WV 9: Berkeley Springs to Martinsburg, WV Planning and Environmental Linkages Study Report

in Morgan and Berkeley Counties, WV

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Michael Baker INTERNATIONAL

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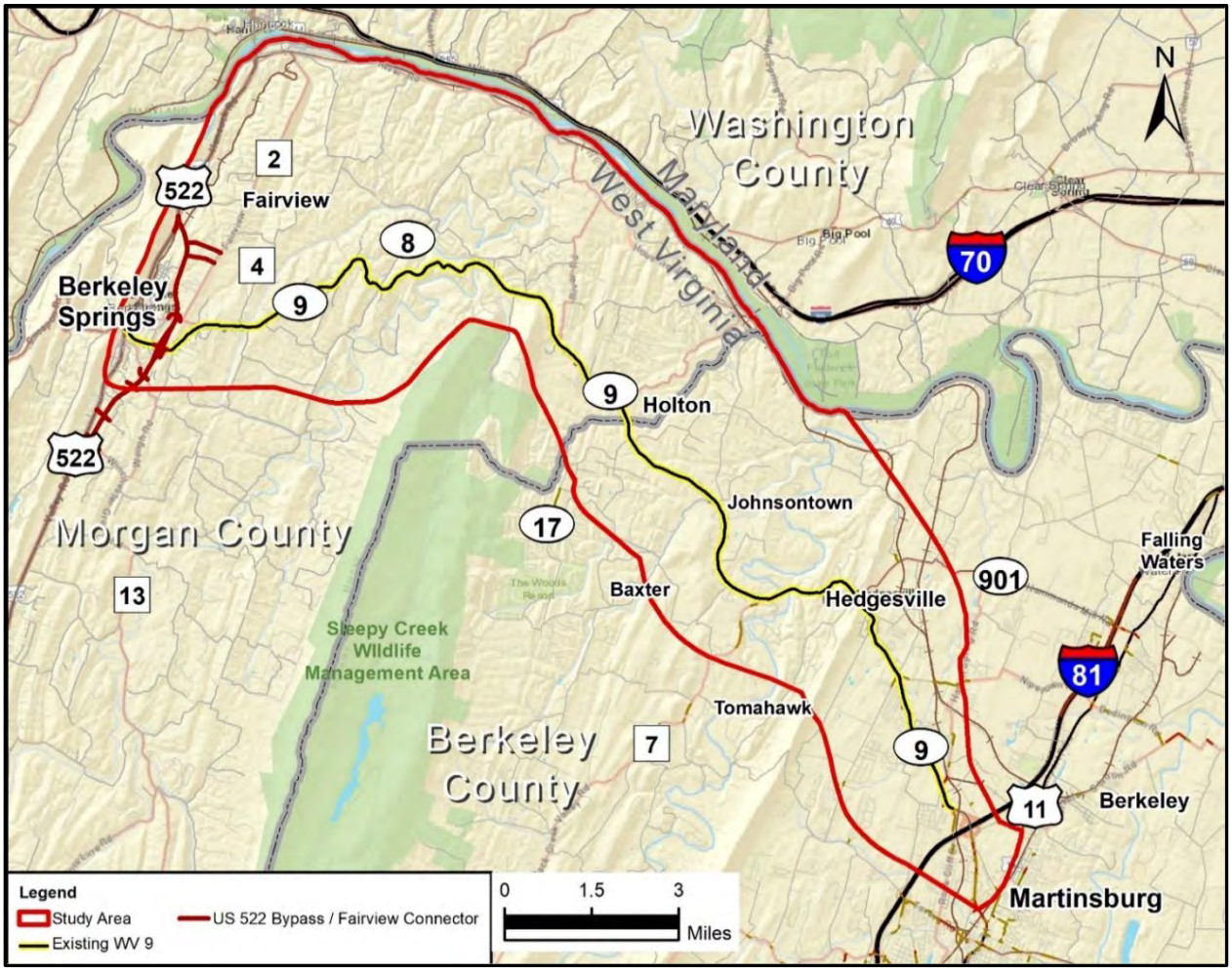
1. Project Introduction

The West Virginia Department of Transportation, Division of Highways, (WVDOH) Planning Division is conducting this Planning and Environmental Linkage (PEL) Study to improve the east-west transportation link between Berkeley Springs and Martinsburg, West Virginia. The PEL study will identify transportation needs within the corridor and conduct a preliminary assessment of relocation alternatives as well as upgrading existing WV 9. The Study Area to be evaluated is shown on **Figure 1-1 WV 9 PEL Study Area**.

The PEL study will identify transportation needs within the corridor and conduct a preliminary assessment of relocation alternatives as well as upgrading existing WV 9.

WV 9 is the primary east-west route in the eastern panhandle of West Virginia that provides access to Virginia on the east and the main body of West Virginia to the southwest. WV 9 intersects Interstate 81, US 11, US 522 and US 340, the major north-south roadways in the eastern panhandle, affording entry to Maryland and Pennsylvania to the north and to Virginia to the south. It connects the towns of Berkeley Springs and Charles Town with Martinsburg.

Figure 1-1: WV 9 PEL Study Area



Project History

The WV 9 corridor between Berkeley Springs and Martinsburg has been under consideration for improvements for over 40 years. The ***1978 Summary Report on the Eastern Panhandle Area Transportation Study*** identified the lack of east-west service as the primary corridor deficiency in the system. This study recommended realignment / reconstruction of two lanes plus truck lanes from Berkeley Springs to Hedgesville, with a four-lane realignment from Hedgesville to I-81. This recommendation was reiterated in the ***1990 Berkeley Comprehensive Development Plan***, which projected that the corridor would experience poor Levels of Service (LOS) by the Year 2000. LOS is the most common measure used by traffic engineers and planners to describe the quality of traffic flow and congestion and is based on traffic volumes, truck percentages, number of lanes, and other characteristics of the roadway.

In December 1993, WVDOH released the ***WV 9 Feasibility / Location Study***. This study developed concepts for new Build corridors between Berkeley Springs and Martinsburg. All of the alignments were designed to avoid the Sleepy Creek Wildlife Management Area. These corridors became the basis for subsequent work in the Study Area.

A ***Draft Corridor Environmental Impact Statement (DEIS)*** was prepared and later approved by the Federal Highway Administration (FHWA) on September 17, 1996. The DEIS study was a two-tiered process. Tier 1, which was completed with the selection of a preferred corridor in 1998, evaluated 2,000 foot-wide corridors for a new four-lane roadway (**Figure 1-2 DEIS Study Corridors**), improvements to existing WV 9 and a combination of the two. The Tier 1 study recommended a preferred 2,000 foot-wide corridor to carry forward into Tier 2. Due to concerns that had been expressed about environmental impacts during the corridor selection process and a lack of funding to advance the project, the DEIS did not advance into Tier 2, which would have evaluated and selected a preferred alignment within the Preferred Corridor.

The DEIS documented the Purpose and Need for improvements in the corridor based on:

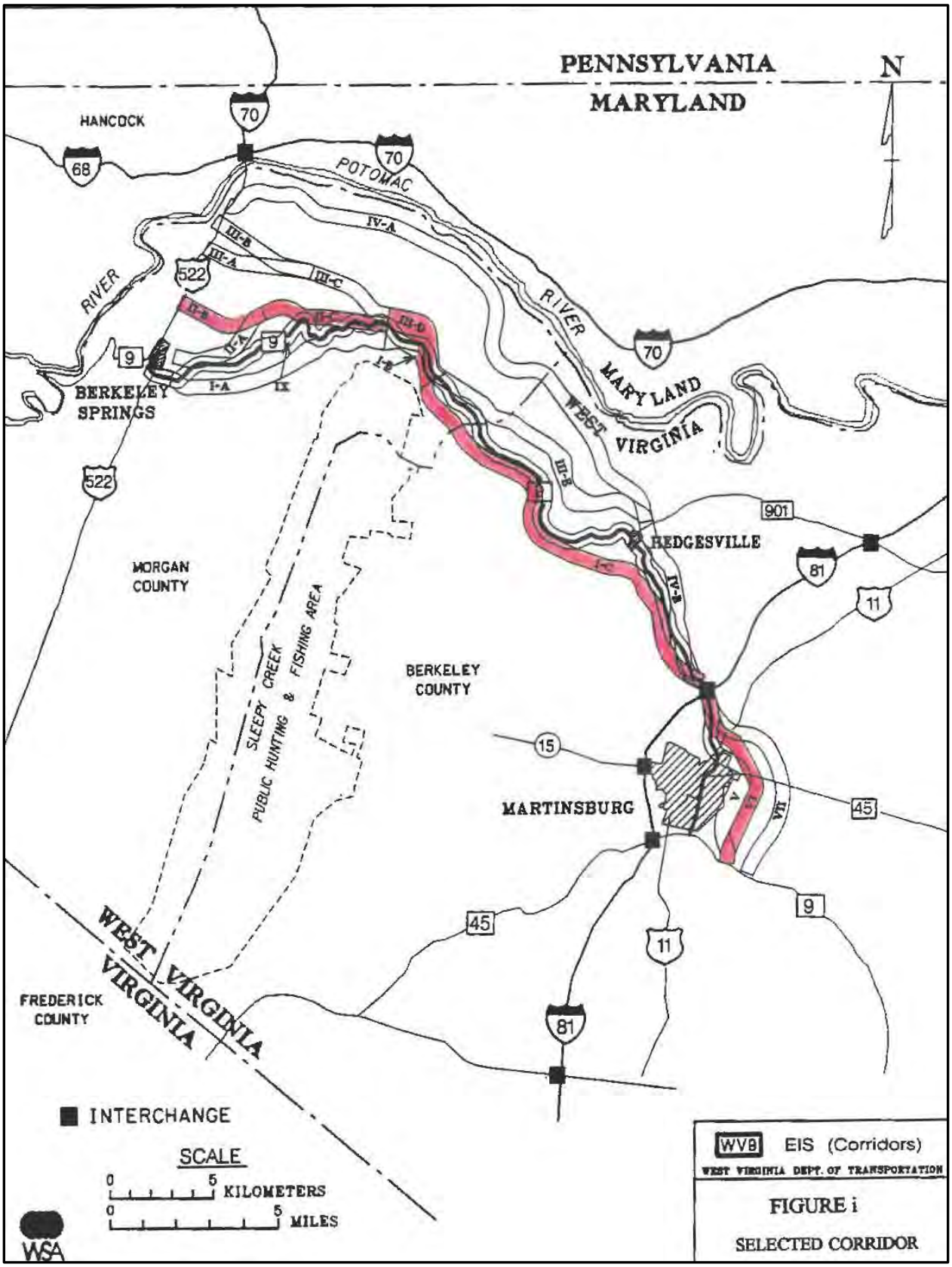
Capacity

Traffic analyses for Year 1993 and projected for Year 2013 showed Level of Service (LOS) ranging between C and E in 1993, deteriorating mostly to LOS F by 2013. LOS is a qualitative measure used to assess the level of traffic congestion and is commonly used in traffic engineering studies. LOS values range from an "A" to and "F" scale, with "A" being the best and "F" being the worst. For a rural highway, LOS B is considered to be desirable, and LOS E and F are considered to be unacceptable. Thus, the corridor was already operating at a less than desirable level and was forecast to become totally unacceptable by 2013.

Safety

The annual number of crashes in the corridor was 20% higher than the statewide average for similar roadways. The fatality rate was double the statewide average in the Morgan County section. Lack of turning lanes and poor geometry were cited as likely causes of these high crash rates.

Figure 1-2: DEIS Study Corridors



Highway System Linkage

WV 9 is the primary east-west roadway in the region and provides poor connectivity to the bounding roadway network including I-68/I-70, I-81, and US 522. It is part of the federally funded National Highway System (NHS) and is identified as a component of the designated National Freight Network (NFN) in the ***2018 West Virginia State Freight Plan.*** The bounding roadways are all significant regional and national corridors and are currently either multi-lane divided interstates or, in the case of US 522, is in the process of being upgraded.

The DEIS corridors were evaluated for project costs, user costs, and environmental impacts. Throughout the DEIS process, a series of public meetings occurred between October 1992 and October 1996. Public hearings were held November 6, 1996 and November 7, 1996.

Tier 1 of the EIS process concluded with the development of the ***Corridor Selection Report (May 1998).*** The corridor selection report considered three factors:

- Which corridor best meets the stated transportation needs
- Which corridor best addresses public comments and concerns
- Which corridor minimizes environmental impacts

The report evaluated the Build Corridors (all new four lane roads), an improved existing alignment (two lanes), lower cost Transportation System Management (TSM) actions, Transit, and No Build alternatives. The TSM, Transit, and No Build Alternatives were determined as not meeting the transportation need.

Public comments generally favored the southern Build alignments. Northern Corridor IV was seen as serving Maryland more than West Virginia. Some commenters favored improving the existing alignment. Environmental and socioeconomic impacts varied among the corridors.

Ultimately, combinations of the three southern corridors were compared to the northern corridor and the improved WV 9 alternative. The detailed comparison process yielded the selection of Corridor IIBc as the Preferred Corridor, shown in red on **Figure 1-2 DEIS Study Corridors**. The portion of the corridor east of I-81 around Martinsburg was later dropped from consideration due to the advancement of another project in Martinsburg.

The project remained dormant into the early 2000's but continued to be identified in statewide and regional transportation plans. In the ***West Virginia Multimodal Statewide Transportation Plan (2010),*** a WV 9 four lane realignment from CR 7 west of Hedgesville to CR 1 near I-81 was identified as one of the Top 20 Benefit-to-Cost rated projects in the state. This 2010 plan is currently being updated. The ***Berkeley County Comprehensive Plan Update (2016)*** noted that improvements to WV 9 have been held up primarily due to concerns about impacts to natural and historic resources. The plan identified realignment of WV 9 West as one of eight projects in the 2026 priority network and shows the WV 9 Corridor as a Growth Area on the Growth Management Map.

More recently, the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (***HEPMPO) Regional Bicycle Plan (2016)*** identifies "WV 9 Upgrades" as requiring further study and makes reference

to the ***Direction 2045 – HEPMPO Long Range Transportation Plan (2018)*** which was under development at that point. This 2018 plan, which includes Berkeley and Jefferson Counties, identified WV 9 as "congested" between Hedgesville and WV 45 based on GPS travel time data, which was also supported through a web based public survey. The 2045 travel model forecasted significant travel and congestion growth on this segment. WV 9 at Priscilla Street in Hedgesville was identified as one of 7 high crash locations in Berkeley and Jefferson Counties. No WV 9 projects are indicated on the "Existing Plus Committed" network of projects anticipated to be under construction by end of 2022, but a short segment of WV 9 west of its I-81 interchange to CR 1 is recommended for widening to 6 lanes in the 2023 to 2030 phase of the "Fiscally Constrained Network." In addition, a new four lane alignment is recommended from Morgan County to CR 1 on the "Unconstrained (Vision) Projects" for which there is not identified funding at this time.

A ***WV 9 Road Safety Audit (2018)***[1] conducted by HEPMPO covered 0.3 miles of WV 9 through Johnsontown in Berkeley County. The audit included a variety of recommendations for signing, pavement markings, shoulder improvements, turn lanes and roadway reprofiling through the segment. The ***HEPMPO Regional Traffic Safety Study (2019)***[2] identified Welltown Rd to I-81 and Postal Service Rd to Ben Speck Rd in Hedgesville as being high crash number and high fatality / injury count corridors along WV 9. WV 9 in Johnsontown was identified as having a high fatality / injury rate, and WV 9 at Rock Cliff Drive was identified as a high crash count intersection.

WVDOH conducted a ***WV 9 Roadway Departure Assessment (2017)*** in Morgan County and is currently conducting a similar roadway departure study along WV 9 in Berkeley County. The ***WV 9 Roadway Departure Assessment (2017)*** identified several low cost improvements to enhance traffic safety and prevent lane departures along WV 9 including centerline rumble strips, signage, guardrail and removing fixed objects. Additionally, the study recommends a new 4-lane alignment of WV 9 between MP 26.0-37.0 to improve safety given the existing geometry, traffic volume and crash history along this section of WV 9.

WVDOH prepared the ***West Virginia State Freight Plan*** in 2018. WV 9 was identified as being part of the WV Highway Freight Network and having poor freight travel time reliability. WV 9 widening from Morgan County to near I-81 was identified as a "Candidate Freight Project" in the Plan recommendations.

Project Status

In the ***Direction 2045 – HEPMPO Long Range Transportation Plan (2018)***[3]***,*** this current PEL Study was recommended as the first step in re-starting the project development process for the WV 9 Corridor.

[1] WV 9 Road Safety Audit (2018): https://c666713d-dd04-4e6d-b967-64f6e43533a8.filesusr.com/ugd/116f69_e319696671fd49a7aa6b439ae882aef1.pdf
[2] HEPMPO Regional Traffic Safety Study (2019): https://c666713d-dd04-4e6d-b967-64f6e43533a8.filesusr.com/ugd/116f69_c625bf3f64c84ba7a463391b2bb57dea.pdf
[3] HEPMPO Long Range Transportation Plan: https://www.hepmpo.net/documents

During the most recent legislative session, there was legislation proposed to make this a priority project. In place of the legislation WVDOH was asked to start this PEL Study.

The Hedgesville High School Bridge and ADA curb ramps in the Town of Hedgesville are listed in the ***HEPMPO 2021 to 2024 Transportation Improvement Program (TIP),*** and two large resurfacing projects are being added along WV 9. There are currently no other WV 9 projects identified in the ***WVDOH 2021–2024 Statewide Transportation Improvement Program (STIP).***

2. Introduction to Planning and Environmental Linkage

The objective of this PEL study is to identify planning considerations and environmental features in the Study Area prior to the project entering the preliminary design and National Environmental Policy Act (NEPA) phase of the project development process. PEL represents a collaborative and integrated approach to transportation decision-making that considers environmental, community, and economic goals early in the transportation planning process and uses that information, analysis, and products developed during the planning stage to inform the environmental review process.

According to the Federal Highway Administration (FHWA), the benefits of the PEL approach include the following:

- Addresses complex environmental challenges early and avoids environmentally sensitive natural resources.
- Facilitates the design of projects that meet mobility, environmental, and community needs.
- Minimizes duplication of efforts and data.
- Improves project delivery time.

Planning & Environmental Linkage Studies are a collaborative and integrated approach to transportation decision-making that consider environmental, community, and economic goals early in the transportation planning process.

Early identification of significant social and environmental features within proposed alternative corridors can assist the project development team in the identification and early screening of alternatives prior to the project reaching a more advanced point in the Design/NEPA process where detailed analysis and changes can become more time consuming and costly. In this case, the study was also seen as an opportunity to re-engage with the public, stakeholders and various environmental and planning agencies in the Study Area after the project had been largely dormant since the 1990's.

