives have been designed to include either double tracks or passing sidings (five miles long approximately every ten miles). A number of bridges would have to be constructed, reconstructed, or modified. Most bridges would be built adjacent to the existing bridge structure or the existing structure would be modified to accommodate the proposed SEHSR project.

The incremental addition of high speed rail service where passenger rail service and/or freight rail service is currently active would not substantially alter the visual setting, character, or experience for those adjacent to the rail line because they are already exposed to trains passing through. Thus, the overall degree of change in the visual environment where rail service currently exists would be low. Maximizing the use of existing rail ROW further minimizes visual impacts.

Where rail service is not currently active (from the Burgess Connector in Dinwiddie County, VA, southward to Norlina in Warren County, NC), the physical components of the rail line itself (e.g., railroad tracks) would introduce a change to the existing visual environment. In some instances, the tracks have been removed and small portions of ROW sold for driveway access. Communities without active rail lines include the Dinwiddie Courthouse area, McKenney, Alberta, and La Crosse, VA, and Norlina, NC. Although each of these towns developed along the railroad and had active rail service until the 1980s, the return of rail operations in a community could serve as a visual intrusion, albeit a short and periodic one. Some individuals and communities adjacent to the new rail service may never get used to the sight of trains adjacent to their property and may perceive this as a negative impact on their quality of life. However, others may view the visual changes as a sign of progress and economic opportunity. Outside of the urbanized areas, dense stands of forest and agricultural operations dominate the landscape. The existing wooded areas would provide a visual barrier for those living in rural areas. Where viewsheds are considered sensitive, the use of landscaping as a screening option may be considered during the final design process.

Impacts to visual resources would also result from construction activities. Construction of physical improvements may cause some temporary degradation of visual quality. Construction BMPs often include use of silt fencing or construction barriers, which would have a temporary visual presence.

Results of the area-specific and resource-specific visual impact analysis are presented below and summarized in Table 4-23.

4.9.1 Virginia

4.9.1.1 City of Richmond, VA

Visually sensitive resources in downtown Richmond, VA, include the city skyline, the downtown area, and Shockoe Bottom area. New high speed rail (HSR) will be introduced on existing passenger and freight rail lines in these areas. All project alternatives are on common alignment in the city. HSR would be consistent with the urban setting and would not substantially alter the views of or from the city or adversely affect the visual setting or experience. Therefore, all project alternatives would result in a low degree of visual change.

Historic Main Street Station in Richmond is listed on the NRHP for its architectural and historic values. The SEHSR project would introduce HSR service at its existing multi-modal facility. Minimal changes to the visual aesthetics of the historic resource are expected. These minor changes would be consistent with the existing visual setting of the facility. Therefore, all project alternatives would result in a low degree of visual change.

The James River through Richmond is listed on NRI for its historic and recreational values. The SEHSR project would introduce new HSR service on the existing freight rail line and construct a new bridge alongside the existing bridge across the James River. All project alternatives are on common alignment in this area. No substantial changes to the setting and views of and from the river are expected. Therefore, all project alternatives would result in a low degree of visual change.

The James River Park System's Slave Trail is another visually sensitive resource within the City of Richmond. The SEHSR project would introduce new HSR service on the existing freight rail line and construct a new bridge alongside the existing bridge across the James River and the Slave Trail. All project alternatives are on common alignment in this area. No substantial changes to the visual setting of the trail are expected. The addition of HSR trains would be consistent with existing land use and the existing visual experience on the trail. Therefore, all project alternatives would result in a low degree of visual change.

From south of James River to Chesterfield County, the SEHSR project would introduce new HSR service on the existing freight rail line and construct five new grade-separated crossings (four roadway overpasses and one underpass). All project alternatives are on common alignment in this area. The new road and rail structures would alter the viewsheds of adjacent properties. However, most land use in this area is industrial, therefore, the impact of the visual change would be low. In the few residential areas adjacent to the new, grade-separated crossings (e.g., Ruffin Road and Bells Road), the visual change would be moderate in that a new roadway structure would be a dominant foreground feature (typically about 30 feet high at the highest point) for those adjacent to the road/rail crossing. Therefore, all project alternatives would result in a low to moderate degree of visual change.

4.9.1.2 Chesterfield County, VA

Within Chesterfield County, the SEHSR project would introduce new HSR service on existing freight rail lines. All project alternatives are on common alignment in this area. The eight new, grade-separated crossings (seven roadway overpasses and one underpass) would alter the viewsheds of adjacent properties. A new roadway structure would be a dominant foreground feature for those adjacent to the road/rail crossing. Where there is residential development (e.g., Kingsland Road, Dupuy Road) the visual impact would likely be moderate. The HSR would not likely be visible from the Virginia State University campus. Visual impacts to most of the remaining area would be low. Therefore, all project alternatives would result in a low to moderate degree of visual change.

There are several visually sensitive historic resources in the community of Centralia, including the Centralia Post Office and Circle Oaks, which are eligible for the NRHP. All project alternatives are on common alignment in this area. The SEHSR project would convert the existing at-grade railroad crossing of Centralia Road to a bridge. The visual

change would be moderate in that the bridge would be a dominant foreground feature (about 30 feet high at the highest point) for those adjacent to the crossing. Therefore, all project alternatives would result in a moderate degree of visual change.

The Chester Historic District is also a visually sensitive resource eligible for the NRHP. The SEHSR project would introduce new HSR service on existing passenger and freight rail lines. All project alternatives are on common alignment in this area. Many new residential developments are located along and adjacent to the existing rail line. There is a buffer of deciduous and evergreen vegetation between the rail and these developments, helping to reduce the visual impact. However, the conversion of the existing at-grade railroad crossing of Curtis Street to an underpass would be a moderate change for those adjacent to the crossing. Therefore, all project alternatives would result in a low to moderate degree of visual change.

The planned Chester Kiwanis Historical Park is another visually sensitive resource in the Chester community. All project alternatives are on common alignment in this area. The SEHSR project would introduce new HSR service on existing passenger and freight rail lines. The new, grade-separated crossing calls for Curtis Street to go under the existing rail line. Given that Chesterfield County officials specifically included ROW for the SEHSR improvements when they accepted the parcel as part of their park system, and given that the roadway improvements would be below grade, the visual sensitivity of the planned park to HSR would be low. Therefore, all project alternatives would result in a low degree of visual change.

The Ettrick Park & Mayes-Colbert Ettrick Community Building is located in southern Chesterfield County. All project alternatives are on common alignment in this area. The SEHSR project would introduce new HSR service on existing passenger and freight rail lines. No substantial changes to the setting and views of and from the park are expected. Therefore, all project alternatives would result in a low degree of visual change.

4.9.1.3 City of Colonial Heights, VA

Within the City of Colonial Heights, the SEHSR project would introduce new HSR service on existing passenger and freight rail lines. The existing rail bridge over Cedar Lane would be expanded. All project alternatives are on common alignment in this area. The new road and rail structures would not substantially alter the viewsheds of adjacent properties. Given that the rail lines are currently in use, the addition of HSR would not be inconsistent with the existing viewsheds afforded Virginia State University. Therefore, all project alternatives would result in a low degree of visual change.

4.9.1.4 City of Petersburg, VA

In the City of Petersburg, the SEHSR would introduce new HSR service on existing passenger and freight rail lines and expand several existing bridges (Washington and Farmer Streets and Defense and Flank Roads). The project also includes construction of one new pedestrian crossing under the existing rail line at Lincoln Street, with the existing Lincoln Street rail crossing being closed to vehicular traffic. All project alternatives are on common alignment in this area. The widened bridges would be consistent with the existing visual character of the area and the introduction of HSR would be consistent with existing rail activities. The new pedestrian underpass would use an existing resource and

would be below grade. This would make it both inconspicuous and consistent with the visual setting of an urban environment. Therefore, all project alternatives would result in a low degree of visual change on the Petersburg area.

The Upper Appomattox Canal Trail is a visually sensitive resource in the Petersburg area. The SEHSR would introduce new HSR service where passenger and freight rail lines are currently active. All project alternatives are on common alignment in this area and all project alternatives would provide a new rail bridge, adjacent to the existing rail bridge, over the Appomattox River. Given that the trail currently passes under the existing rail bridge, construction of a new rail bridge at approximately the same location would not substantially alter the existing visual experience or detract from existing visual features. Therefore, all project alternatives would result in a low degree of visual change.

4.9.1.5 Dinwiddie County, VA

Just south of Collier Yard in northern Dinwiddie County, the SEHSR would cross over the existing CSX A-Line on a new structure. The VA1, VA2, and VA3 alignments in this area differ slightly due to construction technique, but are similar in location and in visual change. While the new structure would dominate the area, it is immediately adjacent to an existing major rail classification yard and is in a largely rural setting. Therefore, all project alternatives would result in a low to moderate degree of visual change.

Also in the northern portion of Dinwiddie County, the SEHSR would introduce new HSR service on the abandoned section of rail corridor and construct three new grade-separated crossings. The area is dominated by forested and agricultural uses on either side of rail line. While the alignments of VA1/VA3 and VA2 differ slightly, impacts to the visual environment would generally be similar. The new, grade-separated Duncan Road, Dabney Mill Road, and Quaker Road bridges over the rail line have a moderate visual impact in that the new structure would be obvious to the few residences in the area but the new structures would not dominate the landscape or detract from the rural, wooded, and agricultural setting. Therefore, all project alternatives would result in a low to moderate degree of visual change.

In the vicinity of the Dinwiddie Courthouse community, the SEHSR would introduce new HSR service on abandoned rail ROW and construct three new grade-separated crossings (two road-over-rail and one rail-over-road). In this area, VA1/VA3 follows the abandoned rail line, whereas VA2 is on new alignment. Because the area is dominated by forested and agricultural uses that would screen the SEHSR project, there is little difference in the visual impacts of VA1/VA3 and VA2. Visual impacts would generally be low to moderate given that there is currently no rail service and new HSR service could be considered a visual intrusion by those unused to it. Therefore, all project alternatives would result in a low to moderate degree of visual change.

In the southern portion of Dinwiddie County, the SEHSR would introduce new HSR service on abandoned rail ROW and construct four new grade-separated crossings; all road-over-rail. All project alternatives are on common alignment in this area. The existing visual setting is dominated by agricultural and rural residential uses. Excluding the Town of McKenney, the new HSR service and road/rail features would be obvious elements on the landscape. Therefore, all project alternatives would result in a moderate degree of visual change.

In the Town of McKenney, the SEHSR would introduce HSR service on abandoned rail ROW and construct one new, grade-separated, road-over-rail crossing (Doyle Boulevard). All project alternatives are on common alignment in this area. The designs call for the rail line to be lowered approximately 15 feet and Doyle Boulevard to be raised approximately 15 feet so that Doyle Boulevard can cross over the railroad on a bridge at its existing location. The existing visual setting is typical of a small, old railroad town with small-scale commercial and business operations along the abandoned rail line and residential areas beyond that. Lowering the rail line would minimize the visual intrusion of the SEHSR facility. While McKenney is an old railroad town, active rail has been absent for over 20 years. The introduction of HSR service and road/rail features would be obvious elements on the landscape. Therefore, all project alternatives would result in a moderate degree of visual change.

4.9.1.6 Brunswick County, VA

In Brunswick County, the SEHSR would introduce new HSR service primarily on abandoned rail ROW and construct 13 new grade-separated crossings depending on project alternative (12 road-over-rail for VA1, VA2, and VA3; one rail-over-road for VA1, VA2, and VA3). There is little difference among alternatives in this area. The existing visual setting is dominated by forested, agricultural, and rural residential uses. Excluding the Town of Alberta, the new HSR service and road/rail features would be obvious elements on the landscape. However, because dense forest cover dominants the landscape, views of the new SEHSR line would be screened from view. In addition, Brunswick County is sparsely populated with a limited number of individuals affected by the new visual change, regardless of project alternative. Therefore, the overall visual impacts would be low.

Within the Town of Alberta, the SEHSR would introduce new HSR service on abandoned rail ROW and construct three new, grade-separated, road-over-rail crossings (Littlemont Road/Church Street, Second Avenue, and Main Street). All project alternatives are on common alignment in this area. The existing visual setting is typical of a small, old railroad town. Because of their proximity within town, the three new roadway bridges would dominate the surrounding landscape. Given the Town of Alberta's interest in downtown revitalization and the receipt of funding for that purpose, the construction of the new bridges and the activation of HSR could be viewed as a positive contribution. Therefore, all project alternatives would result in a moderate degree of visual change.

The Tobacco Heritage Trail is a visually sensitive resource in Alberta, VA. The SEHSR project would introduce new HSR service on abandoned rail ROW. It would construct a pedestrian-only bridge over the railroad for the planned Tobacco Heritage Trail. All project alternatives are on common alignment in this area. The introduction of HSR service crossing the Tobacco Heritage Trail would be an obvious visual element in the landscape. However, because the Tobacco Heritage Trail itself uses an abandoned rail ROW and because the trail will remain wooded on either side, the SEHSR would not impair the visual experience of the user. Therefore, the overall visual impacts would be low.

4.9.1.7 Mecklenburg County, VA

In Mecklenburg County, the SEHSR would introduce new HSR service primarily on abandoned rail ROW and construct several new grade-separated crossings. The VA1

project alternative would require six new grade-separated crossings (three road-over-rail and one rail-over-road); the VA2 project alternative would require seven new grade-separated crossings (six road-over-rail and one rail-over-road); and the VA3 project alternative would require eight new grade-separated crossings (six road-over-rail and two rail-over-road). In both the northern and southern portions of the county, dense forests and agricultural areas dominate the landscape. While the project alternatives vary in alignment and roadway improvement features, the degree of visual change would be relatively the same. For the most part, the rail and associated roadway features would be relatively screened from view, minimizing the visual impact. In the sparsely distributed rural residential areas, visual impacts generally would be moderate given that rail service currently does not exist and new HSR service could be considered a visual intrusion. Therefore, all project alternatives would result in a low to moderate degree of visual change.

Within the Town of La Crosse, the SEHSR would introduce new HSR service on the abandoned rail ROW and construct one new, grade-separated, rail-over-road crossing (Main Street). All project alternatives are on common alignment in this area. The existing visual setting adjacent to the rail corridor is dominated by single-family residences common in small town settings. Small commercial and service-oriented businesses are concentrated along Main Street. The introduction of HSR service and associated road work would be obvious elements on the landscape, as would the planned station stop in the town. Therefore, all project alternatives would result in a moderate to high degree of visual change.

The Tobacco Heritage Trail is a visually sensitive resource in La Crosse, VA. The SEHSR would introduce new HSR service on abandoned rail ROW and would construct a pedestrian-only railroad underpass (trail under rail) to accommodate the planned Tobacco Heritage Trail. As with the Tobacco Heritage Trail in Alberta, the introduction of HSR service crossing the trail, along with an underpass for the safe crossing of the newly active rail line, would be an obvious visual element in the landscape. Because the Tobacco Heritage Trail itself follows an abandoned rail ROW, the SEHSR would not substantially impair the visual experience of the user. Therefore, all project alternatives would result in a moderate degree of visual change.

In the Roanoke River/Lake Gaston area, the SEHSR would introduce new HSR service primarily on abandoned rail ROW and refurbish the existing railroad bridge over the Roanoke River (using the existing piers and substructure). All project alternatives are on common alignment in this area. The dominant visual feature on the landscape is Roanoke River/Lake Gaston, a popular area for boating. Because the SEHSR would follow the existing railroad bridge alignment, the visual changes would be minimal and would not be an obvious visual intrusion to those in the adjacent subdivisions or recreating on the water. Therefore, all project alternatives would result in a low degree of visual change.

4.9.2 North Carolina

4.9.2.1 Warren County, NC

In Warren County, the SEHSR would introduce new HSR service primarily on abandoned rail ROW and construct six new, grade-separated, road-over-rail crossings. From the VA/NC state line to the Town of Norlina, NC, the alignments of NC1/NC3 and NC2 vary.

The NC2 alignment maximizes the use of the existing rail ROW, while the NC1/NC3 alignment is on new location in several areas. Agricultural fields, mixed woodlands, and scattered rural residential uses dominate the landscape. NC1/NC3 is on new alignment through an area not currently exposed to rail activity and would create a high degree of visual change. However, that change would not be obvious because it would be screened by existing vegetation and because access to and views of the area are so limited. In the community of Wise, NC, roadway realignments for Wise Five Forks Road and Old Wise School Road would be considerable under any of the project alternatives. The visual change associated with the roadway improvements would not likely alter the existing rural agricultural setting of the community, but the introduction of HSR could be seen as an unwanted visual intrusion. Therefore, all project alternatives would result in a moderate to high degree of visual change.

Within the northern portion of the Town of Norlina, the SEHSR project alternatives vary. The NC1/NC3 alignment would introduce new HSR on the existing, abandoned rail ROW, whereas NC2 would be on new alignment to the east. At the southern end of the town, the project alternatives converge and would use the existing, active rail line from that point southward. The visual setting of the Town of Norlina is that of an older, small rail town with inactive rail in the northern half of town and active rail in the southern half. In the northern half of town, mixed wooded areas, agricultural uses, and single-family residential areas dominate the viewshed for the NC1/NC3 alignments. Along Hyco Street, commercial buildings are located adjacent to the rail line. For the NC2 alignment, the visual setting is dominated by forested and agricultural uses with single-family residential areas along Warren Plains Road. Given the absence of active rail in this portion of the town, along with the substantial roadway realignments at Warren Plains Road, all project alternatives would result in a moderate to high degree of visual change.

In the southern half of Norlina, single-family residences dominate the visual setting. Freight rail is active from this point southward. The NC1, NC2, and NC3 alignments converge in the southern half of Norlina and follow the existing rail line through the remainder of town. Because they would utilize existing rail ROW on an active rail line, the associated roadway improvements would not be visually intrusive. Therefore, all project alternatives would result in a low to moderate degree of visual change.

To the south of Norlina, the landscape in Warren County is dominated by agriculture, wooded areas, and scattered residential and small to moderate-scale commercial and industrial development. The NC2 alignment primarily uses the existing rail ROW on the active freight rail line, whereas the NC1/NC3 alignment is on new location in several areas. For all project alternatives, Kimball Road would require realignment and a new road-over-rail, grade-separated crossing. While this would be an obvious change to the visual setting, it would not necessarily be considered an adverse change given the industrial activity in the area and the very low number of residences. Therefore, all project alternatives would result in a low to moderate degree of visual change.

4.9.2.2 Vance County, NC

Within Vance County, from the Warren County line to Henderson, NC, the SEHSR alignments vary in location from using existing freight rail ROW to being on new location. South of Henderson, NC, the project alternatives follow the same alignment, maximizing the use of the existing freight rail ROW. The NC1 alignment would require nine new road-over-rail crossings and four new rail-over-road crossings; the NC2 alignment would require

eight new road-over-rail crossings and three new rail-over-road crossings; the NC3 alignment would require eight new road-over-rail crossings and four new rail-over-road crossings. The dominant landscape feature in the county is agricultural, followed by forested lands and sparsely populated farming communities. Mining operations and some commercial and industrial uses are also visually present. Where the existing rail ROW is used, the visual impact would be low. Where the proposed alignment would be on new location, the new rail and associated roadway improvements would be an obvious visual change. However, this visual change would not likely detract substantially from existing features. Therefore, all project alternatives would result in a low to moderate degree of visual change.

Through the Town of Middleburg, NC, the NC1/NC2 alignment would use the existing, active freight rail ROW, whereas the NC3 alignment would be on new location to the southeast of town. For the NC1/NC2 alignment, the largest visual change would be associated with the new road-over-rail crossing (Carroll Street). For the NC2 alignment, a new access road from Carroll Street would also be constructed. The landscape is dominated by agricultural use. The visual change associated with the new crossing and the new access road would be obvious, but would not necessarily detract from the existing landscape features. For the NC3 alignment, the new railroad tracks would be located approximately 1,000 to 2,500 feet to the southeast of town. This project alternative would also provide a new road-over-rail crossing of Carroll Street. The new rail and associated road improvements would be an obvious visual change, but would not dominate the landscape or substantially detract from existing features. Therefore, all project alternatives would result in a moderate degree of visual change.

Within the Town of Henderson, the SEHSR would introduce new HSR service on active freight rail ROW and construct two new road-over-rail crossings (Andrews Avenue and Alexander Avenue) and one new rail-over-road crossing (Main Street). All project alternatives are on common alignment in this area. The existing visual setting adjacent to the rail corridor is that of the downtown area in a small city. Along the rail corridor, the rear facades of the downtown face the rail line. Near Chevasse Avenue, the rail line curves to the south where it runs roughly parallel with Old Raleigh Road/US 1 Business. Much of this area has heavy commercial and industrial uses, along with some older neighborhoods. This pattern continues well outside of Henderson. The realignment of Dabney Drive, its connection to Alexander Avenue, and its new bridge over the rail line would be an obvious change in the landscape. However, given the urban and industrial nature of the area, the road and rail improvements would not substantially detract from the visual setting or landscape features of the surrounding area. Overall, improvements to the roadway network would be obvious but would not detract from the existing setting given the currently active rail line and the current urban environment. Therefore, all project alternatives would result in a low degree of visual change.

Within the Town of Kittrell, the SEHSR would introduce new HSR service on the active freight rail ROW, construct a new road-over-rail bridge for Church Street, and realign Williams Street. All project alternatives are on common alignment in this area. The existing visual setting adjacent to the rail corridor is that of an older, small residential community in a rural area. The introduction of a new bridge and the realignment of Williams Street would be obvious and could detract from the small town visual setting of the area. Therefore, all project alternatives would result in a moderate to high degree of visual change.

4.9.2.3 Franklin County, NC

In the northern portion of Franklin County, the NC1/NC3 alignment diverges from the existing freight rail line to follow a new alignment southward to where it rejoins the NC2 alignment on the existing rail ROW near Misty Way. The surrounding visual setting is dominated by agricultural and forest uses with homes sparsely dotting the landscape. The exception to this is the residential community located to the east of the rail line off Montgomery Road. This subdivision is buffered from the existing rail line (approximately 900 feet to the west) by vegetation and terrain. The introduction of HSR under the NC1/NC3 alignment would detract from the existing landscape and pose a high visual impact to this community. Because it utilizes the existing rail line, the NC2 alignment would have a low visual impact in this area.

Within the Town of Franklinton, the SEHSR would introduce new HSR service on active freight rail ROW and construct two new, grade-separated pedestrian-only crossings (one over the rail line and one under the rail line). The pedestrian crossing at Mason Street would be elevated and, therefore, visible from adjacent properties. All project alternatives are on common alignment in this area. The existing visual setting adjacent to the rail corridor is that of an older, small railroad town that is transitioning to a bedroom community for employment centers in the Triangle area of North Carolina. The introduction of new pedestrian crossings would not detract from the small town setting nor would the introduction of HSR where freight rail use already exists. Just to the south of the town limits, visual impacts associated with the proposed Hawkins Street realignment and improvements would be low given the rural, sparsely populated nature of the area. Therefore, all project alternatives would result in a low degree of visual change.

To the south of Franklinton, the NC1/NC3 and NC2 alignments separate and diverge from the existing rail ROW. For all alignments, the adjacent landscape is dominated by forests and agricultural uses. The visual impact through this area would be low. As the alignments approach the northern limits of the Town of Youngsville, they converge to follow the existing, active freight rail line. In this area, the landscape is dominated by forested, agricultural, and scattered industrial uses. All project alternatives would result in a low degree of visual change.

In the Town of Youngsville, the SEHSR would introduce new HSR service on active freight rail ROW. The rail line would be lowered approximately 30 feet to allow Main Street to remain at the same elevation on a new bridge over the railroad. A pedestrian-only bridge would be constructed over the rail line near Franklin Street, and NC 96 north of town would be realigned and extended over the rail line to connect with the existing road network on the east side of the railroad tracks. All project alternatives are on common alignment in this area. The existing visual setting adjacent to the rail corridor is that of an older, small residential community in a rural area, and active rail ROW and roadway improvements are limited. Therefore, all project alternatives would result in a low to moderate degree of visual change.

4.9.2.4 Wake County, NC

In Wake County, the SEHSR would introduce new HSR on existing freight rail ROW and construct several grade-separations. The NC1/2 alignment includes eight new, grade separated, road-over-rail crossings and two rail-over-road crossings. The NC3 alignment would have seven new road-over-rail crossings and two new rail-over-road crossings.

Along the SEHSR corridor, Wake County is a rapidly suburbanizing county with the visual landscape becoming dominated by residential, commercial, and industrial development. Large tracts of forested and agricultural lands are interspersed throughout the county, but are not the dominant landscape features.

Through Wake County, NC1, NC2, and NC3 converge and diverge at various points. While the alignments may vary in places, the difference in visual impact would be essentially the same because the alignment shifts are relatively close to each other and the roadway and pedestrian improvements would be similar in nature.

Within the Town of Wake Forest, the SEHSR would introduce new HSR on existing freight rail ROW and construct one new rail-over-road crossing (Holding Avenue) and one new road-over-rail crossing (Rogers Road). A new pedestrian bridge over the rail line would be constructed in the vicinity of Cedar Avenue. The Town of Wake Forest is an old, historic town with a visual landscape dominated by established neighborhoods, mature tree-lined streets, a commercial core, and rapidly expanding suburban development outside the original town core. The NC1, NC2, and NC3 alignments would remain within the existing rail ROW from the northern town limits southward to Vernon Avenue. While the rail line is currently active, the realignment and new grade-separated crossing for Holding Avenue would be an obvious visual landmark. The visual impact for any project alternative in this part of Wake Forest would be low to moderate.

From Vernon Avenue southward within Wake Forest, the alignments converge and diverge at various points. While the alignments may vary in places, the difference in visual impact would be essentially the same because the alignment shifts are relatively close to each other. All alignments would require a bridge for Rogers Road to cross the rail line. While the new structure would be obvious on the landscape, it would not be inconsistent with the other new construction in the area or with the new commercial and industrial development adjacent to it. South of Rogers Road, in the vicinity of the Wake Forest ball fields, all of the alignments shift to the west to straighten the existing curve in the rail line. This shift would require the acquisition of the two larger ball fields and would bring the rail ROW within feet of the remaining ball fields. Without the existing wooded buffer area, the new rail line would likely be a strong visual contrast to the existing visual setting of the remaining ball fields. Therefore, all project alternatives in this part of Wake Forest would result in a low to high degree of visual change, depending on the location.

South of Wake Forest, from Seawell Drive southward to Durant Road, the three SEHSR alignments are primarily on common alignment within the existing rail ROW. When outside of the existing ROW, the alignments are slightly shifted but remain relatively close to the existing rail line. The visual setting of this area ranges from dense, suburban, single-family communities to wooded lands to commercial retail centers to large-scale industrial operations. The use of the existing rail ROW is maximized where possible and alignment shifts are in primarily wooded, unpopulated areas. Therefore, all project alternatives would result in a low to moderate degree of visual change.

From Durant Road into the City of Raleigh, the SEHSR would introduce new HSR on predominantly existing freight rail ROW and construct six new road-over-rail crossings and one new rail-over-road crossing. A new pedestrian underpass would be constructed downtown at Harrington Street under the NC1/NC2 alignment. Much of the northern portions of this section are heavily wooded. However, the dominant landscape features

vary from suburban residential and commercial to industrial to forested to dense urban mixed-use development.

From Durant Road southward to Whitaker Mill Road, the NC1, NC2, and NC3 alignments are common and remain primarily within the existing rail ROW. Through this area, the visual impact of HSR service would remain low because freight rail is currently active on the tracks and the rail ROW is heavily wooded. The addition of HSR on the existing track would not be visually intrusive or inconsistent with existing uses.

The roadway improvements proposed for Gresham Lake Road would have a low visual impact given that the adjacent landscape is either heavily wooded or high density commercial/industrial. Similarly, the roadway improvements associated with new bridges over the rail at East Millbrook Road, New Hope Church Road, and Whitaker Mill Road would be obvious, but not inconsistent with the existing urban commercial setting.

The Middle Crabtree Creek Greenway is a visually sensitive resource located just south of the I-440 Beltline. The SEHSR would introduce new HSR service essentially within existing freight ROW. A single track bridge would be constructed adjacent to the existing single track bridge that spans the Middle Crabtree Creek Greenway, Crabtree Creek, and Hodges Street. All project alternatives are on common alignment in this area. The new adjacent, parallel bridge would not substantially alter the existing landscape and setting for individuals using the Middle Crabtree Creek Greenway. Therefore, all project alternatives would result in a low degree of visual change.

South of Whitaker Mill Road to downtown Raleigh, the alignments diverge with the NC1/NC2 alignment maximizing use of the existing, active CSX S-line, while the NC3 alignment splits to the west and follows the Norfolk Southern NS-line to the west of Capital Boulevard. Because the NC1/NC2 alignment remains within existing ROW and because the existing rail line is active, the introduction of HSR would not create a visually intrusive feature nor would it be inconsistent with the historic Mordecai neighborhood, the historic Pilot Mill buildings, or the new urbanist Pilot Mill Village. The NC3 alignment uses the active NS freight corridor west of Capital Boulevard. This corridor is generally bordered on one side by the Roanoke Park Historic District (residential) and commercial uses, and on the other side by a combination of heavy industrial and commercial uses. Because the NC3 alignment remains largely within the existing ROW, and because the existing rail line is active, the introduction of HSR service along this alignment would not be an obvious visual intrusion nor would it be visually inconsistent with the surrounding development patterns.

From just north of Jones Street southward, the NC1, NC2, and NC3 alignments converge to follow essentially the same alignment while maximizing the use of the existing rail ROW. With the exception of the Jones Street crossing, there are only slight differences between the three alignments; thus, their overall visual impacts are essentially the same. At Jones Street, the NC1/NC2 alignment would require a new, road-over-rail bridge that would span the rail, as well as Glenwood Avenue and West Street. As a result, the NC1/NC2 bridge would be approximately 750 feet in length with a total length of approximately 1,300 feet. This new structure would be obvious and inconsistent with the surrounding Central Raleigh Historic District. Therefore, the visual impact of the NC1/NC2 alignment at this location would be high. The NC3 alignment would require closing the existing Jones Street at-grade rail crossing. From a visual standpoint, this action would be much more consistent with the surrounding landscape features and would not pose an obvious visual

element into the area. Therefore, the visual impact of the NC1/NC2 alignment at this location would be low to moderate.

At Hargett Street, all three alignments would require a road-over-rail crossing of both the rail and West Street. This area has an industrial and commercial landscape setting. Therefore, all project alternatives would result in a moderate degree of visual change.

As the alignments approach the Boylan Wye and the terminus of the project, the immediate view to the east is of older brick buildings within the Warehouse District (another industrial area transitioning towards entertainment and office uses) with the Raleigh skyline in the background. The view to the south is of the Amtrak station with the Boylan Heights National Register District on the hill behind. The view to the west is of an older neighborhood, the Boylan Avenue bridge and both NS and North Carolina Railroad (NCRR) rail corridors. Because this is an active freight rail area and because any of the alignments would be primarily within existing rail ROW, the visual impact would be low.

Table 4-23
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
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

Table 4-23 Visual Impacts (Low, Moderate, High)				
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

4.10 Biological Resources

Proposed project impacts to the natural terrestrial communities occurring within each project alternative are described in the following sections (aquatic community impacts are summarized in Sections 4.1 and 4.2). Impact minimization, threatened and endangered species, and bald eagles are also addressed.

4.10.1 Natural Communities

Project construction would have various impacts to the terrestrial and aquatic communities described in Section 3.10.1. Construction activities in or near these resources have the potential to impact biological functions. This section quantifies and qualifies potential impacts to the natural communities within the study corridor in terms of the area impacted and the plants and animals affected. Temporary and permanent impacts are considered here along with recommendations to minimize or eliminate impacts.

4.10.1.1 Terrestrial Community Impacts

Terrestrial communities in the study corridor would be impacted permanently by project construction from clearing and paving and loss of the terrestrial community area. Destruction of natural communities within the study corridor would result in the loss of foraging and breeding habitats for the various animal species that utilize the area. Animal species would be displaced into surrounding communities. Adult birds, mammals, and some reptiles are mobile enough to avoid mortality during construction. Young animals and less mobile species may suffer direct loss during construction.

Potential project impacts (in acres) to the various different land cover types classified by the Southeast Gap Analysis for Virginia and North Carolina are summarized by project section for each alternative in Appendix O. Appropriate land cover types were combined into "Mixed Forest," "Pine Forest," and "Maintained/Disturbed" to summarize the impacts in Table 4-24.

Table 4-24
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

Table 4-24 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	NC1			NC2			NC3		
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

Natural terrestrial community impacts would be minimized by selection of alternatives which include the lowest acreages of mixed forested habitats for each section. In Virginia, selection of the VA2 project alternative for Sections DD, A, B, H, I, J, and K (but not D, E, or L) and the VA1 project alternative for Section G will minimize impacts to forested habitat types. In North Carolina, selection of the NC2 project alternative would minimize forested impacts for Sections L, O, Q, R, T, and U (but not M, N, or S).

4.10.1.2 Aquatic Community Impacts

Aquatic habitat in the study corridor would be both directly and indirectly affected by the construction of the project. Direct impacts will include the destruction of habitat by the placement and re-placement of culverts at stream crossings and clearing and filling of adjacent floodplain and wetlands (see Tables 4-1 through 4-7). Many of the historic railroad culverts were bottomless arched rockwork placed on bedrock with rock walls at the entrance and exit. These were morphologically stable. As a result of their bottomless design, the natural streambed was able to fully function and did not impede fish migration or impair benthic habitat. In subsequent years, the exterior rock walls on some culverts have been supplemented with concrete culvert extensions. These extensions have increased plunge pool depths at outfalls and downstream stream bank erosion. This erosion was observed to embed stream substrate for hundreds of linear feet downstream of the culverts. Many culverts are creating fish migration blockages either at their outfall or as a result of the shallow water that passes through them with swift currents and high velocities.

Impacts to aquatic communities for new construction would include fluctuations in water temperatures as a result of the loss of riparian vegetation. Shelter and food resources, both in the aquatic and terrestrial portions of these organisms' life cycles, would be affected by losses in the terrestrial communities. The loss of aquatic plants and animals will affect terrestrial fauna, which rely on them as a food source.

Temporary and permanent impacts to aquatic organisms may result from increased sedimentation. While aquatic invertebrates may be severely impacted, some may drift downstream during construction and recolonize the disturbed area once it has been stabilized. Sediments have the potential to affect fish and other aquatic life in several ways, including the clogging and abrading of gills and other respiratory surfaces, affecting the habitat by scouring and filling of pools and riffles, altering water chemistry, and smothering different life stages. Increased sedimentation may cause decreased light penetration through an increase in turbidity. Dissolved oxygen rates may be lower as well.

4.10.1.3 Natural Community Impact Minimization

Measures to minimize terrestrial and aquatic impacts should include:

- Minimizing clearing and grubbing activity
- Limiting or eliminating discharges into streams
- Reducing fill slopes at stream/wetland crossings
- Placing drainage structures with care
- Using spanning structures or bottomless culverts over streams
- Reestablishing vegetation on exposed areas, with judicious pesticide and herbicide management
- Scheduling "in-stream" activity during dry or low flow periods
- Using responsible litter control practices

4.10.2 Rare and Protected Species

4.10.2.1 Threatened and Endangered Species

Biological conclusions regarding potential project impacts for the nine federally protected species within the project study area described in Section 3.10.2 are summarized in Table 4-25. More detailed information can be found in the natural resource technical reports for the project (NCDOT and VA DRPT, 2004a, 2008).

Table 4-25
Biological Conclusions for Federally Protected Species in the Study Area

Scientific Name	Common Name	Status	County/State	Biological Conclusion
Haliaeetus leucocephalus	Bald eagle	BGEPA	Richmond, Chesterfield, Mecklenburg/ VA Warren, Vance, Wake/ NC	No Effect for VA1, VA2, and VA3 in Virginia – see discussion below regarding population west of Petersburg, VA No Effect for NC1, NC2, or NC3 in North Carolina
Picoides borealis	Red-cockaded woodpecker	E	Wake/NC	No Effect for all alternatives - No habitat in the project study area
Percina rex	Roanoke logperch	E	Dinwiddie, Brunswick, Mecklenburg/ VA	Informal Section 7 consultation is ongoing with USFWS; surveys will be conducted followed by additional coordination with USFWS

Table 4-25
Biological Conclusions for Federally Protected Species in the Study Area

Scientific Name	Common Name	Status	County/State	Biological Conclusion
Alasmidonta heterodon	Dwarf wedgemussel	E	Chesterfield, Dinwiddie/VA Warren, Vance, Franklin, Wake/NC	Informal Section 7 consultation is ongoing with USFWS; surveys will be conducted followed by additional coordination with USFWS
Pleurobema collina	James River spinymussel	E	Chesterfield/ VA	Informal Section 7 consultation is ongoing with USFWS; surveys will be conducted followed by additional coordination with USFWS
Elliptio steinstansana	Tar River spinymussel	E	Warren, Franklin/NC	May Affect – Not Likely to Adversely Affect for all alternatives
Rhus michauxii	Michaux's sumac	E	Chesterfield, Dinwiddie, Brunswick, Mecklenburg/ VA Franklin, Wake/NC	No Effect for VA2; May Affect – Is Likely to Adversely Affect for VA1/VA3 in Section D only (No Effect for VA1/VA3 in all other sections – see discussion below) No Effect for NC1, NC2, or NC3 in North Carolina
Ptilimnium nodosum	Harperella	E	Mecklenburg/ VA	No Effect for all alternatives - No habitat in the project study area
Aeschyno-mene virginica	sensitive joint-vetch	T	Chesterfield/ VA	No Effect for all alternatives - No habitat in the project study area

The Roanoke logperch (*Percina rex*) is presumed to occur within the study corridor as it crosses over Nottoway River and Stony Creek. The species has been observed in both streams above and below the study corridor and suitable habitat is present where the study corridor crosses these streams. At the request of USFWS, surveys for the Roanoke logperch will be scheduled prior to project construction along the Nottoway River and suitable tributaries where the Roanoke logperch may be found. Construction of the project should not impact Roanoke logperch populations in Nottoway River or Stony Creek if in-stream activities and sedimentation are appropriately minimized.

Additional surveys for listed freshwater mussels will be scheduled prior to project construction for Sappony Creek, Nottoway River, Tar River, Neuse River, and Cedar Creek in order to determine potential project impacts to the dwarf wedgemussel (*Alasmidonta heterodon*), Tar River spinymussel (*Elliptio steinstansana*), and James River spinymussel (*Pleurobema collina*). The results of these surveys will be coordinated with USFWS in continuing informal Section 7 consultation. Stringent erosion controls will be enforced during construction to minimize impacts to the dwarf wedgemussel population downstream of the project crossing at Cedar Creek.

The area of the Michaux's sumac (*Rhus michauxii*) population described in Section 3.10.2 has been avoided in Section D with the VA2 project alternative, 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.

Based on informal Section 7 consultation, the USFWS stated in letter dated November 8, 2004, that "…this project is not likely to adversely affect Michaux's sumac provided the following conditions apply:

- The railway footprint would be located a minimum of 20 feet from the closest extent of the population,
- No construction activity would occur within 20 feet of the closest extent of the population,
- During and following construction, no herbicide treatment would occur within 500 feet of the population…"

Based on this coordination, FRA has determined that the VA2 alternative within Section D of the project would have no effect on the Michaux's sumac. As encouraged by USFWS, the Army National Guard Maneuver Training Center, Fort Pickett, was contacted regarding potential management of the sumac population and coordination is on-going.

The sumac population is located along an inactive portion of the S-line; therefore, the population area is not currently sprayed by CSX for maintenance. Following project construction, typical practice along active lines with high density traffic would be to spray once in the spring, and perform heavy cutting and spraying of the ROW 25 feet from the centerline as needed. The spraying is done using Hi-Rail trucks with booms that can be raised and lowered. The equipment operators use railroad mile post numbers to identify locations along the line where they are prohibited from spraying. During and after construction, the SEHSR project would identify the sumac population area as an area where spraying is prohibited.

4.10.2.2 Bald Eagle and Golden Eagle Protection Act

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large, dominant trees are utilized for nesting sites, typically within one mile of open water. While conducting field surveys for federally listed species, a pair of bald eagles was observed on September 14, 2005, along the Appomattox River, just west of the City of Petersburg, VA. The area was revisited on February 2, 2006 (after leaf fall), to survey nest locations. Two potential nests were found in mature loblolly pine trees along the north bank of the Appomattox River outside the project study area. The nest locations were reported to USFWS and the Virginia Department of Game and Inland Fisheries. Because 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.

4.10.2.3 Migratory Bird Treaty Act

The SEHSR project can have effects on migratory bird populations, including habitat loss, habitat degradation, and habitat fragmentation. Each of the project alternatives passes through areas of developed land, farm fields, and forested areas. However, all alternatives are focused on the existing rail corridor and do not impact large areas of undisturbed land.

4.11 Community Resources

In this section, direct impacts to the human environment and land use from the proposed project are discussed. These issues are directly related to one another; as communities and neighborhoods are affected by development, so too is the land on which we live. This assessment analyzes and reviews critical areas such as communities, facilities, services, environmental justice, and land use planning on a local and regional level.

4.11.1 Socio-Economics

This section assesses the economic benefits that could potentially accrue within the project study area. As stated in the SEHSR Tier I EIS, the addition of the proposed SEHSR service would provide numerous transportation, environmental, and community benefits. An increase in ridership would reduce dependence on highways and airports, thus adding efficiency to the total transportation system. It is anticipated that the construction and operation expenditures associated with the SEHSR program would spur economic activity by creating additional jobs. This would then generate income and sales that would generate additional tax revenues for both Virginia and North Carolina.

4.11.1.1 Economic Impacts from Construction and Operation

Construction of the proposed SEHSR would create new jobs for individuals to upgrade the railroad road bed, install signal and safety devices, build frontage/service roads, improve grade separated crossings, and build bridges to replace grade crossings. Additional jobs, possibly within the study area, could be created within the manufacturing sector to produce the equipment and materials needed to make these improvements. The additional jobs would increase income, thus affecting the economy of the region.

During construction, the economic impact would depend on the location of the firms supplying the labor and materials needed for the project. It is estimated that a high percentage of the new employment during the construction phase would come from within the study area. Communities along the route will also benefit as construction crews spend money in local hotels, restaurants, and shops.

The impact from operation expenditures would likely be more concentrated; the majority of new jobs would likely be created in communities served by the proposed service. Ticket agents and other railroad personnel would be located in these communities and the secondary impacts of their employment would be spread throughout the areas in which the stations are located. Once SEHSR service is in place, there would be additional needs such as maintaining the equipment and the track. The SEHSR Tier I EIS estimated that in North Carolina alone, the SEHSR program would bring $700 million in new state and local tax revenues, $10.5 billion in employee wages over 20 years, over 31,400 new one-year

construction jobs, more than 800 permanent new railroad operation positions, and nearly 19,000 permanent fulltime jobs from businesses which choose to locate or expand in North Carolina because of the SEHSR service. It can be reasonably assumed that similarly positive benefits would accrue in Virginia.

The specific economic impacts to the communities receiving HSR stops (Richmond, VA, Petersburg, VA, La Crosse, VA, Henderson, NC, and Raleigh, NC) are outside the scope of this document, but are anticipated to be positive.

In addition, once the HSR is in place, it is anticipated that additional service could be added to more towns based on feasibility and need. This additional service would operate with the same equipment and speeds, but would have more stops. Similar economic impacts would accrue to these towns.