This PEL study summarizes the following elements of the WV 9 project as it moves from the Planning phase to the Preliminary Design / NEPA phase:

- Project History
- Project Status
- Project Goals and Objectives
- Transportation Deficiencies and Needs
- Linking Planning to the Environment
- Alternative Corridors
- Agency/Stakeholder Coordination
- Public Workshop

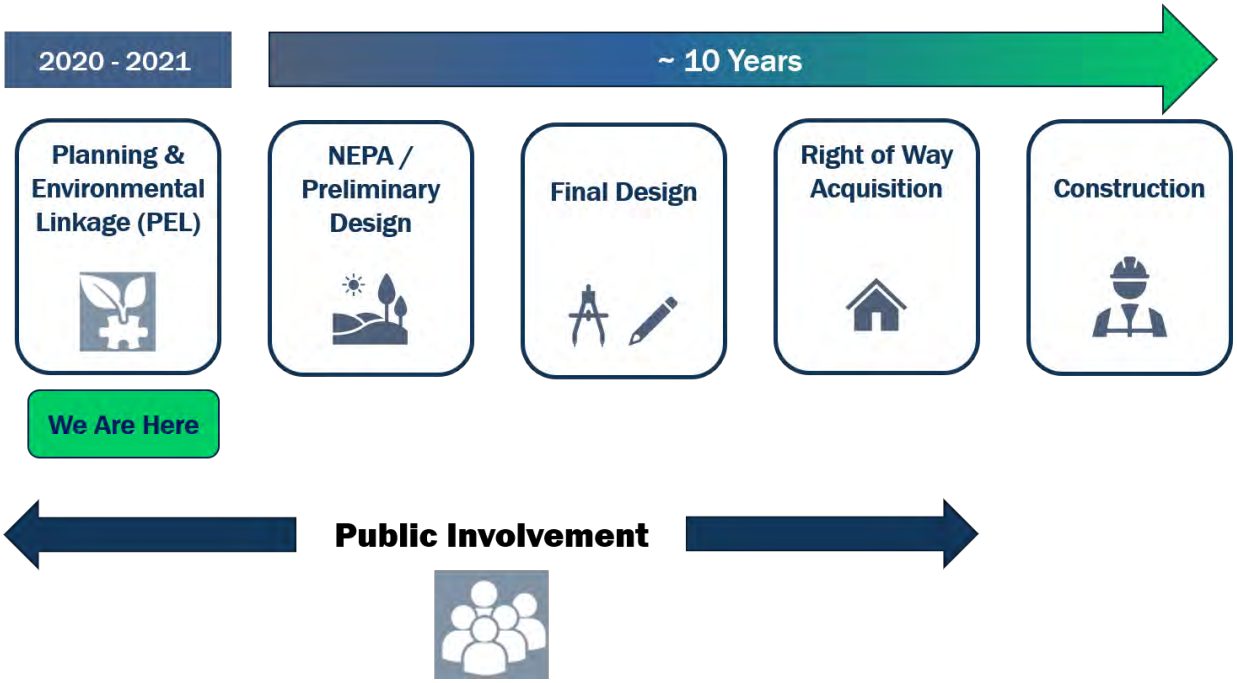
The results of the PEL study will provide guidance on the project needs, feasibility, and recommendations for moving the project forward.

- Preliminary Alternatives Comparison
- Next Steps and Challenges

The results of the PEL study will provide guidance on the project needs, feasibility and recommendations for moving the project forward.

Figure 2-1 Project Development Process shows the steps in the project development process from the PEL through construction, along with a typical timeframe to complete all the steps. This PEL study is being completed in 2021.

Figure 2-1 Project Development Process



3. Project Goals and Objectives

The WV 9 PEL Vision is to improve east-west mobility between Berkeley Springs and Martinsburg while alleviating congestion, improving the level of safety, promoting economic development, and protecting the environmental resources of the region. At the outset of the PEL study, the study team met with stakeholders in the Study Area to introduce them to the project and get input on the goals and objectives that will support this Vision. Based on this collaboration and a review of local and statewide goals, the following goals and objectives were identified for this study. These goals and objectives will form the basis against which the corridor alternatives will be evaluated.

Project Vision: Improve the east-west mobility between Berkeley Springs and Martinsburg while alleviating congestion, improving the level of safety, promoting economic development, and protecting the environmental resources of the region.

Mobility Goal:

Improve mobility between Berkeley Springs and Martinsburg while alleviating congestion on area roadways.

Objectives include:

- Increase travel time reliability by eliminating congested areas and evaluating signal timing
- Improve roadway connectivity and provide travel options including connections to I-81, the US 522 Bypass, WV 901 and Rt 7 / Back Creek Valley Road
- Evaluate adding left turn lanes to reduce delay
- Evaluate a bypass around the town of Hedgesville to reduce congestion and improve mobility

Safety Goal:

Improve the level of safety for motorists and pedestrians in the Study Area.

Objectives include:

- Reduce overall crash rates and evaluate improvements at high crash locations
- Evaluate adding wildlife crossings to reduce deer collisions
- Improve bicycle / pedestrian safety by providing appropriate accommodations
- Evaluate truck climbing lanes and improved passing zones

Economic Development Goal:

Support planned development and promote future growth in the area.

Objectives Include:

- Improve access to growth areas including residential and commercial development near Hedgesville High School
- Facilitate freight growth by providing improved access

Environmental Goal:

Protect and preserve the Region's Environment and Resources.

Objectives Include:

- Minimize impacts to the Sleepy Creek Watershed and other environmental and cultural resources
- Evaluate stormwater runoff and issues related to undersized culverts and new development near Back Creek area of Hedgesville
- Evaluate strategies to improve water quality and protect drinking water

Multimodal Goal:

Support and enhance all travel modes in the area.

Objectives Include:

- Accommodate pedestrian and bicycle access to commercial areas and within residential subdivisions to improve safety conditions and walkable communities

- Improve trail connectivity and evaluate a multi-use path between Berkeley Springs and Martinsburg
- Facilitate access to local transit service and regional trains

Corridor Land Use Goal:

Support Corridor Land Use Vision.

Objectives Include:

- Improve access to growth and recreational areas
- Evaluate improving recreational areas using federal funds
- Minimize impacts to Farmland Protection Board conservation easements
- Support Hedgesville zoning plans and restrictions

4. Transportation Deficiencies and Needs

The PEL Study evaluated the existing traffic and safety conditions along the WV 9 study corridor from Berkeley Springs to I-81 near Martinsburg. The information obtained from the assessment highlights the project transportation deficiencies and needs and provides data to support alternative screening. Current conditions were evaluated based on available traffic counts, reported crash locations, origin-destination data, and travel time data from GPS data sources.

Existing Roadway Network

WV 9 is classified as a principal arterial in the Federal Highway Functional Classification System and Trunkline in the State Functional Class System, collecting traffic from local and secondary roads and providing a high-volume connection to the major arterials. The existing roadway consists primarily of a two-lane facility, which expands to a three-lane section at Edwin Miller Blvd that becomes a two-lane section in Martinsburg before widening into a six-lane roadway when overlapping with WV 45 to a four lane divided highway past Queen Street.

Table 4-1 Existing Roadway, Right-Of-Way Width and Speed Limits contains a list of the typical sections and posted speed limits which currently exist along WV 9 through the Study Area.

The Study Area is served by US 522 and I-81. These are the major north-south roadways in the eastern panhandle, affording entry into Maryland and Pennsylvania to the north and to Virginia to the south. WV 9 connects Berkeley Springs and Charles Town with Martinsburg. The segment to the east of the Study Area between Martinsburg and Charles Town and from Charles Town to the Virginia state line has been upgraded to a four-lane limited access highway.

WV 9 is the only West Virginia route which passes through the Study Area. It provides access to cities, towns and local destinations. The roadway was originally designed for 40 miles per hour. It is presently posted at 55 miles per hour with exceptions on those portions approaching and passing through Hedgesville and Martinsburg.

Table 4-1: Existing Roadway, Right-Of-Way Width and Speed Limits

Roadway Segment	Typical Section	Right-of-Way Width (feet)	Posted Speed Limit
WV 9/ US 522	2-lane	40 ft	25 mph
Through Berkley Springs	2-lane	30 ft	40 mph
Between Berkley Springs and Hedgesville	2-lane	30 ft	40 - 55 mph
Through Hedgesville	2-lane	30 ft	40 mph
Between Hedgesville and I-81 Interchange	2-lane	30 ft	40 - 45 mph
Through I-81 Interchange	6-lane	90 ft	45 mph

The segment of WV 9 under consideration for improvements is located within Morgan and Berkeley counties. The northwestern portion of the Study Area is located within Morgan County with connection to US 522 near Berkeley Springs. The existing route from Berkeley Springs to Hedgesville has the most severe geometric alignment with rolling topography and continuous horizontal and vertical curves, resulting in short sight distances and limited passing opportunities. Since WV 9 is not access controlled, driveway connections to businesses and individual properties exist all along the route and result in numerous conflicts.

The southeastern portion of the Study Area is located in Berkeley County, beginning at the Morgan county line and traveling through Hedgesville and terminating at the Martinsburg interchange of I-81. The alignment from Hedgesville to Martinsburg is less severe than the segment from Berkeley Springs to Hedgesville, but the terrain remains rolling.

The annual Average Daily Traffic (AADT) varies along the length of WV 9 from a low of 3,230 (2017) vehicles per day (vpd) near Berkeley Springs to a high of 27,022 (2014) vpd in Martinsburg. Based on current and anticipated development, future traffic volumes are expected to continue to increase . The regional travel demand model is being used to evaluate potential increases to traffic and anticipated diversions related to alternative improvements.

No interchanges or control of access are provided on WV 9 within the Study Area. Traffic signals currently exist at the WV 9 / US 522, the WV 9 / WV901, WV 9 / Roaring Lion Drive, WV 9 / Ridge Rd, WV 9 / Severna Parkway, WV 9 / Harlan Springs Rd and at the WV 9/General Motors Access Road intersections. All other intersections within the Study Area are stop-sign-controlled. **Table 4-2 Existing Intersections along WV 9** lists the major roads which intersect with WV 9 in the Study Area, the existing intersection configuration and type of traffic control. The list begins in the western portion of the Study Area and progresses east.

Table 4-2: Existing Intersections along WV 9

Cross Street	Intersection Configuration	Traffic Control
WV 9/ US 522	T	Signal
WV 9/Potomac Rd/Spohrs Rd	+	Sign
WV 9/Cherry Run Rd	T	Sign
WV 9/Back Creek Valley	Y	Sign
WV 9/WV 901	+	Signal
WV 9/Roaring Line Drive	+	Signal
WV 9/Ridge Rd	X	Signal
WV 9/Severna Parkway	+	Signal
WV 9/Harlan Springs Rd	T	Signal
WV 9/General Motors Access Rd	T	Signal

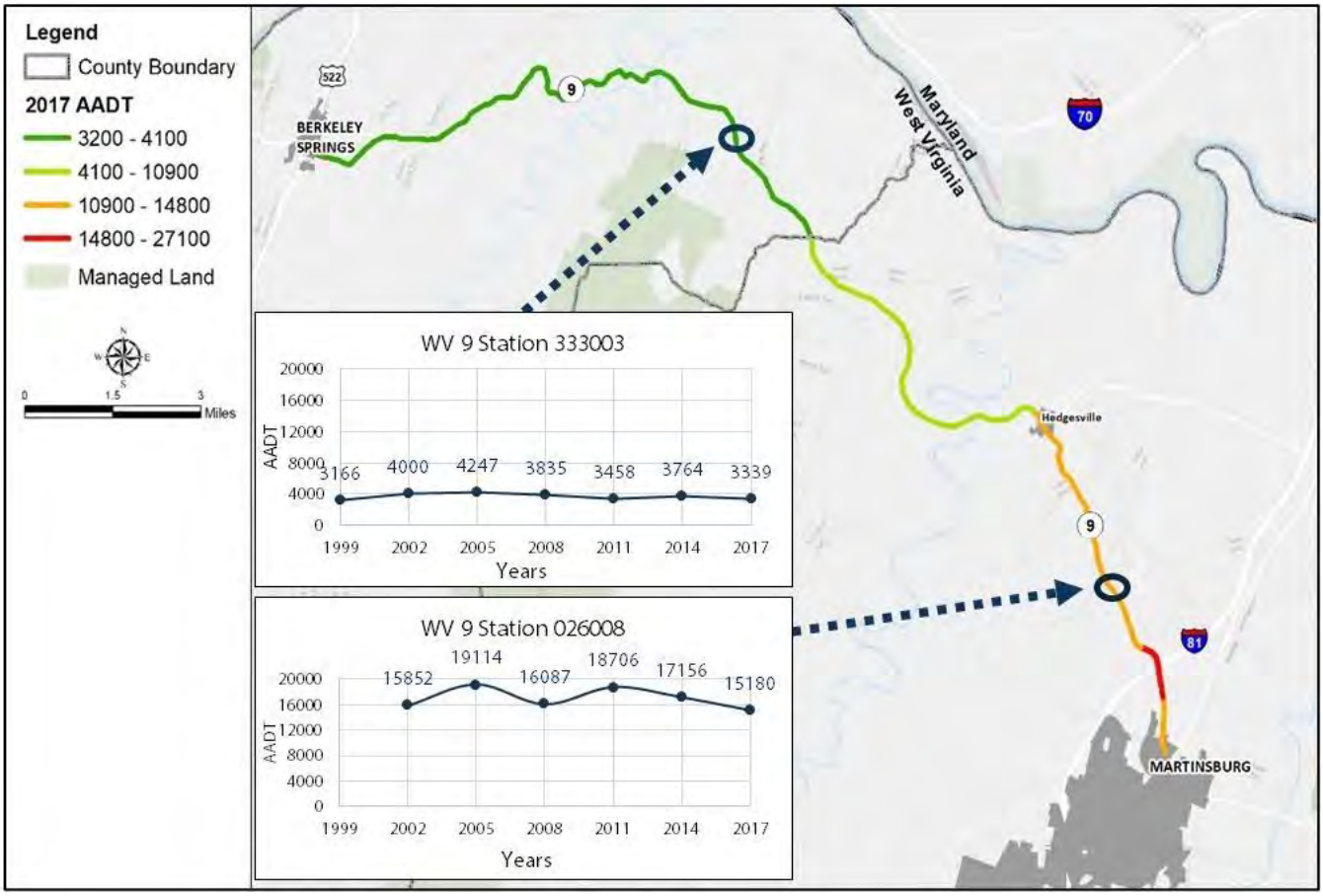
Travel Demand

There has been little to no traffic volume growth from 2000-2017 on most portions of the WV 9 study corridor.

Historic Average Annual Daily Traffic (AADT) volume data was obtained from the WVDOT online traffic count site (https://geocounts.com/traffic/us/wvdoh/route/WV%209). At the time of this report, the latest traffic counts available were for 2017. **Figure 4-1 Traffic Volumes and Trends** highlights the range of daily traffic volumes throughout the corridor. Much of the corridor carries less than 5,000 vehicles per day west of Hedgesville. Traffic volumes are much higher east of Hedgesville with daily volumes greater than 25,000 vehicles per day near I-81. **Figure 4-1 Traffic Volumes and Trends** also highlights the historic traffic volume trends at two traffic count locations. These count locations indicate no significant traffic volume growth since 2000. Future studies will need to evaluate more recent traffic volume count data to evaluate if new land development has resulted in higher traffic volumes.

In most cases, the 2017 WV 9 traffic counts are less than the forecasted 2013 traffic volumes provided in the original 1993 Draft Environmental Impact Statement (DEIS) study. The exception is on the portion of WV 9 closest to I-81 near Martinsburg.

Figure 4-1 Traffic Volumes and Trends



Truck Demand

In 2017, truck volumes on WV 9 were relatively small (as compared to roadways with a similar functional class). Typically, the truck volumes average about 5% of the total traffic volume. This equates to less than 250 trucks per day on WV 9 in Morgan County. East of Hedgesville, truck volumes are closer to 1,000 trucks per day with the highest numbers near the I-81 interchange where the GM Access Road provides access to key freight distribution centers.

Origin-Destinations of Travel

This PEL study included the acquisition of 2019 cellular and GPS vehicle origin-destination data from StreetLight, Inc. to help better understand the number of long-distance trips within the corridor. Understanding trip origins-destinations on WV 9 provides insights on the project goals and objectives. The data also can help evaluate the potential travel demand of a new roadway. The results of the origin-destination data analysis are provided in **Table 4-3 Origin-Destination Assessment on WV 9 Corridor**. Percentages were determined from the origin-destination data and then applied to the average traffic volume along the corridor section to estimate the trips per day.

Table 4-3: Origin-Destination Assessment on WV 9 Corridor

Trips Between WV 9 Segment Sections			Portion of WV 9 Total Traffic Volume*	Estimated Trips Per Day
From		To		
Berkeley Springs	⟷	I-81	2%	100
Morgan/Berkeley County Border	⟷	I-81	18%	900
	⟷	Hedgesville	35%	1,700
Hedgesville	⟷	I-81	20%	3,000

- Percentages are dependent on the total traffic volume on the roadway section. One section having a greater percentage than another does not necessarily mean it has more total trips.

The results of the origin-destination data indicate that the WV 9 corridor is not a prevalent long-distance travel corridor. There are some travelers that do travel from Berkley Springs to I-81 but these are estimated to be around 100 vehicles per day. An analysis conducted for truck travel provided similar results indicating that WV 9 is not currently a long-distance freight corridor. Higher percentages of traffic travel between Hedgesville and I-81 are most likely to work or shopping destinations in the urbanized areas.

The WV 9 study corridor does not currently service a significant number of long-distance travelers.

Traffic Congestion

Travel time data was assessed using TomTom GPS travel time data collected between 2016-2017 and 2019-2020. The data was used to evaluate the differences in weekday travel times between peak (e.g. AM and PM peak travel periods) and off-peak periods (e.g. night-time). A performance measure called travel time ratio (TTR) is used to measure the level of traffic congestion. TTR represents the ratio of peak period travel time divided by the off-peak travel time. TTR values greater than 1.20 indicate a 20% higher travel time in the peak period as compared to off-peak conditions and is a typical threshold for lower levels of congestion. TTR values greater than 1.50 indicate higher levels of congestion. **Figure 4-2 Traffic Congestion Hotspot Locations** highlights the traffic congestion locations on the WV 9 corridor, all of which are between Hedgesville and I-81.

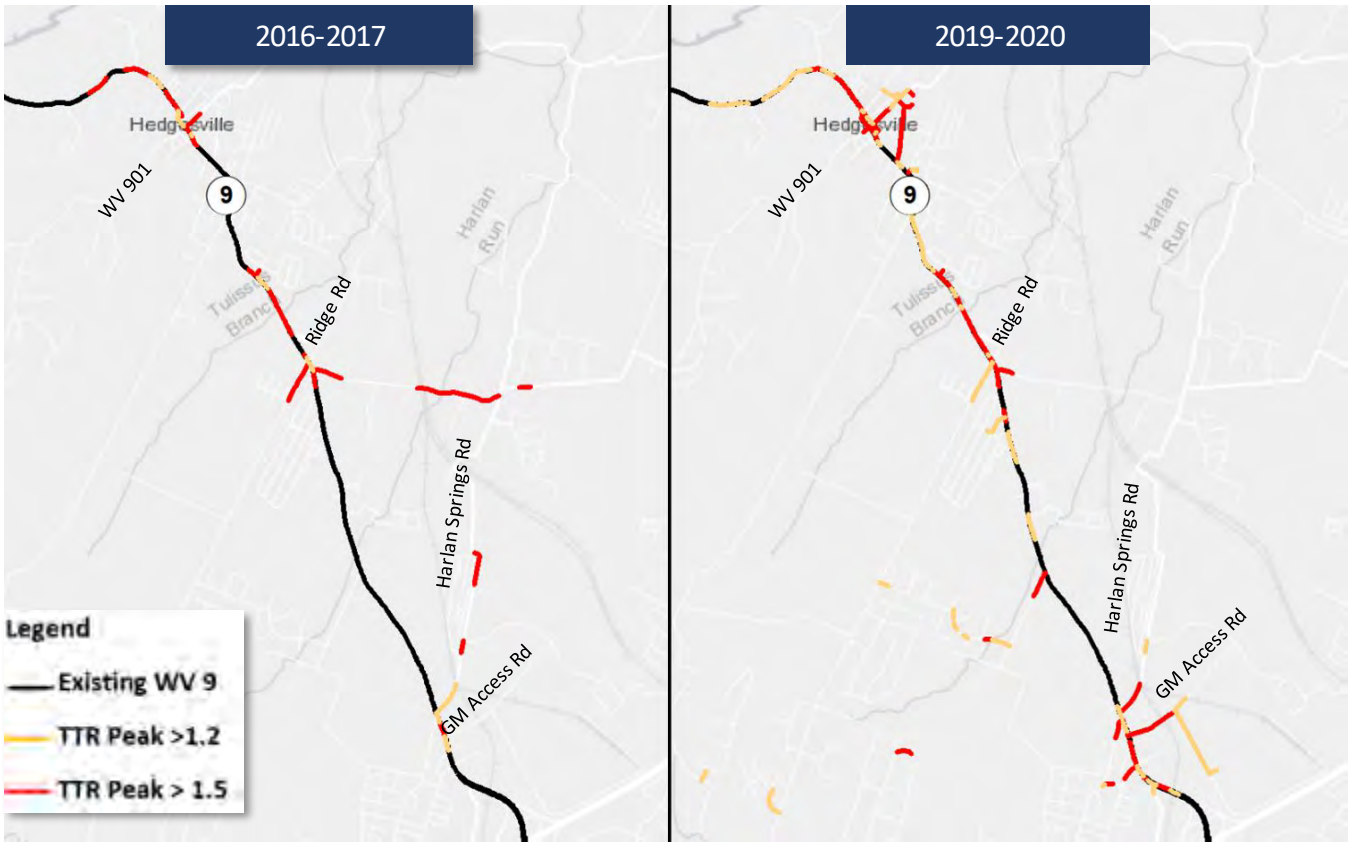
- Traffic congestion is most prevalent in Hedgesville and several locations south of Hedgesville towards I-81.
- Data has indicated that congestion has worsened the last 2-3 years.