4.11.1.2 Changes in Economic Activity

In addition to impacts from direct expenditures on system construction and operation, the proposed SEHSR service would increase the flow of travelers between cities along the route and thus enhance economic activity in those communities with station stops. A ridership projection model developed for the SEHSR service by KPMG estimated current demand and projected future travel between cities along the travel corridor, as well as along the entire Atlantic Coast for all modes of travel. Thousands of auto, air, bus, and rail travelers were surveyed to find their stated and revealed preferences. For North Carolina, the study determined that annual intra-state person trips along the Piedmont Crescent between the Raleigh and Winston-Salem areas were almost 1.2 million in 1995. Between Raleigh and Charlotte there were over 900,000 person trips and nearly 1 million between Winston-Salem and Charlotte. Most of these trips were for personal business and other discretionary travel. The next largest category was business trips, followed by recreation trips, which made up less than 25 percent of all trips. Based on current trends and experience along the high speed corridor between New York and Washington, DC, business travel will increase faster than other trips for rail.

To serve these business travelers and all other travelers, the model found that speed seems to be the key. Reduced travel time through increased speed, has a dramatic effect on revenue through increased ridership and graduated fares. Analysis shows that increasing speed on the corridor to 100 mph and adding service frequencies increases ridership by over 300 percent, but increases revenue by over 600 percent with enhanced fares. An example of potential economic and fiscal impacts using North Carolina factors is provided in Table 4-26.

Based on economic projections for Virginia, as presented in the SEHSR Tier I EIS and updated to 2008 dollars, for every $121,400 spent implementing high speed rail, one new permanent job will be created. Each new permanent job will, 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.

Table 4-26 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 high speed rail can provide specific locations with improvements to attract growth. The Southeastern Economic Alliance (SEA), a coalition of thirteen 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, the SEHSR would provide Virginia and North Carolina the infrastructure to remain competitive

4.11.2 Neighborhood and Community Impacts

The neighborhoods and communities along the SEHSR corridor are of many types, ranging from mobile home parks to upscale neighborhoods. Surrounding land uses range from agricultural to commercial to densely developed industrial areas. Commercial, industrial, upscale residential and mixed uses are found along the southern reaches of the project.

Medium sized communities are found in towns such as Dinwiddie, VA, La Crosse, VA, and Henderson, NC. They are typified by older grid patterned street systems close to the heart of the original town center or central business district (CBD). The larger, urbanized communities such as Richmond, VA, Petersburg, VA, Colonial Heights, VA, Wake Forest, NC, and Raleigh, NC, have residential areas typified by a mixture of distinct urban and suburban areas.

4.11.2.1 Community Concerns

Overall, community officials and citizens who provided input during the public outreach effort for the SEHSR project agreed that it would enhance and improve most areas along the corridor and surrounding areas. The SEHSR project is seen as providing an opportunity for business, retail, tourism, and residential growth possibilities. While there was overall support for the SEHSR, the following concerns still remained.

4.11.2.1.1 High Speed Rail Bypassing a Community

Communities not identified as receiving a stop as a part of this project were concerned they would miss out on the economic and community benefits associated with high speed rail. While only five locations are proposed to receive high speed rail stops (Richmond, Petersburg, and La Crosse, VA; Henderson and Raleigh, NC), this does not preclude the addition of other stations in the future. The new or improved rail lines constructed for high speed service would be available for future, conventional passenger rail service once the high speed rail corridor is developed. This option will be given further consideration as the system develops based on user demand along the route.

4.11.2.1.2 Neighborhood Disruptions

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 is 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.

From the Burgess Connector in Dinwiddie County, VA, southward to Norlina in Warren County, NC, the rail corridor is inactive and, in some instances, the tracks have been removed and small portions of ROW sold for driveway access. Communities without active rail lines include the Dinwiddie Courthouse area, McKenney, Alberta, and La Crosse, VA, and Norlina, NC. In these communities and other areas adjacent to the inactive rail line, residents may view the reactivation of rail service as a negative impact on their quality of life. The sights and sounds of the rail would require a degree of adjustment for the families and businesses adjacent to it. However, given the number of trips planned (eight high speed trains and up to eight additional intermodal trains and two to four additional freight trains), and the speed at which the trains will be traveling, exposure to rail activity would be of a limited duration and frequency for those communities without a rail stop. In La Crosse, VA, and Henderson, NC, the duration of exposure to the high speed rail will be greater given that two stops daily are planned for each town.

Residents and businesses within the communities not currently living with an active rail line could also experience a sense of their community being split by the newly active rail line. What has in recent years been a situation of unencumbered access to and from either side of the tracks would now only be possible at designated bridges and underpasses. Given that the vast majority of consolidated crossings were designed to be no more than one mile apart, the change in community travel patterns would not be substantially altered.

There will also be some changes to the visual environment within communities. The required minimum clearance for a road over a rail line is 23 feet from the bottom of the bridge. The required minimum clearance for a rail line over a road is 17 feet. Because of these vertical clearance requirements and topographical constraints, the average new bridge will be between 25 feet and 38 feet high at its tallest point. This is about the height of a three to four-story building. Even in the rural communities with existing rail activity, the new bridge structure will be an obvious, new landmark. Some may see the new structures as a sign of progress whereas others may find it to be inconsistent with their community's setting and sense of place.

Relocations are discussed in detail in Section 4.11.6.

4.11.2.1.3 Safety and Fencing

Because of the speeds at which the SEHSR trains would be traveling, fencing on both sides of the rail line may be necessary in some areas, particularly in urban areas. While the fencing would serve as a physical barrier between communities on either side of the tracks, it would provide a necessary measure of safety to keep vehicles, pedestrians, and animals off of the tracks. Refer to Section 4.16 for additional discussion about fencing.

4.11.2.1.4 Rail Noise & Vibrations

For safety reasons, trains are required to sound their horns when approaching at-grade crossings. Train horn noise would decrease or be eliminated in locations with active rail traffic under the SEHSR project alternatives, 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. Noise and vibration impacts are discussed in greater detail in Section 4.7.

4.11.2.1.5 Traffic Changes & Public Road and Private Drive Closures

Travelers in areas with active rail lines are accustomed to waiting at at-grade crossings for stopped or passing trains. While construction activities and the consolidated or realigned closings may be an initial inconvenience for these travelers, the short-term inconvenience would be offset by having a grade-separated rail crossing that allows for continuous, unimpeded access to and from both sides of the rail line. Regardless of whether a road or drive is consolidated, realigned, or closed, access would be provided to all properties.

Whether the rail line is active or inactive, rail crossing consolidations and associated improvements to adjacent roadways could have an impact on community cohesion

within neighborhoods and communities. Potential impacts were identified if an alternative alignment created a new physical barrier that isolated one part of an established community from another and potentially resulted in a physical disruption to community cohesion. However, the railroad line predates existing development and the railroad already acts as a boundary for many neighborhoods and businesses along the corridor. With the rail line already in existence, such adverse impacts are expected to be minor and are addressed in the discussion that follows.

4.11.2.2 Impacts from Changes to the Transportation Network

The proposed improvements to existing at-grade crossings included in the SEHSR project are in response to documented needs for increased safety. Safety improvements are currently underway on active rail lines in North Carolina and Virginia to consolidate and close crossings where possible, and grade-separate those that remain (i.e., replace with bridges or underpasses) to separate vehicular and pedestrian traffic from rail traffic. The effect of these grade crossing closures is enhanced community safety.

One of the benefits of the SEHSR project is the opportunity to consolidate unsafe and redundant at-grade rail crossings along the corridor into safer, grade-separated crossings that do not adversely affect the surrounding communities. Increased train speeds and frequencies along the SEHSR corridor will require an increased degree of protection at crossings. The safest such measure is the closure and consolidation of at-grade crossings in proximity to each other, rerouting traffic to new or existing bridges or underpasses. In addition, crossing closures can save money by eliminating installation and maintenance costs associated with warning devices, crossing surfaces, and foliage removal to improve sight distance. Consolidating crossings also improves a community's quality of life by eliminating noise from train horns sounded at crossings.

The construction of new railroad bridges and underpasses and the associated roadwork would impact highway traffic through temporary lane closures and changes to traffic patterns. The degree of impact will vary based on the level of service of the roadway, the proximity of alternate routes, and the extent of construction required at a given crossing.

Communities and neighborhoods along the SEHSR corridor have a deep interest in the impacts of the proposed at-grade crossing changes, access consolidations, and road closures. Throughout the design process, meetings were held with local government representatives along the corridor to obtain input on local conditions that would affect design considerations. This information was used to refine proposed designs to better suit the needs of the local communities. The decision to consolidate a crossing in a community considered accessibility and connectivity to the larger transportation network. Local and regional land use and transportation plans were taken into account and natural resource constraints, such as wetlands and cultural resources, were also considered. Descriptions for each crossing and associated roadwork, by alternative, are included in Appendix F. Maps displaying the proposed roadwork are included in Appendix Q.

Because of extensive outreach efforts with localities and communities within the SEHSR corridor, there is a high degree of awareness of the proposed project. As with any project where there are multiple opinions and stakeholders, support for one particular improvement over another is not always unanimous; however, localities and communities have continued to support the overall concept of high speed rail in their respective areas.

To assess potential impacts, the proposed improvements were divided into the following categories and tabulated by section and alternative (Table 4-27).

- Existing Bridge / Underpass Maintained - In some instances, an existing bridge is proposed to be expanded or replaced in the same location.

- Public Crossing Relocated - "Relocated" means the current public road crossing location will be closed and the traffic re-routed to an adjacent, grade-separated, public road crossing via improved roadways, as appropriate.

- Private Crossing Closed, Alternative Access Provided

- New Bridge / Underpass Provided

- Existing Pedestrian-Only Bridge / Underpass Maintained

- New Pedestrian-Only Bridge / Underpass Provided

Undocumented rail crossings such as informal footpaths across the rail line are considered trespassing and, for safety reasons, will be eliminated.

Table 4-27
Crossing Consolidations per Alternative by Section

Section	Action	VA1	VA2	VA3
AA	Existing Bridge / Underpass Maintained	20	20	20
	Public Crossing Relocated	3	3	3
	Private Crossing Closed (Alt Access Provided)	3	3	3
	New Bridge / Underpass	8	8	8
	Existing Pedestrian Bridge / Underpass Maintained	1	1	1
	New Pedestrian Bridge / Underpass	0	0	0
BB	Existing Bridge / Underpass Maintained	3	3	3
	Public Crossing Relocated	2	2	2
	Private Crossing Closed (Alt Access Provided)	1	1	1
	New Bridge / Underpass	2	2	2
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
CC	Existing Bridge / Underpass Maintained	10	10	10
	Public Crossing Relocated	2	2	2
	Private Crossing Closed (Alt Access Provided)	4	4	4
	New Bridge / Underpass	3	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	1	1	1
DD	Existing Bridge / Underpass Maintained	1	1	1
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	1	1	1
	New Bridge / Underpass	3	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0

Table 4-27 Crossing Consolidations per Alternative by Section				
Section	**Action**	**VA1**	**VA2**	**VA3**
	New Pedestrian Bridge / Underpass	0	0	0
A	Existing Bridge / Underpass Maintained	2	2	2
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	3	1	3
	New Bridge / Underpass	3	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
B	Existing Bridge / Underpass Maintained	1	2	1
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	3	4	3
	New Bridge / Underpass	3	2	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
C	Existing Bridge / Underpass Maintained	2	2	2
	Public Crossing Relocated	4	4	4
	Private Crossing Closed (Alt Access Provided)	7	7	7
	New Bridge / Underpass	4	4	4
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
D	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	1	1	1
	Private Crossing Closed (Alt Access Provided)	1	1	1
	New Bridge / Underpass	3	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
E	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	2	2	2
	Private Crossing Closed (Alt Access Provided)	2	1	2
	New Bridge / Underpass	4	4	4
	Existing Pedestrian Bridge / Underpass Maintained	1	1	1
	New Pedestrian Bridge / Underpass	0	0	0
F	Existing Bridge / Underpass Maintained	4	4	4
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	4	4	4
	New Bridge / Underpass	3	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
G	Existing Bridge / Underpass Maintained	0	1	1
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	0	0	0
	New Bridge / Underpass	2	1	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0

Table 4-27 Crossing Consolidations per Alternative by Section				
Section	**Action**	**VA1**	**VA2**	**VA3**
H	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	1	1	1
	Private Crossing Closed (Alt Access Provided)	2	2	2
	New Bridge / Underpass	2	3	2
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
I	Existing Bridge / Underpass Maintained	2	2	2
	Public Crossing Relocated	5	5	5
	Private Crossing Closed (Alt Access Provided)	9	8	9
	New Bridge / Underpass	2	2	2
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	1	1	1
J	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	5	5	5
	New Bridge / Underpass	3	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
K	Existing Bridge / Underpass Maintained	1	2	1
	Public Crossing Relocated	0	1	0
	Private Crossing Closed (Alt Access Provided)	0	0	0
	New Bridge / Underpass	1	0	1
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
L (VA)	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	0	0	0
	Private Crossing Closed (Alt Access Provided)	0	1	0
	New Bridge / Underpass	1	1	1
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
Section	**Action**	**NC1**	**NC2**	**NC3**
L (NC)	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	1	2	1
	Private Crossing Closed (Alt Access Provided)	4	9	4
	New Bridge / Underpass	2	2	2
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
M	Existing Bridge / Underpass Maintained	1	1	1
	Public Crossing Relocated	2	3	2
	Private Crossing Closed (Alt Access Provided)	6	6	6
	New Bridge / Underpass	2	2	2
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0

Table 4-27 Crossing Consolidations per Alternative by Section				
Section	**Action**	**NC1**	**NC2**	**NC3**
N	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	1	1	1
	Private Crossing Closed (Alt Access Provided)	2	2	2
	New Bridge / Underpass	2	2	2
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
O	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	1	1	0
	Private Crossing Closed (Alt Access Provided)	4	6	1
	New Bridge / Underpass	4	3	3
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
P	Existing Bridge / Underpass Maintained	4	4	4
	Public Crossing Relocated	14	14	14
	Private Crossing Closed (Alt Access Provided)	2	2	2
	New Bridge / Underpass	5	5	5
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	1	1	1
Q	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	4	5	4
	Private Crossing Closed (Alt Access Provided)	3	3	3
	New Bridge / Underpass	4	4	4
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
R	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	0	2	0
	Private Crossing Closed (Alt Access Provided)	0	1	0
	New Bridge / Underpass	1	1	1
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	0	0	0
S	Existing Bridge / Underpass Maintained	1	1	1
	Public Crossing Relocated	5	5	5
	Private Crossing Closed (Alt Access Provided)	0	0	0
	New Bridge / Underpass	4	4	4
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	3	3	3
T	Existing Bridge / Underpass Maintained	0	0	0
	Public Crossing Relocated	2	3	2
	Private Crossing Closed (Alt Access Provided)	0	0	0
	New Bridge / Underpass	1	2	1
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	1	1	1

Table 4-27 Crossing Consolidations per Alternative by Section				
Section	**Action**	**NC1**	**NC2**	**NC3**
U	Existing Bridge / Underpass Maintained	3	3	3
	Public Crossing Relocated	3	3	3
	Private Crossing Closed (Alt Access Provided)	2	2	2
	New Bridge / Underpass	4	4	4
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	1	1	1
V	Existing Bridge / Underpass Maintained	13	13	15
	Public Crossing Relocated	3	3	3
	Private Crossing Closed (Alt Access Provided)	1	1	0
	New Bridge / Underpass	6	6	6
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	1	1	0
VA Totals	Existing Bridge / Underpass Maintained	46	49	47
	Public Crossing Relocated	21	22	21
	Private Crossing Closed (Alt Access Provided)	45	43	45
	New Bridge / Underpass	47	45	48
	Existing Pedestrian Bridge / Underpass Maintained	2	2	2
	New Pedestrian Bridge / Underpass	2	2	2
NC Totals	Existing Bridge / Underpass Maintained	22	22	24
	Public Crossing Relocated	36	42	35
	Private Crossing Closed (Alt Access Provided)	24	32	20
	New Bridge / Underpass	35	35	34
	Existing Pedestrian Bridge / Underpass Maintained	0	0	0
	New Pedestrian Bridge / Underpass	7	7	6
Project Totals	Existing Bridge / Underpass Maintained	68	71	71
	Public Crossing Relocated	57	64	56
	Private Crossing Closed (Alt Access Provided)	69	75	65
	New Bridge / Underpass	82	80	82
	Existing Pedestrian Bridge / Underpass Maintained	2	2	2
	New Pedestrian Bridge / Underpass	9	9	8

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. As noted in Chapter 2, all existing at-grade crossings located between proposed and existing bridges or underpasses would be closed and vehicular traffic rerouted to the nearest bridge or underpass. Bridges or underpasses would be located at a maximum distance of approximately one mile apart. In addition, the Annual Average Daily Traffic (AADT) of roads proposed for closure is typically very low, indicating that the numbers of drivers inconvenienced by the consolidations and reroutes would not be substantial. Drivers and pedestrians would experience the benefits of safety improvements via the elimination of at-grade road and pedestrian crossings and improvements to existing access roads for better sight distance and roadway geometrics. In addition, by replacing at-grade crossings with bridges and underpasses, driver and pedestrian access would not be impeded by a passing or stopped train.

The following discussion identifies how the individual communities will be changed and challenged by the proposed project alternatives. Impacts to communities and their resources were assessed for the communities listed below. Impacts from proposed changes to the transportation network from a traffic perspective are provided in Section 4.14.2. Impacts from potential relocations are discussed in Section 4.11.6.

The communities discussed below were chosen because they are formally recognized as communities, towns, or cities, and have the potential to be impacted by the alignments under consideration for the SEHSR project.

4.11.2.2.1 City of Richmond, VA

The areas along the corridor in the City of Richmond are located on the "Southside" between Richmond and Petersburg. Most of the area is developed with industrial and commercial establishments. The VA1, VA2, and VA3 project alternatives all share a common alignment through Richmond that maximizes the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within the City of Richmond are not expected to divide communities or create community barriers. Impacts would primarily be associated with road closures and consolidations and new, grade-separated crossings.

The proposed ROW for the new Maury Street bridge over the existing rail line may require the removal or relocation of several large petroleum storage tanks and small businesses. Relocation of East Commerce Road and a new bridge over the rail line may require the relocation of several businesses in this heavily industrialized part of the city. In these industrial areas, a safe and unimpeded crossing of the rail line should be a welcome improvement to businesses.

Further to the south, the project area is a combination of residential, commercial, and industrial uses. At Ruffin Road, the rail line would bridge the road. The ROW needed for this underpass may require the relocation of several residences and commercial facilities. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced. At Bells Road, a new bridge over the rail line would be constructed. Roadway improvements and ROW may require the acquisition of a portion of the Philip Morris parking lot to the east of the rail line, as well as the relocation of several residences to the west of the rail line. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced. In the City of Richmond, there is no difference between alternatives in the number of estimated relocations.

4.11.2.2.2 Chesterfield County, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment through Chesterfield County that maximizes the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within Chesterfield County are not expected to divide communities or create community barriers. Impacts are the same for all three alternatives and would primarily be associated with road closures and consolidations and new, grade-separated crossings. Station Road is an existing at-grade crossing and serves as the only point of access to Chesterfield County's water treatment plant. Station Road would be realigned with a new, grade-separated crossing provided to

maintain access to the plant. A new road connecting Thurston Road with Chester Road would improve access within the Bellwood community.

4.11.2.2.3 Chester, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment through the community of Chester that maximizes the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within the community of Chester are not expected to divide communities or create community barriers. Impacts are the same for all three alternatives and would primarily be associated with road closures and consolidations and new, grade-separated crossings.

Centralia Road would be relocated with a bridge that crosses both the rail line and Chester Road with a connection to Chester Road. For those traveling on Centralia Road, access to Centralia Road across the tracks would be slightly circuitous in that drivers would be rerouted to Chester Road to reconnect to Centralia Road. The existing rail crossing of Woods Edge Road would be closed. Travelers wanting to cross the rail line in this vicinity would have to travel approximately 1.0 mile to the north to Ruffin Mill Road or approximately 1.5 miles to the south to Pine Forest Drive. To the east of the rail line, a new road connecting Pine Forest Drive with Walthall Industrial Parkway would improve access to the industrial and commercial businesses on this side of the tracks.

4.11.2.2.4 City of Colonial Heights, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment through Colonial Heights that maximizes the use of existing rail ROW. There are no road closures or realigned roadways within Colonial Heights. An additional rail bridge over Cedar Lane would not have a negative effect on travel or adjacent communities. The rail alternatives are proposed to cross over Boulevard US 1 on an expanded rail bridge. This general location represents the northernmost site of four potential SEHSR station locations in the Petersburg area.

4.11.2.2.5 Ettrick, VA

The community of Ettrick straddles the existing railroad corridor. Although located within Chesterfield County, it is a small bedroom community for the City of Petersburg. Recent development within this community has been driven by Virginia State University, which is located within Ettrick. The Amtrak station in Ettrick is one of four potential SEHSR stop locations in the Petersburg area.

The VA1, VA2, and VA3 project alternatives all share a common alignment through Ettrick that maximizes the use of existing rail ROW. Because the rail line is active and the Ettrick rail station is currently in operation, the proposed rail improvements within the community of Ettrick are not expected to divide communities or create community barriers. Impacts are the same for all three project alternatives, and would primarily be associated with road closures and consolidations and new, grade-separated crossings.

ROW required for the realignment and new bridge crossing for Branders Bridge Road, along with the associated roadway improvements, may require the relocation of approximately two homes in the residential development along Maurer Lane. The

realignment and new bridge crossing for Dupuy Road would potentially displace between 15 and 20 homes on the north side of the road between Roosevelt Avenue and Laurel Road. While these homes may be displaced, the Ettrick community as a whole would experience improved access through the area. During final design, further measures to avoid and minimize displacements will be implemented; this will likely lower the numbers ultimately displaced.

4.11.2.2.6 City of Petersburg, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment through Petersburg that maximizes the use of existing rail ROW. The common alignment provides an option for a SEHSR station in the Washington Street area or Collier area. Petersburg officials have consistently supported a SEHSR stop within the city. Because the rail line is active, the proposed rail and roadway improvements within Petersburg are not expected to divide communities or create community barriers. Impacts are the same for all three project alternatives, and would primarily be associated with road closures and consolidations and new, grade-separated crossings. While the Washington Street underpass would be realigned and the existing rail bridge widened, these improvements would not have a negative effect on travel or adjacent communities. At Lincoln Street, the at-grade crossing would be closed but a pedestrian crossing would be provided, maintaining pedestrian access between the communities on either side of the rail.

4.11.2.2.7 Dinwiddie Courthouse Community, VA

The Dinwiddie Courthouse community is clustered around the intersection of Boydton Plank Road (US 1) and Courthouse Road, approximately 600 feet to 2,000 feet to the west of the inactive rail line. It is a small community whose main business and residential core is along Boydton Plank Road. The VA1 and VA3 project alternatives have a common alignment through the Dinwiddie Courthouse area, diverging from the existing rail alignment onto new alignment to improve train performance by straightening two curves. The VA1 and VA3 project alternatives would require a new bridge over the railroad for Carson Road. There are no communities within the new alignment area. Therefore, the portion of new rail alignment would not be considered adverse or disruptive.

To maximize the use of existing rail ROW, the VA2 project alternative would follow the existing rail alignment until it crosses Courthouse Road. From this point southward, the VA2 project alternative would be on new location to straighten a curve; the VA1 and VA3 project alternatives are on common new alignment, separate from the VA2 project alternative. Once back on the existing rail ROW, all three alignments would require the closing of existing Gatewood Road, realigning it with a new underpass (i.e., rail-over-road). The realignment of Gatewood Road closes its current at-grade rail crossing, but shifts the road approximately 600 feet to the southwest. For any of the proposed alignments, aside from the short-term disruption from construction activities, the realignment of Gatewood Road would have negligible adverse effects on the community.

4.11.2.2.8 McKenney, VA

Although the rail line is currently inactive, the Town of McKenney is an old railroad village and most of the development in town has occurred along the rail line and Factory

Street. The VA1, VA2, and VA3 project alternatives are on a common alignment through McKenney that maximizes the use of the existing rail line and ROW. Town officials were concerned about preserving the historic nature and features of their town with any proposed grade-separated rail crossing. The current designs for a bridged crossing of the railroad at Doyle Boulevard were developed through coordination efforts with the Town. The designs call for lowering the existing rail alignment approximately 15 feet, and raising the elevation of Doyle Boulevard approximately 15 feet, so that Doyle Boulevard can cross over the railroad on a bridge in the existing location. This design feature would help to maintain the historic setting of Doyle Boulevard and the surrounding area. Aside from the short-term disruption from construction activities, the proposed road and rail improvements would have minor adverse effects on community cohesion.

4.11.2.2.9 Alberta, VA

The Town of Alberta is an old railroad village with the intersection of the inactive CSX and NS rail lines at its core. The town has minimal development in terms of industrial, commercial, and retail establishments. Development and neighborhoods are relatively dispersed within the town limits. The Town of Alberta is actively pursuing downtown revitalization and is hopeful that the SEHSR project would provide positive economic benefits to the town.

Through town, the VA1, VA2, and VA3 project alternatives are on a common alignment along the inactive CSX rail corridor that maximizes the use of the existing rail ROW. Because of this, improvements to the rail corridor itself would have minimal effect on adjacent neighborhoods and businesses. However, roadway improvements associated with the rail improvements would be substantial, including road closings, road realignments, and grade-separated rail crossings. The improvements are the same for all three project alternatives.

The current at-grade rail crossing of Church Street would be closed and Church Street would be realigned approximately 1,700 feet to the northeast, crossing over the railroad on a bridge. This realignment would provide a better connection with Littlemont Road and the new residential development currently under construction around Brunswood Avenue. The new Littlemont Road bridge over the rail line would be approximately 31 feet high. Several of the homes on the southeast side of Littlemont Road may be displaced because of the need for ROW for the new bridge approach. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

The current at-grade rail crossing of Second Avenue would be closed and the road realigned through an undeveloped parcel approximately 500 feet to the northeast. While this undeveloped parcel has been subdivided, the realignment of Second Avenue through it would not disrupt any existing neighborhoods. The realigned road would include an approximately 30-foot high bridge over the railroad.

The current at-grade rail crossing of Main Street would be closed and Main Street would be realigned approximately 200 feet to the north, crossing over the railroad on a bridge. This roadway improvement would not separate communities or have an adverse effect on community cohesion.

The Tobacco Heritage Trail (THT) follows the inactive NS rail line through town. The Town of Alberta includes the THT as a vital component of its downtown revitalization effort as it would stimulate tourism in the region. To ensure the safety of those using the THT, a new, grade-separated pedestrian bridge over the rail line would be constructed where the THT intersects with the proposed SEHSR. Given that the THT follows an inactive rail line through a town built around the railroad, the re-introduction of passenger rail in the area would be in keeping with the historic context of the Town of Alberta and would not likely have a negative impact on the trail user's experience.

4.11.2.2.10 La Crosse, VA

The Town of La Crosse is becoming a suburb of South Hill, a larger town approximately 2.5 miles to the northwest. La Crosse was originally built around the now inactive railroad corridor. The town's original rail station was eventually converted into the now-closed La Crosse Hotel. Given its proximity to South Hill and that the town was a former rail stop, the town has actively pursued and succeeded in being identified as a location that would have a high speed rail stop.

Through town, the VA1, VA2, and VA3 project alternatives are on a common alignment along the inactive rail corridor that maximizes the use of the existing rail ROW. Improvements to the rail corridor itself would have minimal disruptive effects on adjacent neighborhoods and businesses. However, there are several roadway improvements associated with the rail improvements, including road closings, road realignments, and grade-separated rail crossings. The proposed roadway improvements are the same for all three project alternatives.

The current at-grade rail crossing of Main Street would be closed and relocated to a new, grade-separated crossing (rail-over-road) approximately 1,000 feet to the south. This crossing would connect to a traffic circle that would include the intersections of Meredith Street and St. Tammany Road. The traffic circle element was designed in response to community requests that traffic be maintained on downtown roads, especially Main Street. Closing the existing Main Street rail crossing and relocating the feeder roads to it would alter the character of the downtown area. However, the change is welcomed by the town in the hope that the future rail stop would encourage business, residential, and tourism development opportunities.

As with Alberta, the THT follows the inactive NS rail line through town. To ensure the safety of those using the THT, a railroad bridge would be constructed where the THT intersects with the proposed SEHSR, providing a pedestrian-only underpass. Given that the THT follows an inactive rail line through a town built around the railroad, the re-introduction of passenger rail in the area would be in keeping with the historic context of the Town of La Crosse, and would not likely have a negative impact on the trail user's experience.

4.11.2.2.11 Norlina, NC

Like Alberta and La Crosse, VA, the Town of Norlina, NC, is an old railroad town and its development has been evenly divided along either side of the now-inactive CSX line. In the northern half of Norlina, the NC2 project alternative follows the existing rail corridor, maximizing the use of existing rail ROW. The NC1 and NC3 project alternatives are on

common alignment in this area, and diverge from the CSX S-line to the east. The NC1 and NC3 project alternatives then join the old SA-line ROW near Town and Country Road, thereby improving train performance by straightening curves.

Close to Main Street and US 158, the alternatives converge and share a common alignment on the existing and active rail corridor. In general, reactivation of rail operations in the northern half of Norlina would be disruptive to the community in that the rail line has been inactive for over 20 years. For the NC2 project alternative, reactivation of railroad operations could be seen as a barrier between residences and businesses on either side of the tracks, creating new travel patterns for access across the rail line. The relocation of Warren Plains Road under either the NC1/NC3 or NC2 project alternatives would have essentially the same effect on travel patterns and the community as a whole. However, under the NC2 project alternative, the intersection of the newly aligned Warren Plains Road with US 1 would be disruptive to one home as it would be surrounded on three sides by the relocated road.

4.11.2.2.12 Middleburg, NC

Middleburg is an old town that developed along US 1 and the active CSX line. Most of the town's development is located west of US 1 and the railroad corridor. The NC1 and NC2 project alternatives are on common alignment through Middleburg, maximizing the use of the existing rail ROW. The NC3 project alternative is on new location to the southeast. Under the NC1 and NC2 project alternatives, private rail crossings would be closed in town and consolidated into one crossing at S. Carroll Street, with a bridge over the railroad. Under the NC3 project alternative, Carroll Street would bridge over the new rail line further to the east. Because of the existing terrain, this new road-over-rail crossing would be raised approximately 30 feet. Overall, the proposed road consolidations and crossings would not have an adverse effect on travel patterns and quality of life within this predominately agricultural community.

4.11.2.2.13 City of Henderson, NC

Henderson is equally developed on either side of the existing CSX S-line. The NC1, NC2, and NC3 project alternatives are on a common alignment through Henderson that maximizes the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within Henderson are not expected to divide communities or create community barriers. Impacts are the same for all three alternatives, and would primarily be associated with road closures and consolidations and new bridges or underpasses. As with La Crosse, VA, the town has actively pursued and succeeded in being identified as a location that would have a high speed rail stop.

Of the 20 existing, at-grade road/rail crossings within the vicinity of Henderson, 13 would be closed and consolidated into 6 new or existing grade-separated crossings. The new crossings include Main Street, Andrews Avenue, Alexander Avenue, JP Taylor Road, and Bearpond Road. The existing crossings include Charles Street and the US 1 Bypass. A new pedestrian crossing would be located at Peachtree Street. The ROW required for the construction of the Alexander Avenue bridge over the rail line and its extension to Dabney Drive would potentially require the relocation of between one and five businesses. However, this would improve access for both sides of the rail line in this

area. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

Because the roadway network is well developed within Henderson, the road closures and travel reroutes would not have an adverse effect on travel patterns or the quality of life within Henderson. Henderson residents and business owners hope that the future rail stop would encourage business, residential, and tourism development opportunities.

4.11.2.2.14 Kittrell, NC

The NC1, NC2, and NC3 project alternatives are on a common alignment through Kittrell that maximizes the use of existing rail ROW. The majority of Kittrell's development is to the east of the existing rail line. Because the rail line is active, the proposed rail improvements within Kittrell are not expected to divide communities or create community barriers. As such, impacts would primarily be associated with road closures and consolidations and new, grade-separated crossings.

While the existing at-grade crossing of E. Main Street would be closed, Church Street would be extended to connect to Kittrell College Road and would include a bridge over the rail line. Because of grade requirements for the extension of Church Street to Kittrell College Road, approximately one to five homes located along this two block section, between US 1 and the rail line, may be displaced. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

4.11.2.2.15 Franklinton, NC

The Town of Franklinton is an old railroad town that developed along the active rail line and old US 1. Commercial development is primarily west of the rail line. The NC1, NC2, and NC3 project alternatives are on a common alignment through Franklinton that maximizes the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within Franklinton are not expected to divide communities or create community barriers. Impacts are the same for all three project alternatives, and would primarily be associated with road closures and consolidations and new, grade-separated crossings.

Existing at-grade crossings at Pearce, Joyner, Mason College, and Hawkins Streets would be closed. Automobile travelers needing to cross the rail line would use the existing (but improved) Green Street underpass or the realigned and new Cedar Creek Road bridge over rail that connects to Main Street. Pedestrian-only access would be possible via a new pedestrian bridge between Mason and Front Streets, and pedestrian underpasses between E. College and W. College Streets, and south of Hawkins Street. Because the roadway network is well developed within Franklinton, the road closures and travel reroutes would not have an adverse effect on travel patterns or the quality of life within Franklinton.

4.11.2.2.16 Youngsville, NC

This small community is located adjacent to the active rail corridor and old US 1. It is a bedroom community of the Wake Forest area. Through town, much of the development

faces the railroad line. The NC1, NC2, and NC3 project alternatives essentially share a common alignment through Youngsville that maximizes the use of existing rail ROW. While the NC1 and NC3 project alternatives diverge to the west on common new alignment at the southern town limits, the impact on the town and the difference between alignments at this point would be minimal. Because the rail line is active, the proposed rail improvements within Youngsville are not expected to divide communities or create community barriers. Impacts would primarily be associated with road closures and consolidations and new, grade-separated crossings.

A major feature of the proposed improvements would be the lowering of the rail corridor by approximately 30 feet between Main Street and Winston Street in order to maintain the architectural and historic integrity of the town. The lowering of the rail line through this area would require the closing of both East Railroad Street and West Railroad Street on both sides of the rail line. The end result would be a new Main Street bridge over the rail line; however, the crossing would maintain its current grade. The Winston Street and Pine Street at-grade crossings would be closed, while a new pedestrian bridge would be built over the railroad connecting E. Franklin Street to W. Franklin Street. To the east of the railroad, during construction of the Main Street railroad bridge, Nassau Street would be used as a detour to a new connection at Fleming Road. In addition, on the north side of town, a new perpendicular street would connect Nassau Street/Fleming Road on the east to NC 96/US 1/Park Avenue on the west, crossing over the railroad on a bridge. The inconvenience of the road closures and consolidations in Youngsville would be offset by the improved connectivity and safety of roads and the maintenance of the historic integrity of the town.

4.11.2.2.17 Wake Forest, NC

The Town of Wake Forest is the second largest urban area in the North Carolina SEHSR corridor and is considered a bedroom community for the City of Raleigh. Development has occurred on both sides of the active railroad corridor over the years. The NC1, NC2, and NC3 project alternatives essentially share a common alignment through Wake Forest that maximizes the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within Wake Forest are not expected to divide communities or create community barriers. Impacts would primarily be associated with road closures and consolidations and new, grade-separated crossings.

Wake Forest officials were concerned about maintaining pedestrian access across the rail line. Undocumented pedestrian crossings would be eliminated near Brick/N. White Streets and near Cedar Avenue/ Brewer Avenue/N. White Street, and a new grade-separated, pedestrian-only bridge over the railroad would be constructed near the latter of the two. While the Elm Avenue crossing would be closed, new crossing access would be available at a realigned Holding Avenue. The realignment would connect E. Holding to W. Holding Avenue. However, this realignment may require the displacement of several homes along W. Holding Avenue and S. Main Street. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

The existing crossing at Friendship Chapel Road would be closed and a new road would be constructed to the east that connects to the NC 98 Bypass. This new access point to NC 98 would provide an improvement to the traffic network and would not disturb residential communities.

The three project alternatives differ slightly in their grade-separated crossing of Rogers Road (road over rail). While there are slight variations among the three alignments, the general design footprint and community impact are essentially the same with regard to improving access to Heritage Middle and Elementary Schools to the east of the crossing and Wake Forest – Rolesville Middle School to the west of the new crossing. However, to eliminate impacts to these schools and to minimize impacts to the subdivision adjacent to the eastern side of the rail line, all three alignments would likely require the displacement of approximately two of the privately-owned, large ball fields belonging to Capital City Baseball Park on the western side of the rail line. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

4.11.2.2.18 City of Raleigh, NC

As North Carolina's state capitol, Raleigh is the largest urban area in the North Carolina rail corridor. A variety of residential, commercial, and industrial development has occurred on both sides of the active railroad corridor over the years. The NC1, NC2, and NC3 project alternatives share a common alignment through the northern and central portions of Raleigh, but are on separate alignments towards the SEHSR project's southern terminus at the Boylan Wye. The alignments maximize the use of existing rail ROW. Because the rail line is active, the proposed rail improvements within Raleigh are not expected to divide communities or create community barriers. Impacts would primarily be associated with road closures and consolidations and new, grade-separated crossings.

Outside the Route I-440 Beltline, Durant Road would become grade-separated with a bridge over the rail line for the three alternatives which are on common alignment. The associated Durant Road improvements may require the relocation of one business. Additional ROW may be required from the front parking lot area of the City of Raleigh's Fire Station 22 to the west of the rail line, as well as the parking lot for a business to the east of the rail line. ROW from a townhome community and a single-family neighborhood would be required, but no displacements would be necessary. The new Durant Road bridge would provide unimpeded access across the rail line; a feature that would be especially beneficial when Fire Station 22 responds to calls east of the rail line.

The three alternatives are on common alignment at Gresham Lake Road, and would require a new Gresham Lake Road bridge over the rail line. The new bridge and associated roadway improvements would provide unimpeded ingress and egress to the adjacent industrial areas on either side of the rail.

The three alternatives are on common alignment and would maintain the existing bridges at I-540, Old Wake Forest Road, Spring Forest Road, and Atlantic Avenue. Therefore, there would be no disruption to existing access at these crossings. A new rail bridge over Millbrook Road would be required for the NC1, NC2, or NC3 project alternatives. Aside from the temporary inconveniences associated with construction activities, the new rail bridge would improve ingress and egress through this commercial/industrial area.

The three project alternatives are on common alignment at New Hope Church Road, and would require a new bridge over the rail line in this location. Roadway improvements associated with the grade-separated crossing would include St. Albans Drive, Tarheel

Drive, Craftsman Drive, and New Hope Church Road. These improvements would provide unimpeded access between the commercial area to the west of the rail line and the many residential communities to the east of the line.

The closure of the Wolfpack Lane rail crossing would pose a minor inconvenience for travelers in the area. For those east of the tracks wanting to travel west, the closest rail crossing would be via Atlantic Avenue to Six Forks Road, approximately 3,500 feet to the south. For those west of the tracks wanting to travel to the east, the closest rail crossing would be via Tarheel Drive to New Hope Church Road, approximately 4,500 feet to the north. Given the industrial and commercial nature of the area and the relative short reroutes, the reroutes would not split or disrupt communities nor would they have a substantial impact on access to the businesses in the area.

Inside the Beltline, the NC1, NC2, and NC3 project alternatives would maintain the existing I-440 bridge, replace the existing bridges over Six Forks Road, and construct a second bridge adjacent to the existing bridge over Hodges Street. This would result in minimal community disruption.

Remaining on common alignment, the NC1, NC2, and NC3 project alternatives would require a new Whitaker Mill Road bridge over the rail line. This would likely result in the displacement of several industrial buildings for the realignment of Whitaker Mill Road. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

The existing underpasses at Capital Boulevard, Wade Avenue, Peace Street, Johnson Street, Tucker Street, W. North Street, and Capital Boulevard would be maintained for the NC1, NC2, and NC3 project alternatives. Under the NC1/NC2 project alternatives, Fairview Road would remain open. However, under the NC3 project alternative, Fairview Road would be closed. ROW required for the NC3 rail improvements would necessitate the taking of several businesses in this area. For those west of the rail crossing, the closest reroute to the east would be via Wade Avenue, approximately 1,600 feet to the south. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

Under the NC1/NC2 project alternatives, Harrington Street (near North Street) and West Street would be closed and no new road structure would be constructed. However, a new pedestrian underpass would be built at this Harrington Street location. The closure of these two roads would take the form of roadway cul-de-sacs on either side of the rail crossing. Harrington Street would also be closed at Jones Street due to the new bridge at Jones Street. At Jones Street, the NC1 or NC2 project alternatives would require a new bridge over the rail line, whereas the NC3 project alternative would facilitate the closing of this crossing. Given the well-developed roadway network, inconveniences associated with reroutes would be minimal. Under the NC3 project alternative, both Harrington Street and West Street would remain open and no new pedestrian underpass would be necessary.

The existing bridges at Hillsborough Street and Morgan Street would be maintained for all three alignments.

At Hargett Street, the NC1, NC2, and NC3 project alternatives would require a new bridge over the rail line. The NC1 and NC3 project alternatives replace an existing rail

diamond near Boylan Avenue with a turnout, resulting in a shorter bridge over Hargett Street compared to the NC2 project alternative. All alternatives would potentially result in the displacement of several businesses; however, all efforts will be made to minimize impacts in final design. In addition, Harrington Street would be closed on either side of Hargett to accommodate the Hargett Street improvements. Given the well-developed roadway network, inconveniences associated with re-routes would be minimal.

The NC1, NC2, and NC3 project alternatives would maintain the existing Boylan Avenue bridge over the rail line. Therefore, disruptions and reroutes would be avoided.

4.11.3 Community Facilities and Services

The effect of rail crossing consolidations and road closures on community facilities and services such as schools, places of worship, and emergency services are evaluated in this section. Noise and vibration impacts to community facilities and services are discussed earlier, in Section 4.7. An evaluation of impacts to parks and recreation areas is provided in Section 4.13.

4.11.3.1 Schools

There are 30 educational facilities located within the designated communities of the project corridor; with 12 in Virginia and 18 in North Carolina. The schools potentially impacted by the proposed alternatives were evaluated in light of changes in accessibility and safety improvements due to elimination of at-grade crossings. Table 4-28 provides a summary of the impacts associated with each alternative by section. As previously mentioned, noise and vibration impacts at these sensitive receptors are addressed in Section 4.7.

Overall, there would be a net benefit to all schools from roadway safety improvements provided by grade-separated rail crossings (bridges and underpasses), the elimination of at-grade rail crossings, and the addition of pedestrian-only crossings. Inconveniences associated with construction activities would be temporary. The negative impacts of potentially longer driving distances to cross the rail line would be minimal and offset by the benefits gained in safety and unimpeded access. Table 4-28 displays the impacts to schools by project section.

Table 4-28
Impacts to Schools by Section

Section	Map Sheet	Location	School	Impacts		
				VA1	VA2	VA3
AA	4	Richmond, VA	Ruffin Road Elementary	Elimination of at-grade crossing and Ruffin Rd underpass would provide safer travel and unimpeded access (same for all alternatives).		
	7	Chesterfield County, VA	Bensley Elementary	No impact (same for all alternatives).		
	8	Chesterfield County, VA	Perrymont Middle	Realignment and new grade-separated bridge for Kingsland road would improve safety and provide better access to the school at Perrymont Road (same for all alternatives).		