These locations include:

- Intersection of WV9 / WV 901 in Hedgesville
- WV 9 from Roaring Lion Drive to Ridge Road at Hedgesville High School
- WV 9 from Harlan Springs Road to General Motors (GM) Access Road just north of I-81

The multiple years of data provide some insight into whether traffic congestion has worsened due to recent land development along the corridor. As visualized in **Figure 4-2 WV 9 Traffic Congestion Hotspot Locations**, traffic congestion levels appear to have worsened between 2016 and 2020.

Figure 4-2: Traffic Congestion Hotspot Locations



(Red = High Congestion / Red = Low Congestion)

Safety Issues

Crash data records were obtained from 2015-2019 for the WV 9 corridor. The data was analyzed to identify and rank the ten highest crash locations along the corridor as shown in **Figure 4-3 High Crash Rates**. The highest crash locations are generally concentrated south of Hedgesville through the WV 9/Ridge Road intersection. This section contains higher traffic volumes, commercial development, a significant number of driveway access points, and traffic signals. This study included an assessment of potential strategies to address these safety concerns under the upgrade of existing WV 9 corridor alternative.

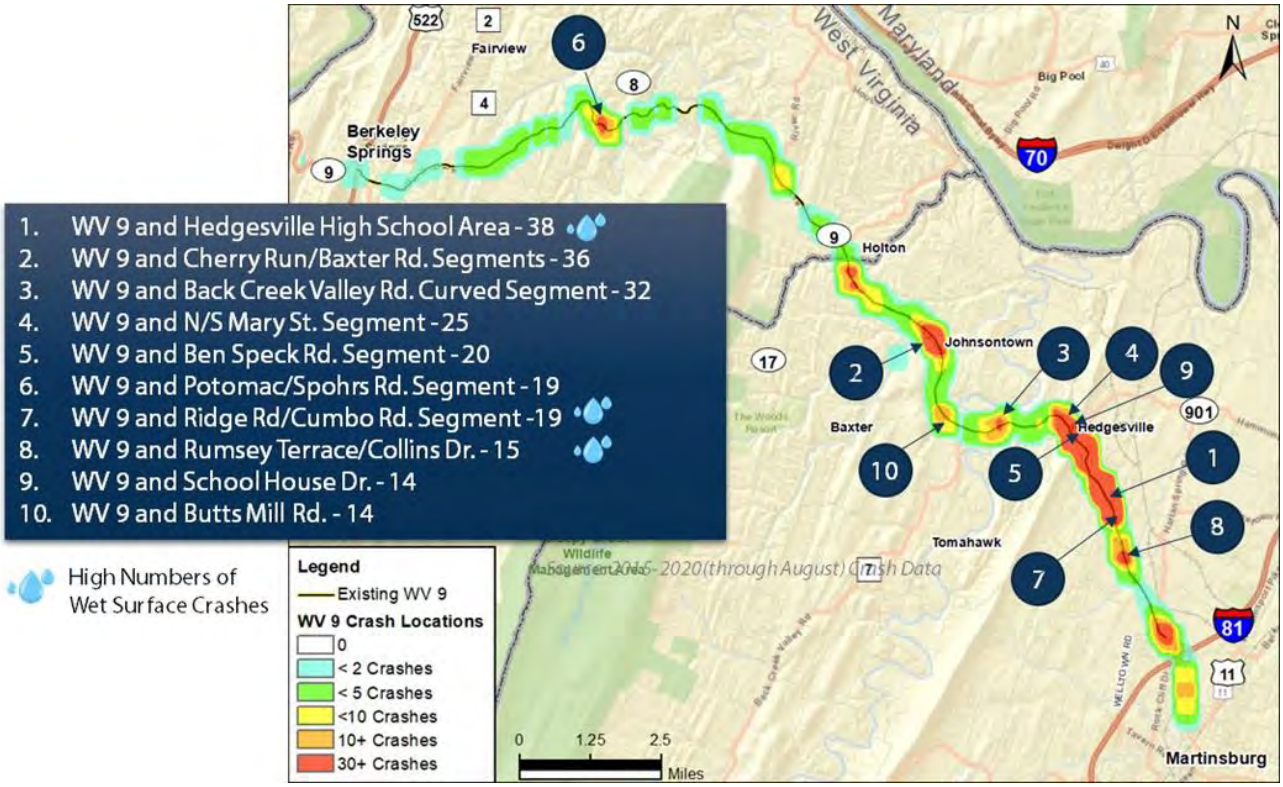
Crashes are most prevalent from Hedgesville to the WV 9 / Ridge Road Intersection. Safety issues and the causes vary by location.

In the northern portions of WV 9, roadway curves and higher speeds have resulted in several locations with high crash numbers. In Johnsontown, the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO) conducted a Road Safety Audit (RSA) in 2019 to identify potential safety

strategies to address the high numbers of crashes (including a fatality) near the Cherry Run Road intersection. This section has a crash rate higher than the statewide average. The RSA recommendations will be integrated into future NEPA studies for the WV 9 corridor and are a component of the alternative for upgrading existing WV 9 in this study.

The southern portion of WV 9 has also seen some crash concentrations, typically near the WV 9 / GM Access Road. These safety concerns are most likely related to higher traffic and truck volumes. The GM Access Road is a key access point for freight distribution centers along I-81.

Figure 4-3 High Crash Locations



Multimodal Connectivity

A 2016 Regional Bicycle Plan was developed for the region by the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO) to identify regional bicycle goals and objectives, evaluate existing bicycle conditions, and propose context-sensitive recommendations that seek to improve safety and mobility for cyclists traveling in, around and through the region. The plan recommended as a top future study to evaluate bike lanes or a separate multi-use path between Berkeley Springs and Martinsburg. This trail would provide regional connections to destinations in neighboring counties.

Freight is a significant contributor to the regional economy and reliable transportation network is necessary for the free flow movement of goods and services within and through the region. WV 9 is designated as a Critical Rural Freight Corridor in the Berkeley County ***Direction 2045 Long Range Transportation Plan*** and as an element of the National Freight Network in the ***West Virginia Statewide Freight Plan.*** The plan indicates that WV 9 has poor freight travel time reliability. This corridor services trucks accessing I-81. Several distribution centers with heavy truck traffic are located within the Study Area off WV 9 near Martinsburg.

Improvements to WV 9 would improve freight mobility and support the regional economy.

Planned Projects and Land Development Trends

The area between Hedgesville and Martinsburg has seen significant growth over the past decade. Several large residential subdivisions have been built and additional developments are planned as shown on **Figure 4-4 Land Development Trends and Planned Projects**. With that residential growth, commercial development has accompanied it. Since 2010, in Berkeley County, in the area near WV 9, there have been 2,787 lots covering 1,558 acres approved for final plat according to the Berkeley County Planning Commission. This increased development will add to the current congestion and safety issues already experienced along the corridor.

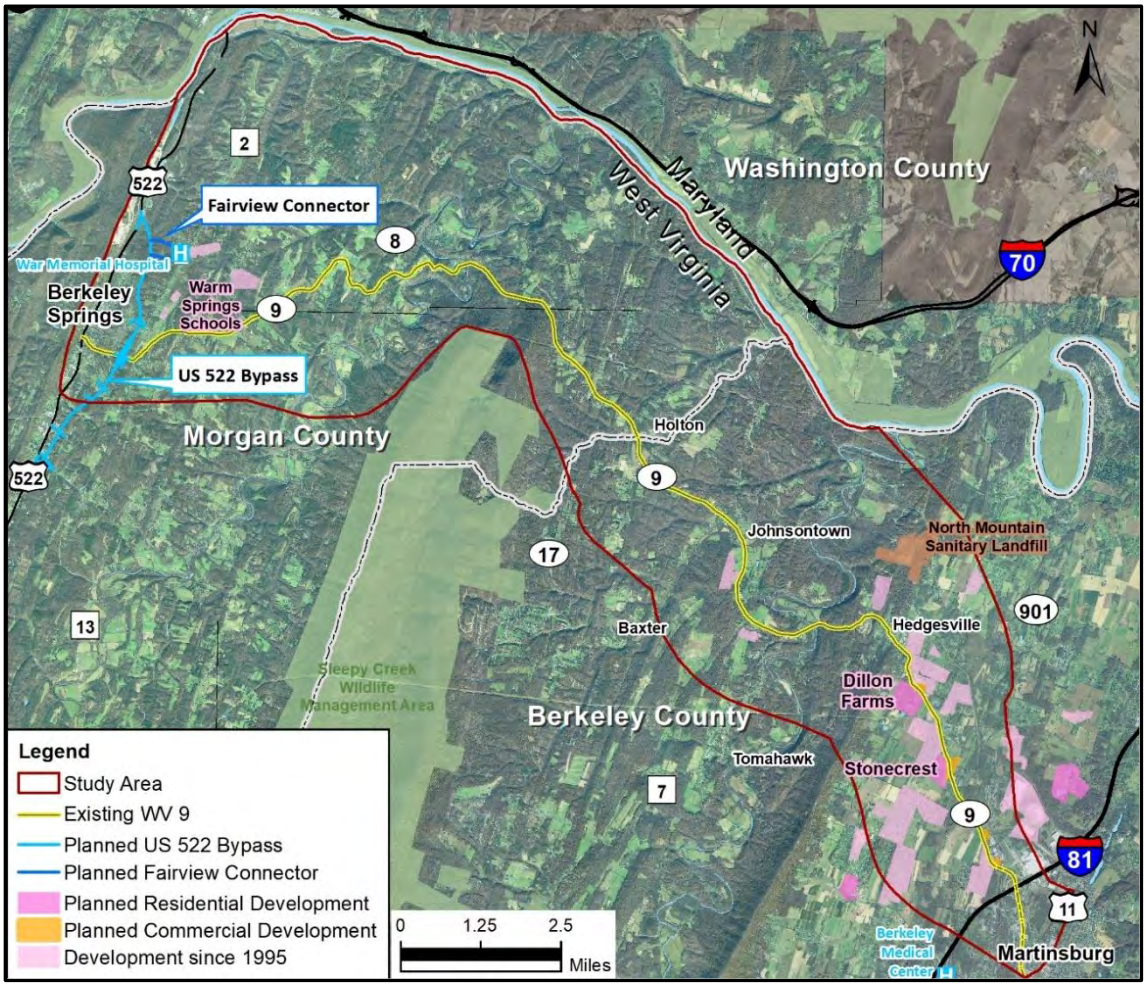
New developments in Morgan County include the War Memorial Hospital and the Warm Springs Intermediate and Middle Schools which were built in the Berkeley Springs area.

Several developments are planned/proposed in the Study Area as shown on **Figure 4-4 Land Development Trends and Planned Projects**. Planned residential subdivisions include Dillon Farms, a 50 acres subdivision containing 219 lots, and Stonecrest Subdivision containing 198 proposed lots. Commercial developments include two ROC Stores located along WV 9 south of Hedgesville and a Rutter's Store on the northwest corner of WV 9 and Harlan Springs Road.

LCS Services opened the North Mountain Sanitary landfill in 1991 in Berkeley County, north of Hedgesville. The 67-acre private landfill is a municipal solid waste (MSW) management facility. The landfill accepts municipal solid waste, construction/demolition/debris (CDD), and approved residual waste streams for the region.

Planned projects within the Study Area include improvements and updates to US 522 through Morgan County, West Virginia. WVDOH has approved the US 522 Berkeley Springs Bypass project which begins approximately 0.42 miles south of Winchester Road (CR 13) to approximately 0.20 miles south of Sandmine Road (CR 38/1), for a distance of approximately 4 miles. Additionally, one of two connectors from the US 52 Bypass to Fairview Drive near the War Memorial Hospital is planned as shown on **Figure 4-4 Land Development Trends and Planned Projects**.

Figure 4-4: Land Development Trends and Planned Projects



Summary of Needs

Based on the established Project Goals and Objectives and the traffic and safety analysis, the following three (3) primary transportation needs were identified:

- **Improve the capability of WV 9 to meet its mandated objectives as a major east-west route in the eastern panhandle of West Virginia**

  WV 9 provides major east-west movement through the Study Area. Development and congestion along WV 9 have resulted in unacceptable levels of service for many segments of the roadway. Also, the poor geometric alignment from the Berkeley county line to Hedgesville provides limited capacity, is a safety concern, and decreases freight travel time and reliability. Most of the other major east-west and north-south highways serving the area, including I-70, I-81, US 340, and WV 9 between Martinsburg and Charles Town and from Charles Town to the Virginia State line, are four-lane limited access highways. The other major highway, US 522, is under design as a four-lane bypass at Berkeley Springs. The WV 9 corridor between Berkeley Springs and Martinsburg thus represents the missing link in a continuous system of safe, efficient highway connections throughout the area.

- **Improve traffic flow along the WV 9 corridor in the Study Area**
  Projected increases in traffic volumes along segments of existing WV 9 will result in travel delays, increase the potential for crashes, and contribute to the inefficient operation of motor vehicles. Municipalities in the corridor and the I-81 interchange area experience severe congestion which is forecast to worsen with continuing development in the area.

- **Improve safety levels along WV 9 in the Study Area**
  Crash data and results from the HEPMPO's Regional Traffic Safety Study have highlighted key areas of concern within the corridor. Crash causes vary within the corridor. Although travel volumes are much lower in the northern/western sections of the corridor, crashes and fatalities have resulted from roadway alignment issues (curves), non-signalized intersections with limited sight distance, and higher speeds. Safety issues in the southern/eastern portions of the corridor have resulted from higher traffic volumes, access management issues related to continued development, commercial and school activity and freight or other truck activity.

Based on these needs, it is evident that WV 9 should be upgraded or realigned, and its capacity increased, in order to fulfill its function as a safe, efficient, major east-west arterial through the project area.

5. Linking Planning to the Environment

Environmental considerations in transportation planning can lead to a seamless decision-making process that minimizes duplication of effort, promotes environmental stewardship, and reduces delays in project implementation by promoting early coordination. One goal of the WV 9 Planning and Environmental Linkage Study is to identify known potential impacts that could affect the cost or feasibility of the project during the Preliminary Design / NEPA phase to facilitate the avoidance, minimization or mitigation of those impacts as the project moves forward.

This chapter describes the existing natural, cultural and socioeconomic environment of the Study Area. PEL is a planning-level study and as such relies upon existing, readily available data for its analysis. Information was gathered from a variety of existing databases, published sources, previous studies, windshield surveys and input from the public. Data compiled from these efforts function as a baseline for the alignment screening that is documented in **10.0 Preliminary Screening**.

The goal of the study is to identify potential impacts that could affect the feasibility of the project prior to the NEPA phase.

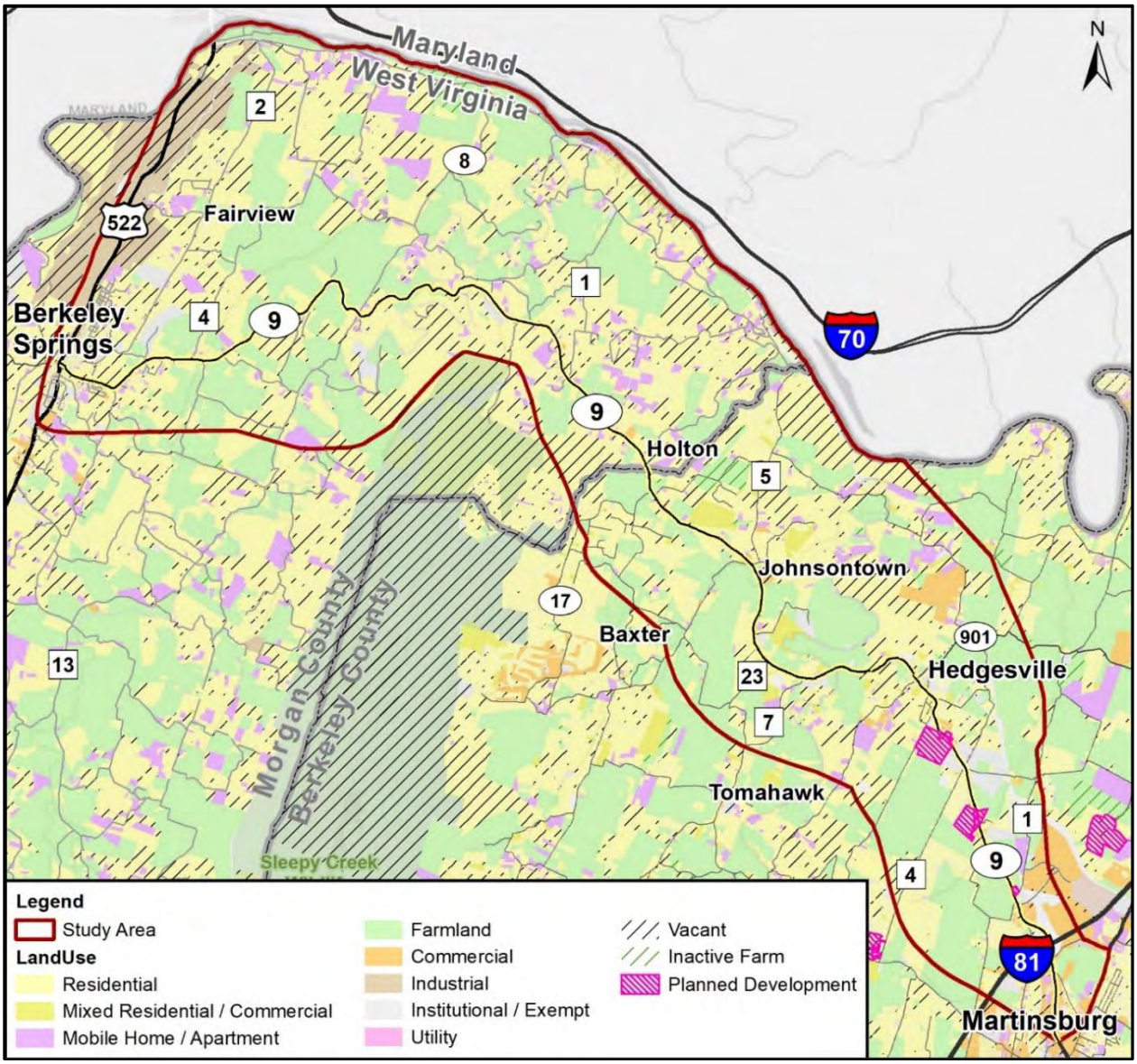
Land Cover / Land Use

Berkeley and Morgan County (2020) parcel and tax layers were obtained from the West Virginia GIS Technical Center. Each parcel layer contains an attribute with the current property classification that was used to identify the existing land use / land cover type.