Table 4-28 Impacts to Schools by Section						
Section	Map Sheet	Location	School	Impacts		
				VA1	VA2	VA3
BB	12	Chesterfield County, VA	Chester Middle	No impact (same for all alternatives).		
CC	17	Colonial Heights, VA	North Elementary	No impact (same for all alternatives).		
	18	Colonial Heights, VA	Lakeview Elementary	No impact (same for all alternatives).		
	20	Ettrick, VA	Ettrick Elementary	No impact (same for all alternatives).		
	24	Petersburg, VA	JEB Stewart Elementary	No impact (same for all alternatives).		
	25	Petersburg, VA	Westview Elementary	No impact (same for all alternatives).		
DD	37	Dinwiddie County, VA	Southside Elementary	Improved, safer access from the east via Quaker Road realignment with new grade separated bridge over rail and new inter-section with Boydton Plank Road (same for all alternatives).		
	39	Dinwiddie County, VA	Dinwiddie Middle	Improved, safer access from the southeast via Honeycutt Road realignment with new grade separated bridge over rail (same for all alternatives).		
A	--	Dinwiddie County, VA	N/A	N/A – no schools in Section		
B	--	Dinwiddie County, VA	N/A	N/A – no schools in Section		
C	51	McKenney, VA	Sunnyside Elementary	Doyle Blvd becomes new grade separated bridge over rail, improving access to Sunnyside Road and Sunnyside School (same for all alternatives).		
D to L	--	N/A	N/A	N/A – no schools in Section		

Table 4-28 Impacts to Schools by Section						
Section	Map Sheet	Location	School	Impacts		
				NC1	NC2	NC3
L	--	N/A	N/A	N/A – no schools in Section		
M	99	Norlina, NC	Northside Elementary	Realignment of Warren Plains Rd with bridge over new rail alignment and direct connection to US 1, improves safety and access from the southeast.	Realignment on Warren Plains Rd with bridge over rail, looping onto US 1 improves safety and access to school from the southeast.	Same as NC1
N & O	--	N/A	N/A	N/A – no schools in Section		
P	108	Middleburg, NC	E.O Young Elementary	Closure of existing Carroll Street crossing and realignment, with new bridge over existing rail, improves access to school from the south.	Same as NC1	Closure of existing Carroll Street crossing and realignment with new bridge over new rail improves access to school from the south.
	110	Middleburg, NC	Carver Elementary	Realignment of Carver School Road improves access to school (same for all alternatives).		
	112	Henderson, NC	Northern Vance High	Improvements to Warrenton Road (realignment and new rail bridge) improve access to school (same for all alternatives).		
	115	Henderson, NC	Henderson Middle	No impact to nearby Charles Street underpass which provides access to school (same for all alternatives).		
	116	Henderson, NC	L.B. Yancey Elementary	No Impact (same for all alternatives).		

Table 4-28 Impacts to Schools by Section						
Section	Map Sheet	Location	School	Impacts		
				NC1	NC2	NC3
Q	118	Henderson, NC	Zeb Vance Elementary	Direct access from Peter Gill Road would be closed and rerouted to new Wildlife Lane extension, and new underpass of the rail. New route would be longer but unimpeded and safer with removal of at-grade rail crossing (same for all alternatives).		
	121	Kittrell, NC	Kittrell Job Corps Center	Improved, unimpeded access from the east with extension of Church Street and its bridging of rail line (same for all alternatives).		
R	--	N/A	N/A	N/A – no schools in Section		
S	127	Franklinton, NC	Franklinton High	Rail crossing consolidations limit travel from eastern side of rail line to school on western side of rail line. From new access road and underpass near Massenburg Street, the next crossing to south would be a pedestrian bridge at Mason Street. Existing underpass at Green Street would be replaced for better clearance (same for all alternatives).		
	128	Franklinton, NC	Franklin-ton Elementary	Access to school from east of rail line would be safer and unimpeded with two new pedestrian only underpasses near College Street and Hawkins Street (same for all alternatives).		
T	132	Youngsville, NC	Youngsville Elementary	Access to school from east of rail line would be safer and unimpeded with new Main Street bridge over rail. Main Street connects to US 1 where school is located (same for all alternatives).		
U	136	Wake Forest, NC	Wake Forest Elementary	Rail crossing consolidations limit travel from eastern side of rail line to school on western side of rail line. From existing underpass at Roosevelt Avenue southward, the next rail crossing would be a new bridge at realigned Holding Avenue , a distance of approximately 3,500 feet (same for all alternatives).		
	137	Wake Forest, NC	Heritage Elementary	New Rogers Road bridge over rail line provides improved, safer, and unimpeded access to school from west of rail line (same for all alternatives).		
	137	Wake Forest, NC	Heritage Middle	New Rogers Road bridge over rail line provides improved, safer, and unimpeded access to school from west of rail line (same for all alternatives).		
	138	Wake Forest, NC	Wake Forest – Rolesville Middle	New Rogers Road bridge over rail line provides improved, safer, and unimpeded access to school from east of rail line (same for all alternatives).		
V	144	Raleigh, NC	Millbrook High	No impact (same for all alternatives).		

Table 4-28 Impacts to Schools by Section						
Section	Map Sheet	Location	School	Impacts		
				NC1	NC2	NC3
	149	Raleigh, NC	Peace College	No impact (same for all alternatives).		
	149	Raleigh, NC	Raleigh Charter High	No impact (same for all alternatives).		

4.11.3.2 Places of Worship

There are 100 places of worship located within the SEHSR corridor, with 32 in Virginia and 68 in North Carolina. The places of worship potentially impacted by the proposed alternatives were evaluated in light of changes in accessibility and safety improvements due to elimination of at-grade crossings. In terms of the human environment, a community's place of worship is very important to the lifestyle and overall health of the population. A summary of the impacts to places of worship associated with each alternative by section is provided in Table 4-29. As mentioned previously, noise and vibration impacts at these sensitive receptors are addressed in Section 4.7.

Overall, there would be a net benefit to all places of worship from roadway safety improvements provided by grade-separated rail crossings, the elimination of at-grade rail crossings, and the addition of pedestrian-only crossings. Inconveniences associated with construction activities would be temporary. The negative impacts of potentially longer driving distances to cross the rail line would be minimal (less than 1 mile) for most places of worship, and offset by the benefits gained in safety and unimpeded access. However, there are 13 churches where one or more of the SEHSR design alternatives may require ROW: Shekinah Temple Church in Richmond, VA; Church of God in Christ in Richmond, VA; Historic First Baptist Church in Chester, VA; Mount Calvary Baptist Church in Dinwiddie County, VA; Warfield Baptist Church in Alberta, VA; Wise Baptist Church in Warren County, NC; New Creation Church, in Norlina, NC; Manson Baptist Church in Warren County, NC; St. John's Episcopal Church in Henderson, NC; Cotton Memorial Presbyterian Church in Henderson, NC; Kittrell Church of God in Vance County, NC; Tri-Area Ministry, in Wake Forest, NC; and the Deliverance Holy Church of God, in Raleigh, NC. Of these, one or more project alternatives may result in the relocation of the Warfield Baptist Church in Alberta, VA, and the New Creation Church, in Norlina, NC.

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				VA1	VA2	VA3
AA	3	Richmond, VA	All Saints Apostolic Church, 2001 Royall Ave.	Unimpeded access from the east via realignment of Commerce Road and a new bridge over rail to a new connection to Bellemeade Road (same for all alternatives).		
	4	Richmond, VA	Shekinah Temple Church of Our Lord Jesus Christ, 2102 Ruffin Rd.	Construction of new Ruffin Road underpass would require some ROW from church (same for all alternatives).		
	4	Richmond, VA	Church of God in Christ, 2208 Summer Hill Ave.	ROW may be required for extension of Lynnhaven Avenue along west side of the church. Access to the church would be improved through the new bridge over the railroad at Ruffin Road, one block south (same for all alternatives).		
	8	Chesterfield County, VA	Kingsland Baptist Church, 8801 Perrymont Rd.	Access to the church would be improved due to an extension of Kingsland Road, which would cross the railroad on a bridge (same for all alternatives).		
	10	Chester, VA	Historic First Baptist Church, 4412 Centralia Rd.	Small amount of ROW needed to accommodate new access west of property through adjacent undeveloped property (same for all alternatives).		
	10	Chester, VA	Centralia Presbyterian Church, 4625 Centralia Rd.	Access across the railroad will be improved through realignment of Centralia Road, which includes a bridge over the railroad and Chester Road (same for all alternatives).		
BB	12	Chester, VA	Chester Church of Christ, 12100 Winfree St.	Access from the north will not be altered, while there will be improved access from the south due to the new underpass at Curtis Street (same of all alternatives).		
	12	Chester, VA	St. John's Episcopal Church, 12201 Richmond St.	Access from the north will not be altered, while there will be improved access from the south due to the new underpass at Curtis Street (same of all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				VA1	VA2	VA3
CC	17	Colonial Heights, VA	Calvary Baptist Church, 15800 Woods Edge Rd.	No impact (same for all alternatives).		
	18	Colonial Heights, VA	Church of Nazarene, 601 Ellerslie Ave.	No impact (same for all alternatives).		
	18	Chesterfield County, VA	Kingdom Hall, 3635 Halifax Rd.	No impact (same for all alternatives).		
	18	Colonial Heights, VA	St. Michael's Episcopal Church, Old Town Rd.	No impact (same for all alternatives).		
	19	Chesterfield County, VA	Third Presbyterian Church, 1660 Dupuy Rd.	Access to church from east of rail line would be improved with new grade-separated crossing of Dupuy Road (same for all alternatives).		
	20	Ettrick, VA	Macedonia Tabernacle, 3615 E. River Rd.	No substantive change in access (same for all alternatives).		
	20	Ettrick, VA	God Mission of Faith Church, 3718 East River Rd.	No substantive change in access (same for all alternatives).		
	24	Petersburg, VA	Shining Light Pentecostal Holiness Church, 1417 Farmer St.	No substantive change in access (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				VA1	VA2	VA3
CC	25	City of Petersburg, VA	Greater Faith AME Zion Church, 1301 Youngs Rd.	Vehicular access would be altered in that the at-grade rail crossing of Lincoln Street would be closed. Vehicular traffic from east of the rail line would be rerouted a maximum of 1.5 miles to access the church. Pedestrian access would be improved with a pedestrian-only, grade-separated crossing at Lincoln Street (same for all alternatives).		
	25	City of Petersburg, VA	New First Baptist Church, 1346 Grant Ave.	No substantive change in access (same for all alternatives).		
	25	City of Petersburg, VA	Zion Apostolic Church, 1601 Youngs Rd.	No substantive change in access (same for all alternatives).		
DD	--	N/A	N/A	N/A – no places of worship in Section		
A	38	Dinwiddie County, VA	Olive Branch Baptist Church, 11119 Boydton Plank Rd.	No impact (same for all alternatives).		
B	41	Dinwiddie County, VA	Smyrna Baptist Church, 18725 Carson Rd.	No substantive change in access (same for all alternatives).		
C	45	Dinwiddie County, VA	Mount Calvary Baptist Church, 16609 Glebe Rd.	Small amount of ROW needed along the front of church property to accommodate realignment of Glebe Road. Access across the railroad would be improved due to new bridge over railroad on Glebe Road (same for all alternatives).		
D	54	Brunswick County, VA	Lovely Zion Baptist Church, Lovely Zion Rd.	No substantive change in access.	Minor roadwork within existing roadbed in front of the church, but no ROW required.	Same as VA1

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				VA1	VA2	VA3
D	60	Brunswick County, VA	Mercy Seat RZUA Church, Waqua Creek Rd.	Kress Rd. to the north will be realigned with a bridge over the railroad, but no substantive change in access.	No impact.	Same as VA1
	62	Brunswick County, VA	Warfield Baptist Church, 7318 Flat Rock Rd.	ROW requirements for new Flat Rock Rd bridge over rail may displace church.	Although alignment of VA2 is slightly to the east of VA1/VA3, the new Flat Rock Rd bridge for this alternative may also displace church.	Same as VA1
E	66	Alberta, VA	United Methodist Church, 304 Church St.	Church St. Littlemont Rd. would be realigned and cross the railroad on a bridge. Roadwork would end near the church, but no ROW required (same for all alternatives).		
	66	Alberta, VA	Trinity-St. Mark's Episcopal Church, 194 Connelly St.	No substantive change in access (same for all alternatives).		
F to H	--	N/A	N/A	N/A – no places of worship in Section		
I	83	La Crosse, VA	Morning Star Apostolic Church, 142 Morris Town Circle	Access would be altered in that the crossing of Morris Town Circle crossing would be closed. Travelers from the east of the railroad tracks would have to travel northward to Hillcrest Road (maximum reroute of 1.25 miles) to access the church (same for all alternatives).		
	83	La Crosse, VA	First Baptist Church, Marengo Rd.	Access would be altered in that the Morris Town Circle crossing south of the church would be closed. Travelers west of the railroad tracks would utilize a new underpass at a re-configured Main Street, less than .5 miles north.		

Table 4-29 Impacts to Places of Worship by Section						
Section	**Map Sheet**	**Location**	**Place of Worship**	**Impacts**		
				VA1	**VA2**	**VA3**
I	83	La Crosse, VA	Mecklenburg United Methodist Church, 6503 Marengo Rd.	Access would be altered in that the Morris Town Circle crossing north of the church would be closed. Travelers west of the railroad tracks would utilize a new underpass at a re-configured Main Street, less than .75 miles north.		
J	85	Mecklenburg County, VA	Pleasant Hill Reformed Zion Union Apostolic Church, 4143 Marengo Rd.	No impact (same for all alternatives).		
	86	Mecklenburg County, VA	Sardis United Methodist Church, 3152 Marengo Rd.	Existing at-grade access across the railroad closed, with alternate access provided (same for all alternatives).		
K & L	--	N/A	N/A	N/A – no places of worship in Section in Virginia		
Section	**Map Sheet**	**Location**	**Place of Worship**	**Impacts**		
				NC1	**NC2**	**NC3**
L	93	Warren County, NC	Jerusalem United Methodist Church, 850 Paschall Station Road	No impact	Existing nearby access across the railroad closed, with alternate access provided	Same as NC1
	94	Warren County, NC	Bethlehem Baptist Church, 1258 Cole Farm Road	No impact	Cole Farm Road will cross railroad on new bridge, with improved access across the railroad. Roadwork in front of church, but no ROW required.	Same as NC1

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
L	95	Warren County, NC	Locust Grove Baptist Church, Paschall Station Road	No substantive change in access (same for all alternatives).		
	95	Warren County, NC	Wise Baptist Church, 1840 US Hwy 1 North	Small amount of ROW may be required for realignment of Wise Five Forks/Carrie Dunn Road, but access would be improved through new bridge over railroad (same for all alternatives).		
M	99	Norlina, NC	First Baptist Church, 300 Washington St.	Existing access from the west via Jerman Ln. would remain unaltered. However, access from the east would be rerouted to the realigned Warren Plains Rd and new bridge.	Current direct access from the west across the rail corridor via Jerman Ln. would be closed. Traffic would be rerouted to the realigned Warren Plains Rd and new bridge.	Same as NC1
	100	Norlina, NC	New Creation Church, 108 Hyco St.	Access from the east of the rail line would be slightly modified.	Rail ROW requirements may displace church.	Same as NC1
	100	Norlina, NC	Norlina United Methodist Church, 401 US 1 N.	Access from the east of the rail line would be slightly modified (same for all alternatives).		
	100	Norlina, NC	Unity Prayer House of Faith, 291 US 1 S.	Because of crossing closings and consolidations, access from the east of the rail line would now follow realigned Axtel Ridgeway Parkway and cross the rail line at Ridgeway Rd. to connect to US 1 (same for all alternatives).		
	101	Ridgeway, NC	Chapel of the Good Shepherd, NC Rt.1107	Realignment of Ridgeway Warrenton Road and its new grade-separated crossing of the rail line reroute access to the church such that all traffic approaches from the east (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
M	102	Warren County, NC	Ridgeway Baptist Church, 156 Wycoff Rd.	Access from the east across the rail line would be more indirect, with rerouting along realigned Axtell Ridgway Rd., realigned Ridgway Warrenton Rd. and new bridge over rail, to Old St. Tammany Rd. to US 1 (same for all alternatives).		
N	106	Warren County, NC	Manson Baptist Church, Kimball Rd.	Railroad is on new alignment east of the church. Kimball Rd. will be realigned, crossing over the railroad on a bridge. A small amount of ROW may be required for realignment of Kimball Road and driveway access may change.	Railroad is on new alignment west of the church. Kimball Rd. will be realigned, crossing over the railroad on a bridge (further south than NC1/NC3). A small amount of ROW may be required for realignment of Kimball Road.	Same as NC1
O	108	Middleburg, NC	Middleburg Baptist Church, 80 N. Plummer Ave.	With the rail crossing closings of N. Jackson Ave. and N. Hawkins Ave., traffic from the east would be redirected to the new alignment and bridge crossing of S. Carroll St.	Same as NC1	While NC3 is to the east of NC1/NC2, the local road closings would be the same, as would the rerouting to a realignment and new bridge for S. Carroll St.
	111	Vance County, NC	Young's Memorial Holy Church, 1379 Brookston Rd.	From the west, access is unimpeded with new bridge and realigned Greystone Rd (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
O	111	Vance County, NC	Brookston Baptist 242 Baptist Church Rd.	Access from the west of the rail line would be improved and unimpeded with the realignment of Brookstone Rd and its new bridge over the rail line.	Access from the west of the rail line would be improved and unimpeded with the realignment of Brookstone Rd and its new bridge over the rail line.	Access from the west of the rail line would be improved and unimpeded with the realignment of Brookstone Rd and its new bridge over the rail line.
P	112	Vance County, NC	Church of God Parsonage, 305 John Deere Rd.	No substantive change in access (same for all alternatives).		
	112	Vance County, NC	Forest Hills Baptist Church, 30 S. Oliver Drive	No impact (same for all alternatives).		
	114	Henderson, NC	North Henderson Baptist Church, 1211 North Garnett Street	No substantive change in access (same for all alternatives).		
	114	Henderson, NC	St. John's Episcopal Church, 100 Main Street	A small amount of ROW may be required for realignment of Beckford Drive behind church. Access across the railroad will be improved with new Beckford Dr. underpass (same for all alternatives).		
	114	Henderson, NC	Cotton Memorial Presbyterian Church, 511 Chestnut Street	A small amount of ROW may be required for vertical realignment of Chestnut Street. No substantive change in access (same for all alternatives).		
	114	Henderson, NC	Calvary Temple Holy Church 215 Kitchen Ave.	No impact (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
P	114	Henderson, NC	Mt Zion Christian Church of Henderson 995 Burr St.	Immediate area would go from 4 at-grade rail crossings to 2 grade separated rail crossings. However, access from west improved with intersection improvement at N. Garret St. and N. Beckford Drive, as well as the realignment of N. Beckford Drive with new bridge over rail line (same for all alternatives).		
	114	Henderson, NC	Davis Chapel 742 N. Chestnut St.	Immediate area would go from 4 at-grade rail crossings to 2 bridge over rail crossings. However, access from east would be improved with intersection improvement at N. Garret St. and N. Beckford Drive, as well as the realignment of N. Beckford Drive with road over rail bridge. Realigned Andrews Ave. and road over rail bridge also improves safety and unimpeded access (same for all alternatives).		
	114	Henderson, NC	First Congregational Christian Church, 427 Rowland St.	Realignment of Andrews Ave. and new road over rail bridge improves safety and unimpeded access from the west (same for all alternatives).		
	114	Henderson, NC	Rock of the Reach Ministry, 611 N. Garnett St.	Vehicular access would be altered in that the at-grade rail crossing of Rock Street would be closed. Traffic rerouting from east of the rail line would be minor because the proposed Andrews Avenue (NC 39) bridge over the railroad would be less than 0.25 miles to the south (same for all alternatives).		
	115	Henderson, NC	A Touch of Faith Community Church, 601 S. Williams St.	Vehicular access would be altered in that the nearby at-grade rail crossing of Chavasse Street would be closed. Traffic rerouting would be minor because the proposed extension of Alexander Avenue and a bridge over the railroad is located less than 1 mile to the south (same for all alternatives).		
	115	Henderson, NC	First Presbyterian Church, 222 Young St.	No substantive change in access (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
P	115	Henderson, NC	First United Methodist Church, 114 Church Street	No substantive change in access since the existing Charles Street underpass, which is located directly across the street from the church, will be maintained (same for all alternatives).		
	115	Henderson, NC	First Baptist Church, 205 W. Winder St.	Several nearby existing at-grade crossings will be closed but vehicular access across the railroad will be maintained through the nearby existing underpass at Charles Street and new bridge on E. Andrews Avenue. Additional access will be provided to the south through a new pedestrian only underpass at Burwell Avenue. (same for all alternatives).		
	115	Henderson, NC	Shiloh Baptist Church, 635 S. College St.	No substantive change in access (same for all alternatives).		
	116	Henderson, NC	Fisher of Men, 163 Elsie St.	Vehicular access would be altered in that the nearby at-grade rail crossing of Nichols Street which intersects with St. Matthews Street would be closed. Traffic rerouting would be minimal because new bridges over the railroad are proposed less than a mile to the north and south (same for all alternatives).		
	116	Henderson, NC	United Prayer of Faith Church, Miriam St.	Vehicular access would be altered in that the nearby at-grade rail crossing of Nichols Street, which intersects with St. Matthews Street, would be closed. Traffic rerouting would be minimal because new bridges over the railroad are proposed less than a mile to the north and south (same for all alternatives).		
	116	Henderson, NC	Cooks Chapel Zion Church, 210 Center St.	Vehicular access would be altered in that the nearby at-grade rail crossing of Nichols Street, which intersects with St. Matthews Street, would be closed. Traffic rerouting would be minimal because new bridges over the railroad are proposed less than a mile to the north and south (same for all alternatives).		
	116	Henderson, NC	Victory Baptist Church, 475 J P Taylor Rd.	Vehicular access would be improved through a new bridge over the railroad for J P Taylor Road, with an extension west of the railroad to Belmont Drive. The extension of King Street will further improve connectivity (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
P	116	Henderson, NC	Welcome Chapel Baptist Church, 237 Welcome Ave.	Road closure of Welcome Ave. at Nicholas St. would create a reroute for traffic from the east. The reroute would divert traffic to realigned JP Taylor Rd and its new road over rail bridge to a new intersection with Belmont Dr (same for all alternatives).		
	117	Henderson, NC	Raleigh Rd Baptist Church, 3892 Raleigh Rd.	No impact (same for all alternatives).		
Q	120	Vance County, NC	Union Chapel United Methodist, Church, 6479 Raleigh Rd.	Closure of private crossing would divert traffic to realigned Chavis Road, intersecting the proposed realignment of Edwards Road which would cross over the railroad on a bridge, less than half a mile to the north (same for all alternatives).		
	120	Vance County, NC	New Hope Baptist Church, Raleigh Rd.	Access to the church would be altered but traffic re-routing would be minimal in that the crossing at Chavis Rd. would be closed, and the road realigned to connect with a new underpass at Edwards Road less than .5 miles to the north (same for all alternatives).		
	121	Kittrell, NC	Taylor's Chapel AME Zion Church, 106 William St.	No substantive change in access (same for all alternatives).		
	121	Kittrell, NC	St. James Episcopal Church, William St.	N. Williams Street will be closed along the west side of the church property, and realigned slightly to the west. No ROW required, but driveway access may change. Access across the railroad will be provided by an extension of Church Street, bridging over the railroad (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
Q	122	Vance County, NC	Long Creek United Holy Church, 313 Oak Ridge Rd.	Access would be altered due to the closing of the crossing at Beechtree Trail Rd. Travelers would utilize a new bridge over the railroad at Egypt Mt. Rd. approximately 1 mile south.	Access would be altered due to the closing of the crossing at Beechtree Trail Rd. Travelers would utilize a new bridge over the railroad located approximately 0.5 miles south.	Same as NC1
	122	Vance County, NC	Kittrell Church of God, 2540 US Hwy 1 South	Access would be altered due to the closing of the crossing at Beechtree Trail Road. Travelers would utilize a new bridge over the railroad at Egypt Mt. Rd. approximately 1 mile south.	Access would be altered due to the closing of the crossing at Beechtree Trail Road. Travelers would utilize a new bridge over the railroad located just south of the church. Some ROW from the church parking lot may be required for the new roadwork.	Same as NC1
R	--	N/A	N/A	N/A – no places of worship in Section		
S	127	Franklinton, NC	Franklinton United Methodist Church, 109 N. Main St.	From the east, closure of Mason and Joyner Street rail crossings would redirect traffic to an expanded Green Street underpass. New pedestrian bridge would provide safe crossing at Mason Street (same for all alternatives).		
	127	Franklinton, NC	First United Church of Christ, 20 W. Green St.	From the east, closure of Mason and Joyner Street rail crossings would redirect traffic to expanded Green Street underpass. New pedestrian bridge would provide safe crossing at Mason St (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
S	127	Franklinton, NC	Franklinton Baptist Church, 102 W. Mason St.	From the east, closure of Mason and Joyner Street rail crossings would redirect traffic to expanded Green Street underpass. New pedestrian bridge would provide safe crossing at Mason Street (same for all alternatives).		
	127	Franklinton, NC	Mt. Pleasant Presbyterian Church, S. Main St.	No substantive change in access (same for all alternatives).		
	128	Franklinton, NC	First Baptist Church, S. Main St.	From the east, pedestrian access to church would be improved with pedestrian-only underpasses near College Street and Hawkins Street (same for all alternatives).		
	132	Youngsville, NC	Union Grove Baptist Church, 552 N. College St.	From the east, access would improve via NC 96's realignment and new rail crossing, as well as new Main Street bridge over the railroad (same for all alternatives).		
	132	Youngsville, NC	Youngsville Baptist Church, 315 E. Main St.	From the west, access would improve via NC 96's realignment and new road over rail bridge, as well as new Main Street bridge over the railroad (same for all alternatives).		
	132	Youngsville, NC	Grace Fellowship Church, 120 W. Franklin St.	Vehicular access from east of the rail line would be altered in that the at-grade rail crossings of Winston and Franklin Streets would be closed but a new bridge over the railroad would be provided at Main Street. This reroute would be minimal, adding up to five blocks of travel (same for all alternatives).		
T	--	N/A	N/A	N/A – No places of worship in Section		
U	133	Wake Forest, NC	Holy Redeemer Catholic Church, 1841 N. White St.	No impact (same for all alternatives).		
	133	Wake Forest, NC	Wake Forest Cemetery, N. White Street	No substantive change in access (same for all alternatives).		
	135	Wake Forest, NC	Glen Royal Baptist Church, 731 Elizabeth Ave.	Improved pedestrian access via new pedestrian-only bridge over rail line near Cedar Ave. and White Street (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
U	135	Wake Forest, NC	Wake Forest Church of God,155 E. Cedar Ave.	Improved pedestrian access via new pedestrian-only bridge over rail line near Cedar Ave. and White Street (same for all alternatives).		
	135	Wake Forest, NC	Olive Branch Baptist Church, 326 E. Juniper Ave.	Pedestrian access to the church would be improved via the pedestrian-only crossing near E. Cedar Avenue less than one quarter mile to the north (same for all alternatives).		
	136	Wake Forest, NC	Spring Street Christian Church, E. Spring St.	No substantive change in access (same for all alternatives).		
	136	Wake Forest, NC	Hope Baptist Church, 220 S. White St.	While the Elm Ave. at-grade rail crossing would be closed, access would be maintained via the Roosevelt Avenue underpass, approximately 500 feet north of the church (same for all alternatives).		
	136	Wake Forest, NC	Tri-Area Ministry, 149 E. Holding Ave.	A portion of the church's front property may be acquired for ROW associated with the realignment of E. Holding Avenue. However, the church and its parking lot should not be disturbed. Construction activities would be an inconvenience but would be short-lived (same for all alternatives).		
	136	Wake Forest, NC	Wake Forest Baptist Church, 107 E. South St.	No substantive change in access (same for all alternatives).		
	136	Wake Forest, NC	Church of God of Prophecy, 122 N. White St.	No impact (same for all alternatives).		
	136	Wake Forest, NC	Wake Forest United Methodist Church, 905 S. Main St.	Access would be improved via realignment and new road over rail bridge for Holding Avenue (same for all alternatives).		
	136	Wake Forest, NC	South Main Baptist Chapel Church, S. Main St	Vehicular access from east of the rail line would be altered in that the at-grade rail crossings of Elm Street would be closed but the realignment and new bridge over the railroad at Holding Avenue would provide improved access (same for all alternatives).		

Table 4-29 Impacts to Places of Worship by Section						
Section	Map Sheet	Location	Place of Worship	Impacts		
				NC1	NC2	NC3
U	137	Wake Forest, NC	Friendship Chapel Baptist Church, 237 Friendship Chapel Rd.	From the east, access would be improved via new access road connecting Friendship Chapel Rd., NC 98 Bypass, and Franklin Street. From the southwest, existing access via at-grade rail crossing of Friendship Chapel Road would be closed. This would result in an additional 1.5 mile travel distance to the church from the closed rail crossing (same for all alternatives).		
	139	Wake County, NC	Living Word Family Church	No impact (same for all alternatives).		
V	145	Raleigh, NC	Millbrook United Methodist Church, 1712 E. Millbrook Rd.	Access would be improved via new Millbrook Road. Bridge over the railroad (same for all alternatives).		
	149	Raleigh, NC	Deliverance Holy Church of God, 626 Capital Boulevard	A portion of the rear of the property may be required for ROW.	Same as NC1	No Impact
	149	Raleigh, NC	Powerhouse Church of Jesus Christ, 1130 N. Blount St.	No impact (same for all alternatives).		
	150	Raleigh, NC	St Paul AME Church, 402 W. Edenton St.	No substantive change in access (same for all alternatives).		
	150	Raleigh, NC	Victory Tabernacle Church, W. South St.	No impact (same for all alternatives).		

4.11.3.3 Police, Fire, and EMS

Under the project alternatives, closing existing at-grade railroad crossings and consolidating access across the SEHSR corridor would have some effect on police, fire, and emergency medical service (EMS) response in the communities along the project. Seven facilities were studied to determine the impact that changes in access would have

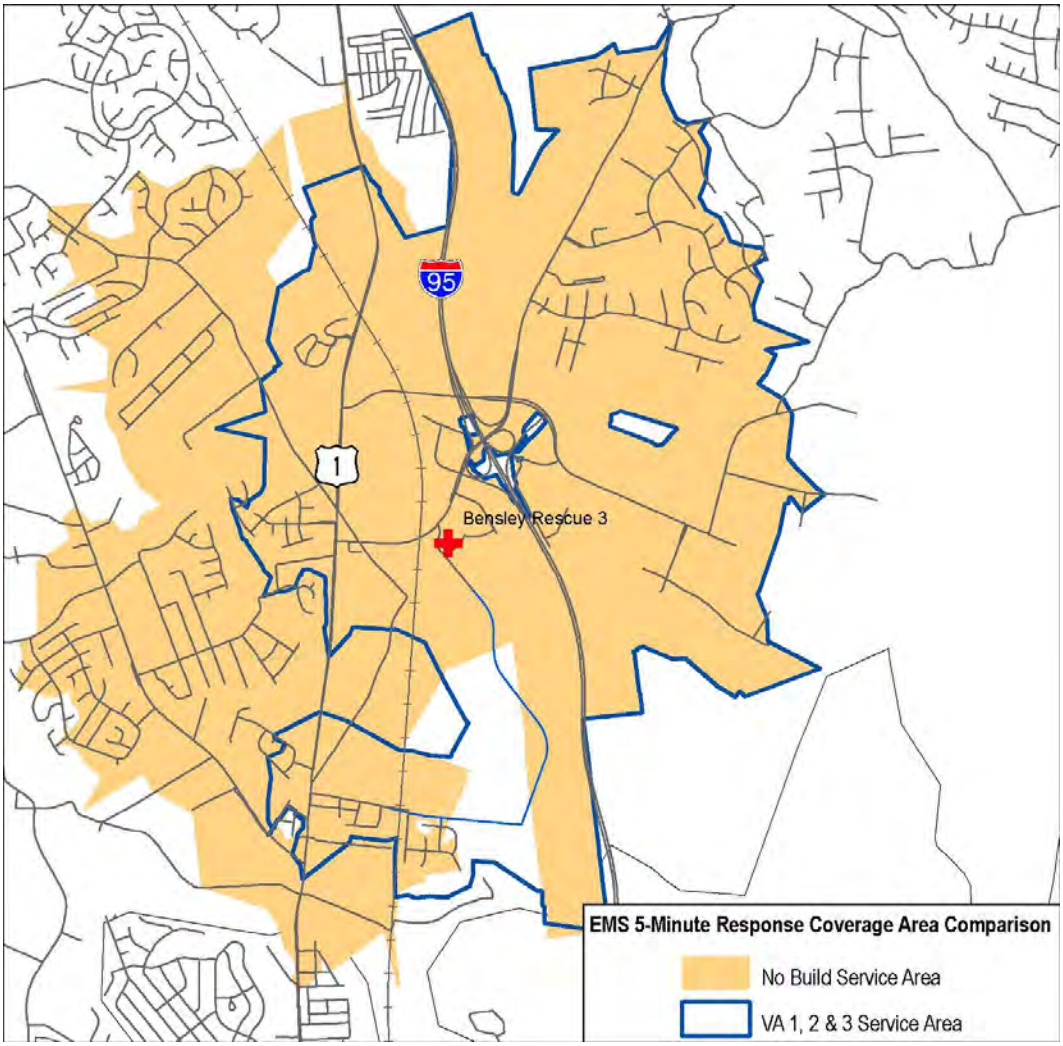
on EMS service coverage. These seven facilities are close to the corridor and would experience changes in access across the railroad. They are representative of the worst-case changes that may occur; changes at other locations should be less substantial. In locations near existing rail operations, where freight trains may block existing at-grade rail crossings; all alternatives provide better conditions for emergency service response than existing conditions.

To determine the effect changes in access would have on EMS services, a service area analysis was completed in ArcGIS using the Network Analyst extension. For each scenario (No Build [i.e., if project were not constructed]; VA1, VA2, and VA3; and NC1, NC2, and NC3), a road network was developed that corresponds to the expected changes that would be made. These road networks were used to develop an approximate service area that could be reached within about five minutes. The exact area shown in the figures below is not the actual area that could be served within five minutes; that area would fluctuate depending on traffic conditions and other variables. For purposes of this analysis, the actual areas shown are not critical; rather, the differences between the service areas provide insight into what, if any, effects access changes would have on response times.

4.11.3.3.1 Bensley-Bermuda Volunteer Rescue Squad, South Station

This facility provides emergency medical response for the southern section of the Bensley-Bermuda Volunteer Rescue Squad coverage area in Chesterfield County, VA. It is located very near and to the east of the Woods Edge Road crossing of the SEHSR corridor. This crossing would be closed under all project alternatives. Because all alternatives would have the same crossing consolidations and realignments in this area, all were modeled as one Build scenario. An extended Walthall Industrial Parkway connecting to Pine Forest Drive would provide new access across the corridor to the south. The existing crossing at Ruffin Mill Road to the north would remain available. Changes in access would affect response time and coverage to the west of the corridor. A comparison of potential coverage areas is shown in Figure 4-3. There are some sizeable shifts in the five-minute response area with most being to the west of the corridor and attributable to closing the Woods Edge Road crossing. The overall service area is substantially smaller for the Build scenarios; approximately one-third smaller than the area covered under the No Build scenario. Thus, there is a substantial difference between the overall EMS service area for the Bensley-Bermuda Volunteer Rescue Squad, South Station, in southern Chesterfield County under the No Build versus the Build scenarios. The nearest EMS station that would not be constrained by crossing closures is approximately 5 miles from the affected area of the Bensley-Berumuda station's service area. It appears possible that the affected area could still be reached within the 6-minute response time that is the established standard in Chesterfield County. A 6-minute response time does represent an increase in response time over current conditions, except in cases where a freight train would block the Bensley-Bermuda southern station from crossing the railroad tracks.

Figure 4-3
EMS Response Coverage Area Comparison
Chesterfield County, Virginia

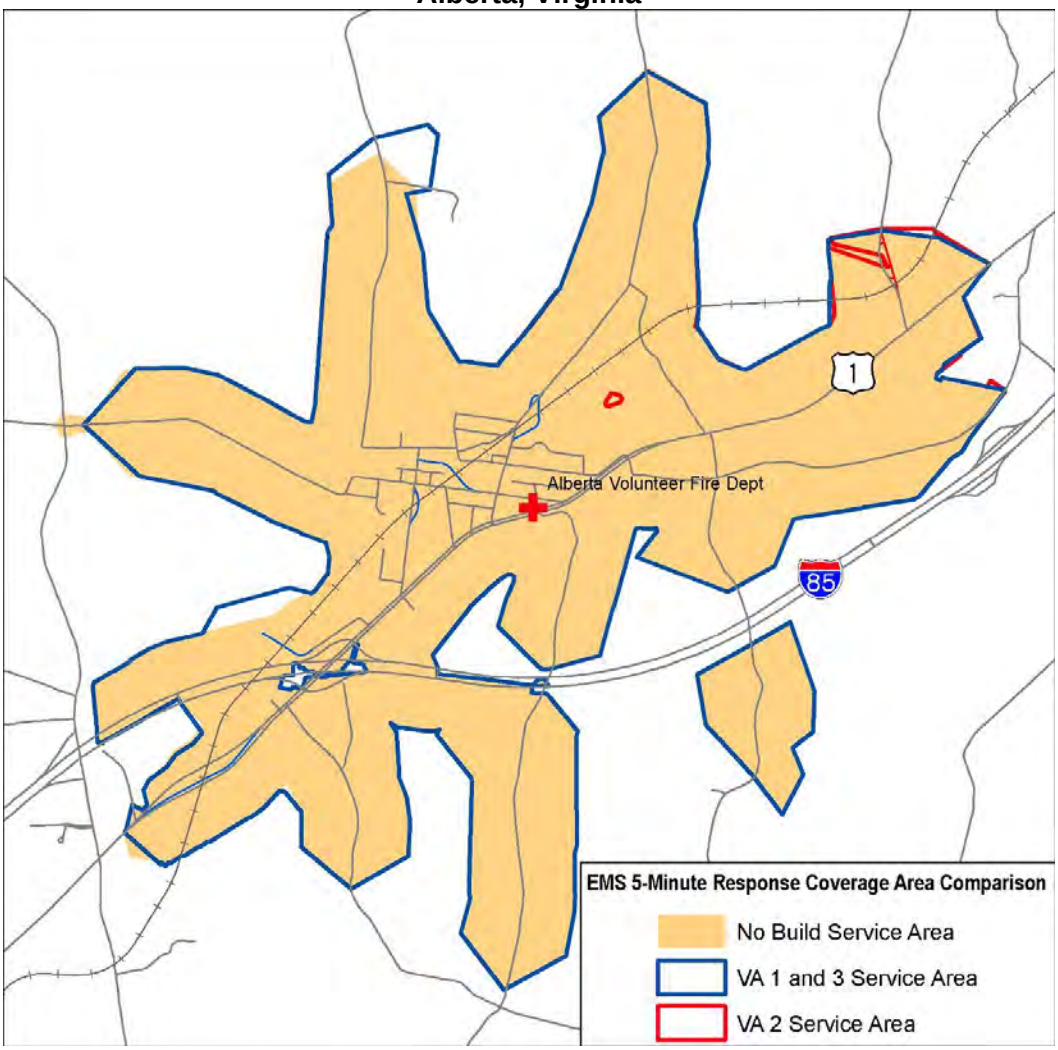


4.11.3.3.2 Alberta Volunteer Fire Department

The Town of Alberta in Brunswick County, VA, straddles the inactive CSX S-line. The SEHSR would affect several crossings that are proposed for consolidation with approximately five roads proposed for realignment. The Alberta Volunteer Fire Department facility is very near and to the east of the existing rail ROW. Changes in access could affect response time and coverage to the west of the corridor. In this area, the VA1 and VA3 project alternatives have essentially the same impact on roadway closures and realignments and thus were modeled as one scenario for this area. The VA2 project alternative was modeled as a separate network because its alignment and impacts are different. A comparison of potential coverage areas is shown in Figure 4-4. There is very little change in the five-minute response window between the No Build and Build scenarios. In all Build scenarios, the total area covered is essentially identical to the No Build coverage area and there is no indication that areas to the west of the

corridor would be subjected to reduced coverage. Thus, there is almost no difference between the overall EMS service area for the Alberta Volunteer Fire Department under the No Build or Build scenarios in Brunswick County.

Figure 4-4
EMS Response Coverage Area Comparison
Alberta, Virginia

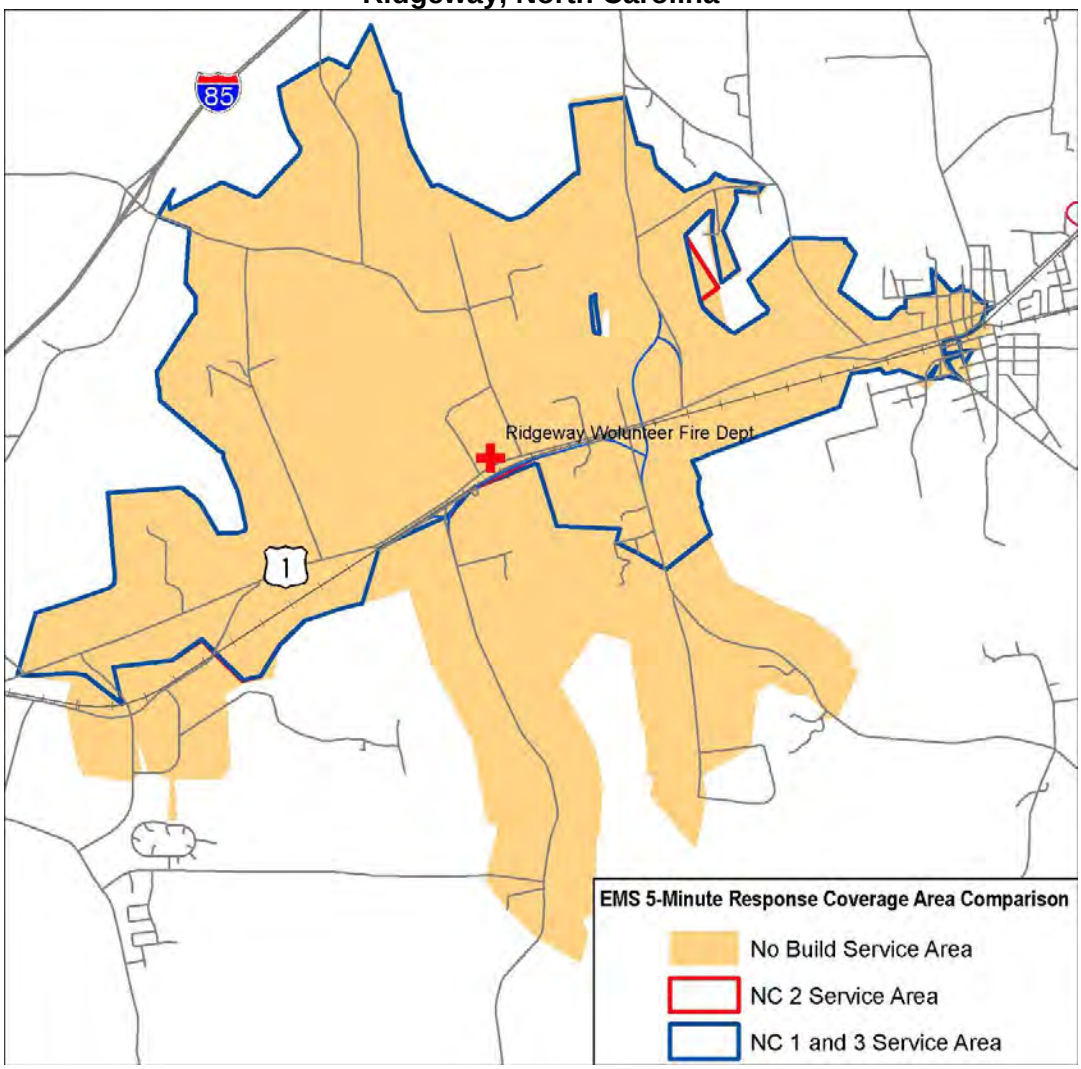


4.11.3.3.3 Ridgeway Volunteer Fire Department

This facility provides fire response for the Ridgeway area, southeast of Norlina, in Warren County, NC. It is located along US 1, just north of the SEHSR corridor. The nearby crossings at Joe Jones Road and Axtell Ridgeway Road would be consolidated and the nearby Ridgeway Warrenton Road crossing would be realigned under all Build scenarios. Changes in access could affect response time and coverage to the south of the corridor. In this area, the NC1 and NC3 project alternatives have essentially the same impact on roadway consolidations and realignments and thus were modeled as one scenario for this area. The NC2 project alternative was modeled as a separate network because its alignment and impacts are slightly different. A comparison of potential coverage areas is shown in Figure 4-5. There are some sizeable shifts in the

five-minute response area with most being to the south of the corridor and most likely attributable to the consolidations previously noted. As a result of the crossing consolidations, the overall service area under the Build scenarios is about one-third smaller than the No Build scenario. Thus, there is a notable difference between the overall EMS service area for the Ridgeway Volunteer Fire Department under the No Build versus the Build scenario in Warren County, NC. The nearest EMS station that would not be constrained by the crossing closures is approximately 5 miles from the affected area of the Ridgeway station's service area. It is important to note, however, that Warren County has budgeted to construct EMS satellite facilities to improve emergency response times throughout the county, which may affect the future impact of proposed SEHSR crossing consolidations.

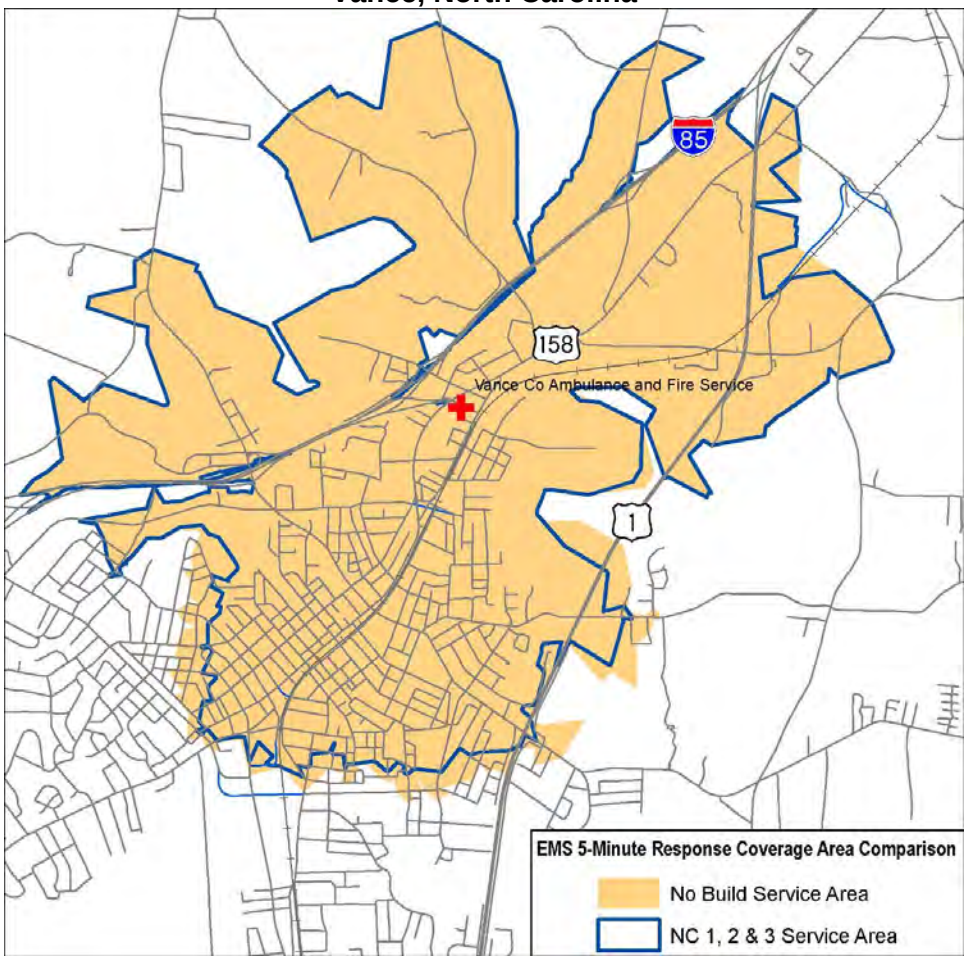
Figure 4-5
EMS Response Coverage Area Comparison
Ridgeway, North Carolina



4.11.3.3.4 Vance County Ambulance and Fire Service

Located in Henderson, this facility provides fire response for Vance County, NC. It is located near US 158, just north of the SEHSR corridor. All project alternatives would have the same impacts on roadway consolidations and realignments in this area and thus all were modeled as one Build scenario. The SEHSR would affect several crossings that are proposed for consolidation, and one nearby road that would be realigned. Changes in access could affect response time and coverage to the south of the corridor. A comparison of potential coverage areas is shown in Figure 4-6. The overall service area is largely the same between the No Build and Build scenarios as the total area covered under the Build Alternatives is about 93 percent of the No Build coverage area. There are some small shifts in the five-minute response area south suggesting a small decrease in the areas covered to the south, but these shifts are very small. Thus, there is little substantial difference between the overall EMS service area for the Vance County Ambulance and Fire Service under the No Build or Build scenarios.

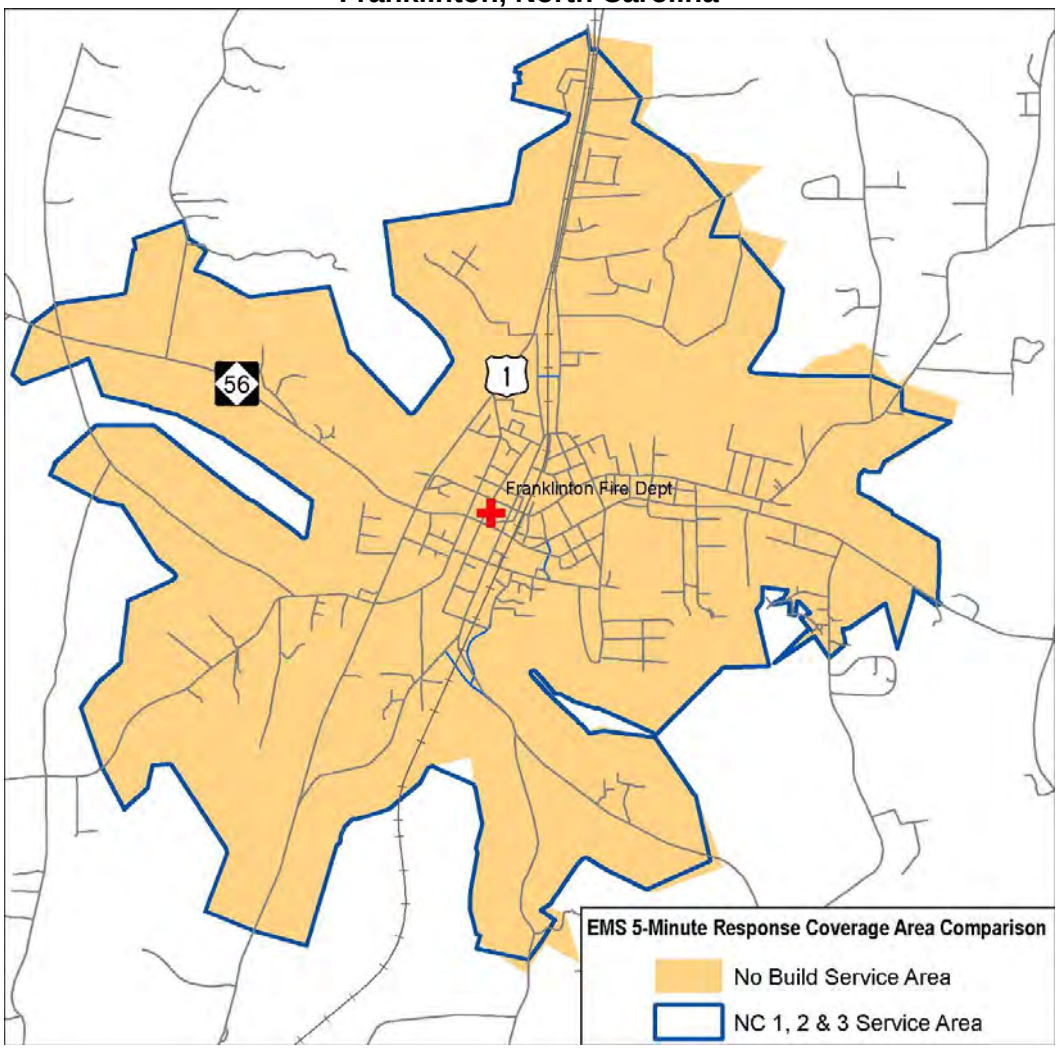
Figure 4-6
EMS Response Coverage Area Comparison
Vance, North Carolina



4.11.3.3.5 Franklinton Fire Department

The Town of Franklinton in Franklin County, NC, straddles the active CSX S-line about 30 miles northeast of Raleigh. The Franklinton Fire Department facility is very near and to the west of the existing rail ROW. All project alternatives would have the same impacts on roadway closures and realignments in this area and thus all were modeled as one Build scenario. The SEHSR would affect several crossings that are proposed for consolidation, and approximately three roads that would be realigned. Changes in access could affect response time and coverage to the east of the corridor. A comparison of potential coverage areas is shown in Figure 4-7. There is very little change in the five-minute response area between the No Build and Build scenario. In all Build scenarios, the total area covered is 97 percent of the No Build coverage area and there is little indication that areas to the west of the corridor would suffer reduced coverage. Thus, there is very little difference between the EMS service area for the Franklinton Fire Department under the No Build or Build scenarios in Franklin County.

Figure 4-7
EMS Response Coverage Area Comparison
Franklinton, North Carolina

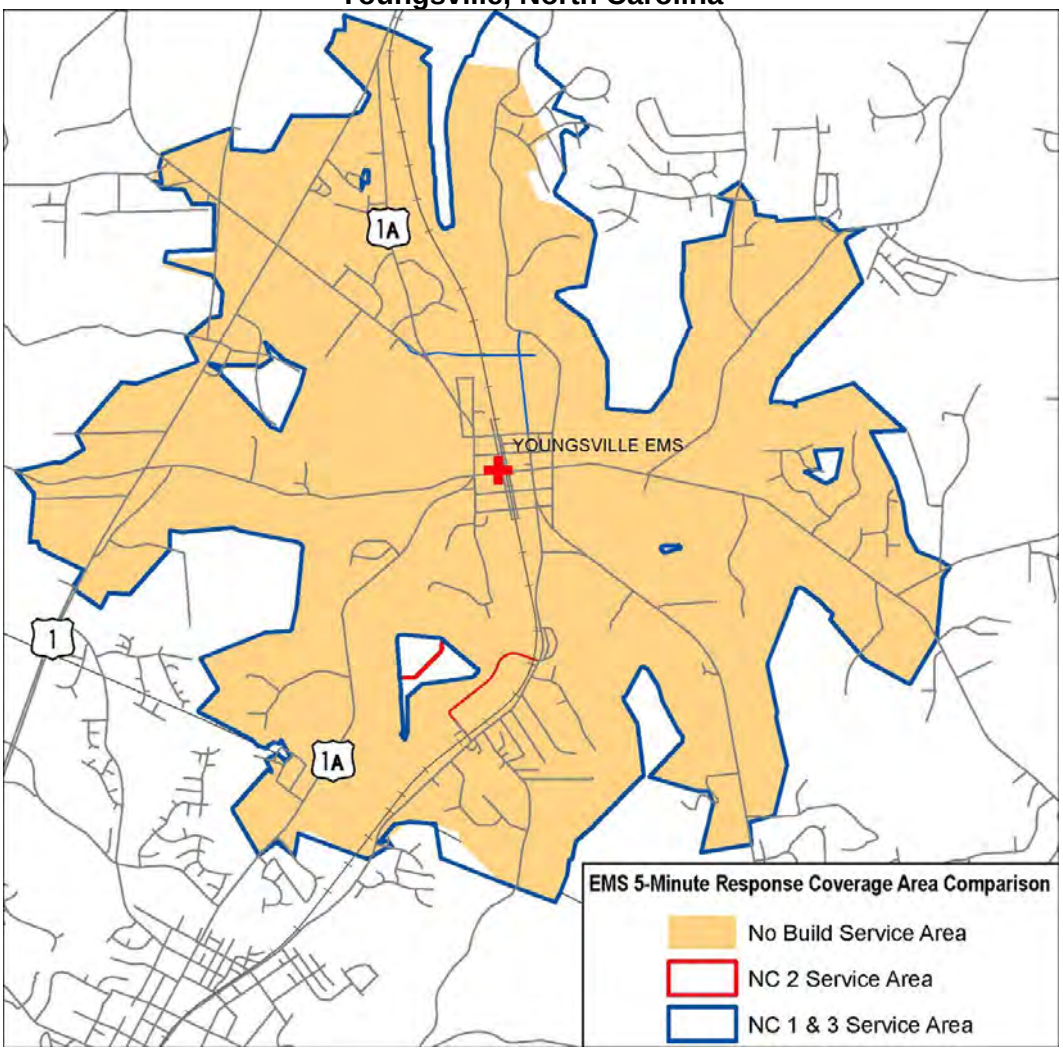


4.11.3.3.6 Youngsville EMS Rescue Station

The Town of Youngsville in Franklin County, NC, straddles an active railroad line northeast of Raleigh. The SEHSR would affect several crossings that are proposed for consolidation, and approximately three roads that would be realigned. The Youngsville EMS Rescue Station is very near and to the west of the existing rail ROW. The designs for the three alternatives are on common alignment near the EMS station. The proposed new rail ROW, and new Main Street ROW would affect the existing entrances for the station; however new access would be provided for, and determined through negotiations during final design.

Changes in the road network could affect response time and coverage to the east of the corridor. In the Youngsville area, the NC1 and NC3 project alternatives have essentially the same impacts on roadway closures and realignments and thus were modeled as one alternative for this area. The NC2 project alternative was modeled as a separate network because its impact is slightly different. A comparison of potential coverage areas is shown in Figure 4-8. The five-minute response area is slightly larger under all Build scenarios compared to the No Build. There is no indication that areas to the east of the corridor would suffer reduced coverage. Thus, there is no negative impact to the EMS service response area for the Youngsville EMS Rescue Station in Franklin County under the Build scenarios and there are actual improvements in response coverage area.

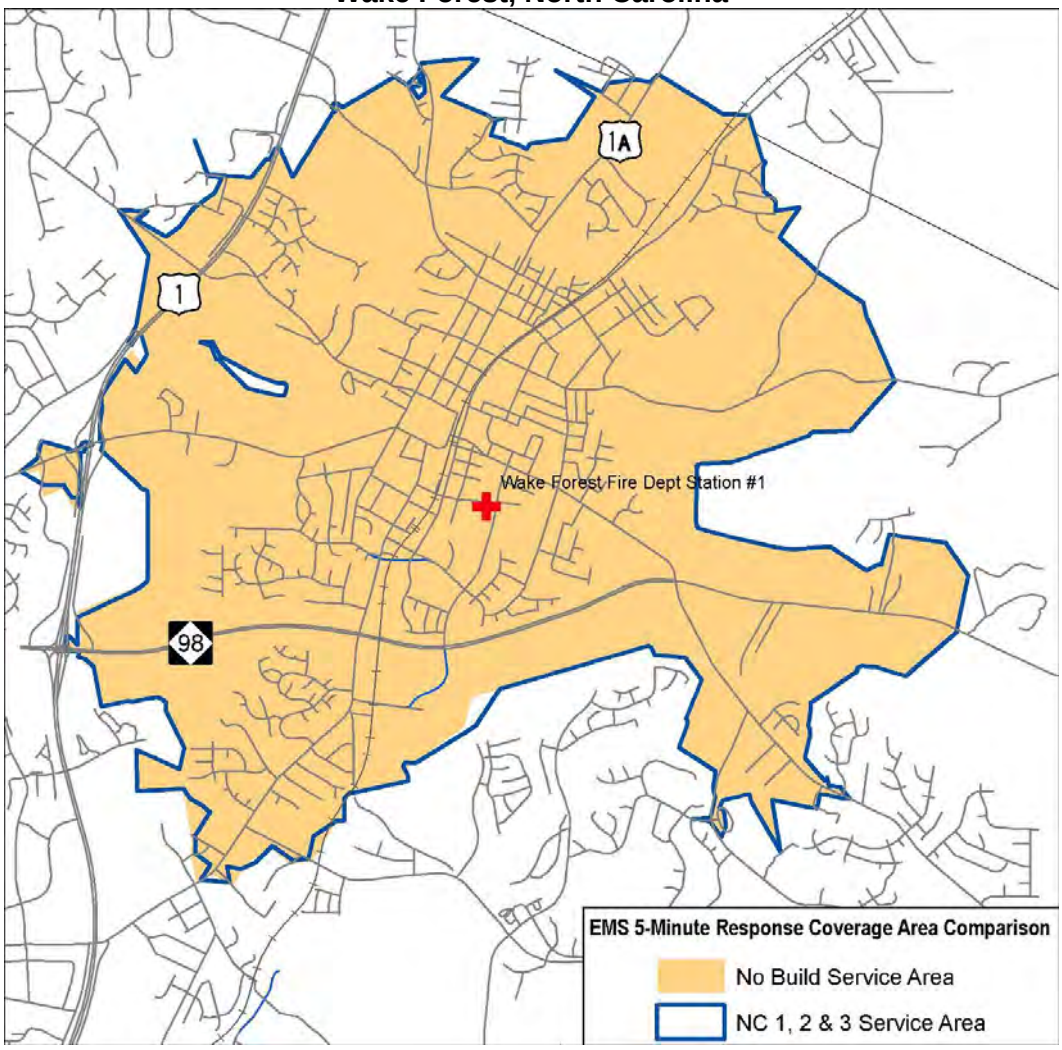
Figure 4-8
EMS Response Coverage Area Comparison
Youngsville, North Carolina



4.11.3.3.7 Wake Forest Fire Department Station #1

The Town of Wake Forest in Wake County, NC, straddles the active CSX S-line just northeast of Raleigh. The Wake Forest Fire Department facility is very near and to the east of the existing rail ROW. All project alternatives would have the same impacts on roadway consolidations and realignments in this area and thus all were modeled as one Build scenario. The SEHSR would affect several crossings that are proposed for consolidation, and approximately two roads that would be realigned. Changes in access could affect response time and coverage to the west of the corridor. A comparison of potential coverage areas is shown in Figure 4-9. There is very little change in the five-minute response area between the No Build and Build scenarios. In all Build scenarios, the total area covered is 99.6 percent of the No Build coverage area and there is little indication that areas to the west of the corridor would suffer reduced coverage. Thus, there is essentially no difference between the EMS service coverage areas for the Wake Forest Fire Department under the No Build or Build scenarios in Wake County.

Figure 4-9
EMS Response Coverage Area Comparison
Wake Forest, North Carolina



4.11.4 Land Use Planning

Land use and transportation planning impacts for the project alternatives were assessed using current city and county comprehensive land use plans and long range transportation plans. This information was further refined through the extensive partnering and community outreach efforts documented in Chapter 7. To the greatest extent practicable, the alternatives would utilize existing rail lines and rail ROW that are adjacent to established cities and towns. This helps to minimize impacts to current and future land uses. Because the SEHSR would use existing active and inactive rail lines, consistency with state, regional, and local land use and transportation plans is also possible.

4.11.4.1 Land Use Plans

The potential for direct impacts on land use and development resulting from the proposed corridor is generally a function of:

- The availability of land for development or redevelopment;
- Regional and local markets; and
- Local government plans and land use controls such as zoning ordinances and economic development programs.

As noted in the Tier I EIS for the SEHSR, the long range planning effects of the implementation of the SEHSR would increase transportation opportunities, as communities may choose to add conventional passenger and commuter service along the SEHSR corridor. This would allow communities within the study area to look toward land use planning to spur development and possibly increase redevelopment efforts in the smaller communities. The presence of these opportunities would also create a favorable environment for new economic activity and investment possibilities. In most communities, no major direct land use impacts would occur since the project follows existing rail ROW throughout much of the project corridor. Any direct impacts would result from land availability for development and or redevelopment purposes. This would affect regional and local markets, land use plans, and controls such as zoning and economic development programs.

Land use plans are important to the overall development of a community. This is achieved through comprehensive plans and studies that examine existing and future projects and infrastructure demands. Section 3.11.3 identifies those communities that specifically include the SEHSR in their respective land use, transportation, or comprehensive plans. Regardless of whether or not the SEHSR is included in the most recently approved plan, extensive community outreach efforts have garnered strong support for the SEHSR concept through all communities affected. In addition, counties, cities, towns, municipal planning organizations (MPOs), rural planning organizations (RPOs), and Planning District Commissions (PDCs) embrace the idea of the SEHSR.

4.11.4.2 Changes in Land Use

As discussed in Chapter 2, the proposed project would maximize the use of existing rail corridors. Freight and passenger rail service is active between Richmond and Petersburg, VA, and freight rail service only is active between Norlina and Raleigh, NC. For the area between Petersburg, VA, and Norlina, NC, rail service has been inactive for approximately 20 years. It is unlikely that land uses adjacent to the rail would change as a result of continuing or reintroducing passenger rail service into the corridor because:

- The rail corridor already exists within the communities
- The number of high speed passenger trains is expected to be eight per day (four round-trips)
- The number of additional trains is expected to up to eight intermodal trains and two to four freight trains
- The location of rail stops would be limited to Richmond, VA, Petersburg, VA, La Crosse, VA, Henderson, NC, and Raleigh, NC

It is also unlikely that land uses would change appreciably in the vicinity of existing passenger rail stations (e.g., Main Street Station in Richmond), although increased train frequencies and passengers could trigger associated private development and investments. Some positive land use changes also should be expected in the vicinity of new passenger stations as business development and investment is triggered to serve

passenger needs. These changes would be evaluated in the future environmental documentation developed for the stations.

4.11.4.3 Compatibility with Future Land Use and Long-Range Transportation Plans

This section examines long-range plans to ensure that the proposed SEHSR project is consistent and compatible with future land use plans and long-range transportation plans (Table 4-30 and 4-31). Where the SEHSR appears in a community's land use plan, it is included as a concept only and does not indicate a preference for one alternative alignment over another. If the SEHSR project is not already a part of a community's future plans, implementation of the SEHSR project may drive those communities to analyze their future plans differently. Communities may choose to maximize economic opportunities afforded those with rail stations or those in proximity to a rail station. Communities may also choose to minimize the location of sensitive land uses (such as schools and parks) in the vicinity of the SEHSR.

In Virginia and North Carolina, planning and development activities in rural areas are mostly conducted at the city or county level. However, if no specific entity exists to guide land use and development, assistance is often received from the regional planning districts such as Metropolitan Planning Organizations (MPOs), Planning District Commissions (PDCs) and Rural Planning Organizations (RPOs). Many plans at the local level tend to concentrate on the growth in the downtown region and/or around the existing rail corridor which, in most cases, was the development node in the past. Where the proposed SEHSR would add activity in these areas, planning efforts should still look toward these nodes for future development. Both the land use and long-range transportation plans are reviewed in Tables 4-30 and 4-31. A discussion of the integration of transportation modes in existing plans follows.

Table 4-30
Compatibility with Future Land Use and Long-Range Transportation Plans-Virginia

City, County MPO / PDC	Future Land Use Plan	Reference SEHSR and in Support?
City of Richmond	Downtown Master Plan, 2008	Yes
	Strategic Multi modal Transportation Plan-update to be completed in 2010	Yes
Chesterfield County ***Ettrick***	Chesterfield County Comprehensive Plan -2004 – The Ettrick Village Plan	Yes
City of Colonial Heights	Comprehensive Community Development Plan, 1997	Not Mentioned
City of Petersburg	Comprehensive Plan 2000 Update	Yes
Dinwiddie County ***Dinwiddie Courthouse Area, McKenney***	2006 Comprehensive Plan Update	Yes
Richmond	2031 Long Range Transportation	Yes

Table 4-30 Compatibility with Future Land Use and Long-Range Transportation Plans-Virginia		
City, County MPO / PDC	**Future Land Use Plan**	**Reference SEHSR and in Support?**
Regional MPO	Plan	
Tri-Cities MPO (Crater District), ***Colonial Heights Petersburg***	Tri-Cities Area MPO:Unified Transportation Planning Work Program for FY 2010	Yes
	2031 Transportation Plan	Not Mentioned
Southside PDC ***La Crosse***	Community Economic Development Strategy for 2007	Yes

Table 4-31 Compatibility with Future Land Use and Long-Range Transportation Plans – North Carolina		
City, County MPO / RPO	**Future Land Use Plan**	**Reference SEHSR and in Support?**
Vance County ***Middleburg, Henderson, Kittrell***	Henderson –Vance Downtown Development Commission	Yes Want a SEHSR station in Henderson's commercial core
	Vance County Land Use Plan	Yes
Franklin County ***Franklinton, Youngsville***	Franklin County Comprehensive Transportation Plan (for Franklinton and Youngsville) - updated	Yes
	2025 Comprehensive Development Plan –updated for Franklin County	Yes
Wake Forest	2003 Land Use Plan—updated	Yes
	Wake Forest Transportation Plan	Yes
City of Raleigh	2035 Long Range Transportation Plan	Yes Developing plans for a multimodal station to accommodate high speed rail
	Comprehensive Plan – update (*Planning Raleigh 2030*)	Yes
CAMPO	2035 Long Range Transportation Plan	Yes
Kerr-Tar RPO	Franklin Co Transportation Plan Study	Yes

Table 4-31 Compatibility with Future Land Use and Long-Range Transportation Plans – North Carolina		
City, County MPO / RPO	**Future Land Use Plan**	**Reference SEHSR and in Support?**
	Warren Co Transportation Plan Study	Yes
	Regional Plan (completion 2008-2009)	Yes

4.11.4.4 Compatibility with Multimodal Transportation Plans

The SEHSR project is a recommended project listed in the Virginia Department of Rail and Public Transit's *2008 Statewide Rail Resource Allocation Plan*. In addition, city, county, PDC, MPO, and RPO transportation plans within the project study area all address the issues of highway planning, with most regional plans addressing high speed rail. Several have taken a multimodal approach to include transit, bicycle and/or pedestrian plans within their comprehensive and/or long-range transportation plans (Table 4-32). In terms of the SEHSR project, diversity in plans indicates that the cities, counties, MPOs, PDCs, and RPOs are open to the idea of broadening the range of modes considered in the transportation system, including the SEHSR.

Table 4-32 Is SEHSR Compatible With Multimodal Transportation Plans?				
City, County, MPO, PDC or RPO	**Highway Plans**	**Transit Plans**	**Bicycle/ Pedestrian Plans**	**Other Plans: (Port /Air)**
Richmond, VA	Yes	Yes	Yes	Yes
Chesterfield County, VA	Yes	Yes	Yes	Yes
Colonial Heights, VA	Yes	--	Yes	--
Petersburg, VA	Yes	Yes	Yes	Yes
Dinwiddie County, VA	Yes	--	Yes	--
Richmond Regional MPO	Yes	Yes	Yes	Yes
Tri-Cities MPO	Yes	Yes	Yes	Yes
Crater PDC	Yes	Yes	Yes	Yes
Southside PDC	Yes	Yes	--	--
Vance County, NC	Yes	Yes	--	--
Wake County, NC	Yes	Yes	Yes	--
Raleigh, NC	Yes	Yes	Yes	Yes
CAMPO	Yes	Yes	Yes	Yes
Kerr-Tar RPO	Yes	Yes	Yes	Yes

Source: Plans from referenced Cities, Counties, MPOs, PDCs, and RPOs

The information presented in this section demonstrates that the cities, counties, MPOs, PDCs, and RPOs 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 planning future in both Virginia and North Carolina.

4.11.5 Environmental Justice

Executive Order 12898 states that environmental justice is achieved when the actions of federal agencies impose no disproportionately high and adverse environmental effects on low-income and minority populations and when these populations share equally in the benefits of the actions. A summary of guidance on the application of Executive Order 12898 to transportation projects includes the following points:

- Adverse Effects - the totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects which may include, but not limited to, exclusion or separation of minority or low-income individuals with a given community or from the broader community and the denial of, reduction in, or significant delay in the receipt of, benefits of transportation programs, policies or activities. A disproportionately high and adverse effect on minority and low–income population is one that is predominantly borne by a minority population and/or a low-income population, or one that will be borne by the minority and/or low-income population that is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority and/ or low-income populations.

- Minority Population - As applied in the Tier I EIS for this project, minority populations are identified for impact analysis according to the Council for Environmental Quality guidance document on environmental justice where either 1) the minority population of the affected area exceeds 50%, or 2) where the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. A difference of 10% was used in this analysis.

- Low-Income - Defined by the US Department of Transportation (USDOT) Order on Environmental Justice, low-income refers to a person whose median household income is at or below the Department of Health and Human Services poverty guidelines. The data available for populations on a detailed geographic basis is the poverty threshold, which is related to the poverty guideline as explained in the Tier I EIS for this project; consistent with the Tier I EIS, the poverty threshold is used for this analysis.

Where the project alternatives share the same alignment, and are taking place primarily within an existing rail ROW, impacts are being minimized to the most practicable extent and the analysis of any potential disproportionate impact is more appropriately judged at the county level rather than the immediate context. As shown in Tables 3-20 and 3-21 in Chapter 3, there are no concentrations of Hispanic populations in the study area; thus, the analysis of racial and ethnic minorities focuses on race only. Analysis of potential

environmental justice impacts to minorities is provided 1) for the corridor as a whole, which has appreciably higher minority populations compared to the state averages in both Virginia and North Carolina, and 2) specific communities where either:

- The minority population of the affected area exceeds 50%, or

- The minority population percentage of the affected area is meaningfully greater than the minority population in the general population or other appropriate unit of geographic analysis (a threshold greater than 10% was applied)

The percentages of minority population, based on 2000 Census data, are provided in Tables 3-18 and 3-19 in Chapter 3.

The Census data is consistent with field observations of the communities, with the following exceptions: Alberta, VA and Norlina, Kittrell, and Franklinton, NC. While the counties within which these communities are located exceed the threshold of 50 percent minority populations, the towns of Alberta, Norlina, Kittrell, and Franklinton do not.

The environmental justice analysis also includes an assessment of low-income populations. As described in Chapter 3, there are several dimensions to low-income populations including those below the poverty threshold, those who rent, and those without vehicle ownership. Tables 3-24 and 3-25 highlight the poverty level statistics by city/county and within the study area. Within the study area, the location of low-income populations largely coincides with the location of minority communities described above. This determination is based on the study area population in comparison to the jurisdiction-level low-income characteristics, as well as jurisdiction and study-area populations in comparison to the state averages. The statewide poverty levels are met or exceeded in Richmond, Ettrick, Petersburg, McKenney, Brunswick County, Alberta, Mecklenburg County, and La Crosse, VA, as well as in Warren County, Norlina, Vance County, Henderson, Franklin County, and Franklinton, NC.

4.11.5.1 Corridor-Wide Impacts

For minority and low-income populations in the study area as a whole, the impacts are identified in the Tier I EIS. This Tier II document notes that the communities along the study area provided consistently supportive comments regarding the development of high speed rail in the corridor and that, historically, Amtrak services have been utilized by disproportionately higher percentages of minority and low-income populations. These findings suggest that, at the corridor level 1) the high percentage of minority population does not indicate that disproportionately high and adverse impacts would be borne by the minority populations, and 2) there is a reasonable expectation that minority and low-income populations would share in the benefit of the proposed rail improvements.

4.11.5.2 Community-Level Impacts

Minority and low-income populations would equally benefit from the safety improvements provided via the project's closure of at-grade crossings and the provision of consolidated, grade-separated rail crossings. These closures will also reduce train horn noise in the communities as discussed below. In general, where the alternatives use existing rail alignment, the potential for disproportionately high and adverse impacts to all populations

have already been minimized because the use of existing ROW has been maximized. The focus of analysis of impacts is on alignments that require new railroad or road ROW. Based on these factors, no disproportionately high and adverse effects on low-income and minority populations are anticipated within the overall SEHSR corridor.

Listed below are the communities evaluated for environmental justice impacts, along with a determination as to whether or not, based on 2000 Census data, such populations are present. Tables 4-33 and 4-34 provide the community-level Census data for those communities. Communities with low-income and/or minority populations are shown in **bold** type in Tables 4-33 and 4-34.

- Richmond, VA - Minority and Low-income
- Chesterfield, VA – None
- Ettrick, VA (Chesterfield County) – Minority and Low-Income
- Colonial Heights – None
- Petersburg, VA – Minority and Low-income
- McKenney, VA (Dinwiddie County) – None
- Alberta, VA (Brunswick County) – Low-income
- La Crosse, VA (Mecklenburg County) – Low-income
- Norlina, NC (Warren County) – Low-income
- Middleburg, NC (Vance County) – None
- Henderson, NC (Vance County) – Minority and Low-income
- Kittrell, NC (Vance County) – None
- Franklinton, NC (Franklin County) – Low-income
- Youngsville, NC (Franklin County) – Low-Income
- Wake Forest, NC (Wake County) – None
- Raleigh, NC (Wake County) – None

Table 4-33
Potential Environmental Justice Impacts at the Community Level: Virginia

Section	Locality	% Minority	% Low-Income	Study Area / Community	% Minority	% Low-Income	Rail Status	Impact**
VIRGINIA		28%	10%	---				
AA	City of Richmond, VA	61%	21%	Richmond, VA	**78%**	**31%**	Active Freight & Passenger Rail Service	No
AA – CC	Chesterfield County, VA	23%	5%	Chesterfield, VA	33%	8%	Active Freight & Passenger Rail Service	No
CC				Ettrick, VA	**79%**	**11%**	Active Freight & Passenger Rail Service	No
CC	City of Colonial Heights, VA	10%	6%	Colonial Heights, VA	15%	8%	Active Freight & Passenger Rail Service	No
CC – DD	City of Petersburg, VA	72%	20%	Petersburg, VA	**92%**	**20%**	Active Freight & Passenger Rail Service	No
DD - C	Dinwiddie County, VA	35%	9%	Dinwiddie, VA	36%	10%	Inactive Rail	No
C				McKenney, VA	8%	9%	Inactive Rail	No
D - G	Brunswick County, VA	58%	17%	Brunswick, VA	54%	18%	Inactive Rail	No
E				Alberta, VA	43% *	**16%**	Inactive Rail	No
H - L	Mecklenburg County, VA	41%	16%	Mecklenburg, VA	37%	13%	Inactive Rail	No
I				La Crosse, VA	43% *	**16%**	Inactive Rail	No

Table 4-34 Potential Environmental Justice Impacts at the Community Level: North Carolina								
Section	Locality	% Minority	% Low-Income	Study Area / Community	% Minority	% Low-Income	Rail Status	Impact**
NORTH CAROLINA		28%	12%	---				
L - N	Warren County, NC	61%	19%	Warren, NC	63%	16%	Inactive Rail in northern half of Norlina Active Freight Rail in southern half of Norlina	No
M				Norlina, NC	49% *	**23%**	Inactive Rail in northern half of Norlina Active Freight Rail in southern half of Norlina	No
O - Q	Vance County, NC	52%	21%	Vance, NC	67%	28%	Active Freight Rail Service	No
O				Middleburg, NC	24%	0%	Active Freight Rail Service	No
P				Henderson, NC	**72%**	**33%**	Active Freight Rail Service	No
Q				Kittrell, NC	12%	0%	Active Freight Rail Service	No

Table 4-34 Potential Environmental Justice Impacts at the Community Level: North Carolina								
Section	Locality	% Minority	% Low-Income	Study Area / Community	% Minority	% Low-Income	Rail Status	Impact**
R - T	Franklin County, NC	34%	13%	Franklin, NC	35%	15%	Active Freight Rail Service	No
S				Franklinton, NC	38% *	**15%**	Active Freight Rail Service	No
S – T				Youngsville, NC	18%	**16%**	Active Freight Rail Service	No
T - V	Wake County, NC	28%	8%	Wake, NC	37%	11%	Active Freight Rail Service	No
U				Wake Forest, NC	12%	4%	Active Freight Rail Service	No
U - V				Raleigh, NC	38%	11%	Active Freight Rail Service	No

Source: 2000 Census.

*While these populations exceed the threshold of more than 10% above the % minority population in the study area statewide, they do not exceed the county minority population by more than 10%, therefore they do not qualify for consideration.

** Is there the potential for disproportionately high & adverse effects to Minority and/or Low-Income Populations under any alternative?

Within these communities, there are several key distinctions that provide the basis for potential environmental justice impacts:

1. If the alternative(s) within the community is along an existing rail line that is either active or inactive, then the impacts of the proposed action are primarily the increased noise, vibration, and access changes as discussed in other portions of the community

impact assessment. While the impacts are evaluated individually by community in the paragraphs that follow, the analysis in these areas/alternatives focuses on whether these impacts are severe and/or adverse in comparison to other portions of the corridor with lower concentrations of minority and low-income populations. In addition, the impacts are evaluated in light of the displacement of community facilities, households and/or businesses, as well as anticipated community conditions after any relocations are complete in terms of adverse or beneficial impacts.

2. If the alternative(s) within the community is along a rail line that is not in existence or has been entirely abandoned with ROW returned to private ownership, the impact analysis includes; in addition to the factors described above: the extent of disruption to the community in terms of separation/barrier impacts; displacement of community facilities, households and/or businesses; and anticipated community conditions after any relocations are complete in terms of adverse or beneficial impacts.

Unless otherwise noted, no disproportionately high and adverse impacts to environmental justice populations are expected within these minority and/or low-income communities (Table 4-34) based on the following:

- The alignments for the Build Alternatives are common and essentially remain on existing alignment through these communities, thereby minimizing relocation impacts and impacts to community services and facilities.

- All persons, business, and non-profit organizations displaced as a result of the project would be compensated in a fair and equitable manner in accordance with the Uniform Relocation Assistance and Property Acquisition Policies Act of 1970, as amended, and the North Carolina Relocation Assistance Act (GS-133-5 through 133-18).

- With the exception of Alberta and La Crosse, VA, and the northern portion of Norlina, NC, rail service is currently in operation through these communities, thus the visual and auditory introduction of high speed rail would not be inconsistent with the existing condition.

- In Alberta and La Crosse, VA, and Norlina, NC, low-income populations will equally share with wealthier populations the potentially disruptive and intrusive effects of a newly active rail within their community. This includes access restrictions to and from either side of the rail, and exposure to noise and visual intrusions.

- Because road consolidations and at-grade crossings are at a maximum distance of one mile apart, lengthy or circuitous rerouting is avoided. The temporary inconvenience of and disruption caused by construction activities will be shared by all, not just minority and/or low-income populations.

- Minorities and low-income populations share equally in the safety benefits afforded by the road closings and consolidations.

4.11.5.2.1 Richmond, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment on the active rail line in Richmond, VA. Richmond currently has a large minority population, and the highest concentration of low-income population in the study area. With the rail service to be provided in Richmond and the availability of bus transit in the City that will be focused on a transfer center at Main Street Station, this population has a high likelihood of being able to take advantage of the high speed rail service in the corridor.

Along Ruffin Road, one of the residential units at the Lafayette Gardens apartment community and several adjacent homes may be displaced as a result of ROW acquisition for the railroad bridge construction at this intersection. These displacees are likely low-income and minority. A Bells Road bridge over the existing rail line is also proposed. ROW acquisition on the southern side of Bells Road, to the west of the rail line, may result in the displacement of one or two potentially minority and/or low-income occupied homes. The proposed alternatives maximize the use of existing rail ROW in this area, minimizing displacements of any kind. Because these homes and community resources are located adjacent to the existing rail corridor, and because of design requirements, avoidance of all properties was not possible. Where displacements are unavoidable, fair and equitable compensatory mitigation will be implemented in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646). While displacements would be necessary at these new, grade-separated crossings, the surrounding minority population would be easily served by and will directly benefit from the safety improvements afforded by the grade-separated crossings. While the impacts to these minority and/or low-income displacees are considered adverse, they do not appear to be disproportionately high and adverse relative to the community or the project in light of the general avoidance/minimization of impacts, as well as the benefits that will accrue to the community.

4.11.5.2.2 Ettrick, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment on the active rail line through the Town of Ettrick. While Chesterfield County has a lower percentage of minority and low-income residents than the statewide average, the area of the county within the study corridor has a higher percentage of minorities and low-income residents. Part of what accounts for this statistical variation is the location of Virginia State University, a historically black university, within the study corridor in Ettrick, VA. Because the proposed alternatives maximize the use of existing ROW, displacements of any kind will be minimized. In addition, this minority and low-income population would be easily served by and equally benefit from the new high speed rail service in the Petersburg area.

4.11.5.2.3 Petersburg, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment on the active rail line in the City of Petersburg. Petersburg is the second largest city in Virginia on the corridor. It also has the second largest minority population. Minority and low-income populations in Petersburg could economically benefit by way of employment

opportunities should the Washington Street Station or the Collier Station be selected as the new high speed rail station for the Petersburg area. (Selection of station locations is not included in this document.) Road closures and consolidations would have a minimally disruptive effect in this area.

4.11.5.2.4 Alberta, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment on the inactive rail line in the Town of Alberta. Alberta is an old railroad village and the community's structure and identity historically relate directly to the existence of the former rail line. Contrary to Brunswick County as a whole, the 2000 Census indicates Alberta is primarily white (60 percent) yet above the county and statewide average for those at or below the poverty threshold. The reintroduction of rail into the community would bisect the town. Where vehicular and pedestrian access is currently unimpeded, travel patterns will be redirected to cross the rail at the four designated rail crossings. While these changes could be inconvenient and disruptive at first, the impact would not be disproportionately high and adverse to low-income populations within Alberta.

4.11.5.2.5 La Crosse, VA

The VA1, VA2, and VA3 project alternatives all share a common alignment on the inactive rail corridor in the Town of La Crosse. With the support of the La Crosse community, a new high speed rail station will be constructed in town. The economic and travel access benefits of a new station will be equally available to all residents and businesses within La Crosse. Disruption in travel patterns, the reactivation of rail service through town, and the operation of a new rail station in town would likely affect all residents. Therefore, disproportionately high and adverse impacts to low-income populations are not expected.