The Study Area is primarily residential and farmland with 55% residential and 36% farmland. The remaining portion of the Study Area is a combination of commercial, industrial, utility, and exempt properties such as schools, religious, hospitals, and parks. **Figure 5-1 Land Use / Land Cover** shows the land uses in the Study Area.

The Study Area is 55% residential, 36% farmland and the remaining area is commercial, industrial, utility or exempt.

Figure 5-1 Land Use / Land Cover

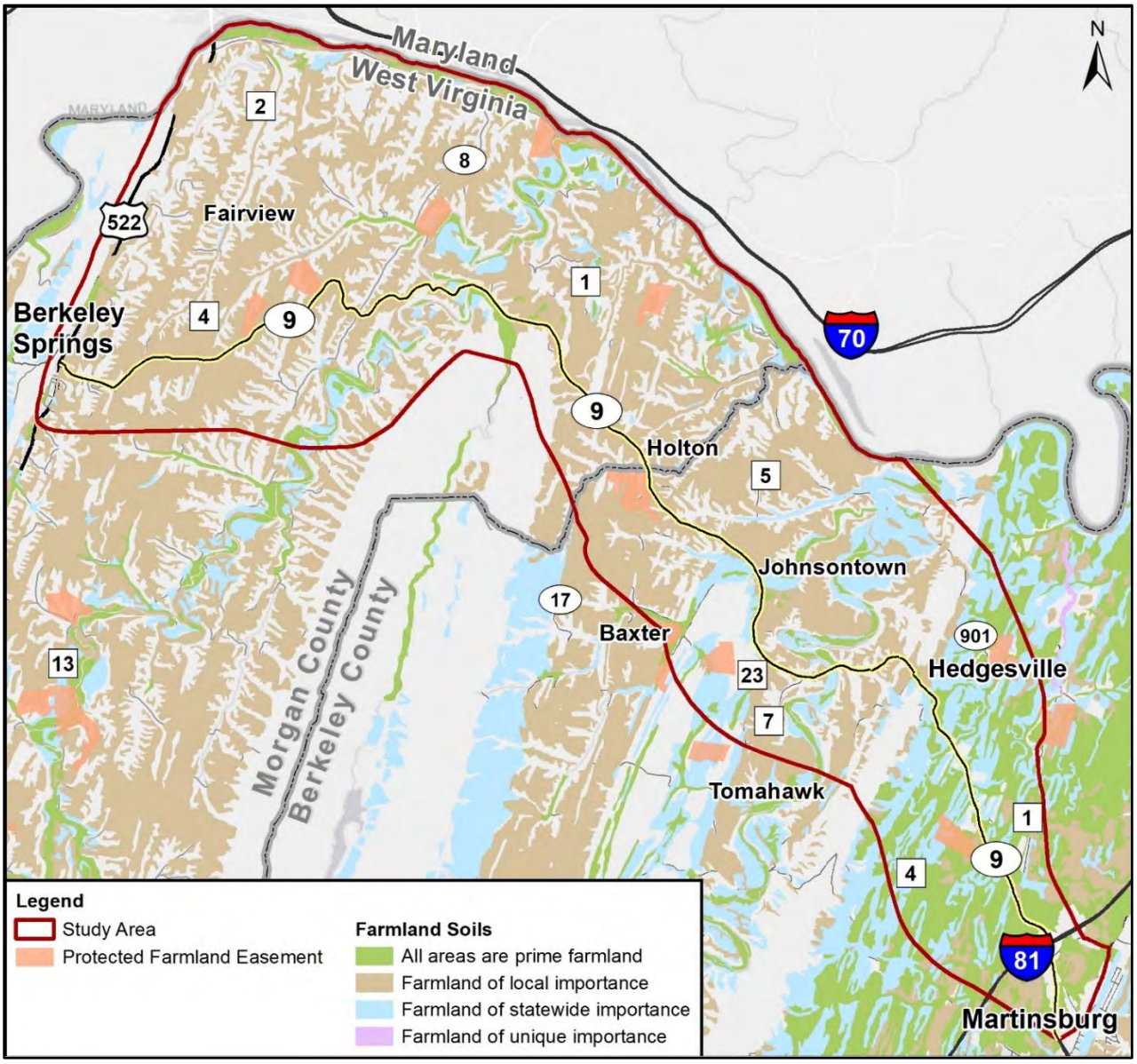


Protected Farmland Easements and Farmland Soils

Protected Farmland Easements

Permanently protected farmland easements (March 2021) were obtained from the Berkeley and Morgan County Farmland Protection Boards. The dataset contains privately-owned lands where a conservation easement is held either by one of these county boards, and/or by a private land trust. These lands are generally under conservation easements due to the agricultural value (including qualifying soils) and/or natural features present. There are six (6) Protected Farmland Easements totaling 579 acres within the Morgan County portion of the Study Area and seven (7) protected farmland easements totaling 840 acres within the Berkeley County portion of the Study Area as shown on **Figure 5-2 Protected Farmland Easements and Farmland Soils**.

Figure 5-2 Protected Farmland Easements and Farmland Soils



Farmland Soils

The Study Area is comprised of 65% farmland soils.

Soil tabular and spatial data for Berkeley County (2020) and Morgan County (2019) were downloaded from Natural Resources Conservation Service (NRCS) Soil Data Mart. In an effort to identify the extent and location of important farmlands, the NRCS, in cooperation with other interested Federal, State, and local government organizations, inventoried land that can be used for the production of the Nation's food supply. The dataset identifies soil map units considered as prime farmland soils, farmland soils of local or statewide importance or unique farmland soils. NRCS defines Prime Farmlands as soils that have the best combination of physical and chemical characteristics to economically produce high yields of agricultural crops when treated and managed according to acceptable farming practices. Land that nearly meet the requirements for prime farmlands is considered to be "farmland of statewide importance" as determined by the appropriate State agencies and is typically used for the production of food, feed, fiber, forage, and oilseed crops. Areas that are not identified as having national or statewide importance, may be considered to be "farmland of local importance" as identified by local agencies.

The Study Area is comprised of 65% farmland soil with 12% prime farmland soil, 42% farmland of local importance, and 11% farmland of statewide importance as shown on **Figure 5-2 Protected Farmland Easements and Farmland Soils**.

Aquatic Resources

Figure 5-3 Aquatic Resources depicts the location of streams, NWI wetlands and 100-year floodplains and floodways within the Study Area.

Streams

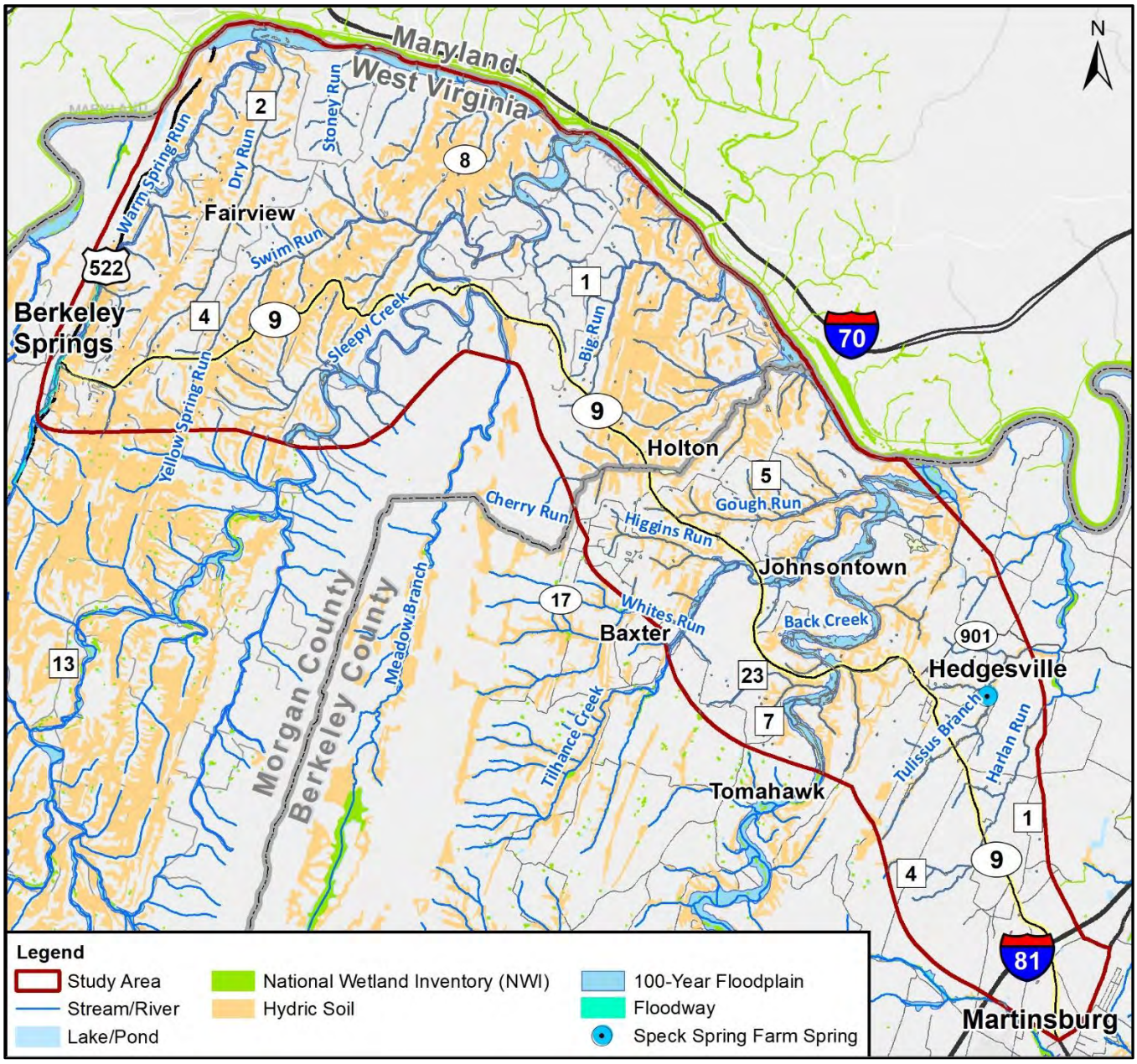
National Hydrography Dataset (NHD) Streams and Waterbodies (2020) were downloaded from the United States Geological Survey (USGS) National Map.

The Study Area is located primarily within the Back Creek, Opequon Creek, Sleepy Creek, and Warm Spring Run sub-watersheds in West Virginia, and the larger Potomac River watershed, which encompasses parts of Pennsylvania, Maryland, Virginia, and West Virginia. A small portion of the Study Area in the far southeastern corner is located within the Opequon sub-watershed; however, Opequon Creek and its tributaries are east of the Study Area and will not be impacted. All surface waters within the Study Area drain directly to the Potomac River, which constrains the Study Area along the northern boundary. Drainage enters the Potomac river either directly via Back Creek, Sleepy Creek, Warm Spring Run, or unnamed tributaries or indirectly through Back Creek, Opequon Creek, or Sleepy Creek.

The Clean Water Act (1972) requires each state to develop water quality standards to protect all water and to provide a list of impaired streams, per Section 303(d). The West Virginia Department of Environmental Protection (WVDEP) Water Quality Standards (47CRS2), effective July 8, 2016, identifies the standards to comply with the Clean Water Act and controls the amount of pollution entering West Virginia waters and the basis for reducing runoff from rural and urban areas. WVDEP developed a list of

streams that are water quality limited and not expected to meet the water quality criteria even after applying technology-based controls, commonly referred to as the 303(d) List.

Figure 5-3 Aquatic Resources



An Ecological Assessment of the Potomac River Direct Drains Watershed prepared by the West Virginia Department of Environmental Protection (WVDEP) in 2005 stated the Sleepy Creek and Back Creek sub-watersheds appeared to have relatively good stream health and support diverse benthic macroinvertebrate communities, with the Opequon Creek watershed supporting less diversity. Warm Spring Run was not mentioned in the report. All sub-watersheds within the Study Area are subject to

The Sleepy Creek and Back Creek sub-watersheds have good stream health that supports diverse small aquatic animal communities.

total maximum daily loads (TMDLs). Total Maximum Daily Loads is a regulatory term identified in Section 303(d) of the Clean Water Act, which identifies the maximum amount of a pollutant that a water body can receive, while still maintaining water quality standards. A list of TMDLs within these watersheds is listed below in **Table 5-1 Stream Classifications and Special Protection Waters Designations**.

Several streams within the Study Area are subject to trout stocking and recreational use such as fishing and boating. The West Virginia Department of Natural Resources (WVDNR) identifies two boating access sites, one off WV 9, west of Hedgesville, and one north of CR 10 along the Potomac River, within the Study Area. Additionally, Tillance Creek, a tributary to Back Creek, is trout stocked twice a month along a 2.65-mile reach south of WV 9 and is listed as a category B-2 Trout Water under Title 47CRS2 Requirements Governing Water Quality Standards Rule. One other stream within the Study Area, Meadow Branch, is also listed as a category B-2 Trout Water.

Table 5-1 Stream Classifications and Special Protection Waters Designations lists streams within the Study Area and their associated state agency management classifications, as well as 303(d) impairment listings and TMDL status category. This includes a list of conditions referred to as conditions not allowable (CNA) in West Virginia waters. These are conditions, which interfere with designated water usage prescribed to waterways in the West Virginia Water Quality Standards. Some examples of CNA conditions include biological conditions such as algal blooms, taste and odor, and other conditions adversely altering water quality.

Table 5-1: Stream Classifications and Special Protection Waters Designations

Watercourse	River Basin	Trout Water (Yes/No)	Title 47CRS2 Designation	303(d) Impairment Listings (Category)
Back Creek Watershed				
Back Creek	Potomac	No	N/A	N/A
Gough Run	Potomac	No	N/A	N/A
Higgins Run	Potomac	No	N/A	N/A
Tilhance Creek	Potomac	Yes	B-2 Trout Waters	N/A
Whites Run	Potomac	No	N/A	N/A
Unnamed Tributaries to Back Creek	Potomac	No	N/A	N/A
Potomac River (Direct – Not via Back Creek or Sleepy Creek)				
Big Run	Potomac	No	N/A	N/A
Cherry Run	Potomac	No	N/A	N/A
Harlan Run	Potomac	No	N/A	CNA – Biological; Fecal Coliform
Stoney Run	Potomac	No	N/A	Fecal Coliform

Watercourse	River Basin	Trout Water (Yes/No)	Title 47CRS2 Designation	303(d) Impairment Listings (Category)
Tulissus Branch	Potomac	No	N/A	CNA – Biological; Fecal Coliform
Unnamed Tributaries to Potomac River	Potomac	No	N/A	N/A
Yellow Spring Run	Potomac	No	N/A	N/A
Sleepy Creek Watershed				
Meadow Branch	Potomac	Yes	B-2 Trout Waters	N/A
Sleepy Creek	Potomac	No	C – Water Contact Recreation	CNA – Biological; Fecal Coliform
Swim Run	Potomac	No	N/A	N/A
Unnamed Tributaries to Sleepy Creek	Potomac	No	N/A	N/A
Warm Springs Run Watershed				
Dry Run	Potomac	No	N/A	CNA – Biological; Fecal Coliform
Warm Springs Run	Potomac	No	N/A	CNA – Biological; Fecal Coliform
Unnamed Tributaries to Warm Springs Run	Potomac	No	N/A	CNA – Biological; Fecal Coliform

1. *Data sourced from the United States Environmental Protection Agency's 2016 West Virginia Section 303(d) List Key.*
2. *Neither Opequon Creek, nor Unnamed Tributaries to Opequon Creek are located within the Study Area.*
3. *All main branch stream listings describe associated Unnamed Tributaries unless these are specifically called out.*

NWI Wetlands

National Wetland Inventory (NWI) wetlands (2020) were downloaded from U.S. Fish and Wildlife Services website. Soil map units designated as Hydric were extracted from the soil tabular and spatial data downloaded from the Natural Resources Conservation Service (NRCS) Soil Data Mart for Berkeley and Morgan counties.

Wetlands include palustrine environments and other lentic or "non-flowing" bodies of water such as reservoirs, lakes, and ponds classified as lacustrine or deep-water habitats. Palustrine habitat classifications are further defined to include open water, emergent, scrub/shrub and forested types in accordance with United States Fish and Wildlife Service (USFWS) Classification of Wetlands and Deepwater Habitats for the United States (Cowardin et. al., 1979). Wetlands located within the Study Area are fresh-water or non-tidal wetlands. Hydric and hydric inclusion soil types and National Wetlands Inventory (NWI) wetland mapping identified within the Study Area are depicted on **Figure 5-3 Aquatic Resources**. The Study Area contains 163 acres of NWI Wetlands, 119 acres of freshwater ponds, 716 acres of riverine and 3,491 acres of hydric soils.

NWI Wetlands, freshwater ponds and riverine comprise nearly 2% of the Study Area.

Wetlands identified on the NWI include riverine, lacustrine, and/or palustrine wetlands emergent, scrub-shrub, open-water, and/or forested plant communities. According to the United States Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI), more than a dozen wetlands greater than ten (10) acres in size have been identified within the Study Area.

Floodplains

National Flood Hazard Layer (NFHL) (2020) was downloaded from the Federal Emergency Management Agency (FEMA) Flood Map Service Center. The Federal Emergency Management Agency (FEMA) recorded 100-year floodplains in the vicinity of the Study Area along Back Creek, Opequon Creek, and Sleepy Creek, and Warm Spring Run Watersheds in West Virginia, and the larger Potomac River Watershed, which encompasses parts of Pennsylvania, Maryland, Virginia, and West Virginia. See **Figure 5-3 Aquatic Resources**. The Study Area contains 6,803 acres of 100-year Floodplain and 117 acres of Floodway.

13% of the Study Area is within a 100-year floodplain or floodway.

US Department of Transportation (DOT) Order 5650.2, Floodplain Management and Protection (USDOT, 1979), prescribes policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of floodplain impacts. DOT Order 5650.2 defines "significant floodplain encroachment" as an encroachment resulting in one or more of the following construction or flood-related effects:

- A considerable probability of loss of human life;
- Likely future damage associated with the encroachment that could be substantial in cost or extent, including interruption of service on or loss of a vital transportation facility; and
- A notable adverse impact on natural and beneficial floodplain values.

The order further defines natural and beneficial floodplain values to include, but not be limited to natural moderation of floods, water quality maintenance, groundwater recharge, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture and forestry.

Hydrology and Groundwater

Springs and seeps are found where groundwater discharges to the surface along fractures, bedding planes, between two rock types of differing permeability, and where a significant change in slope truncates the water table. Aquifers are an underground layer of water-bearing permeable rock that water may be extracted from.

The Sole Source Aquifer (SSA) Program (authorized by Section 1424(e) of the Safe Drinking Water Act) allows communities to petition the United States Environmental Protection Agency (USEPA) for protection when a community is dependent on a single source of drinking water. There is no recognized sole source aquifer in the Study Area. Instead, water is drawn from various springs and groundwater resources throughout the region.

Water in the Study Area is drawn from various springs and groundwater resources throughout the region.

The Berkeley County Public Service Water District (BCPSWD) services much of surrounding the area within Berkeley County. The BCPSWD's primary water source is the Potomac River. The Potomac Water Filtration Plant produces approximately 3.5 million gallons of treated water each day and serves customers from the Maryland state line, south to Martinsburg, and west to Hedgesville.