4.11.5.2.6 Norlina, NC

In the northern half of Norlina, the NC2 project alternative follows the existing rail corridor and the NC1/NC3 project alternative bears to the northeast on existing rail through town. In the southern half of Norlina, all three alignments converge on common alignment on the existing and active rail corridor. The NC2 project alternative would potentially displace a minority church (New Creation Church on Hyco Avenue) whereas the NC1/NC3 project alternative would not. Because the church is located adjacent to the existing rail corridor, and because of design requirements, avoidance of the property was not possible for the NC2 project alternative. If necessary, fair and equitable compensatory mitigation will be implemented in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the North Carolina Relocation Assistance Act (GS-133-5 through 133-18). In discussions with the SEHSR project team in 2009, a church official indicated that the church currently rents the building on Hyco Avenue and hopes to relocate to a larger facility within Norlina in the future. There appears to be vacant suitable land near the church for relocation. While the impacts to this minority church are considered adverse, they are not considered disproportionately high relative to the community or the project. The proposed road closures and crossing consolidations will not have a disproportionately high and adverse effect on low-income populations within Norlina.

4.11.5.2.7 Henderson, NC

The NC1, NC2, and NC3 project alternatives all share a common alignment on the active rail corridor through Henderson, NC. Henderson is one of the larger, more populated areas within the study corridor and has equally large minority and low-income populations. Henderson is one of the towns identified to have a high speed rail stop, which will be evaluated in future environmental documentation. The economic and travel access benefits of a new station will be equally available to all residents and businesses within Henderson. Disruption in travel patterns, the addition of high speed rail service through town, and the operation of a new rail station in town would likely affect all residents. Therefore, disproportionately high and adverse impacts to minority and/or low-income populations are not expected.

4.11.5.2.8 Franklinton, NC

The NC1, NC2, and NC3 project alternatives all share a common alignment on the active rail corridor in Franklinton, NC. Where vehicular and pedestrian access is currently unimpeded, travel patterns will be redirected to cross the rail at the five designated rail crossings in the vicinity of the town. While these changes could be inconvenient at first, the impact would not be disproportionately high and adverse to low-income populations within Franklinton.

4.11.5.2.9 Youngsville, NC

The NC1, NC2, and NC3 project alternatives follow a common alignment along the active rail corridor in Youngsville, NC. The rail line is active and the rail improvements maximize the use of existing rail ROW. Road closures and consolidations and new, grade-separated crossings will impact the residents of the town but this is not anticipated to create a disproportionately high and adverse impact to low-income populations. The inconvenience of the road closures and consolidations in Youngsville will be offset by the improved connectivity and safety of roads and the maintenance of the historic integrity of the town.

4.11.6 Relocations and Associated Right of Way Costs

Upon completion of a FEIS and record of decision (ROD), the SEHSR would begin to coordinate with affected families, businesses, and non-profit facilities. The states have established programs for assisting those affected with relocation to replacement facilities. VDOT policies would be applied in Virginia and NCDOT policies would be applied in North Carolina, as outlined below.

4.11.6.1 VDOT Relocation Policies

A comprehensive program of services and benefits has been established to ensure, to the maximum extent possible, the timely and successful relocation of displacees and reestablishment of businesses per the Virginia Administrative Code, 24VAC30-41. The VDOT Right of Way and Utilities Division's relocation section is staffed with skilled personnel that oversee the Relocation Advisory Services Program. The services provided are intended to assist displacees in relocating to decent, safe and sanitary housing that meets their needs.

VDOT would ensure effective acquisition and relocation services, and would provide moving reimbursement, replacement housing payments and other cost reimbursements so that individuals displaced would not suffer disproportionate injuries as a result of state and/or federally assisted projects. All housing would be fair housing and available to all persons, regardless of race, color, sex, religion, or national origin. The acquisition and relocation program would be conducted in accordance with the Uniform Relocation Assistance and Property Acquisition Policies Act of 1970, as amended.

Early in the acquisition and relocation phase, experienced agents perform field inspections of each proposed segment and connection and secure tax boundary and sales records from local courthouses to determine the various costs of land, buildings, improvements, damages, and relocation costs. Realtors are also questioned regarding the availability of decent, safe, and sanitary replacement housing throughout the corridor alternatives. Each person would have sufficient time to negotiate for and obtain replacement housing or business space.

A displaced individual or family is entitled to receive a payment for moving personal property. The displacee has the option of a payment based upon the actual reasonable moving expenses (commercial move or self-move), a fixed payment that is based on VDOT's room count schedule, or, in unusual circumstances, any combination of the above. An example of such a circumstance would be to have a commercial mover that would move the household items, but would not move certain personal property stored in a shed. The displacee can remove the items from the shed as a self-move.

Individuals and families displaced from a dwelling are eligible for purchase or rental supplement payments. The purpose of the purchase or rental supplement is to enable the displaced household to relocate to decent, safe and sanitary replacement housing that is within financial means. The elements included in the replacement housing payment are: additional costs to purchase replacement housing (purchase supplement); compensation to the owner for the increased interest cost and other debt service costs which are incurred in connection with a mortgage(s) on the replacement dwelling; and reimbursement to the owner for expenses related to the purchase of replacement housing. A residential tenant who was in occupancy at the displacement dwelling for 90 days or more before the initiation of negotiations, is eligible to receive a rent supplement for relocation to comparable housing. An owner-displacee who was in occupancy from 90 to 179 days before the initiation of negotiations is also eligible for the same benefits.

No displaced persons would be required to move until a comparable replacement dwelling is made available within their financial means. Comparable replacement housing may not be available on the private market or does not meet specific requirements or special needs of a particular displaced family. Also, housing may be available on the market, but the cost exceeds the benefit limits for tenants and owners of $5,250 and $22,500, respectively. If housing is not available to a displacee and the transportation project would thereby be prevented from proceeding in a timely manner, VDOT is authorized to take a broad range of measures to make housing available. These measures, which are outside normal relocation benefit limits, are called collectively, Last Resort Housing.

4.11.6.2 NCDOT Relocation Policies

It is the policy of NCDOT to ensure that comparable replacement housing is available for relocates prior to construction of state and/or federally assisted projects. Furthermore, the

NCDOT has three programs to minimize the inconvenience of relocation: relocation assistance, relocation moving payments, and relocation replacement housing payments or rent supplements.

With the Relocation Assistance Program, experienced NCDOT staff would be available to assist displacees with information such as: availability and prices of homes, apartments, or commercial property for sale or rent, and financing or other housing programs. The Relocation Moving Payment Program, in general, provides for payment of actual moving expenses encountered in relocation. Where displacement would force an owner or tenant to purchase or rent property at higher cost or to lose a favorable financing arrangement (in case of ownership), the Relocation Replacement Housing Payments or Rent Supplement Program would compensate up to $22,500 to owners who are eligible and qualify, and up to $5,250 to tenants who are eligible and qualify.

The relocation program for the proposed action would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the North Carolina Relocation Assistance Act (GS-133-5 through 133-18). This program is designed to provide assistance to displaced persons in relocating to a replacement site in which to live or do business. At least one relocation officer is assigned to each transportation project for this purpose.

The relocation officer would determine the needs of displaced families, individuals, businesses, non-profit organizations, and farm operations without regard to race, color, religion, sex, or national origin. The NCDOT would schedule its work to allow ample time, prior to displacement, for negotiation and possession of replacement housing that meets decent, safe, and sanitary standards. The relocatees are given a 90-day written notice after the NCDOT purchases the property.

Relocation of displaced persons would be offered in areas not generally less desirable in regard to public utilities and commercial facilities. Rent and sale prices of replacement housing would be within the financial budget of the families and individuals displaced and would be reasonably accessible to their places of employment. The relocation officer also would assist owners of displaced businesses, non-profit organizations, and farm operations in searching for and moving to replacement property.

All tenant and owner residential occupants who may be displaced would receive an explanation regarding all available options, including: 1) purchases of replacement housing; 2) rental of replacement housing, either private or public; and 3) moving existing owner-occupied housing to another site (if practicable). The relocation officer also would supply information concerning other state or federal programs offering assistance to displaced persons and would provide other advisory services as needed in order to minimize hardships to displaced persons in adjusting to a new location.

Last Resort Housing is a program used when comparable replacement housing is not available, or is unavailable within the displacee's financial means, and the replacement payment exceeds the federal and state legal limitation. The purpose of the program is to allow broad latitudes in methods of implementation by the state so that decent, safe, and sanitary replacement housing can be provided. Since opportunities for replacement housing appear adequate within the study area, it is not likely that the Last Resort Housing Program would be necessary for the proposed project. However, this program would still be considered, as mandated by State law.

4.11.6.3 Relocation Impacts

Historically, railroads played a major transportation role in the development of the east coast. Many large and small municipalities developed along and around the rail lines. This is true for the cities and towns throughout the SEHSR study corridor.

To minimize impacts, alternatives were developed that took advantage of existing rail corridors. Throughout most of the urban and developed areas, the three alternatives share a common alignment. The proposed rail improvements and associated roadwork understandably require relocations to residences and business, due to their close proximity to the rail line. Because the alternatives are on common alignment through much of the downtown areas, the number of expected relocations is often the same, or very similar.

Table 4-35 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. Because the project alternatives are on common alignment in these locations, there is no difference between alternatives.

As the tables show, in many sections there are small differences between alternatives in the number of residential and commercial relocations. During final design, further measures to avoid and minimize displacements will occur; this will likely lower the numbers ultimately displaced.

Table 4-35
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 4-35 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: DRPT, 2006, 2009; NCDOT, 2008.

4.11.6.4 Right of Way Costs

Total ROW costs include land and damages, residential and business relocation costs, and acquisition costs. Table 4-36 presents a summary of the estimated ROW costs associated with each of the alternatives by section.

Table 4-36 Right of Way Costs by Section			
Section	**VA1**	**VA2**	**VA3**
AA	$28,113,343	$28,113,343	$28,113,343
BB	$11,035,693	$11,035,693	$11,035,693
CC	$26,141,675	$26,141,675	$26,141,675
DD	$2,719,744	$2,656,207	$2,452,856
A	$505,900	$505,900	$505,900
B	$1,538,500	$1,302,800	$1,538,500
C	$4,335,300	$4,335,300	$4,335,300
D	$1,817,000	$1,001,700	$1,817,000
E	$1,533,800	$1,392,500	$1,533,800
F	$268,100	$268,100	$268,100
G	$369,000	$309,900	$531,200
H	$1,142,000	$1,115,300	$1,142,000
I	$1,929,100	$2,252,800	$1,929,100
J	$1,159,900	$1,415,900	$1,159,900
K	$1,573,000	$904,300	$1,573,000
L (VA)	$388,700	$170,600	$388,700

Table 4-36 Right of Way Costs by Section			
Section	**NC1**	**NC2**	**NC3**
L (NC)	$5,032,500	$5,190,000	$5,032,500
M	$5,767,500	$5,102,500	$5,767,500
N	$2,080,188	$2,571,563	$2,080,188
O	$3,563,063	$4,190,375	$3,841,750
P	$6,976,313	$6,976,313	$6,976,313
Q	$7,943,532	$6,743,782	$6,779,095
R	$3,178,438	$706,095	$3,178,438
S	$6,801,188	$8,348,938	$6,801,188
T	$2,956,250	$2,520,000	$2,956,250
U	$26,245,625	$24,609,375	$25,755,625
V	$53,338,750	$56,468,750	$90,243,750

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

4.12 Archaeological and Historical Resources

Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), and implementing regulations (see 36 CFR Part 800) require federal agencies to consider the effects of their actions on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment if the action would result in an adverse effect on the property listed on or eligible for the National Register of Historic Places (NRHP). Eligibility criteria for the NRHP are summarized in Section 3.12.

4.12.1 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 FEIS.

The one archaeological resource listed on the NRHP within the project area, the Falling Creek Ironworks site, is outside of the limits of disturbance of all three project alternatives.

4.12.2 Historical Resources

The potential effect of the SEHSR project on historic architectural resources was evaluated in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended. According to the criteria for Effect and Adverse Effect developed by the Advisory Council on Historic Preservation (36 CFR Section 800.9), potential effect is determined based upon the following:

- No Effect - There would be no effect, neither adverse nor beneficial, on potential cultural resources.

- No Adverse Effect - There would be an effect, but it is determined that the effect would not compromise those characteristics which qualify the property for listing on the NRHP.

- Adverse Effect - There would be an effect that would compromise the integrity of the resource.

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.

Recommendations of effect for resources in Virginia are listed in Table 4-37 and Table 4-38. The resources are listed in the order they appear in the project study area from north to south. The VDHR concurred with these recommendations in a letter dated November 23, 2009. The effects are described as "recommended" because, per state policy, final determination of effects for resources in Virginia will be not be completed until after all archaeological investigations have been completed (i.e., after selection of the preferred alternative). These final effect determinations will be reported in the FEIS. In addition, coordination with the National Park Service (NPS) regarding impacts to historic battlefields is ongoing and will be completed prior to publication of the FEIS.

Determinations of effect for resources in North Carolina are listed in Table 4-39. The North Carolina State HPO concurred with these determinations of effect in a form signed December 23, 3009. Copies of the correspondence related to Section 106 coordination are provided in Appendix L.

If "No Effect" is listed for a project alternative in Tables 4-37 through 4-39, the alternative does not have any property impacts on the resource; therefore, no further discussion is provided. For resources where the project has been determined to have no adverse effect or adverse effects, details are provided below regarding each alternative's impact on the resource.

Table 4-37 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 4-37 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/Earthworks	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 4-38 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
Peebles Farm	No Adverse Effect	No Adverse Effect	No Adverse Effect

Table 4-38 Effect Recommendations for Battlefields - Virginia			
Resource Name	**VA1 Section 106 Effect**	**VA2 Section 106 Effect**	**VA3 Section 106 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 4-39 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
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

Table 4-39 Effect Determinations for Historic Architecture Resources – North Carolina			
Resource Name	**NC1 Section 106 Effect**	**NC2 Section 106 Effect**	**NC3 Section 106 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
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

Table 4-39 Effect Determinations for Historic Architecture Resources – North Carolina			
Resource Name	**NC1 Section 106 Effect**	**NC2 Section 106 Effect**	**NC3 Section 106 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

4.12.2.1 Historical Resources – Virginia

The follow discussion provides details on the effect of the SEHSR project alternatives on historical resources in Virginia where the project has been determined to have no adverse effect or adverse effects for at least one project alternative. For all other resources, the project has been determined to have no effect for all alternatives.

4.12.2.1.1 Seaboard Air Line Railroad Corridor

All three of the project alternatives are on common alignment in the vicinity of the Seaboard Line Railroad Corridor. The rail improvements would be located within the existing rail corridor. Historically, the corridor contained two to three sets of parallel tracks. Over the years, the number of tracks has been reduced; therefore, the corridor now only contains one or two sets of tracks within the wider ROW. The addition of an additional set of tracks would return most of the corridor to its original historic appearance and configuration. In addition, the existing tracks have been replaced with in-kind materials numerous times over the past 150 years, including new rails, cross ties, spikes, and ballast. As such, the resource is only eligible for the NRHP under Criterion A (associated with events that have made a significant contribution to the broad patterns of our history) and not under Criterion C (embody the distinctive characteristics of a type, period, or method of construction) due to compromised physical integrity. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.2 C. & O. & Seaboard Railroad Depot

All three of the project alternatives are on common alignment in the vicinity of the C. & O. & Seaboard Railroad Depot. The SEHSR project begins at this depot and runs south. The project alternatives would not require any modifications to the existing building or the surrounding tracks. Moreover, historically, numerous rail lines ran perpendicular to Main Street Station, thus this project would return rail traffic to this notable historic building. Because the rail is elevated, no road changes are required in this area. Because the project would not alter the property's location, design, setting, materials, workmanship, feeling, or association, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.3 Shockoe Valley & Tobacco Row Historic District

All three of the project alternatives are on common alignment in the vicinity of this resource. Currently, as trains exit to the south of Main Street Station and through this district, they run along a single track, which is elevated on T-shaped supports built to accommodate two tracks. The project alternatives would retain the existing track and add a second track on top of the T-shaped support. All work would be between one and three stories above the historic district atop existing supports. Because the rail is elevated, no road changes are required in this area. As such, the addition of the second track would not alter the physical composition or viewshed of the district in any way. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this district.

4.12.2.1.4 Shockoe Slip Historic District

All three of the project alternatives are on common alignment in the vicinity of this resource. As discussed with the Shockoe Valley & Tobacco Row Historic District above, the existing single track that runs north-south through the Shockoe Slip Historic District is located on top of a T-shaped pier. The project alternatives would add a second track to the same pier, thus limiting any potential impacts on surrounding historic properties. Because the rail is elevated, no road changes are required in this area. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this district.

4.12.2.1.5 James River and Kanawha Canal Historic District

This district is located south of Shockoe Slip Historic District and north of the James River. All three of the project alternatives are on common alignment in the vicinity of this resource. As discussed with the nearby districts above, the existing single track through the district is located on top of a T-shaped pier. The project alternatives would add a second track to the same pier, thus limiting any potential impacts on surrounding historic properties. Because the rail is elevated, no road changes are required in this area. Modifications would not impact the integrity of any aspects of this district, and the addition of the second track on the existing pier would not alter the district's significance or character. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this district.

4.12.2.1.6 Atlantic Coast Line Railroad Corridor

All three of the project alternatives are on common alignment in the vicinity of the Atlantic Coast Line Railroad Corridor. The rail improvements would be located within the existing rail corridor. Historically, the corridor contained two to three sets of parallel tracks. Over the years, the number of tracks has been reduced; therefore, the corridor now only contains one or two sets of tracks within the wider ROW. The addition of an additional set of tracks would return most of the corridor to its original historic appearance and configuration. In addition, the existing tracks have been replaced with in-kind materials numerous times over the past 150 years, including new rails, cross ties, spikes, and ballast. As such, the resource is only eligible for the NRHP under Criterion A and not under Criterion C due to compromised physical integrity. It is recommended

that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.7 Williams Bridge Company

All three of the project alternatives are on common alignment near this resource. The project alternatives would reroute the entry and roadways near this complex to include changes to the road system and possible alterations to building remains. Due to the project's potential to diminish the property's integrity of location, design, setting, feeling, and association, it is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this resource.

4.12.2.1.8 Transmontaigne Product Services, Inc.

All three of the project alternatives are on common alignment near this resource. As mentioned above, the proposed rail work in this vicinity of Richmond, VA, is limited to adding a second track to the existing corridor. However, Goodes Street would be widened south of this resource. Widening on the eastern portion of Goodes Street near the railroad tracks requires creating an underpass to bring the roadway under the rail near the southeastern corner of the Transmontaigne property. A retaining wall would be constructed on the north side of Goodes Street to eliminate any modifications to this historic property. The viewshed would not be modified, and no Transmontaigne-owned property would be used. As such, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.9 Davee Gardens Historic District

All three of the project alternatives are on common alignment near this resource. The proposed rail modifications near Davee Gardens are minimal and would include rebuilding a second track within the existing rail corridor. Road work in this area would involve widening a 2,300-foot long stretch of Ruffin Road, which is located along the northern perimeter of the district. The road widening in this area is minimal and would result in expanding the existing paved shoulder by approximately five feet. Thus, the front yard of one of the 165 homes in the district would be shortened by between one and five feet. This modification would not alter any of the characteristics that render this district eligible for the NRHP. As such, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.10 Dupont Spruance

All three of the project alternatives are on common alignment near this resource and run along the existing rail corridor. The project alternatives would reintroduce a second track to this area; there are no road modifications in the vicinity of this parcel. The rail corridor runs north-south along the western boundary of this resource. The complex was created in this particular location due to the close proximity of the active rail line and the company historically used the second rail track to help transport goods. Although the project has the potential to slightly alter the setting of the resource, it would not diminish the characteristics that make this property eligible for the NRHP. As such, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.11 Richmond & Petersburg Electric Railway

All three of the project alternatives are on common alignment near this resource, just east of Chimney Corner in Chesterfield County. The project alternatives would rebuild a second rail line across the resource. The rail line had been in existence for almost 70 years when the electric rail line was established in the early-twentieth century. This resource has always crossed the rail line in this exact spot. Moreover, the rail line contained two active tracks when the electric rail line was active. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.12 House at 3619 Thurston Rd

All three of the project alternatives are on common alignment near this resource. The House at 3619 Thurston Road is located west of the railroad. Although the parcel is not within the APE of the rail modifications, a new roadway would be created west of the house, running from Thurston Road on the northwest, across the railroad tracks, and connecting to Chester Road on the southeast. The road would be located about 250 feet west of the dwelling. The house would be separated from the road ROW by a modern home and a vegetative buffer, and there would be no land takes from this resource. Because the road would not alter the resource's location, design, materials, workmanship, and feeling, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this property.

4.12.2.1.13 Centralia Post Office

All three of the project alternatives are on common alignment near this resource. The project alternatives would construct an overpass on Centralia Road across the rail corridor to replace the existing at-grade crossing the railroad tracks. The fill slope from the bridge would be approximately 30 feet tall and located less than 30 feet south of the resource. The driveway for the property would be moved and the road itself would be shifted south. This would disconnect the resource from the local attributes that rendered its construction necessary. It is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this resource.

4.12.2.1.14 Ragland House/4626 Centralia Rd

All three of the project alternatives are on common alignment near the Ragland House. The project alternatives would construct an overpass on Centralia Road across the rail corridor to replace the existing at-grade crossing the railroad tracks. The fill slope from the bridge would be approximately 30 feet tall and located less than 30 feet south of the resource. A portion of Centralia Road would be rerouted just east of Ragland House. No roadwork would be completed on the Ragland property, and the viewshed from the main house would be only slightly modified as the new road meets the old road southeast of the house. Because the road change would not alter any of the characteristics that make Ragland House eligible for the NRHP, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.15 Circle Oaks/4510 Centralia Road

All three of the project alternatives are on common alignment near this resource. Circle Oaks is located east of Ragland House, listed above. The project alternatives would construct an overpass on Centralia Road across the rail corridor to replace the existing at-grade crossing the railroad tracks. The approach to the bridge would be visible from Circle Oaks and would require reconfiguring a section of driveway. The modifications have the potential to diminish the characteristics that make the property eligible for the NRHP. As such, it is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this resource.

4.12.2.1.16 Chester Historic District

All three of the project alternatives are on common alignment through the Chester Historic District. Although the rail modifications in this area would require a slight widening to the existing rail corridor, the more notable changes would occur due to road improvements. Several original road alignments would be rerouted and rail crossing points would be closed. The project alternatives would result in notable modifications to the district's original plan, thus it is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this district.

4.12.2.1.17 Pretlow House

All three of the project alternatives are on common alignment near this resource. The Pretlow House is located at the intersection of Curtis and Winfree Streets in Chester, VA. The property is one block away from the rail tracks, but the project alternatives would lower Curtis Street under the rail tracks with an underpass, removing the existing at-grade crossing. This change would require modifications to the Curtis Street between the rail tracks and Winfree Street. At Pretlow House, the road changes have been minimized through the creation of curb and gutter designs, thus avoiding impacts to vegetation currently in existence at the corner of the property and avoiding any impacts to the existing store wall. As such, the only adjustments to the property may be the addition of a sliver of pavement and a new curb at the eastern corner of the property. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource. As a condition of this effect recommendation, the VDHR requested that the all efforts be made during construction to avoid impacts to the existing stone wall and adjacent vegetation.

4.12.2.1.18 Eichelberger House

All three of the project alternatives are on common alignment near this resource. The Eichelberger House was once part of a large parcel of land that covered the entire block. It was designed to accommodate both the home life and work pattern of its owner, Harry Eichelberger, a railroad executive who caught the train at the station in Chester, VA, every day to travel to his office in Richmond, VA. He reached the station by a trail that wound through his property, exiting onto Curtis Street from an ornate stone gate. The project alternatives would widen Curtis Street as part of the new railroad underpass. This would require the removal of the original stone gate and part of the trail. Both of these resources are contributing elements to the larger Eichelberger House property. It

is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this property.

4.12.2.1.19 Battersea

All three of the project alternatives are on common alignment near this resource. Battersea is located just south of the Appomattox River in Petersburg, VA. There are no road changes proposed for this section of the project. The main house of Battersea is not within the APE of the project; however, the western boundary of the larger property abuts the rail line. Thus the larger parcel is within the general APE. The main house and all above-ground resources are shielded from the rail corridor by distance (the closest above-ground contributing element is over 750 feet from the rail track and the main house is 1,200 feet from the tracks), topography, and dense vegetation. The corridor is not at all visible from the primary occupation areas of the house, and this would not change with the reinstallation of a second rail within the existing corridor. Thus, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this property.

4.12.2.1.20 North Battersea/Pride's Field Historic District

All three of the project alternatives are on common alignment near this district. The North Battersea district is located east of the rail corridor in Petersburg, VA. Most of the district itself is outside of the project APE; however, Battersea mansion (a contributing element to the district) is located between the rail tracks and the remainder of the district. As such, the district is tangentially included within the project APE. With the exception of Battersea itself, the closest contributing element to the rail corridor is over 2,000 feet east of the rail line, and no road changes are proposed in this area. The project alternatives would not impact the physical or historic integrity of the resource. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this district. As a condition of this effect recommendation, the VDHR requested that the project team coordinate with the City of Petersburg to identify measures to minimize impacts to this resource.

4.12.2.1.21 Defense Road

All three of the project alternatives are on common alignment near this resource. Defense Road is perpendicular to the railroad corridor in this area. The project alternatives would add a second railroad bridge over Defense Road (directly adjacent to the existing railroad bridge), which would necessitate the removal of a small section of the original roadway and lowering the overall road grade near the bridge to allow for vehicular passage beneath the new span. This change would impact the road's location, design, setting, materials, workmanship, and feeling. It is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this resource.

4.12.2.1.22 Dimmock Line/Earthworks

The three SEHSR project alternatives are on common alignment near this resource. The project alternatives would add a second railroad bridge over Defense Road (directly adjacent to the existing railroad bridge). Construction of the bridge and associated improvements to Defense Road would necessitate large disturbances to the segment of

the earthworks within the project APE. It is recommended that the VA1, VA2, and VA3 project alternatives would have an adverse effect on the resource under Section 106 of the NHPA.

4.12.2.1.23 Bridge over Defense Road

All three of the project alternatives are on common alignment near this resource. The project alternatives would construct a second bridge directly east of the existing span, thus introducing a new element adjacent to the current bridge. Due to the introduction of this large new element, it is recommended that the VA1, VA2, and VA3 project alternatives have an adverse effect on the bridge.

4.12.2.1.24 Bowen House

The three SEHSR project alternatives are on common alignment near this resource, which is on the east side of US 1. The project alternatives would add a set of tracks within the existing rail corridor on the west side of US 1. The rail corridor is approximately 75 feet west of the western boundary of this resource and over 150 feet from the main house. However, the road system in this area would also be modified by rerouting the corridor to the south of the Bowen House and bridging Glebe Road over the rail lines. This new bridge would be just southwest of the Bowen House boundaries. It is possible that the new structure would be visible from the main house. However, any modifications to the viewshed would be tempered by a vegetative screen, distance, and the US 1 corridor. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource under Section 106 of the NHPA.

4.12.2.1.25 Wynnhurst

The project alternatives vary near this resource. The VA1 and VA3 project alternatives are on common alignment, running in a straight line south of the Dinwiddie/Brunswick county line. This alignment runs through the southeastern half of the Wynnhurst property, located north of Route 629. The new rail corridor is 100 feet from the main house and entirely within the larger property boundaries. Due to alterations to the property's location, design, setting, feeling, and association, it is recommended that the VA1/VA3 project alternative would have an adverse effect on this resource.

The VA2 project alternative veers off to the northwest of Wynnhurst, running through the small community of Rawlings, VA. All rail work for this alternative would occur 300 feet west of the main house, and the rail corridor would be shielded from this resource by several modern dwellings and vegetation. It is recommended that the VA2 project alternative would have no effect on this resource.

4.12.2.1.26 Blick's Store

The project alternatives vary near this resource. Blick's Store is located north of the intersection of the railroad corridor and Route 629 in Rawlings, VA. All project alternatives would rebuild the railroad tracks through this area in the existing corridor.

The VA1 and VA3 project alternatives are on common alignment. This alternative includes no roadwork in the vicinity of the Blick's Store. Therefore, it is recommended that the VA1/VA3 project alternative would have no effect on this resource.

The VA2 project alternative would reroute Route 629 behind the property, about 300 feet south of the store building. The road movement would not impact the physical characteristics of the resource. Therefore, it is recommended that the VA2 project alternative would have no adverse effect on this resource.

4.12.2.1.27 Tourist Guest House

The project alternatives vary near this resource. The Tourist Guest House was recorded during an investigation to locate an avoidance alternative to the Oak Shades property described below. The VA3 alignment was designed to serve as the Oak Shades avoidance alternative.

The VA1 and VA2 project alternatives are located over 300 feet southeast of the property. Therefore, it is recommended that the VA1 and VA2 project alternatives would have no effect on this resource.

The VA3 project alternative would locate the railroad tracks directly behind the main house of the Tourist Guest House. Construction of this new rail line would be within the viewshed of the home. Therefore, it is recommended that the VA3 project alternative would have an adverse effect on this property.

4.12.2.1.28 Oak Shades

The project alternatives vary near this resource. Oak Shades is located south of the Tourist Guest House, to the east of Route 639 in Brunswick County, VA, and west of the abandoned Seaboard Coast Line railroad tracks.

The VA1 project alternative would relocate the railroad corridor on new location just southeast of the main house at Oak Shades. The new rail corridor would be less than 50 feet from the home. Because of the impacts to the building's physical and historic integrity, it is recommended that the VA1 project alternative would have an adverse effect on this resource.

The VA2 project alternative would modify the abandoned rail line southeast of the property. The rail tracks would be located down a steel escarpment and not visible from the main house. Although the property boundaries for Oak Shade are directly adjacent to the rail corridor, the project would only involve work within the existing rail corridor, which is not within the viewshed of the main house. Due to steep topography and dense vegetation blocking the viewshed from the historic resource, it is recommended that the VA2 project alternative would have no adverse effect on this resource.

The VA3 project alternative is located over 300 feet from the Oak Shades property and blocked from view by several homes and roadways. Therefore, it is recommended that the VA3 project alternative would have no effect on this resource.

4.12.2.1.29 La Crosse Commercial Historic District

All three of the project alternatives are on common alignment near this resource. The railroad tracks would run through town at the same grade as the surrounding roadways and above-ground resources. Changes would include remodeling the road system through town and the demolition of at least two contributing resources. Because of these changes, it is recommended that that the VA1, VA2, and VA3 project alternatives would have an adverse effect on this district.

4.12.2.1.30 Wright Farmstead

The project alternatives vary near this resource. The farmstead is located south of Belfield Road in Mecklenburg County, VA.

The VA1 and VA3 project alternatives are on common alignment near the Wright Farmstead and run directly through the western two-thirds of the resource. It is recommended that the VA1/VA3 project alternative would have an adverse effect on this property.

The VA2 project alternative is located more than 500 feet from the Wright Farmstead. Therefore, it is recommended that the VA2 project alternative would have no effect on this resource.

4.12.2.1.31 Sardis Methodist Church

All three of the project alternatives are on common alignment near this resource. Sardis Methodist Church is located east of the old railroad tracks. The project alternatives would require rerouting of the current driveway for the church. The existing access road is an at-grade crossing over the rail bed. Under the project alternatives, the driveway would be rerouted slightly north to utilize an overpass. Visitors would approach the church from the north instead of from the west. Although this change alters the property's setting, it does not diminish any of the characteristics that render the resource eligible for the NRHP. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this resource.

4.12.2.1.32 Bracey Historic District

The project alternatives vary near this resource. The proposed Bracey Historic District is linear, running roughly east-west along Route 619. The town was founded due to the intersection of the road and railway to cater to rail traffic.

The VA1 and VA3 project alternatives are on common alignment in the vicinity of the district. The VA1/VA3 project alternative would construct the rail corridor west of the original Seaboard Air Line tracks. The work would be outside of the district, but would reintroduce an important element of the district's history that has been removed. Because construction of this alternative would not impact the existing viewshed of the resource or require any physical modifications, it is recommended that the VA1and VA3 project alternatives would have no effect on the district.

The VA2 project alternative would reestablish rail on the abandoned Seaboard tracks. However, the existing rail corridor in this area is too narrow to accommodate the proposed line, thus the corridor would be widened to the east. This would result in construction directly adjacent to the existing Bracey Railroad Depot, which is a contributing element to the district. Although the depot would not be destroyed, the work has the potential to diminish the district's design, setting, feeling, and association by modifying the original rail corridor and risking impacts to contributing elements. As such, it is recommended that the VA2 project alternative would have an adverse effect on this district.

4.12.2.1.33 Granite Hall/Fitts House

The project alternatives vary near this resource. Granite Hall is located at the northeastern quadrant of the intersection of Route 712 and the North Carolina/Virginia state line.

The VA1 and VA3 project alternatives are on common near Granite Hall. The rail alignments are located 700 feet west of Granite Hall and several dwellings, vegetation, and roadways are between the home and the alignments. Therefore, it is recommended that the VA1and VA3 project alternatives would have no effect on the resource.

The VA2 project alternative runs along the abandoned Seaboard Air Line rail corridor. While the rail changes would occur within the existing alignment several hundred feet southwest of the main house, the alternative requires construction of a new bridge on Route 712 over the rail line. The fill slope for the new bridge would be located in front of the main house. This would alter both the driveway and the approach to the home and also introduce a new visual element outside of the primary elevation of the home. Because of impacts to the resource's design, setting, feeling, and association, it is recommended that the VA2 project alternative would have an adverse effect on this resource.

4.12.2.2 Battlefields – Virginia

The follow sections describe the effect of the SEHSR project alternatives on battlefields in Virginia within the project APE. The impacts were determined in conjunction with the VDHR, the NPS Petersburg National Battlefield, and NPS Richmond National Battlefield.

As discussed in Section 3.12.2.2, the American Battlefield Protection Program (ABPP) proposed new National Register-eligible boundaries for the 10 project battlefields in July 2009. The impacts described in the sections below are based on the boundaries determined by the state historic preservation office (VDHR). Although there are differences between the individual battlefield boundaries, when considered in total, the VDHR boundaries within the project APE encompass all of the ABPP boundaries with the following exceptions:

- Just south of Highway 288 in Chester, VA – all project alternatives are on common alignment within existing railroad ROW
- Vicinity of Walthall Industrial Parkway just north of Colonial Heights, VA – all project alternatives are on common alignment; rail alignments are within existing railroad ROW; new access road proposed to connect Walthall Industrial Parkway with Pine Forest Road

- Vaughn Road near the Burgess Connector – all project alternatives are on common alignment; rail alignments are within existing railroad ROW; new bridge over the railroad on Vaughn Road
- Carson Road near the Dinwiddie Courthouse community – the VA1/VA3 project alternatives shift rail slightly outside of existing railroad ROW and provide a new bridge over the railroad on Carson Road; VA2 project alternative is within existing railroad ROW
- Courthouse Road near the Dinwiddie Courthouse community – the VA1, VA2, and VA3 project alternatives are separated by less than 150 feet in this area and extend just outside of the existing railroad ROW; no road improvements are proposed
- Gatewood Road south of the Dinwiddie Courthouse community – all project alternatives are on common alignment; no rail work proposed in this location; Gatewood Road would be slightly realigned to accommodate a new bridge over the railroad
- Keelers Mill Road south of the Dinwiddie Courthouse community - all project alternatives are on common alignment; rail alignments are within existing railroad ROW; Keelers Mill Road would be slightly realigned to connect with a new access road on the west side of the railroad (outside battlefield boundaries)

The seven segments listed above comprise an extremely small area. It is estimated that at least 95 percent of the area within the two sets of battlefield boundaries overlap. As such, none of the improvements proposed by the SEHSR project in these areas would result in a change to the recommended Section 106 effects described in the sections below.

4.12.2.2.1 Proctor's Creek

All three of the project alternatives are on common alignment through this battlefield. The resource straddles the existing rail corridor. Unfortunately, due to expansive commercial and residential development much of the battlefield itself has lost its physical integrity. Despite efforts to preserve parts of the battlefield, such as Fort Darling, large swaths have diminished setting, feeling, and association. As such, the battlefield is not eligible for the NRHP under Criterion C. The project alternatives would return a second rail line to the existing corridor, a condition that was present at the time of the battle. Because of the compromised integrity of the region as well as the reintroduction of the second rail line, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.2 Port Walthall Junction

All three of the project alternatives are on common alignment through this battlefield. This battlefield encompasses 880 acres straddling the I-95 corridor. The project alternatives would require road modifications to remove at-grade crossings in the very southwestern corner of the larger battlefield. The epicenter of the engagement is located north of the project area and remains untouched. The portion of the battlefield within the project area, however, has been completely destroyed by development and the creation of an extensive system of roads. While portions of the battlefield retain their original setting and feeling, the project area does not retain its integrity of design, setting, materials, feeling, and association. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.3 Swift Creek/Arrowfield Church

All three of the project alternatives are on common alignment through this battlefield. Oriented roughly east-west, this 3,800 acre resource is south of Port Walthall Battlefield and partially within the City of Colonial Heights, VA. Development within Colonial Heights has destroyed the primary engagement area as well as other segments of the larger battlefield, thus the resource is not eligible under Criterion C. The project alternatives would minimally widen one existing roadway in the very northern portion of the battlefield. The overall impact area is thus very small compared to the size and scope of this large battlefield. Because of the minimal impacts to a resource that already has compromised physical integrity, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.4 Petersburg III/The Breakthrough

All three of the project alternatives are on common alignment through this battlefield. The rail line runs north-south through the center of the battlefield. The project alternatives would return a second set of tracks within the existing rail corridor. In addition, three road modifications would occur within the battlefield boundaries: the existing railroad bridge over I-85 in the very northern portion of the battlefield would be widened to accommodate the second set of tracks; the bridge over Defense Road would be widened (see discussion of Defense Road above); and a short segment of Halifax Road east of the rail tracks would be straightened to remove a curve that runs adjacent to the rail line. In all, the changes include a very small percentage of the overall battlefield area. Most of the core areas of engagement are protected within Pamplin Historical Park, but areas outside the park boundaries have been negatively impacted by development. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.5 Weldon Railroad/Globe Tavern

The project alternatives vary slightly through this battlefield. All of the project alternatives would add a second set of tracks, a bridge over the CSX A-line tracks, and road work along Halifax Road. The impacted areas comprise a very small segment of the larger 4,370 acre battlefield. The difference in the three alternatives is related to the way they bridge the active CSX A-line and a small access road in the vicinity of where Halifax Road crosses the CSX A-line. Refer Section 4.14.3.2 for more details.

The VA2 project alternative maximizes the use of existing railroad ROW. However, the proposed bridge over the CSX A-line is the longest and would be most visible of the three project alternatives.

The VA1 and VA3 project alternatives would require more new ROW than VA2. The VA1 and VA3 project alternatives primarily follow the same rail alignment, but the proposed bridges are different lengths. Both alternatives would have shorter bridges over the CSX A-line than the VA2 alternative.

The VA3 project alternative bridge is significantly shorter than both the VA2 and VA3 project alternatives, but would require the greatest amount of fill material through the battlefield.

It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield. As a condition of this effect recommendation, the NPS Petersburg National Battlefield requested that the fill slopes for the proposed bridge have tree plantings to minimize the visual intrusion on the landscape. The DHR also requested to view the engineering and vegetation plans before construction.

4.12.2.2.6 Peebles Farm

All three of the project alternatives are on common alignment through this battlefield. This 2,800-acre resource includes two bounded areas. The rail corridor runs east-west between these two areas, thus the actual rail corridor is not within the boundaries of this resource. However, the project alternatives would widen a small segment of Vaughn Road running north-south near the northeastern section of the southern battlefield section. This road modification area only clips the very northeastern corner of the southern battlefield area. The northern battlefield section would not be impacted, and the majority of the southern section would remain untouched. Due to the very minimal scope of the proposed change, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.7 Boydton Plank Road

The project alternatives vary slightly through this battlefield in the vicinity of the Burgess Connector, an inactive railroad corridor between the CSX S-Line (currently inactive) and the CSX A-Line (currently active). The VA1/VA3 project alternative stays within the existing railroad ROW in this area. The VA2 project alternative extends slightly outside of the existing ROW from Smith Grove Road to Dabney Mill Road, a distance of approximately two miles, in order to flatten out a severe curve in the existing rail alignment.

The existing rail corridor runs through the center of the resource from its northeastern corner diagonally to its southwestern edge. The project alternatives would add a new set of rails on an abandoned rail track, which was in operation during the period of significance of this resource. In addition, a very small segment of Squirrel Level Road would be modified, located on the eastern edge of the larger resource. Re-establishing the rail line would restore a notable element of this resource that was removed in the twentieth century, and the changes to the road are quite minimal. These two alterations would not diminish the characteristics that rendered this property eligible for the NRHP under Criterion A. It is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.8 Hatcher's Run

The project alternatives vary slightly through this battlefield in the vicinity of the Burgess Connector, as described above for Boydton Plank Road battlefield. As described above, project changes in this general area would include reintroducing the second set of tracks within the rail corridor and road modifications. Two small road changes are proposed: widening a small segment of Vaughn Road, which runs perpendicular to the tracks, and improving a small section of Squirrel Level Road near the east-west oriented rail tracks. Both road improvement areas are located in the very northeastern corner of the larger battlefield. The vast majority of the battlefield would not be impacted by this small

amount of road work, and the project would not alter the characteristics that render this property eligible for the NRHP. Therefore, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.9 Lewis Farm

All three of the project alternatives are on common alignment through this battlefield. The project alternatives would reintroduce a second line within the existing rail corridor. A segment of Quaker Road, located in the northwestern corner of the battlefield, would be rerouted for a distance of about 100 feet. The minimal changes to the road configuration would not alter the property's association with Civil War events, modify the viewshed within the battlefield boundaries, or diminish the property's integrity in any other way. As such, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.2.10 Dinwiddie Courthouse

All three of the project alternatives are on common alignment through this battlefield. This large battlefield encompasses over 3,300 acres northwest of the community of Dinwiddie, VA. The eastern boundary of the battlefield is located adjacent to the western boundary of the rail corridor, thus the battlefield is within the visual APE of the rail work in this area. All modifications would be restricted to the existing rail corridor. The proposed rail alignments are not physically within the battlefield boundaries, and the viewshed of the larger battlefield is shielded from the rail corridor by excessive distance, vegetation, the presence of US 1, numerous modern developments within the community of Dinwiddie, and topography. As such, it is recommended that the VA1, VA2, and VA3 project alternatives would have no adverse effect on this battlefield.

4.12.2.3 Historical Resources – North Carolina

The following discussion provides details on the effect of the SEHSR project alternatives on historical resources in North Carolina where the project has been determined to have no adverse effect or adverse effects for at least one alternative. For all other resources, the project has been determined to have no effect for all alternatives.

4.12.2.3.1 Holtzmann Farm

All three of the project alternatives are on common alignment in the vicinity of the Holtzmann Farm and would require a minor amount of road frontage ROW from the southwest corner of the property directly adjacent to St. Tammany Road. Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource.

4.12.2.3.2 Chapel of the Good Shepherd

All three of the proposed SEHSR rail alignments are on common alignment in the vicinity of the Chapel of the Good Shepherd. The project would reroute Ridgeway Warrenton Road from its current location in front of the church to a new location immediately behind the church. In addition, a new service road adjacent to the rail corridor would be located along the northern church property boundary and would tie into the realigned Ridgeway Warrenton Road. Both the relocated Ridgeway Warrenton Road and the new service

road would be at an elevation approximately 10 feet higher than the surrounding ground elevation and may, therefore, be visible from the church. The driveway access for the church would remain unchanged; however, vehicles approaching from the north would drive south along the realigned Ridgeway Warrenton Road and continue north on the old road approximately 1,500 feet to reach the church. The project alternatives do not require any ROW from the church. Due to the changes in access, potential noise impacts from the relocated Ridgeway Warrenton Road and new service road, and the change in the visual environment, the NC1, NC2, and NC3 project alternatives would have an adverse effect on this resource.