The southern part of Berkeley County receives water primarily from the LeFevre Spring near Bunker Hill. The Bunker Hill Plant produces 2 million gallons of treated water per day and serves customers from the Virginia state line, north to Martinsburg and east to Baker Heights. The Woods Resort has its own system of groundwater wells. The BCPSWD also purchases water from the City of Martinsburg and has an emergency interconnection with the Frederick County, Virginia water system.

The City of Martinsburg receives much of its water from two separate ground water sources, which provide raw water to the Kilmer Springs Water Filtration Plant and Big Springs Water Filtration Plant, and maintains an alternate source of raw water at a nearby reservoir for a backup source of supply of raw water. The Kilmer Springs Water Filtration Plant averages 2 to 4 million gallons of treated water per day. It also has a 0.25-million-gallon raw water storage area. The Big Springs Water Filtration Plant produces 2.5 to 5 million gallons of treated water per day and services two distinct pressure zones. The low zone is served at elevations of 626 feet mean sea level (MSL) or less. This area extends from the original water service areas and eastward and uses pumping stations at the Red Hill Tank Site, Western Avenue Tanks site, and Stuckey Court Site to provide consistent water service. The high zone serves areas between 626 MSL and 699 MSL. These include areas at the west end of the city including City Hospital and areas west of I-81. Off-site storage/pumping for this zone is provided by the Boyd Orchard Tank Site. Numerous points of interchange occur between these pump stations to maintain water use during emergencies.

Berkley Springs is known for its mineral rich water, which is bottled and sold, entered in tasting competitions, and use at local bath houses. Public water within Berkeley Springs is serviced by Berkeley Springs Water Works and serves approximately 2,583 people from three (3) springs, the Basin, Gentlemen's Spring, and Ladies' Spring. The Berkeley Springs water system produces approximately 630,000 gallons of water per day with over 50% of the water unaccounted for (loss). The aquifers pulled from encompass approximately 2,206 acres and is within a Source Water Protection Area (SWPA). Areas under SWPA protection use plans which aim to safeguard, maintain, or improve the quality and/or quantity of drinking water sources and their contributing watersheds. Some examples of source water protection include streambank stabilization efforts, local ordinances to limit certain activities, developing emergency response plans, and incorporating riparian zone restoration.

Other water sources within the area include private groundwater wells and another well-known spring within the area, Speck Spring Farm, identified on **Figure 5-3 Aquatic Resources**.

One (1) area within the Study Area, Sonia's Bar and Grill, north of Martinsburg along I-81, is identified on the West Virginia Department of Environmental Protection's Water Resources Management Plan GIS Portal as a Source Water Assessment Program (SWAP) resource. Resources identified as SWAP under the provisions of the Safe Drinking Water Act (SDWA), are required to develop comprehensive SWAP

programs, which identify the watersheds supplying public tap water, an inventory of contaminants present in the watershed, and assess susceptibility to contamination in the watershed.

Watershed Protection Plans

Chesapeake Bay Watershed

The Study Area lies within the larger Chesapeake Bay Watershed, which is the largest estuary in the United States and the third largest in the world. The Chesapeake Bay watershed spans more than 64,000 square miles. It encompasses parts of six states—Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia—and the entire District of Columbia. Approximately eight million acres of land in the Bay watershed are permanently protected from development.

Executive Order 13508, Chesapeake Bay Protection and Restoration, required a Federal Leadership Committee to prepare a strategy for protecting and restoring the Chesapeake Bay. ***The Chesapeake Bay Final Comprehensive Water Resources and Restoration Plan (2019)***[4] outlines the comprehensive strategies for planned and future restoration activities within the Chesapeake Bay. The U.S. Environmental Protection Agency (EPA) and the six states have determined that the key to restoring the Bay's health entails reducing the flow of nutrients (nitrogen and phosphorus) and sediment flowing from the Bay states into the Bay, and have set maximum amounts for nitrogen, phosphorus and sediment, known as Cap Load Allocations for each of the jurisdictions.

West Virginia's portion of the Chesapeake Bay watershed is the land that drains into the Potomac River and its tributaries and a small area that drains into the James River. Fourteen percent (14%) of West Virginia drains into the Potomac River and on to the Chesapeake Bay. The Chesapeake Bay drainage area in West Virginia includes Berkeley, Grant, Hampshire, Hardy, Jefferson, Mineral, Morgan, Pendleton, and small portions of Preston and Tucker counties. As required by Executive Order 13508, West Virginia developed a Watershed Implementation Plan (WIP) that outlines their strategies to achieve target loads in the areas of wastewater, developed lands and industrial, agriculture, forest and other. During the NEPA process, this plan should be consulted and any appropriate strategies for alternatives still under consideration should be identified if there are any protected lands that may be impacted.

Sleepy Creek Watershed

The Sleepy Creek Watershed has a ***Watershed Based Plan (January 2008)***[5] with an updated plan currently being reviewed by the EPA (January 2021). The Sleepy Creek watershed was selected by the Potomac Tributary Strategy Implementation Committee as the second priority for their efforts toward the Chesapeake Bay Restoration. The designation of being the second priority for the Implementation Committee signifies the commitment from the stakeholders in the watershed, as well as the commitment from the conservation partners working to improve the health of the Chesapeake Bay. As

[4] Chesapeake Bay Final Comprehensive Water Resources and Restoration Plan (2019): https://usace.contentdm.oclc.org/digital/collection/p16021coll7/id/11895/
[5] Sleepy Creek Watershed Base Plan (2008): https://dep.wv.gov/WWE/Programs/nonptsource/WBP/Documents/WP/SleepyCreek_WBP.pdf

discussed above, Sleepy Creek has TMDLs (Total Maximum Daily Loads) for fecal coliform bacteria and is identified as impaired. During the NEPA process, this plan should be consulted and any appropriate strategies including minimizing the number of times a stream is crossed by an alternative, minimize impacts to riparian areas adjacent to waterways, and minimizing runoff from impervious surfaces should be considered when finalizing alternatives. Potential mitigation measures should also be identified including tree planting to replace or enhance buffer areas and stabilizing streambanks.

Back Creek Watershed

The Back Creek Watershed has a ***Watershed Protection Plan (June 2014)***[6] that outlines Best Management Practices for improvement strategies and restoration projects. Protection of forest, wetland, and farmland properties is seen as a key component in the protection of water quality of Back Creek. During the NEPA process, this plan should be consulted and any appropriate strategies for alternatives still under consideration should be identified if there are any protected lands that may be impacted.

Species of Special Concern

Species of special concern include species listed as endangered, threatened, rare, unique, uncommon or in population decline by federal and state agencies. Federally listed threatened and endangered species are protected by 16 U.S.C. § 1531-1543, The Endangered Species Act (1973). The WVDOH screened the Study Area using their existing GIS of federally listed Threatened and Endangered Species information. This information is compiled and maintained by the U.S. Fish & Wildlife Service (USFWS), the West Virginia Department of Natural Resources (WVDNR), the West Virginia Division of Highways (WVDOH) and other various federal, state and local entities. Two (2) Federally endangered plant species, the Northeastern bulrush (*Scirpus ancistrochaetus*) and Harperella (*Ptilimnium nodosum*) were identified within the Study Area. Additionally, two (2) Federally endangered mammals, the Indiana bat (*Myotis sodalis*) and Northern long-eared bat (*Myotis septentrionalis*) are known to have range throughout Morgan and Berkley Counties. State recognized mussel streams are also located within the Study Area. No critical habitats were identified through known databases. **Table 5-2, State and Federal Species of Special Concern**, lists Federally identified species of concern potentially within the vicinity of the Study Area. **Table 5-3 State Mussel Streams** identify streams recognized as State Mussel Streams.

Table 5-2: State and Federal Species of Special Concern

Common Name	Scientific Name	Status
Plants		
Harperella	*Scirpus ancistrochaetus*	Federally Endangered
Northeastern Bulrush	*Ptilimnium nodosum*	Federally Endangered
Mammals		
Indiana Bat	*Myotis sodalis*	Federally Endangered
Northern Long-eared Bat	*Myotis septentrionalis*	Federally Endangered

[6] Back Creek Watershed Protection Plan:
https://dep.wv.gov/WWE/Programs/nonptsource/WBP/Documents/WP/BackCreek_WPP.pdf

Table 5-3: State Mussel Streams

Watercourse	Designation
Back Creek Watershed	
Back Creek	High Quality and State Mussel Stream
Tilhance Creek	High Quality and State Mussel Stream
Sleepy Creek Watershed	
Meadow Branch	High Quality and State Mussel Stream
Sleepy Creek	High Quality and State Mussel Stream

Federal Species of Concern

The Indiana Bat (*Myotis sodalis*) has been federally listed as endangered since 1967 due to people disturbing hibernating bats in caves during the winter months. Indiana bats are vulnerable to disturbance because they hibernate in large numbers in only a few caves. The northern long-eared bat (*Myotis septentrionalis*) has been federally listed as threatened with interim 4(d) rule since February 16, 2016. The Northern long-eared bat (*Myotis septentrionalis*) is one of the species of bats most impacted by the disease known as white nose syndrome.

Northeastern bulrush (*Scirpus ancistrochaetus*) has been federally listed as endangered since 1991 and is identified as a relict species, one which once had a much larger range. It is known to persist in small wetlands, wet depressions with seasonally fluctuating water levels, or sinkhole ponds.

Harperella (*Ptilimnium nodosum*) is a perennial herb, which has been federally listed as endangered since 1988. Harperella is known to inhabit rocky or gravel shoals or sandbars along the margins of clear, swiftly flowing streams. Both species are threatened by habitat degradation and loss.

West Virginia Species of Concern

West Virginia has no state endangered species legislation; therefore, only species listed as Federally threatened or endangered are listed as of concern within the state. It is important to note that species of special concern, not protected by legislation, may still have management recommendations regarding their encroachment. The federal agency responsible for the protection of all federally listed threatened and endangered species identified in the Endangered Species Act, as well as any listed critical habitats, is the USFWS.

Geology and Mining

Geology

The Study Area is situated entirely within the Ridge and Valley physiographic province; the eastern terminus of the Study Area is located within the Great Valley sub-province. The Great Valley portion of the project encompasses only 12 sq mi or 14.6% of the total Study Area. The Ridge and Valley Physiographic Province contains folded and faulted rocks ranging in age from late Precambrian to early Mississippian. The Great Valley, a subprovince of the Ridge and Valley Province, is a relatively flat, agriculturally rich region composed of complexly folded and faulted Cambrian and Ordovician limestone

and dolostone with one prominent Ordovician shale (the Martinsburg Shale). The Great Valley Subprovince ends at North Mountain and from there to the Allegheny Front, a distance of about 50 miles, are a series of northeast-trending mountains and valleys. The rocks in this part of the Ridge and Valley Physiographic Province range in age from late Ordovician to early Mississippian. Valleys within the Ridge and Valley Physiographic Province and the Great Valley Subprovince consist primarily of shale and siltstone, while the mountain ridges are mainly composed of sandstone and limestone. Extensive thrust faults and folds, and complex structural geology are found throughout the Ridge and Valley Physiographic Province. Three (3) major allochthonous thrust sheets have displaced the surface and subsurface rocks westward in the order of 30 to 50 miles.

The following formations can be found within the Study Area:

- Alluvium
- Beekmantown Limestone
- Bossardville Limestone
- Chambersburg Limestone
- Chemung
- Hamilton
- Hedges Shale
- Helderberg Limestone
- Martinsburg Shale
- Medina
- Myers Shale
- Niagara
- Oriskany Sandstone
- Portage
- Rockwell Formation
- Stones River Limestone

The Study Area crosses rugged topography and roadway construction will require areas of deep cuts and high embankments.

Karst regions (1998) were downloaded from the West Virginia GIS Technical Center. The eastern portion of the Study Area is situated in known Karst terrain as shown on **Figure 5-4 Geology, Mining and Pipeline**. The Study Area contains 8,396 acres of Karst formation. Preliminary borings should be completed throughout the Study Area; however, and detailed geologic data is recommended to confirm the presence or absence of Karst terrain and identify potential issues.

Nearly 16% of the Study Area is situated in known Karst terrain.

Mining

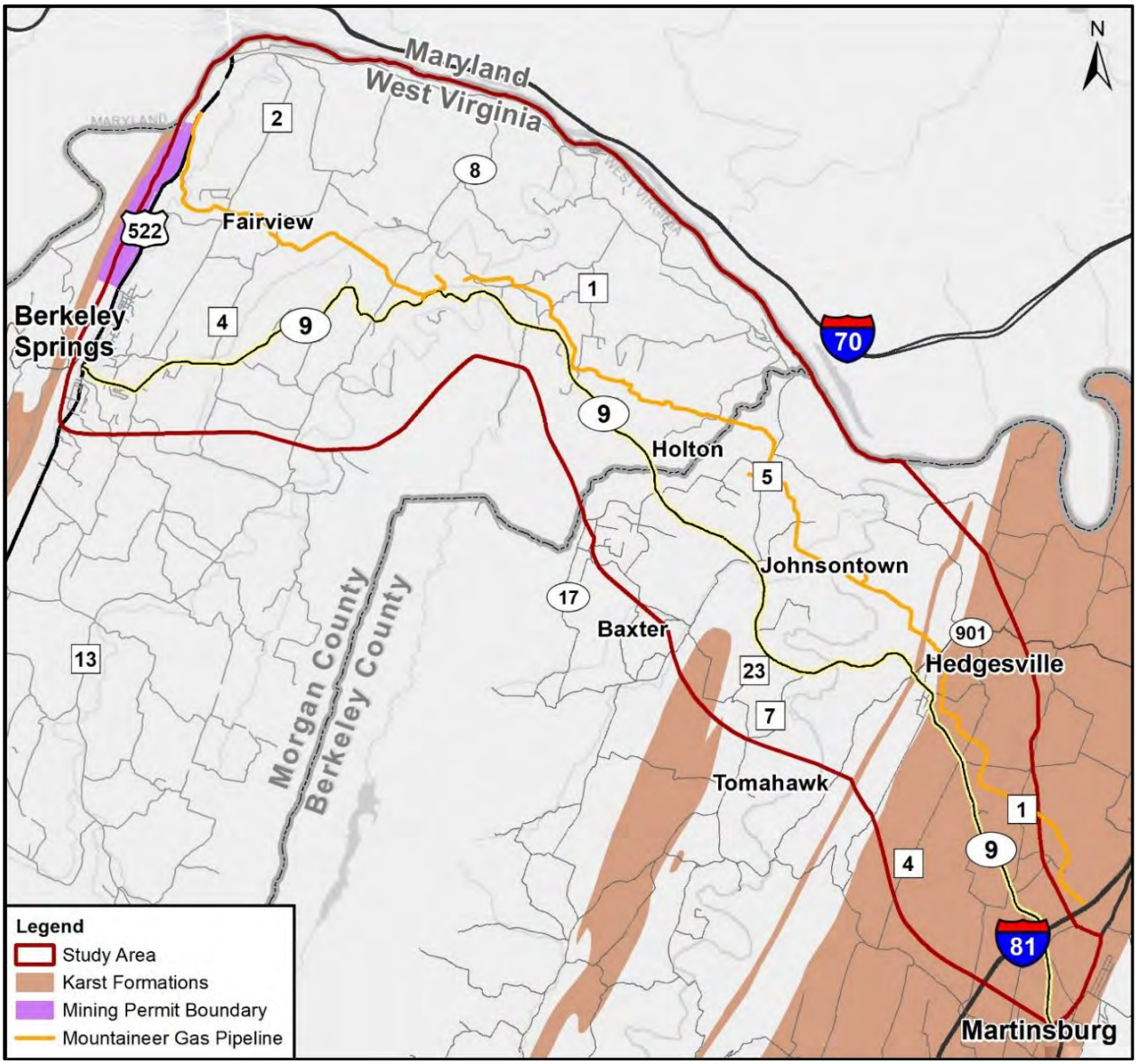
The Study Area has not been mined for coal using either deep or surface mining methods, see **Figure 5-4 Geology, Mining and Pipeline**. One sandstone surface mine located north of Berkeley Springs, owned by US Silica, uses hard rock mining methods to produce high-purity sandstone. The plant uses propane, fuel oil and electricity to make whole grain, ground, and fine ground silica. Berkeley Springs also produces a synthetic magnesium-silica product called Florisil. There are no known active limestone quarries in the Study Area.

Gas Pipeline

The Mountaineer Gas pipeline is an 8-inch natural gas pipeline located within the Study Area as shown on **Figure 5-4 Geology, Mining and Pipeline** and is operated by Mountaineer Gas Company. The pipeline

is part of the Eastern Panhandle Expansion project to convey natural gas between Maryland, Pennsylvania, and West Virginia.

Figure 5-4: Geology, Mining and Pipeline



Hazardous/Residual Waste Site

Hazardous and residual waste sites field reconnaissance studies have not yet been conducted for the Study Area. A Phase I and Phase II investigation are recommended during a future NEPA study. A non-invasive records search and on-site windshield survey were conducted to identify any current or previous sites that stored, generated, treated, or disposed of hazardous or non-hazardous materials located within the Study Area, which fall into the scope of the Comprehensive Environmental Response,

Compensation and Liability Act (CERCLA) and the Superfund Amendments Reauthorized Act (SARA), 42 USC 9601 (35)(B).

Desktop and windshield surveys were conducted in 2021 to confirm the location of potential waste sites identified in various state and federal government databases.

A search of the EPA EnviroFACTS multisystem search identified 263 sites reporting to the EPA including gas stations, mechanic stations, hospitals, industrial facilities, commercial facilities, water companies, and the Waste Management LCS Services Landfill and Berkeley County Solid Waste Authority Recycling Center located in Hedgesville, WV.

During the windshield survey, several sites were identified as containing above ground storage tanks or potentially containing underground storage tanks. Several orchards were also observed. Given the age of some of the orchards within the area, they may have historically used lead arsenate for pest control. These types of orchards are also referred to as "arsenic orchards" and may be present within the Study Area.

EPA Facility Results

A search of the EPA cleanups in your community tool (identifies Superfund, RCRA, Brownfields, and Emergency Response programs) identified eight reporting properties within the Study Area. A summary of these sites are listed in **Table 5-4, Facility Registry Service Report Summary** and shown on **Figure 5-5 EPA Hazardous Sites**.

In addition, spill response report is located within the Study Area at the corner of North Queen Street and Lambert Street in Martinsburg, WV (coordinates: 39.4709920, -77.9543280). Chlorinated organic contamination was discovered in soil gas samples. No related ground water data was available

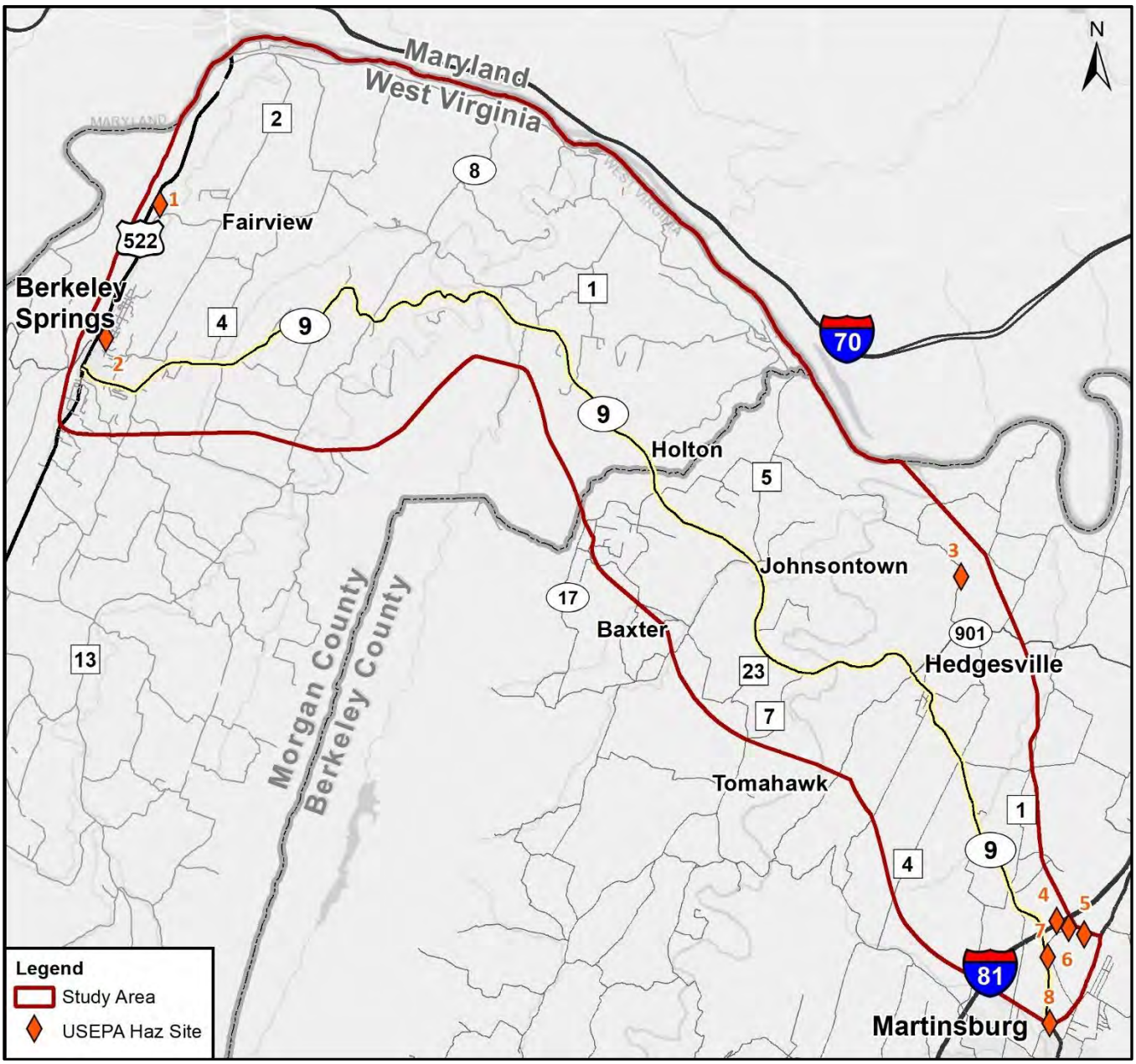
Table 5-4: Facility Registry Service Report Summary

Facility Name	System ID	EPA Registry Code	Address	Environmental Interest Type	Data Source
1. U. S. Silica Company	N/A	110009123162	Berkeley Springs, WV 25411	Air Major (Operating); Compliance Activity	AIRS/AFSNC DB
2. North Berkeley Rail Trail	236401	110070225934	107 Williams St Berkeley Springs, WV 25411	Brownfields Property	ACRES
3. LCS Services Landfill	WV0041	110043815324	911 Allensville Road Hedgesville, WV 25427	Clean Air Act Stationary Source Major Discharger of Air Pollutants; Non-Hazardous Waste Site; Criteria and Hazardous	ICIS AIRS/AFS LMOP EIS E-GGRT

Facility Name	System ID	EPA Registry Code	Address	Environmental Interest Type	Data Source
				Air Pollutant Inventory; Landfill Gas (LFG) Recover; Air Major; Landfill; Air Emissions Classification Unknown; Greenhouse Gas Reporter; RE-Powering Site	
4. Rust-Oleum Corporation	WVR000531194	110059675249	891 Autoparts Place-Space A4 Martinsburg, WV 25401	TSCA Submitter; RMP Reporter; LQG (Y)	API RMP RCRAINFO
5. Ecolab Inc	WVR000541938	11007642129	621 Mid Atlantic Parkway Martinsburg, WV 25404	LQG (Y); Hazardous Waste Biennial Reporter	RCRAINFO
6. MAAX US Corporation	WVR000529842	110040877806	718 Mid Atlantic Parkway Martinsburg, WV 25404	Toxic Release Inventory Reporter; SQG (Y); OSHA Establishment; Hazardous Air Pollutant Inventory; ICIS-NPDES Non-Major; Air Emissions Classification Unknown	ICIS RCRAINFO EIS OSHA-OIS TRIS
7. MAAX US Corporation	WV00000300026	110064352926	2011 Mid Atlantic IND Parkway Martinsburg, WV 25404	Clean Air Act Stationary Source Major Discharger of Air Pollutants; Air Major	AIRS/AFS ICIS
8. CVS Pharmacy #1429	WVR000526558	110045567711	1200 Edwin Miller Boulevard Martinsburg, WV 25404	Hazardous Waste Large Quantity Generator; Unspecified Universe	RCRAINFO

Source: https://www.epa.gov/cleanups/cleanups-my-community

Figure 5-5: EPA Hazardous Sites



Cultural Resources

Archaeological Resources

The Study Area is situated entirely within the Ridge and Valley physiographic province; the eastern terminus of the Study Area is located within the Great Valley sub-province. The Study Area was investigated via a Windshield Survey conducted April 5-6, 2021 in order to preliminarily characterize the region in terms of topography, landforms, water sources and other physical and/or environmental characteristics that may have contributed to human use and/or occupation of the region during both

prehistory and history. Additionally, the survey made note of unique cultural features (e.g. unmarked cemeteries) as well as areas that were demonstrably disturbed via such things as soil stripping, construction, residential development, and/or other land modification. The survey involved driving all roadway and trail courses that were accessible by vehicle and which were not marked as Private Road or with No Trespassing signage.

The overall terrain of Ridge and Valley province within the Study Area, moving west to east, is characterized by a diverse assortment of physical settings, including, but not limited to, gently rolling/undulating and hilly terrain; smaller, level, narrower stream or creek valleys displaying smaller floodplain and/or terrace settings; steeply sloped landscape dissected by V-shaped drainages; areas containing very steep, rock-faced escarpments; saddles; benches; narrow level ridge tops; and much broader, level hilltops. As the project moves into the Great Valley, the foothills and toe slopes descend into the level to slightly undulating floodplains and terraces associated with the Potomac River. Together these present a varied assortment of conditions favorable for human occupation and/or use over time .

Over the last approximately 30 years, many of the ridgetop settings have become residential developments.

Aside from the smaller communities that dot the Study Area between Berkeley Springs and Martinsburg, current land use within the Study Area is predominantly agricultural in the western and central portion of the Study Area – particularly in the floodplain and large broad hilltop settings. Over the last approximately 30 years however, many of these hill and ridgetop settings have become private residential developments; some of which appear to have been moderately to substantially modified via grading and landscaping. Moving into the Great Valley, the region is currently typified by larger scale farms, significant commercial and industrial development (particularly closer to Martinsburg), as well as large expanses of both older and newer residential development.

Previously Recorded Archaeological Resources

Known archaeological sites and prior archaeological surveys (2020) were obtained from the West Virginia State Historic Preservation Office. The SHPO data identified eighty-seven (87) previously recorded sites within the Study Area and forty-five (45) prior cultural resource surveys have been conducted within the Study Area. Historic preservation law prevents the sites from being shown on a map.

Archaeology Probability Areas

A preliminary assessment of archaeological probability was conducted for the Study Area based on a review of key factors including, but not limited to, physiographic location, topographic setting, and proximity to water. In addition, historic site probability was also preliminarily assessed via the cursory examination of available regional historic mapping showing locations of constructs, buildings, and other historic features, as well as a review of several online sources (e.g., WV SHPO Interactive Map Viewer) denoting locations of such historical events as Civil War-era troop movements and early frontier settlement. With 87 previously recorded archaeological resources located within the Study Area, it is evident that the region has a rich prehistoric and historic past. Based on the aforementioned factors, the

majority of the Study Area has been shown to be situated within areas classified as high probability for encountering subsurface prehistoric archaeological deposits as shown on **Figure 5-6 Archaeology Probability Areas**. Similarly, a high potential for encountering previously unidentified historic archaeological sites also exists based not only on the number of known sites related to historic settlement, but also upon historic records indicating a high degree of activity at particular points in history (e.g., Civil War). **Photos 5-1 through 5-6** exhibit representative areas within the Study Area that would be considered to have high potential for encountering buried archaeological deposits. The location of each photograph is shown on **Figure 5-6 Archaeology Probability Areas**.

Figure 5-6: Archaeology Probability Areas

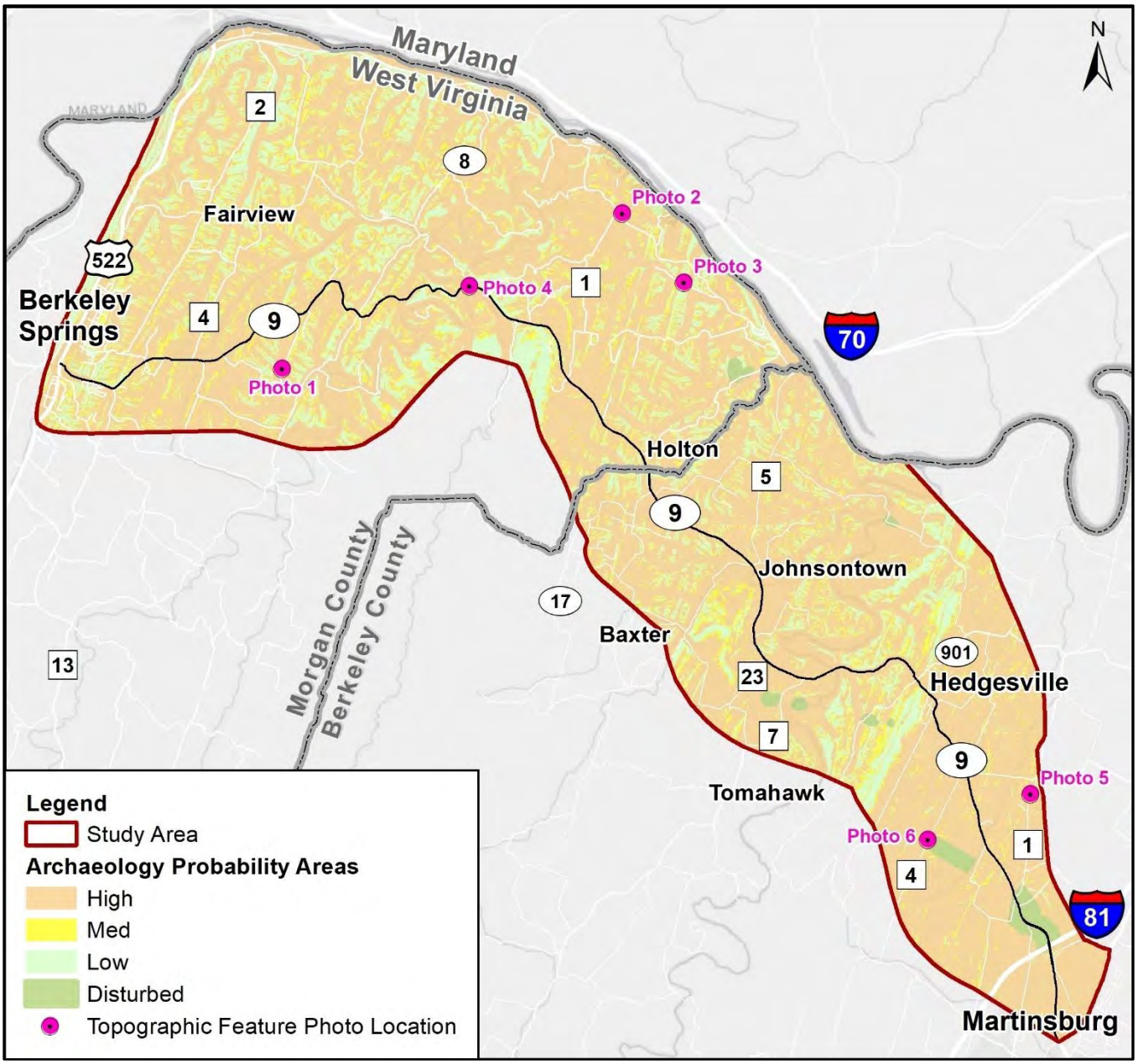


Photo 5-1: General view facing south of broad level hilltop setting within the Ridge & Valley physiographic province portion of the Study Area, roughly 1,150 ft northeast of the intersection of Ridersville Road and Winstead Road.

Photo 5-2: General view facing northeast toward Potomac River valley of gently rolling level hilltop setting intersected by drainage heads within the Ridge & Valley physiographic province portion of the Study Area, just northeast of the intersection of Householder Road and Deshong Lane.

Photo 5-3: General view of narrow stream valley floodplain and terrace setting within the Ridge & Valley physiographic province portion of the Study Area, facing southwest toward Big Run from Householder Road.

Photo 5-4: General view of floodplain/terrace setting within the Ridge & Valley physiographic province of the Study Area, at the confluence of an unnamed tributary/drainage and Sleepy Creek, facing southwest from WV 9/Martinsburg Road.

Photo 5-5: General view of low relief, level to hilly terrain, characterizing the broad expanse of the Great Valley sub-province/Potomac River valley portion of the Study Area, facing southwest from Harlan Springs Road.

Photo 5-6: General view of low relief, level to undulating terrain, characterizing the broad expanse of the Great Valley sub-province/Potomac River valley portion of the Study Area, facing northwest from Ridge Road South toward the toe slopes and foothills of the Ridge & Valley physiographic province.

To assess the likelihood of encountering archaeological resources within the Study Area, key assumptions were made to help guide the development of high, medium, and lower probability areas:

- Landforms exhibiting less than 15% slope have been demonstrated in West Virginia to have a high probability for containing archaeological resources. Several topographic landforms fall within this category including, but not limited to, gently undulating and/or low relief terrain, floodplains, terraces, benches, saddles, and upland flats such as broad hilltops, ridgetops/lines, and ridge spurs, among others.
- Proximity to a water source, whether it be a drainage head, spring, run, stream, or major river, has been shown to be conducive to human occupation and/or use. Based on a review of previously identified archaeological resources within the Study Area and their proximity to a water source, high probability is accorded to areas within 100 meters (328 feet) of a water source.
- Extremely steep landforms exceeding 20% slope (encountered principally within the Ridge & Valley portion of the Study Area) have been shown in West Virginia to have considerably low potential for containing evidence of human occupation and/or use.
- For the purposes of this study, slopes between 15–20% have been coded as medium, or moderate, potential for containing evidence of human occupation and/or use.
- Use of the term "low probability" does not equate with "no probability," merely that the chances of encountering significant buried subsurface archaeological deposits are less likely and/or considerably reduced.
- It is equally important to emphasize that there may be pockets of medium to high probability within areas otherwise demarcated as "low probability" (e.g., narrow hillside benches, rock shelters).
- Areas designated as "Disturbed" exhibit demonstrable evidence of substantial subsurface disturbance. For the purposes of this report, those areas are considered to have no or little archaeological potential.
- It is assumed that historic period occupations and/or use mirror the medium to high probability areas as defined above, with a preference for generally level land with access to water – conducive to historic agricultural production.

Development of Probability Areas considerations:

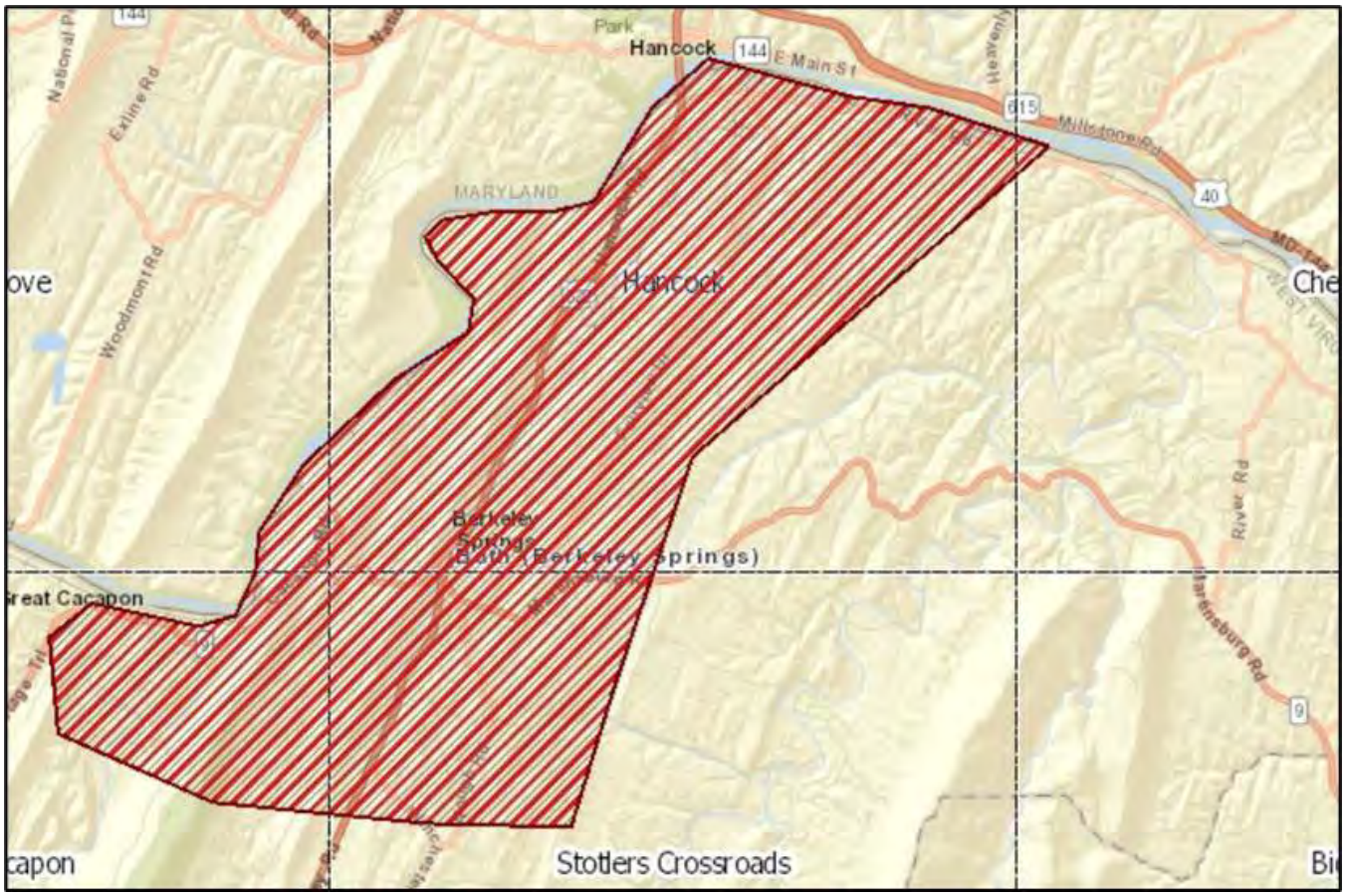
- Areas within a 100-year floodplain or within 100 meters of a stream are considered high probability
- Areas with slope less than 15% are considered high probability
- Areas with slope between 15% and 20% are considered medium probability
- Areas with slope > 20% are considered low probability

However, it is important to note that archaeological evidence for other historic site types, such as those related to broader historical events, (e.g., French & Indian War, Civil War) may also be present within

the Study Area. For example, a preliminary review of historic maps and contextual information indicates the general region has been occupied at least since the 1750s with French & Indian War era forts located at Martinsburg and Hedgesville. Another fort, Stewart's Fort (aka Sleepy Creek Fort), was putatively located in the vicinity of the intersection of present-day River Road with Collier Lane, near the mouth of Sleepy Creek, although its exact location remains unknown (French and Indian War Foundation 2021).