4.12.2.3.3 William J. Hawkins House

All three of the project alternatives are on common alignment in the vicinity of the William J. Hawkins House, and would require a small amount of additional railroad ROW be taken from the resource. In addition, the current driveway access for the property would be relocated to a proposed service road that would provide access to Axtell Ridgeway Road, north of the property. Because of these impacts to the resource, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource. HPO's concurrence with this determination is conditional; the SEHSR must coordinate with the property owner about the access issue, i.e., a temporary construction easement would be required to maintain access.

4.12.2.3.4 Holloway Farm

The project alternatives vary in the vicinity of the Holloway Farm. The proposed NC1 and NC2 rail alignments alternatives would bisect this resource; therefore, the NC1 and NC2 alternatives would have an adverse effect on this resource. No property impacts to the historic resource are anticipated from the NC3 project alternative; therefore, the NC3 project alternative would have no effect on this resource.

4.12.2.3.5 Forrest Ellington Farm

All three of the project alternatives are on common alignment in the vicinity of the Forrest Ellington Farm and would require a minor amount of road frontage ROW from the northwest corner of the property at the intersection of Brookston Road and Carver School Road. Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource.

4.12.2.3.6 Henderson Historic District and Proposed Boundary Expansion

All three of the proposed SEHSR project alternatives are on common alignment through Henderson and would grade-separate Andrews Avenue (NC Hwy 39) within the Henderson Historic District. A retaining wall is included in the design to minimize impacts to the district from the grade separation. However, the retaining wall would require a small amount of ROW be taken from a house along Andrews Avenue and necessitate re-grading a driveway. It would also impact landscaping along Andrews Avenue, potentially removing several trees. Due to these impacts, the NC1, NC2, and NC3 project alternatives would have an adverse effect on the district.

4.12.2.3.7 South Henderson Industrial Historic District

All three of the project alternatives are on common alignment through Henderson and would grade-separate Alexander Avenue on new alignment through the South Henderson Industrial Historic District. Currently, Alexander Avenue tees into Nicholas Street; the proposed alternatives would carry it over the railroad tracks to connect to the Dabney Drive Extension. In order to accommodate the new bridge on Alexander Avenue, the SEHSR alternatives would require the closing of the Nicholas Street intersection with Alexander Avenue. Due to these impacts, the NC1, NC2, and NC3 project alternatives would have an adverse effect on the district.

4.12.2.3.8 Houses (5 worker houses on 1400 block of Nicholas St)

These houses are located within the South Henderson Industrial Historic District. All three of the project alternatives are on common alignment through Henderson and would require minor ROW from the resources directly adjacent to the railroad corridor (at the rear end of the properties). Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on these resources provided that there is no taking of the structures.

4.12.2.3.9 Houses (3 side gable houses on 1500 block of Nicholas St)

These houses are located within the South Henderson Industrial Historic District. All three of the project alternatives are on common alignment through Henderson and would require minor ROW from the resources directly adjacent to the railroad corridor (at the rear end of the properties). Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on these resources provided that there is no taking of the structures.

4.12.2.3.10 Franklinton Historic District (Includes Sterling Mill Historic District)

All three of the project alternatives are on common alignment through Franklinton and would eliminate the railroad crossing at Mason Street and also replace the railroad bridge at Green Street, which is a contributing element to the historic district. Due to these impacts, the NC1, NC2, and NC3 project alternatives would have an adverse effect on the district.

4.12.2.3.11 Sterling Cotton Mill

Sterling Mill is located within the Franklinton Historic District. All three of the project alternatives are on common alignment through Franklinton and would require minor ROW for the Green Street underpass improvements (including sidewalks). Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource.

4.12.2.3.12 Cedar Creek Railroad Bridge Piers

Currently, active railroad traffic in the proposed SEHSR corridor crosses Cedar Creek on a bridge that spans the historic Cedar Creek Railroad Bridge Piers. All three of the

project alternatives would be on new location in this location. The NC1 and NC3 project alternatives would cross Cedar Creek on a new bridge just to the east of the piers; the NC2 project alternative would cross on a new bridge just to the west of the existing piers. With implementation of any of the three project alternatives, the existing railroad bridge would no longer be used for rail traffic. Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource. HPO's concurrence with this determination is conditional; the SEHSR must commit to ensuring the piers are not taken down during the construction or life of the project.

4.12.2.3.13 Youngsville Historic District

All three of the project alternatives are on common alignment through Youngsville and would grade-separate Main Street in the vicinity of the Youngsville Historic District. In order to accommodate the new bridge, the alternatives would require the removal of several on-street parking spots in front of the Youngsville Community Center at 115 East Main Street. Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource.

4.12.2.3.14 Glen Royall Mill Village Historic District

All three of the project alternatives are on common alignment in the vicinity of the Glen Royall Mill Village Historic District. No property impacts within the historic district are anticipated from any of the three proposed alternatives; however, a pedestrian crossing of the railroad tracks is proposed directly adjacent to the district. As a result, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource. HPO's concurrence with this determination is conditional; the SEHSR must design the pedestrian crossing in a manner that minimizes its opaqueness and that fits in with the character of its surroundings.

4.12.2.3.15 Crabtree Creek Railroad Bridge Pier

All three of the project alternatives are on common alignment in the vicinity of the Crabtree Creek Railroad Bridge Pier. The pier is located immediately adjacent to the existing rail bridge that spans both Crabtree Creek and Hodges Street. The SEHSR alternatives would construct a new single track bridge adjacent to the existing single track bridge. The new bridge would span the pier and require a small amount of ROW under the span to allow for access and maintenance. This ROW includes the land where the pier is situated. The pier would not be otherwise impacted. Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on this resource. HPO's concurrence with this determination is conditional; the SEHSR must ensure that the pier is not impacted during construction of the new bridge.

4.12.2.3.16 Roanoke Park Historic District

The project alternatives vary in the vicinity of the Roanoke Park Historic District. The proposed NC1 and NC2 rail alignments are located across Capital Boulevard from the district; therefore, the NC1 and NC2 project alternatives would have no effect on this resource.

The NC3 project alternative would require additional ROW directly adjacent to the railroad corridor behind four properties on Bickett Boulevard within the historic district. The ROW is necessary to maintain the operation of the nearby Norfolk Southern railroad yard. The necessary ROW would impact the backyards of these properties; in particular, one property would lose approximately 0.15 acres, including a garage. Due to these impacts, the NC3 project alternative would have an adverse effect on this resource.

4.12.2.3.17 Noland Plumbing Company Building

The project alternatives vary in the vicinity of the Noland Plumbing Company Building. The proposed NC1 and NC2 rail alignments are located across Capital Boulevard from the district; therefore, the NC1 and NC2 project alternatives would have no effect on this resource.

The NC3 project alternative would require a minor amount of ROW directly adjacent to the railroad corridor along the rear of the Noland Plumbing Company Building property. The ROW is necessary to maintain the operation of the nearby Norfolk Southern railroad yard. Two modern storage buildings may be impacted by the additional ROW; neither is a contributing element to the resource. Due to these impacts, the NC3 project alternative would have no adverse effect on this resource.

4.12.2.3.18 Glenwood-Brooklyn Historic District

The project alternatives vary in the vicinity of the Glenwood-Brooklyn Historic District. The proposed NC1 and NC2 rail alignments are located across Capital Boulevard from the district; therefore, the NC1 and NC2 project alternatives would have no effect on this resource.

The NC3 project alternative would require a minor amount of ROW and easements directly adjacent to the railroad corridor along the Glenwood-Brooklyn Historic District in order to maintain the operation of the nearby Norfolk Southern railroad yard. A minor amount of ROW would be required from one residence on Adams Street and one residence on Washington Street (at the rear end of the properties). In addition, an easement would be required within the parking lots for several commercial properties along Dale Street and Jefferson Street. These easements are necessary to construct and maintain a retaining wall along the railroad corridor. Due to these impacts, the NC3 project alternative would have no adverse effect on this resource.

4.12.2.3.19 Seaboard Railway Station

The project alternatives vary in the vicinity of the Seaboard Railway Station, which is located adjacent to the Mordecai Historic District. The NC1 and NC2 rail alignment alternatives may require temporary construction easements from this resource, but no additional ROW. Therefore, the NC1 and NC2 project alternatives would have no adverse effect on this resource.

The proposed NC3 rail alignment is located across Capital Boulevard from the district; therefore, the NC3 alternative would have no effect on this resource.

4.12.2.3.20 Seaboard Railway Warehouses

The project alternatives vary in the vicinity of the Seaboard Railway Warehouses, which are located adjacent to the Mordecai Historic District. The NC1 and NC2 rail alignment alternatives may require temporary construction easements from this resource, but no additional ROW. Therefore, the NC1 and NC2 alternatives would have no adverse effect on this resource.

The proposed NC3 rail alignment is located across Capital Boulevard from the district; therefore, the NC3 alternative would have no effect on this resource.

4.12.2.3.21 Raleigh Cotton Mills

The project alternatives vary in the vicinity of the Raleigh Cotton Mills. The NC1 and NC2 rail alignment alternatives would require minor ROW from the resource; however, no buildings would be taken. Therefore, the NC1 and NC2 project alternatives would have no adverse effect on this resource.

The proposed NC3 rail alignment is located across Capital Boulevard from the district; therefore, the NC3 project alternative would have no effect on this resource.

4.12.2.3.22 Raleigh Electric Company Power House

The project alternatives vary in the vicinity of the Raleigh Electric Company Power House. The NC1 project alternative would grade-separate West Jones Street. The bridge would be visible directly in front of the Raleigh Electric Company Power House and a minor amount of ROW would be required from the property (with no impacts to the building itself). Therefore, the NC1 project alternative would have an adverse effect on this resource.

The NC2 project alternative would be almost identical to the NC1 project alternative in the vicinity of the Raleigh Electric Company Power House, with a minor shift in rail alignment. The NC2 project alternative would also grade-separate West Jones Street and would have the same visual and property impacts as the NC1 project alternative. Therefore, the NC2 project alternative would have an adverse effect on this resource.

The proposed NC3 project alternative would close the existing at-grade railroad crossing at West Jones Street. The ROW required for the closing would not impact the Raleigh Electric Company Power House. Therefore, the NC3 project alternative would have no effect on this resource.

4.12.2.3.23 Carolina Power and Light Company Car Barn and Automobile Garage

The project alternatives vary in the vicinity of the Carolina Power and Light Company Car Barn and Automobile Garage. The NC1 project alternative would grade-separate West Jones Street. The bridge would be visible directly in front of the Carolina Power and Light Company Car Barn and Automobile Garage and a minor amount of ROW

would be required from the property (with no impacts to the building itself). Therefore, the NC1 project alternative would have an adverse effect on this resource.

The NC2 project alternative would be almost identical to the NC1 project alternative in the vicinity of the Carolina Power and Light Company Car Barn and Automobile Garage, with a minor shift in rail alignment. The NC2 project alternative would also grade-separate West Jones Street and would have the same visual and property impacts as the NC1 project alternative. Therefore, the NC2 project alternative would have an adverse effect on this resource.

The proposed NC3 project alternative would close the existing at-grade railroad crossing at West Jones Street. The ROW required for the closing would not impact the Carolina Power and Light Company Car Barn and Automobile Garage. Therefore, the NC3 project alternative would have no effect on this resource.

4.12.2.3.24 National Art Interiors

All three of the project alternatives share concurrent ROW in the vicinity of National Art Interiors. The alternatives would impact a retaining wall that is located within railroad ROW and provides support for the foundation of the National Art Interiors building. This wall would be reconstructed as part of the SEHSR project. Therefore, the NC1, NC2, and NC3 project alternatives would have no adverse effect on the resource. HPO's concurrence with this determination is conditional; the SEHSR must perform vibration monitoring (including an emergency protocol) during construction of the SEHSR project to ensure the National Art Interiors building is not impacted.

4.12.2.3.25 Raleigh and Gaston Railroad Corridor

All three of the project alternatives are located within the Raleigh and Gaston Railroad Corridor for the majority of their lengths (approximately 74% for NC1, 72% for NC3, and 67% for NC3). The project alternatives do not impact the vast majority of contributing elements to the corridor. However, all project alternatives would replace at least one of the reinforced concrete bridges and would potentially impact at least one of the stone-lined culverts. In addition, the NC2 project alternative would require the relocation of the repeater tower in Norlina, NC. Due to these impacts, the NC1, NC2, and NC3 project alternatives would have an adverse effect on the Raleigh and Gaston Railroad Corridor.

4.12.3 Summary and Potential Mitigation Measures

In summary, there are 24 resources protected under Section 106 of the NHPA that would be adversely affected by one or more of the SEHSR project alternatives. The remaining 91 protected resources in the project APE would have no effect or no adverse effect from any of the project alternatives.

Efforts have been made to identify project alternatives that avoid adverse effects to Section 106 resources. Where avoidance is not possible, measures will be undertaken to minimize and mitigate for impacts. Section 5.11 outlines measures to minimize harm to historic resources. Section 5.12 describes the coordination that has taken place between the project team and state historic preservation offices, resource owners, historic societies, and other consulting parties.

4.13 Parklands, Recreational Areas, and Refuges

The following section describes the federal parklands, city/county parks, and local greenways that have potential impacts from the project alternatives, and the extent of the potential impacts. There are no state parks, natural area preserves, forests or recreation areas located within the study area.

4.13.1 Federal Parklands

The NPS manages the Fort Wadsworth Unit of Petersburg National Battlefield, which is located directly adjacent to the rail corridor near Collier rail yard. VA1, VA2, and VA3 are on common alignment, and would require obtaining between 30 feet and 50 feet of ROW along the western portion of the Fort Wadsworth Unit. This ROW is needed for the additional track necessary to accommodate the high speed trains associated with the SEHSR project.

The SEHSR project team met with the National Park Service regarding this issue on February 26, 2009. In a letter dated March 4, 2009, the Petersburg National Battlefield superintendent stated that the project could mitigate potential adverse effects to the Fort Wadsworth Unit with a land exchange. This land exchange would be worked out as the project is implemented.

4.13.2 County/City Parklands

4.13.2.1 Virginia

4.13.2.1.1 Canal Walk (Richmond, VA)

The City of Richmond's Canal Walk is located between 5th and 17th Streets along the James River and the Kanawha and Haxall Canals. The VA1, VA2, and VA3 project alternatives are on common alignment in this area and would not require any ROW from the Canal Walk. The existing rail line has daily freight and passenger rail traffic that can be heard and seen from the walkway. Therefore, the addition of SEHSR should not alter the character, setting, or use of the Canal Walk.

4.13.2.1.2 James River Park System – Slave Trail (Richmond, VA)

The Slave Trail is located within the City of Richmond's James River Park System. The VA1, VA2, and VA3 project alternatives are on common alignment through Richmond and would require the construction of a new rail bridge over the James River, immediately adjacent to the existing rail bridge located between the South 14th Street and I-95 roadway bridges. A small amount of ROW under the span of the bridge is required to allow for access and maintenance. Included in this ROW is approximately 0.03 acre of the Slave Trail within the James River Park System. The existing rail bridge has daily freight rail traffic that can be heard and seen from the trail; therefore, the new, parallel bridge should not alter the character, setting, or use of the trail. The project would not adversely affect the activities, features, and attributes of this recreation resource.

4.13.2.1.3 Great Shiplock Park (Richmond, VA)

This park is located outside the project study area on the north bank of the James River, east of the VA1, VA2, and VA3 project alternatives and I-95 crossing of the James River. There are no impacts to this resource from the project alternatives.

4.13.2.1.4 Jefferson Park (Richmond, VA)

This park is east of the project study area. There are no impacts to this resource from the project alternatives.

4.13.2.1.5 Thomas B. Smith Community Center (Richmond, VA)

The City of Richmond - Department of Parks, Recreation, and Community Facilities operates the Thomas B. Smith Community Center at 2015 Ruffin Road. The VA1, VA2, and VA3 project alternatives are on common alignment, and would provide a railroad bridge over Ruffin Road just west of the community center and park. This bridge would ensure the safety of automobiles crossing the SEHSR corridor. Due to the need to lower Ruffin Road to accommodate the bridge, a small amount of ROW is needed in southwest corner of the Thomas B. Smith Community Center and Park. The ROW is approximately 0.07 acres along Ruffin Road adjacent to the community center. Automobile access to the community center would be maintained. In addition, the grade-separated rail-over-road crossing would greatly improve safety for pedestrians and bicyclists accessing the community center from west of the rail line. The project alternatives would not have a negative impact on this resource.

4.13.2.1.6 Chester Kiwanis Historical Park (Planned) (Chester, VA)

In 2008, the Chesterfield County Board of Supervisors accepted the Kiwanis Club of Chester's donation of their 5.3 acre property at 4001 Gill Street in Chester, VA, for development as the Chester Kiwanis Historical Park. The property is planned to be used as a public park for passive recreation and historical interpretation. The VA1, VA2, and VA3 project alternatives are on common alignment through this area and would require ROW from the parcel along Curtis Street and Richmond Street planned for the Chester Kiwanis Historical Park. However, Chesterfield County made the acceptance of the donated land conditional upon reserving the necessary ROW for the SEHSR project (100 feet from the centerlines of both Curtis Street and Richmond Street) for non-park uses. In addition, a grade-separated rail-over-road crossing would improve safety for pedestrians and bicyclists accessing the park from east of the rail line. The SEHSR project would not have a negative effect on this planned resource.

4.13.2.1.7 Ettrick Riverside Park (Chesterfield, VA)

This park is east of the project study area. The project alternatives would not physically impact the park nor would they impact the visual or recreational value of the park.

4.13.2.1.8 Ettrick Park & Mayes-Colbert Ettrick Community Building (Ettrick, VA)

This park and community building are located in the Chesterfield County community of Ettrick. The existing and active rail line bounds the southeastern portion of the park with the Ettrick Rail Station (Petersburg Amtrak Station) adjacent to the southern limits of the park. The VA1, VA2, and VA3 project alternatives are on common alignment along the park boundary and would not require any ROW from the park. The existing rail line has daily freight and passenger rail traffic that can be heard and seen from the park and community center. Therefore, the addition of SEHSR should not alter the character, setting, or use of the park. The construction of a Dupuy Road bridge over the rail line would improve the safety of those accessing the park from east of the rail line.

4.13.2.1.9 Appomattox Riverfront Trail (Ettrick, VA)

The VA1, VA2, and VA3 project alternatives are on common alignment through this area and would construct a new rail bridge over the Appomattox River, immediately adjacent to the existing rail bridge near Virginia State University. The bridge would be located just to the east of the existing bridge and would require a small amount of ROW under the span of the bridge to allow for access and maintenance. Included in the ROW needed for the SEHSR project is approximately 0.8 acres of the easement for the planned Appomattox Riverfront Trail. The existing rail bridge has daily freight and passenger rail traffic that can be heard from the surrounding area; therefore, the new bridge should not alter the character, setting, or use of the planned trail.

4.13.2.1.10 Upper Appomattox Canal Trail (Petersburg, VA)

The Upper Appomattox Canal Trail in the City of Petersburg is a 3.6 mile trail following the towpath of the Upper Appomattox canal. The VA1, VA2, and VA3 project alternatives are on common alignment through this area and would require a new rail bridge over the Appomattox River, immediately adjacent to the existing rail bridge near Virginia State University. A small amount of ROW under the span of the bridge is required to allow for access and maintenance. Included in this ROW is approximately 0.1 acre of the Upper Appomattox Canal Trail. The existing rail bridge has daily freight and passenger rail traffic that can be heard and seen from the trail; therefore, the new bridge and SEHSR activity should not alter the character, setting, or use of the trail. The project would not adversely affect the activities, features, and attributes of this recreation resource.

4.13.2.1.11 West End Park Fairgrounds (Petersburg, VA)

This park is located approximately one quarter mile east of the project study area. There are no direct impacts from the project. The VA1, VA2, and VA3 project alternatives are on common alignment through Petersburg, and would pass near the West End Park Fairgrounds. In this area, the existing rail bridge is being widened. This would result in temporary delays accessing the property from east of the rail line during construction, but these delays would end once construction is completed. There may be some increase in noise associated with the project; however, it is not anticipated that any increase would limit use of this resource.

4.13.2.1.12 Pamplin Historical Park (Dinwiddie County, VA)

This park is located more than two miles from the project study area. There are no impacts to this resource from the project alternatives.

4.13.2.1.13 Centennial Park (La Crosse, VA)

This park is located in downtown La Crosse, VA, at the intersection of Main Street and the abandoned Norfolk Southern railroad line (which is intended for use by the planned Tobacco Heritage Trail, discussed in Section 4.13.2). The primary focus of the park is a train caboose, which recognizes the town as a place where railroads once crossed.

The VA1, VA2, and VA3 project alternatives are on common alignment through this area and would close the existing pedestrian crossing just east of Centennial Park and require a small amount of ROW (approximately 0.06 acres) to accommodate the railroad improvements. Although the new rail traffic would be heard from the park, it is in character with its rail theme; therefore, the required ROW should not alter the character, setting, or use of the park.

4.13.2.2 North Carolina

4.13.2.2.1 Vulcan Greystone Mining Operations Park (Henderson, NC)

There are no impacts to this private park from the project alternatives.

4.13.2.2.2 Franklinton Elementary School (Franklinton, NC)

The Franklinton Elementary School, located at 431 South Hillsborough Street in Franklinton, NC, has playgrounds, a practice field, a baseball field, a football field, and a soccer field that are available for public use. The NC1, NC2, and NC3 project alternatives are on common alignment through this area and would require ROW in the vicinity of the Franklinton Elementary School to provide pedestrian access from Hawkins Street, under the railroad tracks, to South Main Street. However, no land would be required from the school. The existing rail line has daily freight rail traffic that can be heard and seen from the school's playground. Therefore, the addition of SEHSR should not alter the character, setting, or use of the playground. The new, pedestrian-only rail overpass would improve the safety of those accessing the school facilities and playground from east of the rail line.

4.13.2.2.3 South White Street and East Holding Avenue Planned Park (Wake Forest, NC)

There are no impacts to this planned resource from the project alternatives.

4.13.2.2.4 J.B. Flaherty Park (Wake Forest, NC)

This park is located just outside the project study area. There are no impacts to this resource from the project alternatives.

4.13.3 Greenways

4.13.3.1 Tobacco Heritage Trail (VA)

The Tobacco Heritage Trail is a planned rails-to-trails corridor that will connect Southern Virginia counties via over 160 miles of abandoned railroad ROW, 110 miles of on-road trail, new trail, and active rail ROW. Within the project area, the Tobacco Heritage Trail intersects the study area in Alberta and La Crosse, VA (Appendix Q, map sheets 66 and 83). In La Crosse, the Tobacco Heritage Trail makes use of the old Norfolk Southern rail line that intersects the SEHSR corridor in the downtown area; a location intended to provide a central access point for residents and tourists. The East Coast Greenway (discussed below) plans to use 55 miles of the Tobacco Heritage Trail, including the section that connects Alberta to La Crosse. Completed sections of the Tobacco Heritage Trail include an unimproved, 4-mile section of trail along the abandoned rail line from Brodnax to La Crosse. The Master Plan for the Tobacco Heritage Trail states that:

"*The Southeast High Speed Rail line is slated to run through La Crosse on the former north-south rail alignment at some point in the future. Trail crossings and pedestrian links to a potential rail station should be anticipated. In addition, the East Coast Greenway plans to use this portion of the Tobacco Heritage Trail to complete their Maine-to-Florida trail. The greatest cost factors for trail improvements within Region 1 are the replacement cost for the missing bridges and constructing an I-85 crossing. Additional costs may include improving trail crossings over the high speed rail line and constructing extra trail footage to link the trail with potential high speed rail stations."* (p. 34)

Within Alberta, VA, the Tobacco Heritage Trail follows the abandoned Norfolk Southern line and crosses the SEHSR project corridor and the inactive S-line in the vicinity of Second Avenue. The VA1, VA2, and VA3 project alternatives are on common alignment through this area. To maintain continuity of the existing trail and to provide a safe crossing by Tobacco Heritage Trail users, the project will provide a pedestrian/non-motorized overpass of the proposed rail alignment. In addition, the realignment of Second Avenue, which is necessary to provide a vehicle bridge over the proposed rail alignment, will require a small amount of ROW from the trail.

Within La Crosse, VA, the trail follows the abandoned Norfolk Southern line and crosses the SEHSR project corridor in the vicinity of Central Avenue. VA1, VA2, and VA3 are on common alignment through this area. The proposed project will re-route the Tobacco Heritage Trail north along Main Street approximately 300 feet, where it will then cross under the proposed rail alignment and rejoin the existing rails-to-trails corridor.

The SEHSR project team worked with representatives from Alberta, La Crosse, and the Roanoke River Rails-to-Trails, Inc. (RRRT) in the development of project designs to ensure that the project will not impede the development or planned use of the trail. The project will not adversely affect the activities, features, and attributes of this recreation resource.

4.13.3.2 Middle Crabtree Creek Greenway (Raleigh, NC)

Middle Crabtree Creek Greenway is part of the City of Raleigh's Capital Area Greenway system. Near Hodges Street, the greenway parallels the north bank of Crabtree Creek, and passes under the existing single track railroad bridge. The NC1, NC2, and NC3

project alternatives are on common alignment in this location, and would construct a new single track bridge adjacent to the existing single track bridge. The new bridge would cross both the greenway and the creek. The existing rail bridge has daily freight rail traffic that can be heard from the trail; therefore, the new bridge should not alter the character or setting of the trail.

4.13.3.3 East Coast Greenway (VA & NC)

Approximately 80 percent of the current routes that make up the East Coast Greenway (ECG) are interim, on-road routes until off-road sections of trail can be designated and constructed (East Coast Greenway Alliance Website, 2009). The on-road routes were selected by the ECG Alliance partly because they offer low traffic volumes, bike lanes, or good shoulders. The ECG's website indicates that interim, on-road routes are subject to change at any time. From Richmond to Petersburg, VA, the current on- and off-road routes identified for the ECG will not be impacted by the SEHSR project or its associated roadway improvements.

From Petersburg, VA, to Raleigh, NC, the ECG Alliance identifies the proposed Multiuse Greenway alignment adjacent to the SEHSR corridor as the future route for this section of the ECG. An interim, on-road route is also identified for this section of the ECG until off-road trail options are available. At locations where the SEHSR and/or the associated roadway improvements and grade-separations impact the interim ECG route, it will be necessary to update the routes to ensure the safety of ECG users. Possible impacts to ECG users include temporary delays and reroutes due to construction activities.

4.13.3.4 Multiuse Greenway Concept (VA & NC)

As discussed in Section 2.4, the SEHSR Multiuse Greenway Concept has the potential to be an important feature of the state-wide trail networks that are being developed by Virginia and North Carolina in conjunction with local governments. Additionally, the SEHSR Greenway Concept may be incorporated into the ECG, an urban version of the Appalachian Trail for walkers, cyclists, and other non-motorized trail users.

For purposes of environmental analysis, DRPT and NCDOT proposed that the Multiuse Greenway have a 30-foot trail "footprint" on a 60-foot ROW, parallel to but separate from the SEHSR rail ROW. This should provide enough room for the greenway cut/fill slopes not to interfere with the proposed SEHSR construction limits, as well as allow for necessary design adjustments for the greenway. The trail itself would be approximately 10 feet wide. Problem areas where additional ROW may be needed (contained within the current SEHSR study corridor) will be identified in the FEIS for the SEHSR project, and impacts will be calculated for those areas. It is anticipated that in municipal areas, trail traffic would be redirected to existing city street ROW and sidewalks or other trail networks, as determined by each municipality. In addition, the trail would utilize portions of the existing inactive rail ROW not needed for the new rail service to the extent possible. It is anticipated that approximately two-thirds of the proposed railroad would utilize existing rail ROW.

The exact location of the Multiuse Greenway Concept will be determined by DRPT and NCDOT after the preferred alternative for the SEHSR project is selected. Therefore, the

potential impacts associated with the Greenway Concept will be documented in the FEIS for the SEHSR.

4.14 Transportation

When built, the SEHSR project will become part of the larger transportation network. This section provides an assessment of potential impacts from the project to that transportation network. The SEHSR project is designed to be completely grade separated by bridges or underpasses, yet maintain connectivity across the railroad. Impacts to connectivity are evaluated below in the Roads section. Impacts to traffic conditions in the communities throughout the corridor are also evaluated. The impacts from proposed changes to roadwork on the human environment were discussed previously (Section 4.11.2). The impacts to existing freight and passenger rail operations are also evaluated, and are followed by a general discussion about accessibility to potential station locations.

4.14.1 Roads

The existing road network within the study corridor was described in Chapter 3.14. Major roads crossing the existing rail ROW with Annual Average Daily Traffic (AADT) counts greater than 1,000 vehicles per day were highlighted. Because the SEHSR is designed to be completely grade separated, it is important to assess the impact from the project alternatives on connectivity- the ability to move across the corridor. Potential impacts to the major east-west travel corridors throughout the project are discussed below. In addition to the discussion regarding *major* corridors, recommendations for all crossings and associated roadwork, by alternative, are included in Appendix F. Maps displaying the proposed roadwork are included in Appendix Q. A discussion of the impacts on communities from the proposed crossing closures and consolidations can be found in Section 4.11.2.

4.14.1.1 City of Richmond, VA

Within the downtown area, the three alternatives are on common alignment along the active railroad. The most heavily traveled roads carrying east-west traffic across the railroad are on existing bridges or underpasses. The project alternatives utilize these existing structures. In addition, the project alternatives provide new bridges for East Commerce Road and West Bells Road, and an underpass for Ruffin Road. Therefore, the project alternatives would not significantly impact east-west connectivity in this area.

4.14.1.2 Chesterfield County, VA

Within Chesterfield County the major east/west corridors are Chippenham Parkway, Highway 288, and West Hundred Road; all three roads cross the railroad on existing bridges. The project alternatives utilize the existing bridges, maintaining east-west connectivity over the railroad.

4.14.1.3 City of Petersburg, VA

Within Petersburg, the greatest east/west traffic volume is carried by Boydton Plank Road, which feeds into Washington Street. I-85 provides some east/west connectivity, in addition to serving as a north/south traffic corridor. The project alternatives maintain a

grade-separated crossing at Washington Street, through an expansion of the existing underpass. The project alternatives also maintain the existing I-85 bridge over the railroad. Therefore, the project alternatives would not significantly impact east/west connectivity in Petersburg.

4.14.1.4 Dinwiddie County, VA

Carson Road provides access to and from I-85 from US 1 in the area of Dinwiddie Courthouse, and is considered the primary connector in this area. The VA1 and VA3 alternatives provide a new bridge to cross over the railroad, while VA2 utilizes the existing bridge to cross over the railroad. Therefore, the project alternatives should not significantly impact connectivity in this area.

In the southern part of the county, VA 40 /Doyle Boulevard provides the main east-west connection through McKenney, VA. The project alternatives are on common alignment in this location, and provide a bridged crossing of the SEHSR line for VA 40/Doyle Boulevard. Therefore, the project alternatives should not significantly impact connectivity.

4.14.1.5 Brunswick County, VA

The project alternatives are on common alignment through Alberta, VA, the largest community along the corridor in Brunswick County. Main Street runs north/south, and carries the largest volume of traffic through the town; however Second Avenue provides the east-west connectivity. The project alternatives propose a realignment of Second Avenue and a new bridge over the railroad, thereby maintaining the cross-town connection. South of Alberta, the project alternatives utilize the existing I-85 bridges to cross over the railroad, as well as the existing Route 46/Christanna Highway bridge, which provides a connection to other east-west corridors in the county. The project alternatives should not significantly impact connectivity.

4.14.1.6 Mecklenburg County, VA

US 58 bears the largest east/west traffic load through the county, crossing the study corridor in La Crosse, VA. Main Street in La Crosse carries the bulk of local traffic across the railroad on an existing at-grade crossing. The project alternatives are on common alignment in this location, and utilize the existing US 58 bridges to cross over the railroad. The project alternatives also provide a realignment of Main Street with a bridged crossing of the railroad, and 9 other bridges or underpasses throughout the county. Therefore, the project alternatives should not significantly impact connectivity.

4.14.1.7 Warren County, NC

US 158 serves as the primary east/west connector in Warren County, and crosses the CSX S-line by way of an underpass in Norlina, NC, where the S-line becomes an active freight railroad. Although the project alternatives are on different alignments as they approach Norlina from the north, they are on common alignment at the intersection with US 158. The project alternatives maintain a grade-separated crossing at US 158, through an expansion of the existing underpass. In addition, three new bridged crossings are proposed south of Norlina. Therefore, the project alternatives should not significantly impact connectivity.

4.14.1.8 Vance County, NC

In Middleburg, NC, there is no major road that provides continuous connectivity across the proposed rail corridor. However Carol Street/Allison Cooper Road (SR 1151) provides a connection from US 1 to the east. The project alternatives are on different alignments through Middleburg, but they all propose that Carol Street cross the railroad on a bridge. Therefore, the project alternatives should not significantly impact connectivity in this area.

In Henderson, NC the project alternatives are on common alignment. Andrews Avenue/NC 39 provides a connection from US 1 to the east, and currently crosses the railroad at-grade. The project alternatives propose a realignment and new bridge over the railroad for Andrews Avenue/NC 39. The project alternatives also maintain the existing underpass at Charles Street, and call for a new bridge over the railroad at Alexander Avenue. Just south of town, the project alternatives propose bridges over the railroad for JP Taylor Road and Bearpond Road, and retain the US 1 Bypass bridges over the railroad. Therefore, the project alternatives should not significantly impact connectivity in this area.

There is no continuous roadway that provides for east-west travel through the town of Kittrell, NC. Main Street, however, does provide a connection to the east, with Kittrell College Road (SR 1105) connecting to the west. The project alternatives are on common alignment through Kittrell, and call for the existing crossing at Main to be closed with traffic relocated to a new bridged crossing at Church Street. While this would have some effect on traffic flow, it does provide the same level of connectivity as is currently found.

4.14.1.9 Franklin County, NC

Highway NC 56 provides east/west connection through the county, crossing the railroad in Franklinton by way of an underpass. The project alternatives are on common alignment in this location, and maintain a grade-separated crossing at NC 56 (Green Street) through an expansion of the existing underpass.

Highway NC 96 also provides east/west connectivity through the county, and currently crosses the railroad in Youngsville, NC with an at-grade crossing. The project alternatives propose an extension/realignment of NC 96; crossing the railroad on a bridge north of town, then connecting with a realigned Fleming Road on the east side of town. This design would enhance the connectivity for east/west through traffic. The east/west connectivity for local traffic would be maintained by the provision of bridges over the railroad at Franklin Street and Main Street.

4.14.1.10 Wake County, NC

In northern Wake County, there are small differences between the three rail alternatives, which generally follow the CSX S-line until reaching the outskirts of downtown Raleigh. Just south of Whitaker Mill Road, NC3 splits from NC1 and NC2 to follow the Norfolk Southern NS-line towards the Boylan Wye. Many roads provide a network of east/west access across the two railroads. As listed in Section 3.14 there are 29 major public road facilities in Wake County that cross the CSX S-line and 7 major public road facilities that cross the NS line. Some of these major road facilities cross the railroads on existing bridges or underpasses, some cross at-grade. Alternatives NC1 and NC2 maintain connectivity by utilizing existing bridges and underpasses, and providing new bridges or

underpasses for all but 4 of the major public road facilities in Wake County. Alternative NC3 also maintains connectivity by utilizing existing bridges and underpasses, and providing new bridges or underpasses for all but 4 of the major public road facilities. Therefore, the project alternatives should not significantly impact connectivity.

4.14.2 Traffic Conditions

Detailed traffic analyses were performed at several locations throughout the SEHSR corridor to determine the effects of rail crossing closures and consolidations on local traffic conditions. Section 3.14 identified these locations and outlined the existing traffic conditions for each location. For intersections anticipated to experience an increase in traffic volume due to changes associated with the project, Synchro (for signalized and unsignalized intersections) and HCS (for unsignalized intersections) were used to determine the change in level of service (LOS) and delay. Also, several intersections were analyzed to determine the expected queue for a particular movement (e.g., turning, through) to determine if "spillback" (queuing from one intersection affecting traffic flow through an adjacent intersection) would affect nearby intersections. The analysis is described in greater detail in the SEHSR Draft Traffic Review (Gibson Engineers, 2009), which is available on CD from NCDOT by request.

This section describes the impacts to traffic from the proposed project alternatives at each of these locations. The anticipated LOS for the project alternatives in the year 2030 is compared to the LOS in the same location were the project not constructed (i.e., a No Build scenario) for both the morning (AM) and evening (PM) peak traffic conditions. The LOS system stratifies travelers' perceptions of the quality of service provided by a roadway. The system uses the letters A through F, where A is free flowing traffic, B is reasonably free flowing, C is stable flow, D is approaching unstable flow, E is unstable flow, and F is forced or breakdown flow. LOS is not reported where a movement does not experience delay, such as a through movement with no stop condition or a right turn with no stop. In addition, LOS is not reported for future No Build conditions at intersections that would not exist without the project (e.g., completely new roadway alignments).

4.14.2.1 Chesterfield County, VA

4.14.2.1.1 Perrymont Road-Bellwood Area

The VA1, VA2, and VA3 project alternatives are on common alignment in this location and the proposed roadwork is the same for all three alignments; therefore, the three project alternatives were analyzed collectively. Refer to map sheet 8 in Appendix Q for a map of the proposed designs in this location. To facilitate east-west traffic movements in this area, an extension of Kingsland Road, including a new bridge over Chester Road, is proposed. This facility would connect Kingsland Road from its intersection with Dorsey Road to Perrymont Road, replacing the church driveway as the western leg of the intersection of Perrymont Road and Norcliff Road. Traffic utilizing the existing at-grade crossing of Kingsland Road located just west of Chester Road would utilize the new bridged crossing and new extension in this design option.

Table 4-40 shows the operations are very similar for the project alternatives and the No Build conditions at the Chester Road and Perrymont Road intersection. The eastbound

movement operates at LOS F in both conditions. The LOS for all other movements is LOS B or better, and is the same for the project alternatives and No Build conditions.

Table 4-40
Chester Road and Perrymont Road/Driveway – Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	F	B	A	A
No Build (PM)	F	B	A	A
VA1, VA2, VA3 (AM)	F	B	A	A
VA1, VA2, VA3 (PM)	F	B	A	A

Source: Gibson Engineers, 2009.

Table 4-41 shows that all movements at the Norcliff Road and Perrymont Road intersection are anticipated to operate at LOS C or better in the design year with the proposed project alternative designs. For northbound and southbound traffic there is no difference between the project alternatives and No Build LOS.

Table 4-41
Norcliff Road and Perrymont Road – Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	A	A	A	A
No Build (PM)	B	B	A	A
VA1, VA2, VA3 (AM)	B	B	A	A
VA1, VA2, VA3 (PM)	C	B	A	A

Source: Gibson Engineers, 2009.

4.14.2.2 Chester, VA

4.14.2.2.1 Chester Road-Bellwood Area

The VA1, VA2, and VA3 project alternatives are on common alignment in this location and the proposed roadwork is the same for all three alignments; therefore, the three project alternatives were analyzed collectively. Refer to map sheet 9 in Appendix Q for a map of the proposed designs in this location. Under the project alternatives, the existing at-grade crossing of Brinkley Road, which is located just west of Chester Road, would be closed and traffic rerouted. The existing at-grade crossing located in the Bellwood Area, just northwest of Park Road, would be converted to a bridged crossing, with a new connection constructed from Thurston Road to Park Road. The traffic currently using the Brinkley Road crossing would be able to utilize the new bridged crossing. The only improvement that would be made to the intersection of Kingsdale Road and Chester Road is the extension of the northbound right-turn lane between Park Road and Kingsdale Road; which would enable a smoother traffic flow from the intersection of Park Road and Chester Road. The proposed intersection configuration, along with estimated traffic resulting from the consolidation, was analyzed to determine the impacts of these designs.

Under the proposed project alternatives, LOS traffic conditions at the intersection of Kingsdale Road and Chester Road, remain the same as the No Build scenario, or in the case of PM northbound and southbound traffic, show an improvement (Table 4-42).

Table 4-42 Kingsdale Road and Chester Road – Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	D	B	A	B
No Build (PM)	D	B	D	D
VA1, VA2, VA3 (AM)	D	B	A	B
VA1, VA2, VA3 (PM)	D	B	C	C

Source: Gibson Engineers, 2009.

Table 4-43 shows that at the intersection of Chester Road and Park Road, the side street movements would experience LOS F conditions by 2030 with or without the proposed project alternatives. Southbound movements remain at level B or better with or without the project alternatives. Northbound PM movements would operate at LOS D with the project alternatives, compared to LOS C without the project.

Table 4-43 Chester Road and Park Road- Level of Service in 2030				
	Northbound	**Southbound**	**Southeast bound**	**Northwest bound**
No Build (AM)	A	B	D	F
No Build (PM)	C	A	F	F
VA1, VA2, VA3 (AM)	A	B	C	F
VA1, VA2, VA3 (PM)	D	A	F	F

Source: Gibson Engineers, 2009.

4.14.2.2.2 Centralia Road and Chester Road

The VA1, VA2, and VA3 project alternatives are on common alignment in this location and the proposed roadwork is the same for all three alignments; therefore, the three project alternatives were analyzed collectively. Refer to map sheet 10 in Appendix Q for a map of the proposed designs in this location. A revised connection of Centralia Road and Chester Road is proposed to facilitate a bridged crossing of Chester Road and the SEHSR line. The revised connection of Centralia Road would span both the rail crossing and Centralia Road with a bridge and would loop back around onto Chester Road to form the eastern leg of the revised intersection. The existing intersection of Chester Road and Centralia Road would remain, but would be converted to a "T" intersection with the removal of the eastbound approach. The revised intersection is located approximately 1,000 feet from the existing intersection. This revision would serve to consolidate the existing at-grade rail crossings at Old Lane (located just north of the intersection of Centralia Road and Chester Road) and Centralia Road. The traffic from these closures would likely use the revised Centralia Road and Chester Road intersection.

As a result of the crossing consolidation, traffic currently utilizing the Old Lane and Centralia Road at-grade rail crossings were analyzed as both using the revised Centralia Road connection, and the results are shown in Table 4-44. Under the proposed project alternatives, the westbound movement is anticipated to operate at LOS E in the AM peak period, which is a slight improvement over the No Build conditions.

Table 4-44 Centralia Road and Chester Road - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	F	F	F	D
No Build (PM)	E	F	E	D
VA1, VA2, VA3 (AM)	NA	E	B	A
VA1, VA2, VA3 (PM)	NA	D	C	B

Source: Gibson Engineers, 2009.

The intersection of the proposed new connection of Centralia Road and Chester Road is anticipated to operate at LOS C in the AM period, compared to LOS F under the No Build scenario (Table 4-45). The D LOS in the PM is anticipated to be the same for both the No Build and the project alternatives.

Table 4-45 Proposed New Centralia Road and Chester Road - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	F	F	F	D
No Build (PM)	E	F	E	D
VA1, VA2, VA3 (AM)	NA	C	C	D
VA1, VA2, VA3 (PM)	NA	C	D	D

Source: Gibson Engineers, 2009.