The western portion of the Study Area in Morgan County falls within a zone of documented Civil War troop movements and activities associated with the Battle for Bath. In January of 1862, as part of the Confederate push to secure Romney in the South Branch Valley, General Stonewall Jackson and his 8,500 troops used the town (now Berkeley Springs) as the location from which to push Union forces back across the Potomac River to nearby Hancock, MD, thereby opening up his route westward to Romney. The GIS polygon for this event, as displayed in the WV SHPO Interactive Map Viewer, and developed by Brewer and Donaldson (2011:2) on behalf of the WV SHPO, is based on "… the information available via the Official Records of the War of the Rebellion, other correspondence, atlases, and any additional primary source material" (see **Figure 5-7 Civil War Era Battle for Bath**).

Figure 5-7: Location of the Civil War Era Battle for Bath



Historic Resources

The Study Area spans Morgan and Berkeley counties, both of which retain significant historic resources that are capable of conveying the rich histories and themes of their respective counties. Berkeley County was formed from Frederick County, Virginia, in 1772, while Morgan County was created by an act of the Virginia General Assembly in March 1820 from parts of Berkeley and Hampshire counties.

By the mid-twentieth century, the Study Area was somewhat different than it is today. The Baltimore and Ohio and Pennsylvania Railroad traversed through the eastern end of the Study Area, connecting towns along the Potomac River with larger cities such as Berkeley Springs and Martinsburg. Paralleling the northern edge of the Study Area, these extant tracks were once part of large railyards at Cherry Run and Cumbo Yard. The towns of Hedgesville and North Mountain remain relatively similar to their appearance in 1944 (USGS 1944), as does Johnsontown. Some towns, such as Cherry Run, appear to have lost infrastructure and housing, based on a cursory review of historical mapping (USGS 1951). Many small towns once comprised of a few buildings remain as such, are remembered primarily by their cemeteries, such as Michael's Chapel and Chestnut Grove. Berkeley Springs appears to have grown, particularly in its suburbs.

One of the most noticeable differences in the mapping from the mid-twentieth century and the current landscape is the presence of Interstate 81 at the southeast portion of the Study Area; many of the other state routes and rural highways have remain unchanged. Another striking difference is the loss of productive orchard land, which is now overgrown, developed, or turned into tilled agricultural lands. Despite the changes, the Study Area retains a substantial number of historic-age resources (45 years of age or older at the time of study; constructed in or prior to 1976), some of which are listed in the National Register of Historic Places (NRHP), eligible for listing in the NRHP, or upon further study, may be potentially eligible for listing in the NRHP.

The identification of historic resources began with an examination of pertinent West Virginia Historic Property Inventory (WVHPI) forms and available records from the West Virginia Department of Arts, Culture, and History (WVDACH) in Charleston. The WVDACH's State Historic Preservation Office (SHPO) provided information on previously recorded historic resources, including individual properties and historic districts, along with their boundaries. The information included NRHP eligibility status, resource name, age, and significance (where applicable). Copies of the forms were obtained for reference.

Historic Properties

There are twenty-one (21) properties individually listed in the NRHP and three (3) NRHP-listed historic districts within the Study Area are shown on **Figure 5-8 Historic Resources** and listed on **Table 5-5 Study Area NRHP-Listed Properties**. In Morgan County, the previously recorded historic properties (listed in the NRHP) are located in and around Berkeley Springs. In Berkeley County, these properties are primarily located in and around Hedgesville and Martinsburg.

Figure 5-8 Historic Resources

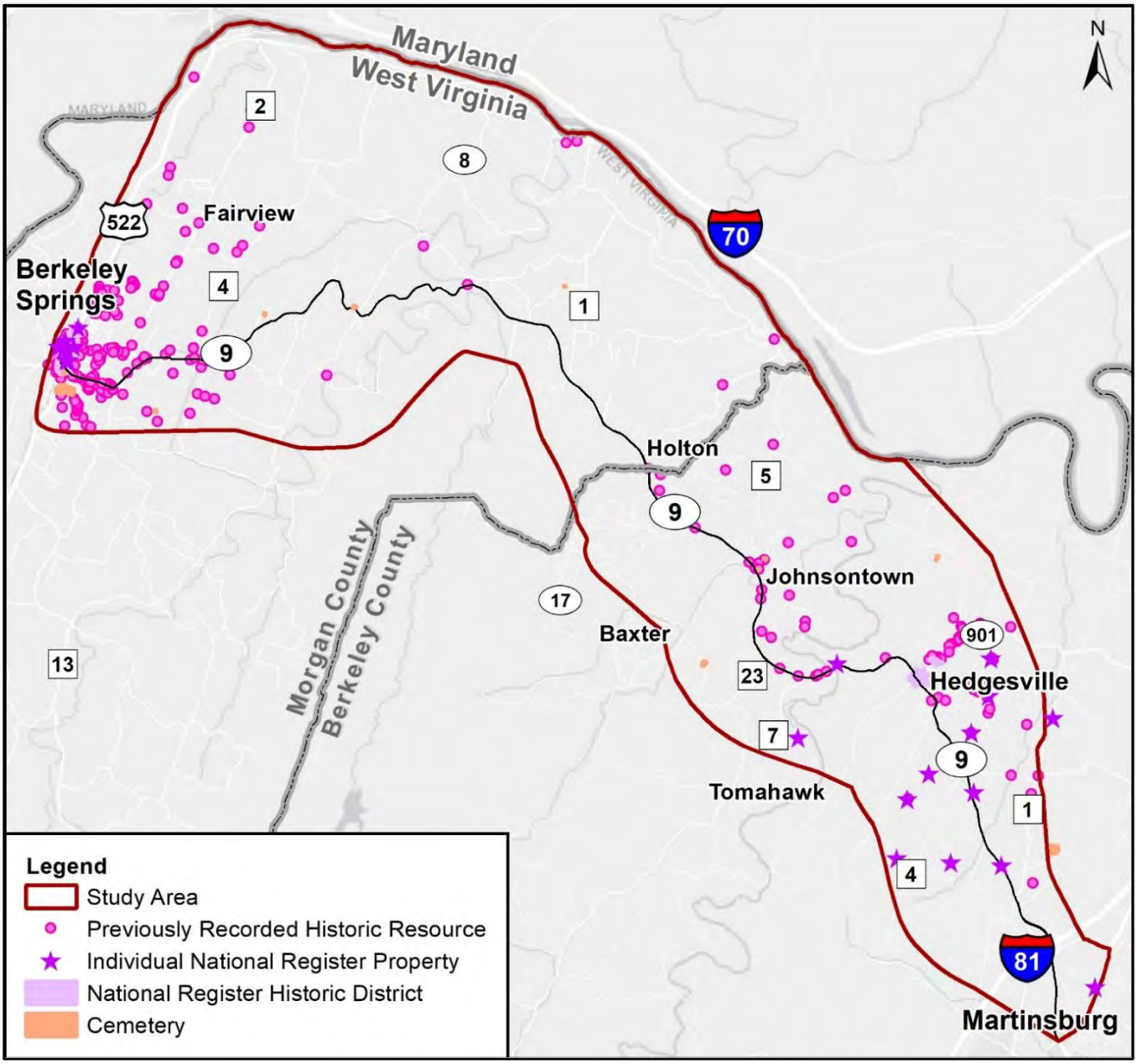
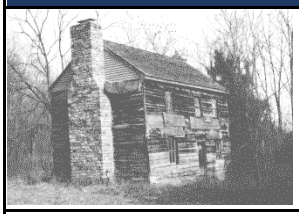
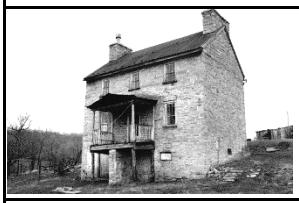


Table 5-5 Study Area NRHP-Listed Properties

Photograph	National Register ID	Name	Location	Significance
	00001310	Boggs, William, Farm	WV 7, Hedgesville, WV	Individually Listed
	00001313	Berkeley Springs Train Depot	504 N. Washington Street Berkeley Springs, WV	Individually Listed
	02001526	Speck, Peter, House	1149 Ben Speck Road, Martinsburg, WV	Individually Listed
	03000350	Hovermale, Clarence, House	167 Wilkes Street Berkeley Springs, WV	Individually Listed
	04000028	Robinson-Tabb House	377 Holden Drive Martinsburg, WV	Individually Listed
	04000032	Nadenbousch, Moses, House	2540 Harlan Spring Road Martinsburg, WV	Individually Listed
	04000310	Overlook (William Douglass Harlan House)	2910 Harlan Spring Road Martinsburg, WV	Individually Listed
	04000314	Clary's Mountain Historic District	Hammond's Mill Road, Hedgesville, WV	District

Photograph	National Register ID	Name	Location	Significance
	05001004	Morgan County Courthouse	202 Fairfax Street Berkeley Springs, WV	Individually Listed
	09000245	Town of Bath Historic District Berkeley Springs Historic District	Roughly Washington and Fairfax Streets and adjacent blocks Berkeley Springs, WV	District
	76001930	Cunningham, Samuel, House	SE of Hedgesville off WV 9 Hedgesville, WV	Individually Listed
	76001931	Hedges, Samuel, House	CR 9/10 Hedgesville, WV	Individually Listed
	76001943	Berkeley Springs State Park	S. Washington and Fairfax Streets Berkeley Springs, WV	Individually Listed
	06000172 73001896	Snodgrass Tavern and Boundary Increase	N side Hedgesville Road (WV 9), W of Hedgesville	Individually Listed
	80004035	Suit, Samuel Taylor, Cottage	WV 9 Berkeley Springs, WV	Individually Listed
	80004418	Hedges-Robinson-Myers House	WV Rt. 3, Hedgesville, WV	Individually Listed

Photograph	National Register ID	Name	Location	Significance
	80004419	Hedgesville Historic District	Approximately N and S Mary St, & E and W Main Street Hedgesville, WV	District
	83003247	Dawson, T. H. B., House	300 S. Green Street Berkeley Springs, WV	Individually Listed
	84003473	Hedges, Decatur, House	WV Rt. 9 Hedgesville, WV	Individually Listed
	84003500	Tabb, Edward, House	On CR 4 S of jct. with WV 9 Hedgesville, WV	Individually Listed
	84003643	Sloat-Horn-Rossell House	415 Fairfax Street Berkeley Springs, WV	Individually Listed
	86000896	Wright, Judge John W., Cottage	305 S. Green Street Berkeley Springs, WV	Individually Listed
	91000556	Hedges-Lemen House	Co. Rt. 4, .7 mi. N of jct. with WV 9 Hedgesville, WV	Individually Listed
	91000557	Kunkel, Elizabeth, House	W side of US 11, 2.4 mi. N of Martinsburg Martinsburg, WV	Individually Listed

Previously Recorded Historic Resources

The Study Area contains four-hundred-forty-five (445) historic resources previously recorded through the WVHPI. While some of the previously recorded historic resources are also listed in or eligible for listing in the NRHP, most of these resources need to be intensively surveyed prior to making recommendations of eligibility. Most of these resources may not be eligible for listing in the NRHP due to lack of significance, lack of historic integrity, or both. Some resources have been demolished since the time of their initial survey.

Known Cemeteries

The Study Area contains seven (7) previously documented cemeteries, although it is likely there are many other cemeteries that have yet to be documented. For example, project historians identified an additional four (4) cemeteries during the windshield survey for this project. **Table 5-6 Known Cemeteries** lists the known cemeteries within the Study Area.

Table 5-6 Known Cemeteries

WVHPI No.	Name	Address	Description
N/A	Allensville Cemetery	Allensville Road Allensville Road (CR 3/2), Hedgesville, WV	This cemetery has approximately 140 burials dating from 1845 through the present.
N/A	Hedgesville Assembly of God Church Cemetery	Butts Mill Road Hedgesville, WV	This is a small cemetery owned by the Pentecostal Church based out of Hedgesville, WV. The cemetery dates to 1937 with an unknown number of graves.
N/A	Chestnut Grove Cemetery	Potter Road, near Schoolhouse Way	Little is known about this cemetery, which is on active farmland.
N/A	Spohrs Crossroads Cemetery (Mt. Zion UMC)	5377 Martinsburg Road, Berkeley Springs, WV	This cemetery contains approximately 1,500 graves.
46-MN-135	Michael Cemetery	Along Tolley Lane near Beulah Land Lane, Berkeley Springs, WV	This cemetery contains approximately 115 burials with the dating from 1812 through the 2000s.
46-MN-130	Old Dutch Cemetery	Located near the intersection of South Green Street and Biser Street, Berkeley Springs, WV.	This cemetery was variously known as the Dutch, German, or Lutheran cemetery. It holds approximately 100 burials.
46-MN-133	Greenway Cemetery	Bounded by S. Washington Street (SR 522), Bishop Street, Greenway Drive, Johnsons Mill Road, and Broadway Street in Berkeley Springs, WV.	This large, planned cemetery has over 4,900 burials dating from 1818 through the present.

WVHPI No.	Name	Address	Description
46-MN-132	Friendship Cemetery	The cemetery is located along Friendship Lane (CR 9/15) near the intersection with Martinsburg Road (WV Rt. 9), near Ridersville, WV.	This cemetery contains approximately 163 burials dating from the 1820s through the 2000s. Many of the graves are people of German ancestry.
46-BY-252	World Evangelism Worship Center Cemetery / Open Arms Ministries	8958 Hedgesville Road Hedgesville, WV	This cemetery is located adjacent to the church building (BY-0033-0155). There are approximately 60 burials dating from the 1890s through the 1990s.
46-BY-251	Johnsontown Church of the Brethren Cemetery	95 Conner Bowers Rd Hedgesville, WV	This cemetery has approximately 275 burials located behind the church building. The church (BY-0033-0153) was constructed ca. 1900 and added on to in phases. Little original historic fabric remains of the church building.
46-BY-101	Jacob Weaver Farm	Approximately 5000 feet northeast of the intersection of WV Rt. 9 and General Motors Road, northwest of Martinsburg; south of the Cumbo Yard Railroad Spur	This cemetery is (was) located on a farm property along with the remains of a house, slave quarters, bank barn, outbuildings, well, cistern, and an icehouse. The burials dated from the 1850s to the late Twentieth Century. In 2010, a large warehouse was constructed on the farm property, destroying all components of the farm. It is not clear what became of the burials.

Air Quality

The 1990 Clean Air Act Amendments (CAAA) requires that a proposed project not cause any new violation to the National Ambient Air Quality Standards (NAAQS), or increase the frequency or severity of any existing violations, or delay attainment of any NAAQS. The EPA established the NAAQS for Carbon Monoxide, Lead, Nitrogen Dioxide, Ozone, Particulate Matter (PM2.5 and PM10) and Sulfur Dioxide. The State of West Virginia adopted the standards set forth in the NAAQS. The Environmental Protection Agency (EPA) conducts ambient air monitoring for these pollutants at various locations throughout West Virginia. Areas within the state can be divided into attainment, maintenance and non-attainment areas, with classifications based upon the severity of the air quality problems. Attainment areas are areas that meet the National Ambient Air Quality Standards (NAAQS).

The Study Area is located within Berkeley and Morgan Counties. Morgan County and Berkeley County are both currently in attainment for all NAAQS pollutants. For project level requirements, the Clean Air

Act Amendments do not require a CO analysis for an attainment area. The appropriate level of study will be identified as part of the future study.

Noise

A planning level noise study was performed to establish potential noise impacts in accordance with **West Virginia Department of Transportation Division of Highways (WVDOH) Highway Traffic Noise Policy (July 13, 2011)**, updated as the **Design Directive DD-253 Noise Analysis and Abatement Guidelines (August 19, 2011)**. WVDOH guidelines are based on the latest **FHWA Federal Aid Policy Guide 23 CFR 772**. Potential sensitive receptors within 400 feet of the alternative corridors were identified through review of aerial photography and available on-line sources. For planning purposes, the FHWA Traffic Noise Model (TNM) was used to conservatively estimate the number of noise sensitive sites that may be impacted as a result of the proposed improvements. Results of the noise study are discussed in **10.0 Preliminary Screening.**

Community Facilities

Schools, libraries, places of worship, hospitals, parks, police stations, fire departments, and recreational and public facilities (2020) were obtained from the West Virginia GIS Technical Center and Google Earth. See **Figure 5-9 Community Facilities** for the community facilities located within the Study Area.

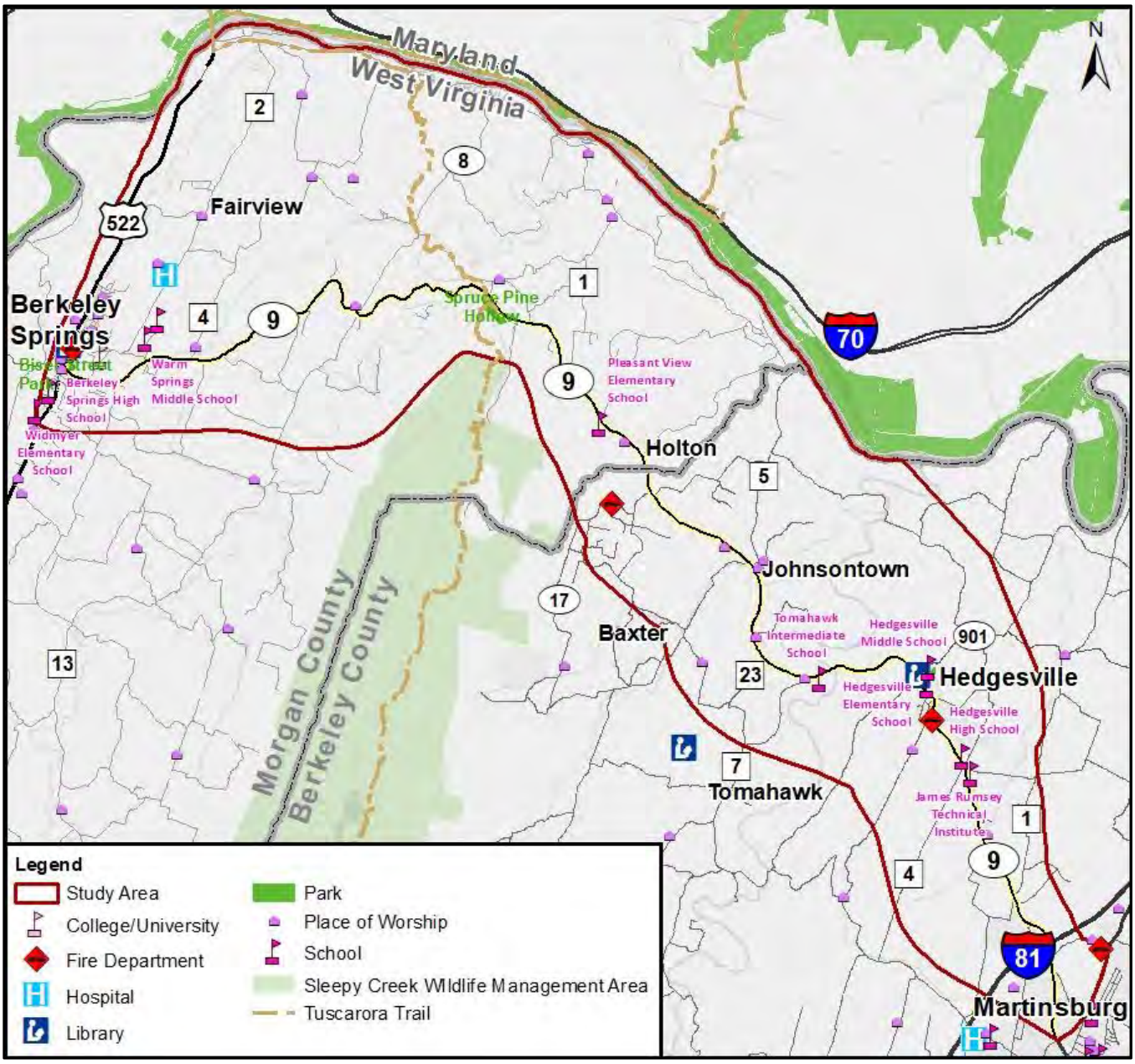
The War Memorial Hospital, which opened in 2012, is located near Berkeley Springs and adjacent to the proposed US 522 Bypass and Fairview Connector.