4.14.2.3 La Crosse, VA

4.14.2.3.1 Main Street and Pine Street

The VA1, VA2, and VA3 project alternatives are on common alignment in this location and the proposed roadwork is the same for all three alignments; therefore, the three project alternatives were analyzed collectively. Refer to map sheet 83 in Appendix Q for a map of the proposed design in this location. The proposed design would eliminate the Pine Street crossing, necessitating the rerouting of east-west travel between Main Street and Montgomery Street. The analysis assumed all rerouted traffic would utilize US 58 as the primary east-west route. Traffic was rerouted to the intersections of US 58 and Main Street; Pine Street and Main Street; and Carter Street and Pine Street, to evaluate impacts on the level of service.

Future traffic projections and analysis in the La Crosse area indicate the intersections evaluated are anticipated to operate at desirable levels of service in the design year with the proposed project alternatives (Tables 4-46, 4-47, and 4-48).

Table 4-46 US 58 and Main Street - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	B	B	C	B
No Build (PM)	B	B	C	C
VA1, VA2, VA3 (AM)	C	C	C	B
VA1, VA2, VA3 (PM)	C	C	C	C

Source: Gibson Engineers, 2009.

Table 4-47 Pine Street and Main Street - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	A	A	A	A
No Build (PM)	B	B	A	A
VA1, VA2, VA3 (AM)	B	A	A	A
VA1, VA2, VA3 (PM)	B	B	A	A

Source: Gibson Engineers, 2009.

Table 4-48 Carter Street and Pine Street - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	A	A	A	A
No Build (PM)	A	A	A	A
VA1, VA2, VA3 (AM)	A	A	A	A
VA1, VA2, VA3 (PM)	A	A	A	A

Source: Gibson Engineers, 2009.

4.14.2.4 Norlina, NC

4.14.2.4.1 Warren Plains Road and Yancey Road

Approaching the Town of Norlina from the north, the NC1 and NC3 project alternatives are on common new alignment to the east of the existing rail ROW. NC1 and NC3 were, therefore, analyzed collectively. The NC2 project alternative follows the existing rail ROW into town and was analyzed separately. Refer to map sheets 98 and 99 in Appendix Q to view the proposed alternatives.

4.14.2.4.1.1 NC1/NC3

The NC1/NC3 project alternative would relocate Warren Plains Road from its current alignment by extending it northwest to intersect US 1, while providing a bridged crossing of the railroad. This intersection is approximately 450 feet from the intersection of US 1 and Elementary Avenue, which provides access to an elementary school. A connection is also provided by extending Warren Plains Road northeast of its intersection with Yancey Road. Access to Warren Plains Road from Yancey Road would be facilitated by a new alignment and "T" connection from Warren Plains Road. Also, the connection of existing Warren Plains Road from Yancey Road to Hyco Street would be removed. To get from existing Yancey Road to Downtown Norlina, drivers

would access US 401 to the south or use the new connector to access US 1 north of Norlina. An analysis was conducted to determine the effect of rerouted traffic on the level of service for the intersection of Warren Plains Road and its new connection with US 1.

4.14.2.4.1.2 NC2

The NC2 project alternative is very similar to the NC1/NC3 project alternative. Warren Plains Road (SR 1320) would be realigned, extending northeast, then cross over the railroad (on existing rail ROW) on a bridge, then loop around to connect to US 1. This intersection is approximately 125 feet from the intersection of US 1 and Elementary Avenue, which is closer than the intersection provided by the NC1/NC3 alignment. Access to Warren Plains Road from Yancey Road would be facilitated by a new alignment and "T" connection from Warren Plains Road. To get from existing Yancey Road to Downtown Norlina, drivers would access US 401 to the south or use the new connector to access US 1 north of Norlina. An analysis was conducted to determine the effect of rerouted traffic on the level of service for the intersection of Warren Plains Road and its new connection with US 1.

Table 4-49 shows the anticipated LOS for the NC1/NC3 project alternative, and Table 4-50 shows the anticipated LOS for the NC2 project alternative. The tables show that for all alternatives, all movements are anticipated to operate at a stable flow.

Table 4-49
Warren Plains Road Extension and US 1 - Level of Service in 2030

	Northbound	Southbound	Westbound	Eastbound
NC1, NC3 (AM)	A	A	C	C
NC1, NC3 (PM)	A	A	C	C

Source: Gibson Engineers, 2009.

Table 4-50
Warren Plains Road Extension and US 1 - Level of Service in 2030

	Northbound	Eastbound
NC2 (AM)	A	C
NC2 (PM)	A	C

Source: Gibson Engineers, 2009.

4.14.2.4.2 Warren Plains Road, Hyco Street, Liberty Street, Main Street and US 401/158

The NC1 and NC3 project alternatives are identical in this area, and were analyzed collectively. The NC2 project alternative follows a separate alignment and was analyzed separately. Refer to map sheet 100 in Appendix Q to view the proposed alternatives in this location.

4.14.2.4.2.1 NC1/NC3

Several changes to the road network in Norlina are proposed under the NC1/NC3 project alternative: a revised Warren Plains Road (SR 1320) alignment at Hyco Street, the removal of the at-grade crossing at Division Street, the removal of the Warren

Plains Road and Division Street intersection, the closure of the east and westbound legs of Hyco Street at US 401/158, and the closure of the east leg of Liberty Street at US 401/158. With the closure of the Division Street crossing, the analysis assumed that traffic using this crossing would reroute to Main Street. Traffic currently using the Division Street crossing has multiple facilities in the grid network to access US 401/158 and reach its intended destination. The analysis also assumed that the closure of the east leg of the intersection of Liberty Street and US 401/158 would route traffic to Elm Street or Division Street and back to Main Street. The closure of the east and west legs of the intersection of Hyco Street and US 401/158 is anticipated to route traffic back to US 1 to reach its desired destination. With the closure of the crossing at Division Street and the additional changes to the above intersections, the intersection of Main Street and US 401/158 was analyzed to estimate the effects of the proposed traffic rerouting and design in the 2030 design year.

4.14.2.4.2.2 NC2

The changes to the road network under the NC2 project alternative are similar to the changes proposed for NC1/NC3: the closure of the east and westbound legs of Hyco Street at US 401/158 and the closure of the east leg of Liberty Street at US 401/158. Additionally, the intersection of Warren Plains Road and Hyco Street would be closed at the existing CSX S-line ROW, as with the NC1/NC3 project alternative, but without a realignment of Warren Plains Road. With the closure of Hyco Street at US 401/158 and the additional changes to the above intersections, the intersection of Main Street and US 401/158 was analyzed with the rerouted traffic and as a stop controlled intersection with the eastbound and westbound movements experiencing the stop conditions.

Table 4-51 shows that for the NC1/NC3 project alternative there is a marked improvement in LOS for the northbound and southbound approaches, which carry the greatest volume through the intersection. Eastbound and westbound approaches would experience an increase in delay (i.e., the time it takes a driver to complete his/her movement through the intersection), which results in a reduced LOS. It is important to note that the number of cars waiting in line at these approaches is predicted to be small (i.e., one or two cars).

Table 4-52 shows the anticipated LOS for the NC2 project alternative. There is a marked improvement for the northbound and southbound approaches, which carry the greatest volume through the intersection. Westbound approaches operate at LOS D or better; eastbound movements are anticipated to operate at LOS E due to an increase in delay. Again, it is important to note that the number of cars waiting in line for this movement is small (i.e., one vehicle in the design year). Based on this information, this intersection is anticipated to operate slightly better under the NC2 project alternative as compared to the NC1/NC3 project alternative.

Table 4-51 Main Street and US 401/158 - Level of Service in 2030				
	Northbound	**Southbound**	**Westbound**	**Eastbound**
AM- No Build	D	D	A	A
PM- No Build	D	C	A	A
AM- NC1, NC3	A	A	C	E
PM- NC1, NC3	A	A	D	F

Source: Gibson Engineers, 2009.

Table 4-52 Main Street and US 401/158 - Level of Service in 2030				
	Northbound	**Southbound**	**Westbound**	**Eastbound**
AM- No Build	D	D	A	A
PM- No Build	D	C	A	A
AM - NC2	A	A	D	E
PM- NC2	A	A	C	E

Source: Gibson Engineers, 2009.

4.14.2.4.3 Axtell-Ridgeway Road , St Tammany Road, and US 1

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheets 101 and 102 in Appendix Q to view the proposed alternatives in this area. The rail crossings at Axtell Ridgeway Road and Ridgeway Warrenton Road are proposed to be closed. Traffic from these intersections would be rerouted along the new extension of Axtell Ridgeway Road to Ridgeway Warrenton Road where motorists can access the bridged crossing of the SEHSR and US 1; this intersection would then tie into St Tammany Road. Rerouted traffic would be able to access US 1 via St Tammany Road. The intersection of US 1 and St Tammany Road was analyzed to determine the operations of this intersection with the rerouted traffic in the design year.

Table 4-53 displays the anticipated level of service for the future No Build and the project alternatives. All movements are anticipated to operate at a LOS D or better for the three project alternatives.

Table 4-53 St Tammany Road and US 1 - Level of Service in 2030		
	Eastbound	**Southbound**
No Build (AM)	A	B
No Build (PM)	A	B
NC1, NC2, NC3 (AM)	A	C
NC1, NC2, NC3 (PM)	A	D

Source: Gibson Engineers, 2009.

4.14.2.4.4 Soul City Boulevard and US 1

The NC1 and NC3 project alternatives are identical in this area and are described below. The NC2 project alternative follows a similar but separate alignment and is described separately. Refer to map sheet 104 in Appendix Q to view the proposed alternatives in this location.

4.14.2.4.4.1 NC1/NC3

Under the NC1/NC3 project alternative, Collins Road (SR 1102) and Soul City Boulevard (SR 1151) are proposed to be slightly realigned, enabling Soul City Boulevard to cross the railroad (on new alignment in this location) on a bridge to the north of the intersection of the two roads. Collins Road would be realigned to connect with Manson Axtell Road. Traffic using the intersection of Collins Road and US 1 would be rerouted to the intersection of Soul City and US 1. Nearby Kimball Road is also proposed to be slightly realigned, enabling an additional bridged crossing of the railroad, and a connection to US 1. Because the Kimball Road design concept is not expected to have a considerable effect on traffic, it was not analyzed.

4.14.2.4.4.2 NC2

Under the NC2 project alternative, Collins Road and Soul City Boulevard are proposed to be realigned to provide a bridged crossing of the railroad (on new alignment in this location) approximately 800 feet north of the current intersection. A partial closure of Collins Road would be located 1,000 feet west of the intersection of Manson Axtell Road. This design also calls for a slight realignment of nearby Kimball Road, enabling a bridged crossing of the railroad and a connection to US 1 south of the existing intersection. Because the Kimball Road design concept is not expected to have a considerable effect on traffic, it was not analyzed.

While the NC1/NC3 and NC2 project alternatives are different in this area, the traffic rerouting would be similar. Therefore, the analysis for the diversion of traffic to the intersection of Soul City Road and US 1 was assessed collectively for all three project alternatives. Table 4-54 shows no change in LOS with the proposed designs, except for a slight reduction in LOS for PM Northbound. All traffic would operate at LOS C or better.

Table 4-54
Soul City Boulevard and US 1 - Level of Service in 2030

	Westbound	Northbound
No Build (AM)	A	C
No Build (PM)	A	B
NC1, NC2, NC3 (AM)	A	C
NC1, NC2, NC3 (PM)	A	C

Source: Gibson Engineers, 2009.

4.14.2.5 Middleburg, NC

4.14.2.5.1 Carol Street and US 1

The NC1, NC2, and NC3 project alternatives use separate alignments in this area and were analyzed separately. Refer to map sheet 108 and 109 in Appendix Q to view the proposed alternatives in this area.

4.14.2.5.1.1 NC1

The NC1 project alternative proposes to close the existing at-grade crossings at Hawkins Road, South Carol Street, and Tucker Lumber Road. South Carol Street would be realigned to enable a bridged crossing of the railroad and US 1, with a loop back around to connect with US 1.

4.14.2.5.1.2 NC2

The NC2 project alternative is very similar to NC1, including the closure of the existing at-grade crossings at Hawkins Road, South Carol Street, and Tucker Lumber Road. The only difference is that NC2 provides connectivity for Tucker Lumber Road traffic to South Carol Street and the bridge across the railroad and US 1.

4.14.2.5.1.3 NC3

With the railroad on new alignment for the NC3 project alternative, there are no closures of existing at-grade crossings. South Carol Street is proposed to cross the new rail alignment on a bridge adjacent to the existing location of the road.

Tables 4-55, 4-56, and 4-57 show that for all three alternatives, the intersection is anticipated at LOS B or better for all movements.

Table 4-55
South Carol Street and US 1 - Level of Service in 2030

	Westbound	Northbound
No Build (AM)	A	B
No Build (PM)	A	B
NC1 (AM)	A	B
NC1 (PM)	A	B

Source: Gibson Engineers, 2009.

Table 4-56
South Carol Street and US 1 - Level of Service in 2030

	Westbound	Northbound
No Build (AM)	A	B
No Build (PM)	A	B
NC2 (AM)	A	B
NC2 (PM)	A	B

Source: Gibson Engineers, 2009.

Table 4-57
South Carol Street and US 1 - Level of Service in 2030

	Westbound	Northbound
No Build (AM)	A	B
No Build (PM)	A	B
NC3 (AM)	A	B
NC3 (PM)	A	B

Source: Gibson Engineers, 2009.

4.14.2.6 Henderson, NC

In the City of Henderson, the NC1, NC2, and NC3 project alternatives are on common alignment along the existing rail ROW, where there is active freight service. There are 14 public roads that cross the railroad at-grade in this densely developed urban area and 1 existing underpass at Charles Street. The designs proposed by the project alternatives were developed in an attempt to balance the need for an adequate number of safe grade-separated crossings, with the desire to minimize impacts to surrounding development. The project alternatives call for 11 existing public crossings to be closed, with traffic re-routed to 3 new bridged crossings. Of note, there is also 1 pedestrian-only underpass proposed.

4.14.2.6.1 Beckford Drive/Main Street and Old Norlina Road

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 114 in Appendix Q to view the proposed alternatives in this area. Main Street is proposed to be extended and realigned in order to allow a bridged crossing of the railroad. The existing four-leg offset configuration of the nearby intersection of Garnett Street (US 1 Business)/Chestnut Street and Beckford Drive is currently inefficient. Traffic along Main Street has to make multiple turning movements to reach Garnet Street, Beckford Drive, or Chestnut Street. The proposed configuration at Beckford Drive and Garnett Street would become a four-legged intersection. This intersection configuration should result in better maneuverability and less driver confusion through the intersection.

Removing the Chestnut Street leg of the current intersection and replacing it with Main Street should keep true to the Town's long range plan and simplify intersection operations. John Street would be extended to Garnett Street to provide an alternate route for northbound traffic on Chestnut Street to reach Garnett Street. Traffic from crossing closures at Old Norlina Road and Main Street would be rerouted to the new four-legged intersection of Main Street/Beckford Drive and Garnett Street. The existing rail crossing of Harris Street would also be removed. The analysis considered the effect of these designs on the intersections of Beckford Drive/Main Street and Garnett Street, and John Street and Garnett Street. The results of the analysis are described below.

4.14.2.6.2 Beckford Drive/Main Street and Garnett Street (US 1 Business)

The anticipated LOS for the Beckford Drive/Main Street intersection with Garnett Street is shown in Table 4-58. This alignment does result in some degradation in LOS compared to the No Build scenario. However, it should be noted this configuration is in keeping with the long range plan to extend Main Street. Additionally, it provides more direct movements from Main Street to major facilities in downtown Henderson.

Table 4-58 Beckford Drive/Main Street and Garnett Street - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	C	C	E	C
No Build (PM)	D	C	E	D
NC1, NC2, NC3 (AM)	D	D	C	D
NC1, NC2, NC3 (PM)	E	E	E	D

Source: Gibson Engineers, 2009.

4.14.2.6.3 John Street and Garnett Street (US 1 Business)

The anticipated LOS for the John Street and Garnett Street intersection with the proposed project is shown in Table 4-59. (The No Build scenario is not included because this intersection does not currently exist.) The intersection of John Street and Garnett Street is anticipated to experience LOS F in both the AM and PM peak hours for all movements except northbound. However, the analysis assumed a worst case scenario in which all traffic from Chestnut Street would use John Street to reroute to Garnett Street. In reality, there are numerous side streets available that vehicles could use to connect to Garnett Street instead of John Street. Without the direct connection of Chestnut Street to Garnett Street/Beckford Drive, vehicles would divert their trips among the numerous side streets to make the desired maneuver. Therefore, the operations are expected to be considerably better than presented in Table 4-59. Also, as long as Garnett Street is a two-lane road in this location, any side street that has a signalized intersection with Garnett Street would experience poor operations. To improve this situation, Garnett Street would need to be widened to a multilane facility. Such improvements are outside the scope of the SEHSR project.

Table 4-59 John Street and Garnett Street - Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
NC1, NC2, NC3 (AM)	F	F	A	F
NC1, NC2, NC3 (PM)	F	F	B	F

Source: Gibson Engineers, 2009.

4.14.2.6.4 Garnett Street (US 1 Business) and Andrews Avenue (NC 39)

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheets 114 and 115 in Appendix Q to view the proposed alternatives in this area. The existing at-grade crossing of Rockspring Street, located just north of the NC 39 crossing, would be closed and the existing at-grade crossing of Andrews Avenue (NC 39) would be closed, with the road realigned slightly, enabling a new bridge crossing over the railroad and Garnett Street (US 1 Business). The north and southbound legs of Garnett Street and Williams Street would remain open. Impacts from these designs to the intersections of Andrews Avenue and Chestnut Street; Montgomery Street and Chestnut Street; and Garnett Street and Montgomery Street were analyzed.

The intersection of Andrews Avenue (NC 39) and Garnett Street (US 1 Business) is anticipated to operate at LOS F in the year 2030 under the No Build scenario. While some of the surrounding intersections experience worse operations with the project, it is

due to the fact this failing intersection would be removed and those volumes would reroute to adjacent intersections. In other words, the existing problem would relocate to other intersections. Improvements were made at these intersections to the extent feasible based on existing constraints.

4.14.2.6.5 Andrews Avenue and Chestnut Street

The intersection of Andrews Avenue and Chestnut Street would experience LOS F conditions by 2030 with or without the proposed rail project (Table 4-60). It should be noted that the project alternatives provide the intersection with additional lanes and help to replace the NC 39 and Garnett Street intersection, which is anticipated to operate at LOS F in both the AM and PM peak periods in 2030 without the project. Improving the level of service at the Andrews Avenue and Chestnut Street intersection would require widening Garnett Street (US 1 Business) to a multilane facility, which is outside the scope of the SEHSR project.

Table 4-60
Andrews Avenue and Chestnut Street - Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	D	E	E	F
No Build (PM)	F	F	F	F
NC1, NC2, NC3 (AM)	E	E	F	F
NC1, NC2, NC3 (PM)	F	F	F	F

Source: Gibson Engineers, 2009.

4.14.2.6.6 Montgomery Street and Chestnut Street

Due to additional westbound right-turns and southbound left-turns, the Montgomery Street and Chestnut Street intersection would operate at LOS E and F under the project alternatives compared to LOS B and C under the No Build scenario (Table 4-61). If additional turn lanes could be added, it would help to improve the LOS at this intersection; however existing sidewalks and adjacent buildings constrain the options for this intersection.

Table 4-61
Montgomery Street and Chestnut Street - Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	D	B	C	B
No Build (PM)	E	B	C	B
NC1, NC2, NC3 (AM)	C	D	D	C
NC1, NC2, NC3 (PM)	C	F	F	E

Source: Gibson Engineers, 2009.

4.14.2.6.7 Garnett Street and Montgomery Street

Due to additional traffic for the eastbound right-turns and the northbound left-turns resulting from the rerouting of traffic, the LOS for this intersection is anticipated to be at LOS E and F for northbound and southbound traffic, in comparison to LOS C under the No Build scenario (Table 4-62). The eastbound and westbound lanes would remain the same or show some improvement. Although additional turn lanes would bring this intersection to a LOS D or better in the future, existing sidewalks and adjacent buildings

constrain the designs. In addition, unless major corridor improvements were made to Garnett Street (US 1 Business) and Andrews Avenue (NC 39), the additional lanes would not result in true system wide operational improvement.

Table 4-62
Garnett Street and Montgomery Street - Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	D	D	B	A
No Build (PM)	E	E	C	C
NC1, NC2, NC3 (AM)	B	C	C	D
NC1, NC2, NC3 (PM)	C	E	E	F

Source: Gibson Engineers, 2009.

4.14.2.6.8 Williams Street and Chavasse Avenue

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 115 in Appendix Q to view the alternatives in this area. Under the project alternatives, the Chavasse Avenue railroad crossing would be closed. Dabney Drive Extension would be realigned to the south, and would intersect Raleigh Road (US 1 Business), then cross the railroad on a bridge and tie into Alexander Avenue. The north and south legs of Nicholas Street at Alexander Avenue would be closed in conjunction with this realignment. The closure of the Chavasse Avenue crossing would cause traffic to be rerouted to the new intersection of Dabney Drive and Raleigh Road. The closure of the northbound and southbound legs of Nicholas Street at Alexander Avenue would mean that traffic from Nicholas Street would be rerouted to adjacent streets to reach Alexander Avenue or to continue their trip on Nicholas Street.

The intersection of Raleigh Road and Dabney Drive/Alexander Avenue was analyzed to determine the effects on LOS from the proposed changes in the area (Table 4-63). This intersection is projected to operate at LOS D or E in the year 2030 under the No Build scenario. Due to the increase in traffic on the eastbound and westbound approaches at this intersection, the LOS for the eastbound traffic remains the same at LOS E, but worsens to levels E and F for the other movements. To improve this intersection to LOS D or better would require widening Raleigh Road to a multilane facility; this improvement is outside the scope of the SEHSR project.

Table 4-63
Raleigh Road and Dabney Drive - Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	E	E	D	D
No Build (PM)	E	E	E	E
NC1, NC2, NC3 (AM)	E	F	E	E
NC1, NC2, NC3 (PM)	E	F	F	F

Source: Gibson Engineers, 2009.

4.14.2.6.9 Belmont Drive and Welcome Avenue

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 116 in Appendix Q to view the alternatives in this area. Under the project alternatives, the Welcome Avenue crossing is proposed to be closed and the road realigned to the east, forming a new intersection with King

Street. King Street is proposed to be extended southward to connect with JP Taylor Road. JP Taylor Road is proposed to be realigned and grade-separated, with a bridge over the railroad; the new road alignment extends to the west, and intersects with Belmont Drive near Julia Avenue. Impacts from these designs to the intersections of Belmont Drive and JP Taylor Road and Raleigh Road (US 1 Business) and Belmont Drive were analyzed.

4.14.2.6.10 Belmont Drive and JP Taylor Road New Connection

Based upon the proposed design and estimated design year volumes, this intersection was analyzed as a signalized intersection and is anticipated to operate at LOS D or better in 2030 with the proposed design (Table 4-64). (The No Build scenario is not included because this intersection does not currently exist.)

Table 4-64
Belmont Drive and JP Taylor Road New Connection - Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
NC1, NC2, NC3 (AM)	C	A	C	B
NC1, NC2, NC3 (PM)	C	B	D	C

Source: Gibson Engineers, 2009.

4.14.2.6.11 Raleigh Road and Belmont Drive

This intersection replaces the existing JP Taylor Road and Raleigh Road (US 1 Business) intersection, as well as the offset Welcome Avenue/Belmont Drive and Raleigh Road intersection. These intersections are proposed to operate under congested conditions in the year 2030 under both the No Build scenario and the project alternatives (Table 4-65).

Table 4-65
Raleigh Road and Belmont Drive- Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	F	F	B	F
No Build (PM)	F	F	F	F
NC1, NC2, NC3 (AM)	F	F	D	E
NC1, NC2, NC3 (PM)	F	F	F	F

Source: Gibson Engineers, 2009.

4.14.2.6.12 Raleigh Road (US 1 Business) and Bearpond Road

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 117 in Appendix Q to view the proposed designs in this area. Under the project alternatives, the existing Bearpond Road rail crossing would be closed; the road would be realigned to cross over the railroad and Raleigh Road (US 1 Business) on a bridge located 200 feet south of the existing intersection. The new alignment of Bearpond Road would connect with Lynnbank Road on the west side of Raleigh Road. Traffic from this area would be rerouted to a new "jug-handle" type connection that would provide connectivity between Raleigh Road and the new alignment of Lynnbank Road/Bearpond Road. Impacts from these designs to

the intersection of Bearpond Road/Lynnbank Road and the New Connector and Raleigh Road and the New Connector were analyzed.

4.14.2.6.13 Bearpond Road/Lynnbank Road and New Connector

This intersection is anticipated to operate between LOS A and D in the year 2030 under the project alternatives (Table 4-66). Note that the No Build scenario is not included because this intersection does not currently exist.

Table 4-66
Bearpond Road/Lynnbank Road and New Connector - Level of Service in 2030

	Eastbound	Westbound	Northbound
NC1, NC2, NC3 (AM)	A	D	C
NC1, NC2, NC3 (PM)	B	C	C

Source: Gibson Engineers, 2009.

4.14.2.6.14 Raleigh Road and New Connector

This intersection is anticipated to operate at an acceptable LOS in the year 2030 under the project alternatives; between LOS B and D (Table 4-67). Note that the No Build scenario is not included because this intersection does not currently exist.

Table 4-67
Raleigh Road and New Connector - Level of Service in 2030

	Eastbound	Westbound	Northbound
NC1, NC2, NC3 (AM)	D	C	C
NC1, NC2, NC3 (PM)	D	B	C

Source: Gibson Engineers, 2009.

4.14.2.6.15 Raleigh Road (US 1 Business) and Peter Gill Road

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 118 in Appendix Q to view the proposed designs in this area. Under the project alternatives, the Eastern Minerals Road at-grade rail crossing would be closed; the Peter Gill Road at-grade rail crossing would be closed and the road realigned to connect with Bobbitt Road; and Wildlife Lane would be extended westward, crossing the railroad via an underpass to connect to a realigned Raleigh Road (US 1 Business). Traffic from the closed crossings would be diverted to the new intersection of Wildlife Lane and Raleigh Road, which was analyzed to determine LOS (Table 4-68). Traffic is anticipated to operate at an acceptable LOS D or better in the year 2030 under the project alternatives. Note that the No Build scenario is not included because this intersection does not currently exist.

Table 4-68
Wildlife Lane and Raleigh Road - Level of Service in 2030

	Westbound	Northbound	Southbound
NC1, NC2, NC3 (AM)	D	D	D
NC1, NC2, NC3 (PM)	D	D	C

Source: Gibson Engineers, 2009.

4.14.2.6.16 Raleigh Road (US 1 Business) and Chavis Road

The NC1, NC2 and NC3 alternatives are identical in this area, and were analyzed collectively. Refer to map sheets 119 and 120 in Appendix Q to view the proposed designs in this area. The Chavis Road at-grade rail crossing would be closed under the project alternatives and traffic re-routed northward to a New Connector road. The New Connector would cross under the railroad via an underpass, and then intersect Raleigh Road (US 1 Business) at Edwards Road. Table 4-69 shows the results of the analysis for the intersection of Raleigh Road and Edwards Road/New Connector. The intersection is anticipated to operate at LOS C or better in the year 2030.

Table 4-69
Raleigh Road and Edwards Road/New Connector- Level of Service in 2030

	Northbound	Southbound	Westbound	Eastbound
No Build (AM)	A	N/A	N/A	B
No Build (PM)	A	N/A	N/A	B
NC1, NC2, NC3 (AM)	A	A	B	C
NC1, NC2, NC3 (PM)	A	A	B	B

Source: Gibson Engineers, 2009.

4.14.2.7 Kittrell, NC

4.14.2.7.1 US 1 (Capital Boulevard) and Kittrell College Road

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 121 in Appendix Q to view the proposed designs in Kittrell, NC. Main Street is the only street in downtown Kittrell to cross the railroad, which it currently crosses at grade. The spacing between Main Street and US 1 was a design constraint, preventing the construction of a bridge or underpass that would also be able to intersect US 1. Thus, the alternatives propose an extension of Church Street to cross the railroad on a bridge. The new alignment for Church Street would then swing south, then west, to provide a connection to US 1 at College Street. Main Street would be closed between the railroad tracks and US 1. Traffic was analyzed at the intersection of US 1 and Kittrell College Road/College Street (Table 4-70). There is no difference in LOS between the No Build scenario and the project alternatives. The intersection is anticipated to operate at a desirable LOS B or better in the year 2030.

Table 4-70
US 1 and Kittrell College Road- Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	B	B	A	A
No Build (PM)	B	B	A	A
NC1, NC2, NC3 (AM)	B	B	A	A
NC1, NC2, NC3 (PM)	B	B	A	A

Source: Gibson Engineers, 2009.

4.14.2.8 Franklinton, NC

4.14.2.8.1 Main Street and Green Street (NC 56)

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 127 in Appendix Q to view the proposed designs in Franklinton, NC. Under the project alternatives, the existing Green Street underpass would be re-built with greater vertical and horizontal clearances. To the north, the Mason Street at-grade rail crossing would be closed to vehicular traffic and replaced with a pedestrian-only bridge. Mason Street vehicular traffic is anticipated to be redirected to Green Street. To the east of the railroad, Tanyard Street would be realigned to provide a better connection with Green Street. The impacts from these designs on the LOS for the intersection of Main Street and Green Street were analyzed (Table 4-71). In the year 2030, the traffic would be approaching unstable flow under the No Build scenario with LOS ranging from C to F. The road designs for the project alternatives provide a small level of improvement for some movements, but a reduced LOS for other movements.

Table 4-71
Green Street (US 56) and Main Street - Level of Service in 2030

	Eastbound	Westbound	Northbound	Southbound
No Build (AM)	D	C	D	C
No Build (PM)	D	C	D	F
NC1, NC2, NC3 (AM)	E	D	E	D
NC1, NC2, NC3 (PM)	D	C	E	E

Source: Gibson Engineers, 2009.

4.14.2.8.2 Main Street (US 1 Business) and Cedar Creek Road

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheet 128 in Appendix Q to view the proposed designs in this area. Under the project alternatives, the existing railroad crossings at College Street and Hawkins Street would be closed to vehicular traffic, with pedestrian-only underpasses constructed nearby. The existing Cedar Creek Road crossing would also be closed. Cedar Creek Road would be realigned to cross the railroad in a new location on a bridge and then intersect US 1 approximately 500 feet south of the existing intersection. Hawkins Road would be extended to intersect with Cedar Creek Road to provide connectivity. Traffic from the proposed crossing closures would be rerouted to US 1 and Cedar Creek Road. Impacts from the additional rerouted traffic to the Cedar Creek Road and Main Street (US 1 Business) intersection were analyzed (Table 4-72). All intersection movements are anticipated to operate at LOS C or better in the 2030 design year with the project alternatives.

Table 4-72 Main Street (US 1 Business) and Cedar Creek Road - Level of Service in 2030		
	Southbound	**Westbound**
No Build (AM)	B	A
No Build (PM)	B	A
NC1, NC2, NC3 (AM)	A	C
NC1, NC2, NC3 (PM)	A	B

Source: Gibson Engineers, 2009.

4.14.2.9 Raleigh, NC

4.14.2.9.1 Atlantic Avenue and Wolfpack Lane/Highwoods Boulevard

The NC1, NC2, and NC3 project alternatives are identical in this area, and were analyzed collectively. Refer to map sheets 146 and 147 in Appendix Q to view the designs in this location. The Wolfpack Lane/ Highwoods Boulevard at-grade rail crossing is proposed to be closed,with northbound traffic rerouted to the proposed new bridge at New Hope Church Road, and southbound traffic rerouted to the existing I-440 bridge. Just west of the proposed New Hope Church Road bridge, the St Albans intersection with New Hope Church Road is proposed to be reconfigured to accommodate the projected traffic volumes. Appendix C-18 of the SEHSR Draft Traffic Review contains an in-depth analysis of impacts to the surrounding road network; the results of that analysis are summarized here.

4.14.2.9.2 St Albans Drive and Wake Forest Road Approach

As shown in Table 4-73, the eastbound and westbound flow of traffic would be constricted at this intersection with or without the proposed project alternatives.

Table 4-73 St Albans Drive and Wake Forest Road Approach- Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	F	F	C	C
No Build (PM)	F	F	E	D
NC1, NC2, NC3 (AM)	E	E	C	D
NC1, NC2, NC3 (PM)	E	F	F	E

Source: Gibson Engineers, 2009.

4.14.2.9.3 St Albans Drive and Tarheel Drive

A northbound left-turn lane is proposed at this intersection to help accommodate increased traffic volumes associated with the crossing closure at Wolfpack Lane. Table 4-74 shows that for the project alternatives and the No Build scenario, traffic would operate at LOS B or better, with the exception of the PM northbound approach, which would operate under LOS D under the project alternatives.

Table 4-74 St Albans Drive and Tarheel Drive - Level of Service in 2030		
	Westbound	**Northbound**
No Build (AM)	A	B
No Build (PM)	A	B
NC1, NC2, NC3 (AM)	A	B
NC1, NC2, NC3 (PM)	A	D

Source: Gibson Engineers, 2009.

4.14.2.9.4 New Hope Church Road and St Albans Drive

Traffic would remain reasonably free flowing at this intersection during the AM peak for both the No Build scenario and the project alternatives (Table 4-75). However, the PM peak flow would operate at LOS F for both the No Build scenario and the project alternatives.

Table 4-75 New Hope Church Road and St Albans - Level of Service in 2030	
	Northeast bound
No Build (AM)	B
No Build (PM)	F
NC1, NC2, NC3 (AM)	B
NC1, NC2, NC3 (PM)	F

Source: Gibson Engineers, 2009.

4.14.2.9.5 New Hope Church Road and Atlantic Avenue

This congested intersection currently operates under LOS F, as detailed in the SEHSR Draft Traffic Review. Only major revisions to the intersection would improve the traffic flow to LOS D. Such revisions are outside the scope of the SEHSR project. However, the project alternatives do include increasing the eastbound right-turn lane from 150 feet to 350 feet, to help with a projected increase in eastbound right-turn traffic. Table 4-76 shows that traffic conditions at this intersection would remain congested in the year 2030 under both the No Build scenario and the project alternatives.

Table 4-76 New Hope Church Road and Atlantic Avenue- Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	F	F	E	F
No Build (PM)	F	F	F	E
NC1, NC2, NC3 (AM)	F	F	E	F
NC1, NC2, NC3 (PM)	F	F	F	F

Source: Gibson Engineers, 2009.

4.14.2.9.6 Wolfpack Lane/Highwoods Boulevard and Atlantic Avenue

This signalized intersection is approximately 200 feet east of the at-grade crossing proposed to be closed. The traffic flow at this intersection is anticipated to improve under the project alternatives (Table 4-77).

Table 4-77 Wolfpack Lane/Highwoods Boulevard and Atlantic Avenue- Level of Service in 2030				
	Eastbound	**Westbound**	**Northbound**	**Southbound**
No Build (AM)	F	D	D	D
No Build (PM)	F	F	F	E
NC1, NC2, NC3 (AM)	n/a	C	C	C
NC1, NC2, NC3 (PM)	n/a	E	C	B

Source: Gibson Engineers, 2009.

4.14.2.10 Downtown Raleigh, NC

In downtown Raleigh, the three project alternatives are on common alignment until just south of Whitaker Mill Road. NC3 separates from the NC1/NC2 alternatives to follow the Norfolk Southern ROW, which roughly parallels the CSX railroad, approximately 1,000 feet to the west. From Whitaker Mill Road, the NC1 and NC2 alternatives are on common alignment along the CSX rail ROW. NC3 rejoins the NC1/NC2 alternatives just north of Jones Street. Upon reaching Morgan Street, the three alignments have slight variations as they approach the Boylan Wye. There is active freight service on both the Norfolk Southern and CSX railroads through downtown Raleigh. Refer to map sheets 148-150 in Appendix Q for the designs through downtown Raleigh.

4.14.2.10.1 NC1/NC2 Alternatives

Listed below are the existing at-grade crossings in downtown Raleigh affected by the NC1/NC2 project alternatives and the proposed change:

- Whitaker Mill Road – New bridge
- Harrington Street – Close crossing, add pedestrian-only underpass
- West Street – Close crossing
- Jones Street – New bridge
- Hargett Street– New bridge

4.14.2.10.2 NC3 Alternative

Listed below are the existing at-grade crossings in downtown Raleigh affected by the NC3 project alternative and the proposed change:

- Whitaker Mill Road – New bridge
- Fairview Road – Close crossing
- Jones Street – Close crossing
- Hargett Street – New bridge

An extensive traffic evaluation study was conducted for the downtown Raleigh area, including the following intersections:

- Glenwood Avenue / North Street (signalized)
- North Street / West Street (unsignalized)
- North Street / Harrington Street (unsignalized)
- Harrington Street / Lane Street (unsignalized)
- Glenwood Avenue / Jones Street (signalized)
- West Street / Jones Street (unsignalized)

- Harrington Street / Jones Street (unsignalized)
- Glenwood Avenue / Hillsborough Street (signalized)
- Edenton Street / West Street (signalized)
- Glenwood Avenue / Morgan Street (signalized)
- Hargett Street / West Street (unsignalized)
- Hargett Street / Harrington Street (unsignalized)
- Fairview Road / Service Road (unsignalized)
- Glenwood Avenue / Harvey Street (signalized)

Because the downtown Raleigh area has a well-developed grid network of roads, projections from traffic analysis show that the network would be able to service the rerouted traffic associated with any of the three project alternatives. LOS analysis was not conducted in this area because available street capacity would not be used up by the small changes in volume predicted under the proposed designs.

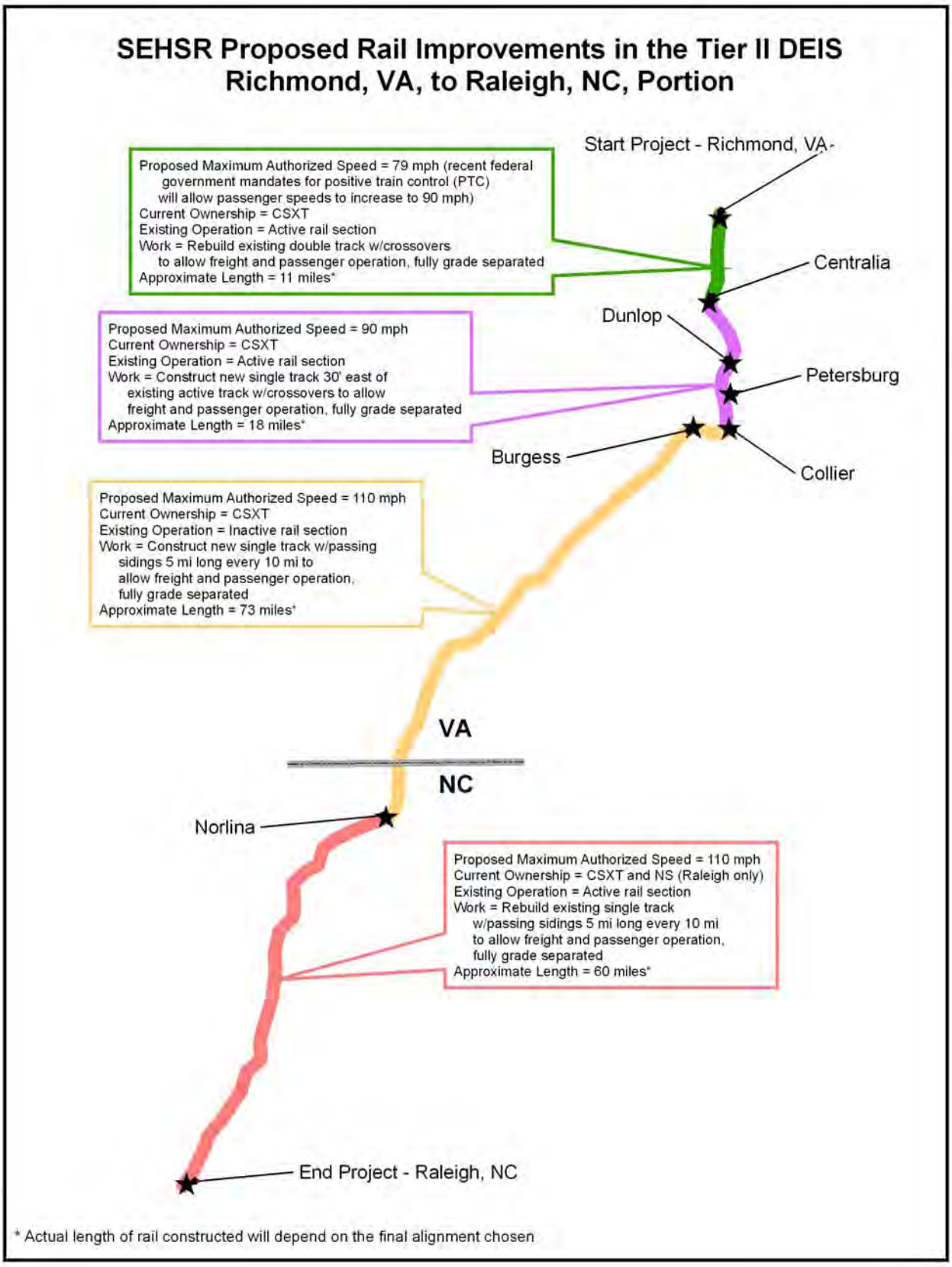
The biggest difference between the project alternatives in the downtown area is that north/south traffic flow is impeded more by the NC1 and NC2 project alternative designs. With the NC1 and NC2 project alternatives, traffic is rerouted from Harrington Street and West Street to Boylan Avenue, Glenwood Avenue, McDowell Street, and Dawson Street. Also, with the NC1 and NC2 project alternatives, more traffic would use North Street between Glenwood Avenue and West Street to bypass the rail crossing closures in the northern section of downtown. Overall, the NC3 project alternative reduces the amount of traffic rerouted or inconvenienced compared to the NC1 and NC2 project alternative.

4.14.3 Rail

Rail designs for this project use existing rail lines or segments of existing rail lines in conjunction with areas of new alignment. The proposed designs for all three of the rail alignment alternatives call for new ballast (the rock surface underneath the railroad ties); concrete ties, and welded steel rails. Throughout the project corridor, the alternatives provide for a combination of high speed passenger service, conventional passenger service, conventional freight, and intermodal freight. The level of work required to achieve this shared system differs depending on the nature of the existing rail operations, as well as the existing conditions of the railroad and rail bed. A schematic map of the proposed rail improvements is provided in Figure 4-10. Depending on the location, the proposed rail designs include:

- Construction of new single track with 5 mile passing sidings approximately every 10 miles
- Rebuilding existing single track with 5 mile passing sidings approximately every 10 miles
- Construction of new single track adjacent to existing active track, with 30 feet separation; and with crossovers to allow passing for freight and passenger operations
- Rebuilding existing double track, with crossovers to allow passing for freight and passenger operations

Figure 4-10


SEHSR Proposed Rail Improvements in the Tier II DEIS
Richmond, VA, to Raleigh, NC, Portion
Start Project - Richmond, VA
Proposed Maximum Authorized Speed = 79 mph (recent federal government mandates for positive train control (PTC) will allow passenger speeds to increase to 90 mph)
Current Ownership = CSXT
Existing Operation = Active rail section
Work = Rebuild existing double track w/crossovers to allow freight and passenger operation, fully grade separated
Approximate Length = 11 miles*
Centralia
Dunlop
Proposed Maximum Authorized Speed = 90 mph
Current Ownership = CSXT
Existing Operation = Active rail section
Work = Construct new single track 30' east of existing active track w/crossovers to allow freight and passenger operation, fully grade separated
Approximate Length = 18 miles*
Petersburg
Burgess
Collier
Proposed Maximum Authorized Speed = 110 mph
Current Ownership = CSXT
Existing Operation = Inactive rail section
Work = Construct new single track w/passing sidings 5 mi long every 10 mi to allow freight and passenger operation, fully grade separated
Approximate Length = 73 miles*
VA
NC
Norlina
Proposed Maximum Authorized Speed = 110 mph
Current Ownership = CSXT and NS (Raleigh only)
Existing Operation = Active rail section
Work = Rebuild existing single track w/passing sidings 5 mi long every 10 mi to allow freight and passenger operation, fully grade separated
Approximate Length = 60 miles*
End Project - Raleigh, NC
* Actual length of rail constructed will depend on the final alignment chosen

Information about the three rail alternative alignments within each section can be found in the Section 2.2.1.3. These tables include design objectives, maximum authorized speed (MAS), and proposed new roadway bridges for the alternatives. These tables also contain schematic maps, and reference specific map sheets for detailed designs, that are found in Appendix Q. Track charts are located in Appendix E.

The proposed rail designs for the three alternatives were developed in accordance with FRA regulations, and in coordination with CSX Transportation and Norfolk Southern railroads, to ensure that the proposed designs do not conflict with existing freight and conventional passenger operations. All the project alternatives increase rail capacity, which would enhance existing operations; and would also provide adequate separation of high speed train operations from freight operations in a fully grade separated corridor. The level of increased capacity is expected to be the same for all three rail alternatives.

The vast majority of proposed new bridge structures for the rail designs are associated with the road crossings; i.e. road bridges or underpasses. Previous discussions about impacts from the construction of those structures are found in Sections 4.14.1 and 4.11.3. The following sections describe the proposed rail bridges at rivers and major creek crossings, and two areas where there are notable differences between the rail alternatives in relation to the proposed bridge structures.

4.14.3.1 River and Major Creek Bridges

The three proposed rail alternatives are on common alignment at the major river and creek crossings where new rail bridges or expansion of existing bridges are proposed, except in North Carolina where the rail alternatives differ at the crossing of Cedar Creek. A description of the proposed bridgework for rivers and major creeks is provided below.

4.14.3.1.1 Virginia River Bridges

4.14.3.1.1.1 James River (MP S0.5)

All three project alternatives are on common alignment as they cross the James River, just south of Main Street Station in Richmond, VA; refer to map sheet 1 in Appendix Q. Coming out of Main Street Station, the existing single track is elevated on supports built to accommodate double track through the triple rail crossing; it remains elevated and transitions to a single track width as it passes through a gated opening in a floodwall on the north side of the James River before proceeding to cross the river on a single track bridge. The designs would necessitate an enlargement of the opening in the floodwall to accommodate the addition of the proposed double track, as well as the construction of an additional single track bridge, adjacent to and on the east side of the existing bridge. This action would expand rail capacity and alleviate congestion at this major choke point.

4.14.3.1.1.2 Appomattox River (MP A23.2)

All three project alternatives are on common alignment as they cross the Appomattox River in this location between Chesterfield County, VA and Petersburg, VA; refer to map sheet 24 in Appendix Q. A new parallel single track bridge is proposed for high

speed passenger trains, located approximately sixty feet to the east of the existing single track bridge. The existing bridge would continue to be used by freight trains.

4.14.3.1.1.3 Nottoway River (MP S50.7)

All three project alternatives are on common alignment as they cross the Nottoway River between the counties of Dinwiddie and Brunswick, VA within the existing CSX rail ROW; refer to map sheet 53 in Appendix Q. Although the existing track has been removed throughout this area of the project, the single track Nottoway River Bridge remains intact. The project alternatives propose to utilize the piers and substructure of the existing bridge; and to replace the superstructure (girders, decking and track).

4.14.3.1.1.4 Meherrin River (MP S70.3)

All three project alternatives are on common alignment as they cross the Meherrin River between Brunswick County and Mecklenburg County, VA; refer to map sheet 75 in Appendix Q. Although the existing track has been removed throughout this area of the project, this concrete ballast deck single track bridge, built in 1975 is in good condition. The project alternatives propose to utilize the piers and substructure of the existing bridge, as well as the superstructure (girders and decking).

4.14.3.1.1.5 Roanoke River/Lake Gaston (MP S89)

All three project alternatives are on common alignment in this location in Mecklenburg County, located at the Virginia/North Carolina state line; refer to map sheet 91 in Appendix Q. Although the existing track has been removed throughout this area of the project, the single track bridge remains intact. The project alternatives propose to utilize the piers and substructure of the existing bridge; and to replace the superstructure (girders, decking and track).

4.14.3.1.2 North Carolina River and Major Creek Bridges

4.14.3.1.2.1 Tar River (MP S125.8)

All three project alternatives are on common alignment as they cross the Tar River in this location between Vance County and Franklin County, NC; refer to map sheet 124 in Appendix Q. This concrete ballast deck single track bridge was built in 1975 and is in good condition. There is active freight service in this location, and all three of the project alternatives propose to utilize the piers and substructure of the existing single track bridge, as well as the superstructure (girders, and decking). There would be no impact to the historic Raleigh and Gaston Railroad bridge piers which are located in close proximity to the existing railroad bridge, but are no longer in use.

4.14.3.1.2.2 Cedar Creek (MP S132.2)

All three project alternatives would require a new bridge to cross Cedar Creek in Franklin County, NC; refer to map sheet 129 in Appendix Q. The NC1 and NC3 alternatives are on common alignment on the east side of the existing rail ROW, while NC2 is on new alignment to the west of the existing rail ROW. Both the NC1/NC3

project alternative and the NC2 project alternative would require construction of a new single track bridge, on new piers. The historic Cedar Creek Railroad Bridge and Raleigh and Gaston Railroad bridge piers lie within the existing rail ROW, but would not be impacted by the proposed project alternatives.

4.14.3.1.2.3 Neuse River (MP S146.3)

All three project alternatives are on common alignment as they cross the Neuse River in this location in Wake County, NC, where there is active freight service; refer to map sheet 141 in Appendix Q. This concrete ballast deck, single track bridge was built in the early 1970s and is in good condition. The project alternatives propose to utilize the piers and substructure of the existing bridge, as well as the superstructure (girders and decking). The proposed work would not impact the historic Raleigh and Gaston Railroad bridge piers which are located in close proximity to the existing Neuse River railroad bridge, but are no longer in use.

4.14.3.1.2.4 Crabtree Creek (MP S154)

All three project alternatives are on common alignment approaching Crabtree Creek in Raleigh, NC, where there is active freight service; refer to map sheet 148 in Appendix Q. This concrete ballast deck single track bridge was built in the early 1970's and is in good condition. A new single track bridge is proposed to be constructed adjacent to the existing single track bridge. The new structure would span (but not touch) the historic Raleigh and Gaston bridge pier that lies within the drip line of the existing bridge.

4.14.3.2 Notable Differences in Infrastructure

There are two locations with notable differences between the proposed rail alternatives in the level of infrastructure required by the designs: the area south of Petersburg, VA where the alternatives transition from the CSX A-line at Collier Yard to the Burgess Connector; and in downtown Raleigh, NC. The proposed designs provide alternative approaches to these areas of complexity, and are described below.

4.14.3.2.1 Collier Yard in Dinwiddie County, VA

The three project alternatives are on common alignment within the CSX A-line ROW as they approach Collier Yard rail yard; refer to the following maps in Appendix Q: 29.1, 29.2, and 29.3. High speed passenger trains would be kept separate from the freight switching operations of the rail yard, on new single track 30 feet to the east of the existing tracks. At the south end of the rail yard, the three rail alternatives cross over the CSX A-line to follow an alignment within the rail ROW of the old Burgess Connector. The highest volume of freight traffic would likely continue south out of the rail yard, along the double track CSX A-line; however a single track freight connection between the rail yard and the Burgess Connector is included in all of the proposed alternatives. The designs are constrained in this area by the Weldon Railroad battlefield (also known as Globe Tavern battlefield) and the National Park Service Fort Wadsworth Unit. Refer to Section 4.12 for a discussion of effects on these properties from a cultural resource perspective. A description of the designs for each of the rail alternatives at this location follows below.

4.14.3.2.1.1 VA1 Alternative

The VA1 project alternative provides a new single track, 30 feet to the east of the rail yard. The design leaves the existing rail ROW at the south end of the rail yard on a long bridge structure, to traverse up and over the CSX A-line tracks and a short access road to the west, before coming back down to grade. New rail ROW would be required on the west side of the existing rail ROW. A single track freight connector leaves the rail yard at grade, and parallels the high speed track on the west side; it then crosses the short access road on a parallel single track bridge. A small amount of new rail ROW would be required for the freight alignment.

- 75 mph limiting speed for Section DD (faster than VA2, the same as VA3)
- Requires more new railroad ROW for high speed track and freight track than VA2

4.14.3.2.1.2 VA2 Alternative

The VA2 project alternative provides new single track 30 feet to the east of existing track. The design maximizes use of existing rail ROW through a tighter curve and a longer bridge structure, to traverse up and over the CSX A-line tracks and a short access road. This alternative provides a parallel single track freight connection to the east of the high speed track, which crosses over the access road on a short bridge. VA2 minimizes ROW required from the Weldon Railroad battlefield.

- 70 mph limiting speed for Section DD (slower than VA1 and VA3)
- Maximizes use of existing rail ROW
- Minimizes ROW required from the Weldon Railroad battlefield.

4.14.3.2.1.3 VA3 Alternative

The VA3 project alternative is similar to the VA1 project alternative, but has a larger "footprint" because it utilizes more earthen fill, a retaining wall, and a shorter bridge structure to achieve the same design speed.

- 75 mph limiting speed for Section DD (faster than VA2, the same as VA1)
- Requires more new rail ROW for high speed track than VA2 and more new rail ROW for freight track than VA1 and VA2

4.14.3.2.2 Downtown Raleigh, NC

The three project alternatives are on common alignment within the CSX S-line ROW on double tracks as they approach downtown Raleigh; refer to map sheets 148.1-150.3 in Appendix Q. The NC1 and NC2 project alternatives continue to follow the S-line through downtown Raleigh towards the Boylan Wye. The NC3 project alternative splits from the S-line to follow the Norfolk Southern NS-line near Capital Boulevard and Wake Forest Road. The NS-line roughly parallels the CSX S-line, approximately 1,000 feet to the west. The alternatives join back together near Jones Street. Between Jones Street and the Boylan Wye, there are differences between the project alternatives in how they maintain freight and passenger connectivity between the NS-line and CSX S-line on the north, through the Boylan Wye, to connect with the North Carolina Railroad (NCRR) to the west, the NCRR to the east, and the NS Fuquay line south. Currently, there is a rail

diamond near the Boylan Avenue bridge, at the western end of the wye, which enables a connection to the NS Fuquay-line south.

Some roads in the heavily developed area of downtown Raleigh cross the S-line and NS-line railroads on bridges or underpasses which are utilized by the project alternatives. However, some of these existing bridge structures do not provide adequate clearance and are proposed to be re-built to the SEHSR design standards. To reduce impacts, and preserve the character of the densely developed downtown core, some existing at-grade crossings are proposed to be closed and consolidated, with traffic diverted to other nearby bridges or underpasses. There are related discussions regarding impacts to Downtown Raleigh in these earlier sections: 4.9 (Visual Environment), 4.11.3 (Neighborhoods and Communities), 4.14.2 (Traffic), and in 4.14.1 (Roads).

4.14.3.2.2.1 NC1 Alternative

The NC1 project alternative utilizes four existing railroad bridges, closes three at-grade crossings (one of these is converted to a pedestrian-only underpass), replaces the existing road bridge at Morgan Street; and provides two new road bridges. This alternative allows for SEHSR service to use the existing Amtrak station at Cabarrus Street, by backing through the rail wye. The distinctive features of this design are:

- New bridge proposed at Jones Street to maintain a link between the growth area of Glenwood South and the rest of the downtown area. The roadway bridge structure would be a substantial new feature in this area.
- Removes the rail diamond near Bolyan Avenue, and replaces with a turnout connection. This means a shorter bridge at Hargett Street, compared to NC2.

4.14.3.2.2.2 NC2 Alternative

The NC2 project alternative is very similar to the NC1 project alternative, except that it maintains the existing freight connection on the west side of the Boylan Wye to the diamond near Boylan Avenue which connects to the NS Fuquay-line south. This alternative utilizes four existing railroad bridges, closes three at-grade crossings (one of these is converted to a pedestrian-only underpass), replaces the existing road bridge at Morgan Street; and provides two new road bridges. This alternative allows for SEHSR service to use the existing Amtrak station at Cabarrus Street, by backing through the rail wye. The distinctive features of this design are:

- New bridge proposed at Jones Street to maintain a link between the growth area of Glenwood South and the rest of the downtown area. The bridge structure would be a substantial new feature in this area.
- Maintains rail diamond near Boylan Avenue, which requires a longer bridge at Hargett Street, to span the configuration of connecting rail lines.

4.14.3.2.2.3 NC3 Alternative

The NC3 project alternative was developed in response to a request made by the City of Raleigh to provide an alternative means of maintaining vehicular and pedestrian connectivity through the downtown area. Because the existing NS line is elevated throughout several blocks of the downtown area, the requirements for bridges and

underpasses are significantly different from NC1 and NC2 between Whitaker Mill Road and Hillsborough Street.

From Peace Street through North Street, the existing NS line is completely grade separated, utilizing a series of single track bridges and earthen fill. The NC3 rail alignment would maintain existing grade separations, by replacing the existing infrastructure with a continuous double track bridge structure. The new continuous bridge structure would be adjacent to the existing NS ROW, on the east side.

At Jones Street (where this alternative re-joins the NC1 and NC2 project alternatives), a closure of the existing at-grade crossing is proposed, rather than the road bridge proposed by the NC1 and NC2 project alternatives.

The NC3 project alternative closes two at-grade crossings, replaces four underpasses with one long double track rail bridge, replaces the road bridge at Morgan Street, and provides a new rail bridge at Wake Forest Road and a new road bridge at Hargett Street. This alternative also allows for SEHSR service to use the existing Amtrak station at Cabarrus Street, by backing through the rail wye. The distinctive features of this design are:

- New double track bridge structure beginning just north of Peace Street, and ending just south of North Street.
- Jones Street would be closed, traffic diverted to nearby bridges or underpasses.
- Removes the rail diamond near Boylan Avenue, and replaces with a turnout connection. This means a shorter bridge at Hargett Street, compared to the NC2 project alternative.

4.14.4 Stations

The five municipalities identified to have high speed rail stops in the Richmond, VA, to Raleigh, NC, SEHSR service area are Richmond, VA; Petersburg, VA; La Crosse, VA; Henderson, NC; and Raleigh, NC. As described in Section 2.2.4, specific station sites will be determined in the future by the municipalities designated to have a stop. This document evaluates impacts related to general station locations only in terms of accessibility to the larger transportation network, as described in Section 3.17. Impacts associated with the future development of these stations will be evaluated in separate environmental documents.

Within each municipality, all rail alternatives are on common alignment at potential station locations, with the exception of Raleigh, NC. In Raleigh, the three alternatives have very slight differences in alignment as they approach the City's potential new station location and into the Bolyan Wye which provides access to the existing Amtrak station.

All rail alternatives accommodate operational requirements of 600 feet to 800 feet of straight alignment for station platforms at each potential stop location, and also allow for flexibility in final station designs by ensuring the ability to meet Americans with Disabilities Act (ADA) standards for platform design. Therefore, there is no difference between alternatives in ability to accommodate potential station locations.

4.14.4.1 Richmond, VA

Main Street Station in Richmond, VA is an existing rail station and the northern terminus of the project (Figure 2-4). All project alternatives are on common alignment at Main Street Station. The station has good connectivity to the local street network and good access to Interstate I-95. There are existing connections with the local public transportation system; the Greater Richmond Transit Company (GRTC).

The City of Richmond is proposing improvements to Main Street Station, which include additional passenger platforms to handle increased trains from SEHSR and the Richmond/Hampton Roads Passenger Rail Project.

4.14.4.2 Petersburg, VA

The four potential station locations in the Petersburg, VA area are Dunlop, Ettrick Station (existing), Washington Street, and Collier. The potential station locations are shown in Figure 2-5 and access is described in Section 3.16. All project alternatives are on common alignment through the Petersburg area.

Ease of access to Interstates I-95 or I-85 is similar for three sites: Dunlop, Washington Street and Collier are each approximately 1.5 miles from an interstate highway exit (either I-85 or I-95). The existing Ettrick Station is furthest from an Interstate exit; a distance of approximately 3 miles. Additionally, access to the Ettrick location requires a more indirect route along the local street network, when compared to the other potential station locations.

None of the potential station locations is adjacent to the City's new transit station (under construction) at the corner of Washington Street and Union Street, however it is presumed that future transit connections are possible at each of the potential SEHSR station locations.

4.14.4.3 La Crosse, VA

The project alternatives are on common alignment in La Crosse, VA, where there is no existing station. The Town will develop plans for the station and conduct the required environmental documentation as appropriate. Accessibility to the local transportation network is one of the factors that the Town will consider in future plans for the proposed station.

There is no public transportation service in La Crosse; therefore connectivity to public transportation cannot be evaluated.

4.14.4.4 Henderson, NC

The project alternatives are on common alignment through Henderson, NC, where there is no existing station. The Town will develop plans for the station and conduct the required environmental documentation as appropriate. Accessibility to the local transportation network is one of the factors that the Town will consider in future plans for the proposed station.

While there is no fixed route transit service in Henderson, there is potential for future connectivity to a SEHSR station by the Kerr Area Rural Transportation System (KARTS), which provides subscription, deviated fixed, and dial-a-ride service throughout the region.

4.14.4.5 Raleigh, NC

The southern terminus for this project is the Boylan Wye, in downtown Raleigh, NC. There is an existing Amtrak Station in Raleigh, which is currently operating at full capacity. The NC1, NC2, and NC3 project alternatives are different as they move through Raleigh and into the Bolyan Wye, which provides access to the existing Amtrak station (Figure 2-6). All three rail alternatives have been designed to serve the existing station, utilizing a backing movement through the Boylan Wye. The backing movement is not an ideal arrangement, as it adds time to the schedule. The existing station has adequate accessibility to the larger transportation network, including connectivity to the services provided by the Capital Area Transit System (CATS).

The City of Raleigh is working on plans for a new multi-modal station, which would serve conventional passenger trains, high speed passenger trains, and potential Triangle Transit commuter trains. Accessibility to the local transportation network will also be considered. The exact location of the station is not finalized, but the platforms would be located between Jones Street and Hillsborough Street. Refer to Section 4.14.3 for more detailed information about how the alternatives would serve a potential new station in downtown Raleigh.

4.15 Utilities

Utility impacts for the SEHSR alternatives vary widely throughout the length of the project. Table 4-78 displays a summary of the projected costs associated with impacts to utility infrastructure, by section. Appendix N provides a breakdown of utility impacts by type (power, telephone, cable television, water, gas, and sewer) for each section.

The greatest estimated costs are in Section AA in Richmond, VA, and are the same for all three alternatives. The highest costs in NC are in Section P, and are the same for each alternative.

Throughout the length of the project, there are only two sections where the costs associated with utility impacts vary significantly by alternative. Both sections are In Virginia, and both show a difference between alternatives that is greater than $500,000. In Section D, the VA1 and VA3 project alternatives are on common alignment, and are projected to have costs of $1,283,500. The VA2 project alternative is projected to have a lower cost of $655,600. In Section J, the VA1 and VA3 project alternatives are on common alignment, and have a projected cost of $412,150. The VA2 project alternative is projected to have a higher cost of $996,550.

Table 4-78 Utility Cost Impacts by Section (in dollars)			
Section	**VA1 Alternative**	**VA2 Alternative**	**VA3 Alternative**
AA	$20,469,250	$20,469,250	$20,469,250
BB	$3,874,350	$3,874,350	$3,874,350
CC	$4,486,800	$4,486,800	$4,486,800
DD	$2,591,500	$2,406,500	$2,421,500
A	$415,675	$415,675	$415,675
B	$264,000	$295,200	$264,000
C	$1,874,650	$1,874,650	$1,874,650
D	$1,283,500	$655,600	$1,283,500
E	$765,900	$765,900	$765,900
F	$409,925	$409,925	$409,925
G	$191,700	$160,200	$191,700
H	$727,900	$714,700	$727,900
I	$990,950	$921,000	$990,950
J	$412,150	$996,550	$412,150
K	$397,900	$397,900	$397,900
L (VA)	$459,200	$463,400	$459,200
Section	**NC1 Alternative**	**NC2 Alternative**	**NC3 Alternative**
L (NC)	$543,597	$879,913	$543,597
M	$1,343,111	$1,343,111	$1,343,111
N	$505,185	$463,977	$505,185
O	$204,380	$204,380	$189,972
P	$2,683,653	$2,683,653	$2,683,653

Table 4-78 Utility Cost Impacts by Section (in dollars)			
Section	**NC1 Alternative**	**NC2 Alternative**	**NC3 Alternative**
Q	$681,550	$675,351	$622,207
R	$21,882	$21,882	$21,882
S	$1,054,977	1,019,474	$1,054,977
T	$906,535	$337,610	$906,535
U	$2,114,507	$2,114,507	$2,114,507
V	$2,644,635	$2,644,635	$2,447,020

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

4.16 Safety and Security

As described in Section 2.2.1.2, an overarching design principal for the SEHSR project alternatives is consolidation and grade separation of all railroad-roadway crossings. Safety is the primary reason for this design approach. By building road bridges or underpasses, the public is provided the assurance of absolute automobile/truck – train collision avoidance. There is no difference between alternatives in terms of crossing safety, since none of the alternatives contain at-grade crossings. Discussion and detailed information about proposed treatments for existing at-grade crossings (both public and private), can be found in Appendix F and are shown on the designs in Appendix Q.

The ability of pedestrians to move safely across the high speed rail corridor is another important safety consideration. All proposed bridge and underpass designs include sidewalks to facilitate safe pedestrian access. In addition, seven new pedestrian-only bridges/underpasses are proposed throughout the project, to provide increased pedestrian access in certain downtown areas. In Virginia, one existing pedestrian only bridge, and one existing pedestrian only underpass would also be retained (there are no existing pedestrian-only bridges or underpasses in North Carolina).

The number and location of the pedestrian-only bridges/underpasses is the same for all project alternatives in every section except for downtown Raleigh, NC (Section V). In downtown Raleigh, the NC1 and NC2 project alternatives propose a pedestrian underpass at Harrington Street; the NC3 project alternative is on different alignment and is not crossed by Harrington Street.

Fencing that would direct pedestrians to bridges/underpasses will be proposed for some locations in urbanized areas as part of the SEHSR alternative designs. Negotiations between the DRPT or NCDOT and the affected communities would take place prior to final design, to determine the location, style, and height of the proposed fencing. Community cohesiveness and aesthetics would be balanced with increased safety in a cooperative fashion.

Section 3.19 provided a discussion about rail line security in the current security climate. It was noted that the entire corridor is accessible from many miles of arterial and secondary roadways where no security measures are practicable. In urban locations where fencing is determined to be appropriate for pedestrian safety, security would also be enhanced.

4.17 Indirect and Cumulative Effects

The purpose of this section is to examine the indirect and cumulative effects (ICEs) of the proposed SEHSR Tier II Richmond, VA, to Raleigh, NC, project. NEPA, as amended, requires the assessment of direct, indirect, and cumulative impacts as part of the project decision-making process. The CEQ guidelines define direct, indirect, and cumulative impacts as follows:

- Direct effects are caused by the action and occur at the same time and place.

- Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

- Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The implementation of the SEHSR would have varying degrees of indirect and cumulative effects at national, regional, and local levels. Contributing factors to indirect and cumulative effects are other major planned actions and the project's compatibility with future land use and transportation plans.

4.17.1 National Effects

As one of the ten federally-designated high speed rail corridors, the SEHSR project will play an important role in modernizing America's transportation system. A national high speed rail network will help fulfill the strategic transportation goals identified in the American Recovery and Reinvestment Act of 2009 and the Passenger Rail Investment and Improvement Act of 2008. Cumulatively, regardless of the Build Alternative Alignment, the SEHSR combined with other HSR projects would help achieve the following national transportation goals:

4.17.1.1 Safe and Efficient Transportation Choices

Provide safe and efficient transportation choices by promoting the safest possible movement of goods and people and optimizing the use of existing and new transportation infrastructure.

4.17.1.2 Foundation for Economic Competitiveness

Build a foundation for economic competitiveness by laying the groundwork for near-term and ongoing economic growth by facilitating efficient movement of people and goods, while renewing critical domestic manufacturing and supply industries. America's transportation system is the lifeblood of the economy. Providing a robust rail network can help serve the needs of national and regional commerce in a cost-effective, resource-efficient manner, by offering travelers and freight convenient access to economic centers.

4.17.1.3 Energy Efficiency and Environmental Quality

Promote energy efficiency and environmental quality by reinforcing efforts to foster energy independence and renewable energy, and reduce pollutants and greenhouse gas emissions. Rail is already among the cleanest and most energy-efficient of the passenger transportation modes.

Findings from the National Surface Transportation Policy and Revenue Study Commission indicate that the expansion of intercity passenger rail would improve the nation's transportation system by reducing congestion on other modes and offering mobility options to travelers. As noted above, it would also address important national goals related to climate change and energy use. The following summarizes the benefits associated with an expanded intercity passenger rail service.

- Relieve highway and airway congestion;
- Improve public safety and air quality;
- Reduce fuel consumption per passenger mile, potentially reducing the nation's dependence on imported oil;
- Help mitigate the negative impacts of short or prolonged energy supply disruptions and energy price increases;
- Provide land use and travel pattern changes that could improve air and water quality, as well as aesthetic appeal;
- Provide mobility and economic development opportunities to smaller communities with little or no other access to public transport;
- Assure a redundant transportation mode for use in emergency situations; and
- Provide a mobility option for individuals who do not drive or fly.

4.17.2 Regional Effects

As stated in the Tier I EIS, the proposed SEHSR program would enhance the existing transportation network in the Washington, DC, to Charlotte, NC, corridor, providing many indirect benefits. It would link cities and major metropolitan areas where highway and airline travel volumes are the greatest, thereby providing a travel alternative that will help ease congestion on the existing highway and airway systems. The proposed SEHSR program would offer an alternative mode of transportation between Virginia and North Carolina.

The increased speeds and frequencies proposed for the SEHSR service allow people to make trips that they otherwise would not make, increasing capacity to the overall transportation network and the ability for people to travel. The auto trip diversions for any of the proposed alignments would aid in improving air quality through the study area. The extension of HSR service into states to the south would allow both Virginia and North

Carolina to be more accessible by rail to tourists and business travelers arriving from the north and south.

The SEHSR program would provide access to rural areas and communities through links with additional intercity passenger rail service.

Virginia and North Carolina have both evaluated the feasibility of adding passenger train service and routes to eastern and western portions of their respective states. The proposed SEHSR program would serve as the spine to these added routes, allowing passengers to take conventional service to the SEHSR service and connect to points in the Northeast, Southeast, and beyond. These new passenger train services and routes in Virginia and North Carolina would provide linkages to the SEHSR service from parts of Virginia and North Carolina not currently served by rail. Passenger rail linkages would be provided to existing and planned commuter rail services at multimodal stations, allowing for connections to suburbs and airports in Washington, DC, Richmond, Raleigh-Durham-Chapel Hill (the Triangle), and Charlotte.

4.17.3 Local Effects

As reported in the SEHSR Tier I EIS, implementation of any SEHSR project alternative is not expected to substantially alter development patterns in the project study area except in the vicinity of the rail stations in Richmond (Main Street Station) and the yet-to-be-determined locations of Petersburg, VA, La Crosse, VA, Henderson, NC, and Raleigh, NC. The SEHSR Tier I ROD states that future development will occur primarily around these stations, with commensurate levels of noise and congestion associated with the increased use of the stations, as well as with secondary commercial and residential development that may be drawn to the station areas. The chief potential negative impact would be noise and vibration caused by the reintroduction of service along the S-line in Virginia where there is presently no rail service.

It is possible that the implementation of SEHSR service could result in undeveloped land in the vicinity of stations developing at a faster pace than without the SEHSR program. This would most likely be the case at the more rural rail station in La Crosse, VA, given that the remaining station locations are in urbanized areas with limited vacant land availability. New or retrofitted passenger stations in Richmond, VA; Petersburg, VA; Henderson, NC; and Raleigh, NC, could assist in urban redevelopment efforts. This could help focus development around the existing infrastructure and minimize the use of undeveloped lands, and thus could help to limit growth of urban sprawl. In areas where no current rail service exists (e.g., the S-line from Petersburg, VA, to Norlina, NC), there may be secondary industrial development because of the new availability of freight access. This could also include expansion of infrastructure and supporting services required by industrial development (e.g., roads, water/sewer, food service). Secondary impacts to the natural environment are not anticipated.

The secondary impacts of increased traffic from the new stations and the traffic diverted as a result of grade-crossing consolidations are expected to be minimal since traffic volumes on surrounding streets are low and can absorb added traffic without reducing the existing level of service.

The greatest potential for development, economic activity, and job creation would likely occur within a three to five mile radius of the potential station areas with the highest

ridership and the greatest market conditions. This would likely occur in Richmond, VA, Petersburg, VA, and Raleigh, NC, given their existing urban development, multi-modal transportation network, and diversified economies. Because this potential is contingent upon many factors such as current financial and real estate market conditions, and local land use and zoning regulations, there are no existing models that can predict secondary development or economic activity on a small geographic scale. The potential for secondary development will be more specifically assessed when a preferred alignment is selected and all station locations are identified. This activity will take place during each state and locality's evaluation of the individual stations, a step that will come after the Record of Decision for this Tier II EIS. At best, this potential was assessed in the Tier I EIS by estimating construction and operations jobs on a gross and aggregate scale based upon capital and operating cost estimates (refer to Economic Impacts discussion in this chapter).

The overall air quality effect is beneficial based on the number of trips diverted from automobiles. This benefit would increase proportionally if the cumulative effect of improvements results in the rail mode capturing more of the corridor trips than currently modeled. The net energy use per passenger mile is substantially less for rail than either air or auto, giving a net positive energy benefit. There is a net positive safety benefit because of the safety advantages of train versus auto travel in the corridor, along with the net positive effect of increased mobility choices for all populations, including minority and low income. These net positive impacts would grow if the cumulative effect of the improvements results in higher use of the rail transportation system. Cumulative impacts appear to be similar along all project alternatives.

4.17.4 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 effects of other planned roadway improvements were evaluated and documented in the SEHSR Draft Traffic Review (Gibson Engineers, 2009). 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 roadway improvements by way of redirecting a portion of roadway users to SEHSR use, thereby reducing roadway congestion and improving air quality. Other planned actions in the study area are identified below. As with planned roadway improvements, these separate, planned projects would have a positive, synergistic effect with the SEHSR.

4.17.4.1 SEHSR: I-95 Corridor

The Commonwealth of Virginia Statewide Rail Plan established the I-95 Corridor as a part of the SEHSR Corridor. The I-95 Corridor runs from Washington, DC, to Richmond, VA, and includes an extension to Hampton Roads, VA. The I-95 corridor was identified as a top priority corridor for passenger rail improvements in Virginia, in the state's request for $1.57 billion in federal funding under the American Recovery and Reinvestment Act of 2009 (ARRA). Key projects within the corridor include:

- Washington, DC/Richmond Rail Improvement - DRPT has recommended a ten-year $370 million rail improvement program along this corridor that includes a proposal for a parallel, third main line track over most of the corridor and identifies other track and

signal improvements to increase railroad capacity and maximum speeds for both freight and passenger rail operations.

- Richmond/Hampton Roads Passenger Rail Project – DRPT is investigating improved passenger rail service between Richmond and Hampton Roads to ultimately connect to the Southeast, Northeast, and Mid-Atlantic regions as an extension of the SEHSR. The project area generally follows the Richmond to Hampton Roads Corridor and includes two routes, the existing Amtrak route from Richmond to Williamsburg to Newport News via the CSX route and another route south of the James River along the Norfolk Southern route between Petersburg and Norfolk.

- Virginia Railway Express Cherry Hill Station and Third Track – Virginia Railway Express (VRE) provides commuter rail service from the Northern Virginia suburbs to Alexandria, Crystal City, and downtown Washington, DC. DRPT is partnering with VRE to fund the evaluation of potential enhancements to improve VRE service. Studies are currently underway to evaluate potential improvements to the Fredericksburg VRE line, including construction of a third track in the CSX ROW, design and construction of a new VRE station and slope stabilization at Cherry Hill, a public commuter parking structure to serve the new Cherry Hill station, and a new highway grade separation over the CSX line.

4.17.4.2 SEHSR: Raleigh, NC to Charlotte, NC

The NCDOT's Statewide Multimodal Transportation Plan identifies the Raleigh to Charlotte corridor as one of its top passenger rail priorities. NCDOT has completed extensive planning and financial analyses for the incremental development of this important section of the SEHSR corridor, including expanding existing capacity through additional trackage, straightening curves to improve travel times, and grade-separations to improve safety. NCDOT has applied for more than $5 billion in federal funding through the ARRA program to complete many of these planned projects.

4.17.4.3 Fort Lee Military Reservation: BRAC Expansion

As a part of the US Department of Defense's Base Realignment and Closure (BRAC) activities, Fort Lee is on the receiving end of many base consolidations and expansion. Fort Lee serves as the focal point for Army Logistics and is approximately four to six miles east of Petersburg. The expansion plans to be implemented by 2011 include establishing a Sustainment Center of Excellence, a Joint Center for Consolidated Transportation Management Training, and a Joint Center of Excellence for Culinary Training, as well as relocating all Defense Commissary Agency and relocating Mobilization Processing Functions to Fort Lee. At the conclusion of the BRAC process, more than seven million square feet of buildings will have been constructed on Fort Lee. It is estimated that approximately 64 percent of the population growth in the areas surrounding Fort Lee will be the result of the Fort Lee expansion. Fort Lee is the Crater District's economic engine. BRAC expansion will result in an almost doubling of its average daily student population from 6,000 to 11,000. Over 8,000 new military, civilian, and contract employees, along with their families, will be moving to the Fort Lee area. Out of town travelers would benefit from the ease of access to Fort Lee via high speed rail, regardless of which Petersburg area station is selected.

4.17.4.4 Heartland Corridor Rail Project & National Gateway Project

Two major freight rail improvement projects are underway in the Crater Planning District region. Norfolk Southern's Heartland Corridor Rail Project is to be complete in 2010 and will extend from Columbus, OH, through Petersburg, VA, and terminate in Norfolk, VA. It will significantly enhance the Crater Planning District area's transportation and distribution capabilities by shortening rail shipments from Norfolk to the Midwest.

The CSX's National Gateway Project is a multi-state project extending from North Carolina to Ohio and includes a spur that connects to the Ports of Hampton Roads. The Heartland Corridor and the National Gateway Projects intersect at Collier Yard in the City of Petersburg, making the Crater Planning District region well suited to serve as an East Coast hub for freight distribution.

4.17.4.5 City of Richmond, VA: Main Street Station Improvements

The restoration and construction of Richmond's Main Street Station into a multimodal transportation center is one of the Richmond Area MPO's Priority Projects. As a multimodal center, Main Street Station will serve not only the SEHSR but Amtrak trains, GRTC local buses, airport shuttles, taxis, and tour buses, along with bicycle and pedestrian access, at one centralized location in downtown Richmond.

4.17.4.6 City of Henderson, NC: Downtown Revitalization

One of the primary goals of the City of Henderson is to promote downtown revitalization projects, the major three of which include the restoration of the Historic Downtown District, the Embassy Center and Embassy Cultural Center, and the Recreation, Economic Development, Education, and Family (REEF) Project. As noted in the City of Henderson's website, revitalizing the "Historic Downtown" is an ongoing process with many storefront shops restoring their original construction. The Henderson-Vance Downtown Development Commission provided grants for improving facades. The city, local property owners, and the Henderson-Vance Downtown Development Commission received two $1,000,000 grants from the U.S. Department of Housing and Urban Development to add 30 apartments above store front buildings on Garnett Street, the main street in Downtown.

The Embassy Center is a ten-acre, two city block site in historic Downtown Henderson. Within it are the Embassy Center, a 25,000 square foot Police Headquarters, and a large garden area and green spaces available for community festivals and outdoor events. The Embassy Cultural Center will host a 35,000 square foot Performing Arts Theater. A 40,000 square foot Public Library was completed in 2006. Adjoining the two is a 5,000 square foot open gallery space used for a variety of public functions.

The REEF Project is a combined effort by the Gateway Corporate Development Commission, the Henderson-Vance Downtown Development Commission, and the North Carolina Community Development Initiative. The project involves renovating an 86,000 square foot tobacco warehouse. The new facility will house a new Community & Business Center, including a Boys & Girls Club center, an off-campus facility for Vance-Granville Community College, 5 Star child care, an urgent care/medical clinic, various retail spaces, cultural arts and farmers market spaces, and other spaces to be decided on in the future.

4.17.4.7 Raleigh Commuter Rail Service

Triangle Transit, the Capital Area MPO, and the Durham-Chapel Hill-Carrboro MPO adopted the Regional Rail Plan in the mid-1990s. The plan includes regional rail service, expanded bus service, shuttles, park-and-ride facilities, and enhanced transit access for pedestrians and bicycles. Triangle Transit will provide regional rail service to communities in the Capital Area MPO and the Durham-Chapel Hill-Carrboro MPO. The system will operate primarily on new tracks that Triangle Transit is building within the existing railroad corridor. Local, regional, and university bus systems will serve the rail stations, and shuttles will transport passengers to Raleigh Durham International Airport and around Research Triangle Park. Twelve stations are proposed for the regional rail system with five of them being located in Raleigh. Four additional future stations are planned, three of which have been planned for areas north of the Government Center station. The completed project will be 28 miles long, connecting 9th Street in Durham to the Government Center in Raleigh. Triangle Transit will construct a new double-track system to be used exclusively by its rail trains in the existing NC Railroad and CSX rail corridors.

4.18 Relationship between Short-Term Impacts and Long-Term Benefits

This section addresses in general terms the proposed SEHSR project's relationship between local short-term impacts/use of resources and the maintenance and enhancement of long-term productivity. Each of the three project alternatives is based upon sound planning for local, regional, and statewide transportation needs within the context of present and possible future traffic requirements and land use patterns. Coupled with the environmentally sensitive design of the proposed project and BMPs, this helps to ensure that the short-term use of resources related to construction will be out-weighed by the long-term impacts of implementing the proposed SEHSR project.

The most disruptive local short-term impacts associated with the proposed project would occur during land acquisition and project construction. The short-term use of the environment and of human, socioeconomic, cultural, and natural resources contributes to the long-term productivity of the study area. Most short-term construction-related impacts would occur within or in close proximity to the proposed ROW.

Existing homes, farms, and businesses within the selected alternative's ROW would be displaced. However, adequate replacement housing, land, and space are available for homeowners, tenants, and business owners within the study area. Improved access within the study area would contribute to long-term residential and business growth.

Construction activities would create short-term air quality impacts, such as dust due to earthwork, road and rail improvements, and exhaust from construction vehicles. Short-term noise impacts would be unavoidable due to use of heavy equipment. Air and noise abatement measures, discussed in Section 4.6 and Section 4.7, would be used to minimize these short-term impacts during construction.

Short-term visual impacts would occur in the vicinity of the construction corridor. Mitigation measures, such as reducing slope cuts outside necessary road widths, reducing vegetation removal and leaving native vegetation screens in place, and minimizing the alteration of scenic viewsheds, would be used to reduce long-term visual resource impacts.

Implementation of the BMPs for the protection of surface waters would minimize potential water quality impacts.

A short-term impact from construction would be the removal of biotic communities and wildlife within the proposed ROW and construction staging areas. However, recovery rates of local wildlife populations are expected to be relatively fast and no effect on long-term productivity is expected.

Overall, the three project alternatives would have similar short-term impacts relative to the long-term benefits because they share a common alignment through much of the SEHSR corridor. The short-term impacts would be offset by the benefits of high speed rail between Richmond, VA, and Raleigh, NC, and the ultimate extension of the SEHSR network along the East Coast. In addition, the elimination of at-grade rail crossings and construction of grade-separated crossings would greatly improve the safety of rail crossings throughout the corridor. Construction-related activities would be localized and temporary. Short-term gains to the local economy should be recognized as a result of hiring local firms and labor, and purchasing local services and supplies to construct the proposed project. Once completed, the benefits of long-term productivity in terms of improved mobility and safety would be realized. The implementation of the SEHSR program would enhance the existing transportation network between Richmond, VA, and Raleigh, NC, and provide a viable travel alternative for residents and users. This is consistent with the purpose of the proposed SEHSR project. Based upon the significant contribution to the long-term objectives of regional and local plans for development, the proposed SEHSR program is consistent with the maintenance and enhancement of the long term productivity at the local, regional, state, and national levels.

4.19 Irreversible and Irretrievable Commitment of Resources

Construction of any of the proposed build alternatives would require certain irreversible and irretrievable commitments of natural resources, manpower, materials, and fiscal resources. Because most of the project will be constructed within existing railroad ROW, land acquisition for construction of the proposed SEHSR project will be minimized. However, there will be an irreversible conversion of land to a transportation use in areas of new alignment and in areas where the existing road network will be modified to accommodate rail crossing closures and consolidations, and to avoid historic resources. If a greater need for the use of the land was to arise or if the transportation facility were no longer needed, it could be converted to another use. At present there is no reason to believe such a conversion would be necessary or desirable.

The acquisition of new right-of way and new construction within the existing ROW may result in both short-term and long-term losses and alterations to the natural resources in the area. Upland and aquatic biotic communities, as well as agricultural land may be committed to rail service where new ROW is required. The most apparent impact may be the loss of aquatic or terrestrial habitat productivity, and therefore, a decline in wildlife abundance in the area, as a result of habitat destruction. Increased noise associated with the project may be intolerable to some wildlife species. Forested areas may be cleared in some locations and wetlands and other surface waters may be filled to accommodate new bridges and underpasses. Riprap may be placed along stream banks at bridge crossings, reducing habitat within riparian zone. After construction, some habitat types may be restored within the construction limits, although their value to wildlife is unlikely to equate to that which was lost. If wetlands are filled for new construction, mitigation of impacts will likely involve restoration of degraded wetlands within

the same watershed. In the long-term, this will offset the loss of wetland habitats within the project construction limits. The commitment of natural resources within existing and additional ROW is a permanent loss of productive wildlife habitat.

Fossil fuels, labor, and construction materials would be expended in the fabrication and preparation of construction materials, as well as during the construction of the chosen build alternative. While materials are generally not retrievable, they are not in short supply and their use would not have an adverse effect on the continued availability of resources. It should be noted that the steel rails required for SEHSR operations could be recycled should an alternate use of the property be selected in the future. Any construction would also require a substantial one-time expenditure of both state and federal funds, which are not retrievable and could be used on other projects within the local community or in other parts of the country.

There are negligible differences between the three build alternatives with regards to the irreversible and irretrievable commitment of resources. Specific natural resource impacts have been previously detailed in this chapter. Where differences in length, fill, cost, or construction material needs exist for the build alternatives through specific sections, when reviewed in the overall context of the project and taken in total, they are proportionately small.