There are ten (10) public schools within the Study Area including the Widmyer Elementary School and Berkeley Springs High School in Berkeley Springs, the Warm Springs Intermediate and Middle Schools, Pleasant View Elementary School, Tomahawk Intermediate School, James Rumsey Technical Institute, and the Hedgesville Elementary, Middle and High Schools. Additionally, one (1) college, the Blue Ridge Community and Technical College's Morgan County Campus, is located near Berkeley Springs within the Study Area.

The Study Area contains two (2) libraries, the Morgan County Public Library located within Berkeley Springs and the Hedgesville Public Library located within Hedgesville. There are also thirty-eight (38) places of worship scattered throughout the Study Area. Three (3) fire stations are located within the Study Area including two (2) Hedgesville stations, and the Berkeley Springs Volunteer Fire Department.

Spruce Pine Hollow Park is a roadside park located along WV 9. The park is owned by the Sons of the Revolution and maintained by Morgan County. Tuscarora Trail crosses WV 9 and can be accessed just east of Spruce Pine Hollow Park. Tuscarora Trail is a 252-mile spur of the Appalachian Trail that extends from Shenandoah National Park in Virginia to New Marysville, Pennsylvania.

Figure 5-9 Community Facilities



Section 4(f) and 6(f) Resources

Section 4(f) of the Department of Transportation Act of 1966, as amended (49 U.S.C. 3030) protects public parks, publicly owned recreation areas, wildlife and waterfowl refuges, and historic and/or cultural resources of national, state of local significance from conversion to highway use unless there is no prudent or feasible alternative. There currently are no resources protected by Section 4(f) that will be impacted by the Build Alternatives.

Section 6(f) of the Land and Water Conservation Fund Act of 1965, (Public Law 88-578) prohibits property acquired or developed with assistance under the Act from being converted to other than public outdoor recreation uses without the approval of the Secretary of the Interior. A review for potential Section 6(f) properties will be required during the NEPA process.

Pedestrian / Bicycle Accommodations

Existing and planned Pedestrian / Bicycle facility information was requested from the WVDOH, HEPMPO, municipalities and county planning agencies. The Tuscarora Trail is the only identified trail within the Study Area (see **Figure 5-9 Community Facilities**). The HEPMPO completed a **Regional Bike Study (2016)** which identified the need for bike facility improvements between Berkeley Springs and Martinsburg. Existing WV 9 roadway widths and right-of-ways do not allow for improved bicycle facilities. Therefore, the HEPMPO Regional Bike Study recommended a future pedestrian / bicycle facility be included as part of the WV 9 PEL Study of Build alternatives.

The PEL study recommends evaluating the feasibility of a separate multi-use path adjacent to any Build alternatives.

Socioeconomic

The Study Area is located within Berkeley and Morgan Counties in the northeast portion of West Virginia, between Berkeley Springs and Martinsburg. The Study Area is predominantly rural in nature with residential and commercial growth occurring primarily to the west of Hedgesville.

The Study Area is comprised of five (5) census tracts with two (2) census tracts located within Morgan County and three (3) census tracts in Berkeley County as shown on **Figure 5-10 Census Tracts**.

Data from the 2010 Decennial US Census (2010) and from the 2015-2019 American Community Survey (2019 ACS) were collected to analyze the demographic characteristics of the Study Area, including population, race, language, and income data.

Population Growth

Between 2010 and 2019, the state of West Virginia experienced a 3.3% decrease in population. Conversely, between 2010 and 2019 the population of Morgan County and Berkeley County have increased, 2.0% and 14.4%, respectively as shown on **Table 5-7 Population Growth** and further breaks down the change in population by census tract and block groups for the Study Area.

Berkeley and Morgan Counties have both experienced an increase in population between 2010 and 2019.

Table 5-7: Population Growth

Census Block Group	2010	2019 ACS	% Change
Morgan County	**17,541**	**17,709**	**2.0**
Tract 9707.00 Block Group 1	2,468	2,300	-6.8
Block Group 2	1,861	2,232	19.9
Block Group 3	2,026	2,210	9.1
Tract 9708.00 Block Group 1	1,114	1,231	10.5
Block Group 3	453	477	5.3
Block Group 4	973	888	-8.7
Berkeley County	**104,169**	**115, 329**	**14.4**
Tract 9712.01 Block Group 1	1,458	1,242	-14.8
Block Group 2	2,314	2,766	19.5
Block Group 3	2,734	3,263	19.3
Block Group 4	1,911	2,255	18.0
Tract 9712.02 Block Group 1	892	1,227	37.6
Block Group 2	1,455	986	-32.2
Block Group 3	1,510	1,354	-10.3
Block Group 4	1,988	1,624	-18.3
Tract 9713.00 Block Group 3	2,541	2,915	14.7
Block Group 4	2,032	2,645	30.2

Sources: US Census Bureau 2010 P1 and American Community Survey 2015-2019 B01001

Economic Environment

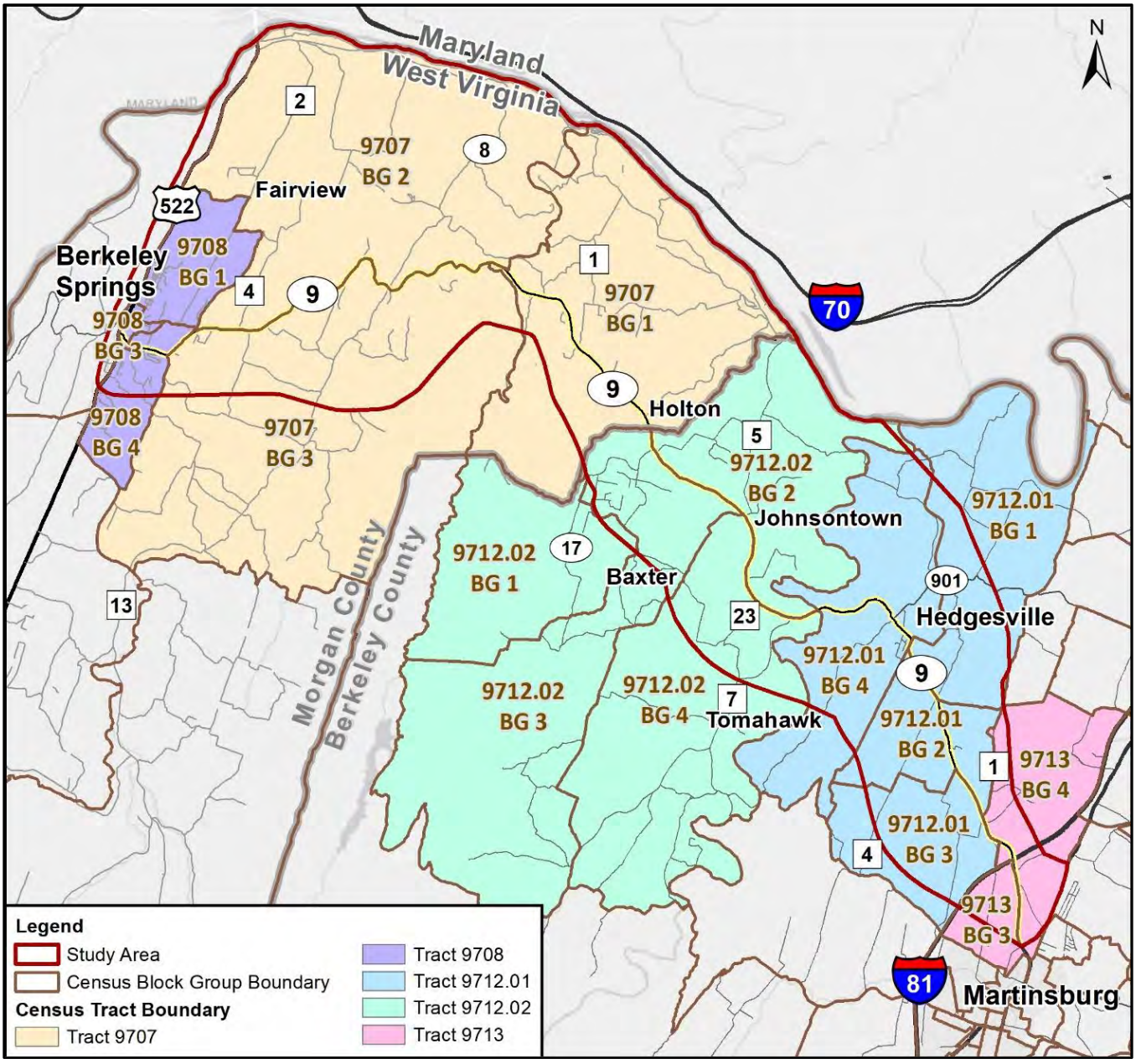
According to the Current Population Survey Annual Social and Economic Supplements (CPS ASEC) conducted by the U.S. Census Bureau and the 2019 ACS the median household income for West Virginia is $46,711. The median household income in both Morgan and Berkeley Counties are above the state average. Morgan County has a median household income of $51,745 and Berkeley County is $62,515. Similarly in 2019, the median household income for the United States is $65,712.

Both Berkeley and Morgan Counties have a lower poverty rates than the state of West Virginia.

The official poverty rate for the United States in 2019 was 12.3%, a decline from 13.1% in 2018. The poverty rate for the state of West Virginia in 2019 was significantly higher than the average, at 16.0%. The 2019 ACS poverty

rate for Berkeley County was 12.0%, while Morgan County was 7.7%. **Table 5-8 Median Household Income and Poverty Level** further breaks down median household income and poverty level by census tract and block groups for the Study Area.

Figure 5-10 Census Tracts



Source: 2010 Census Block Group Layer

Table 5-8: Median Household Income and Poverty Level

Census Block Group	Median Household Income	% Below Poverty Level
Morgan County	**51,745**	**7.7%**
Tract 9707.00 Block Group 1	67,890	0%
Block Group 2	61,679	3.3%
Block Group 3	75,044	5.5%
Tract 9708.00 Block Group 1	60,505	7.8%
Block Group 3	32,500	7.6%
Block Group 4	33,568	35.4%
Berkeley County	**62,515**	**12.0%**
Tract 9712.01 Block Group 1	94,821	7.5%
Block Group 2	59,617	11.8%
Block Group 3	82,309	5.8%
Block Group 4	58,715	11.8%
Tract 9712.02 Block Group 1	76,974	8.3%
Block Group 2	49,432	0%
Block Group 3	104,201	3.6%
Block Group 4	47,188	3.5%
Tract 9713.00 Block Group 3	34,215	25.1%
Block Group 4	58,523	13.0%

Sources: American Community Survey 2015-2019 B06011 and B19013

Minority Population and Language

Both Berkeley and Morgan Counties have a low percentage of households with limited English proficiency.

According to the 2019 ACS, the minority population average for West Virginia is 8%, while the United States average is 25%. Morgan County and Berkeley County each have minority populations of 4.5% and 13.2%, respectively. Linguistically isolated populations average 0.7% for West Virginia and 8.2% for the United States. In Morgan County, approximately 0.2% of the population has limited English proficiency. In Berkeley County, this population is approximately 1.9%. **Table 5-9** further breaks down the percentage of minority population and limited English proficiency households by census tract and block groups for the Study Area.

Table 5-9: Minority Population and Language

Census Block Group	% Minority	% Limited English Proficiency
Morgan County	**4.5%**	**0.2%**
Tract 9707.00 Block Group 1	2.3%	0%
Block Group 2	11.2%	0%
Block Group 3	4.9%	0%
Tract 9708.00 Block Group 1	1.7%	0%
Block Group 3	6.1%	0%
Block Group 4	0%	0%
Berkeley County	**13.2%**	**1.9%**
Tract 9712.01 Block Group 1	0%	0%
Block Group 2	13.6%	0%
Block Group 3	9.9%	0%
Block Group 4	21.5%	0%
Tract 9712.02 Block Group 1	1.1%	0%
Block Group 2	0%	0%
Block Group 3	3.0%	0%
Block Group 4	0.9%	2.6%
Tract 9713.00 Block Group 3	26.0%	3.6%
Block Group 4	15.9%	1.1%

Source: American Community Survey 2015-2019 B016003, B16004, and B02001

6. Possible Solutions

Development of Possible Solutions

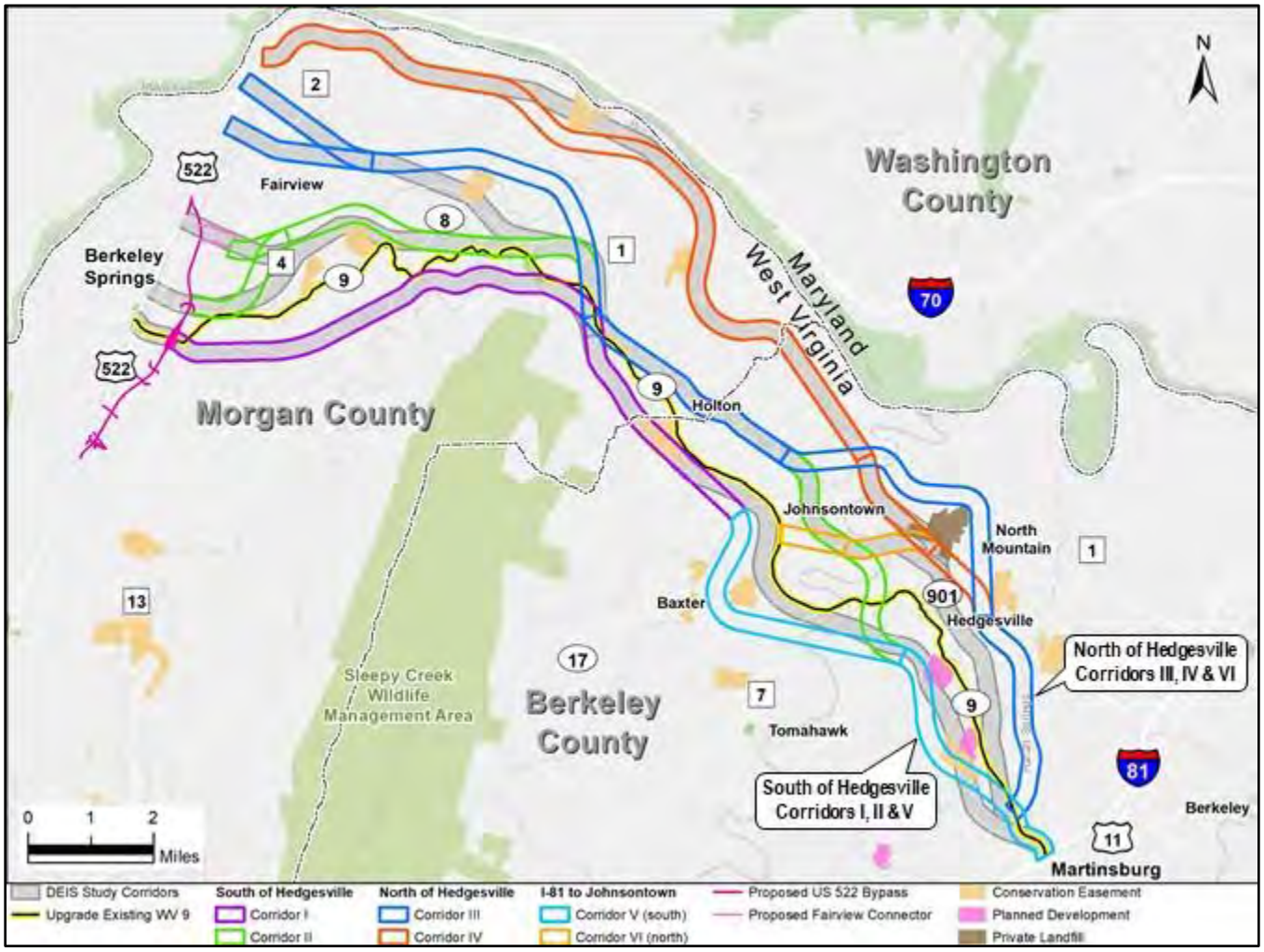
The solutions screened as part of this PEL Study began with a review of the four broad corridors identified in the 1996 DEIS. Using historic aerial imagery, areas of development that have occurred since 1996 were identified. Planned and proposed developments were requested from Berkeley and Morgan County planning, protected farmland easements were obtained from the Farmland Protection Board, along with identifying land use and development trends in the region. The four DEIS corridors were then revised to reduce potential impacts to these areas to the extent possible. The western terminus of DEIS corridors I and II were revised to connect with the proposed US 522 Bypass (see **4.0 Transportation Deficiencies and Needs - Planned Projects and Land Development Trends**). Input received from Stakeholders to consider alternatives that follow Harlan Springs Road and provide access to the LCS Services Landfill located near North Mountain (see **4.0 Transportation Deficiencies and Needs - Planned Projects and**

Land Development Trends) was also incorporated. Finally, two partial corridor alternatives (Corridors V and VI) were identified that would contain a new road on new alignment only between I-81 and Johnsontown and with upgrades to existing WV 9 from Johnsontown to Berkeley Springs.

Alternatives

Six (6) Build corridor alternatives, upgrade existing WV 9 and a No Build Alternative are being considered for the WV 9 PEL Study. For this planning-level study, specific design specifications have not been established. It is anticipated that the Build corridor alternatives would be constructed as a four-lane roadway with access limited to significant crossroads. This PEL study evaluated 1,500-foot wide corridors for the Build alternatives as shown on **Figure 6-1 Alternatives**.

Figure 6-1 Alternatives



No Build Alternative

The No Build Alternative assumes that a new roadway between Berkeley Springs and Martinsburg would not be constructed and only maintenance of existing WV 9 would be provided. The No Build Alternative

also serves as the baseline against which the other alternatives are compared. Maintenance projects such as repaving, bridge repair/replacements, drainage improvements, etc. would take place as necessary to maintain the current function of the roadway. The No Build Alternative represents the transportation system as it currently exists.

Upgrade Existing WV 9

The upgrade existing WV 9 would make improvements to existing WV 9 primarily along its current location. The roadway would remain primarily as two lanes with its existing turning lanes and include minor and major improvements to address congestion and safety issues. Minor improvements could include new or improved signing, lighting, pavement markings, centerline rumble strips, shoulder improvements, and traffic signals. Major improvements could include short sections of realignment to address geometric deficiencies, intersection improvements including new turning lanes, and addition of truck climbing lanes on longer steep grades where truck speeds are decreased by the grade. Note that the initial analysis of adding a truck climbing lane showed that it does not meet the recommended threshold for traffic or truck volumes. The need for a truck climbing lane should be re-evaluated in a future study. The alternative was developed by reviewing comments from stakeholders, observations during a field view of the corridor, a review of the roadway horizontal and geometric alignment related to its operating speeds, a review of the congestion and safety analysis described previously, and a review of previous safety studies in the corridor including the ***WV 9 Road Safety Audit (2018)***[7] conducted by HEPMPO. WVDOH conducted a ***WV 9 Roadway Departure Assessment (2017)*** in Morgan County and is currently conducting a similar roadway departure study along WV 9 in Berkeley County. A review of the completed Berkeley County assessment is recommended during the Preliminary Design / NEPA phase to identify any improvements that could be incorporated. This information was used to identify locations along the corridor where improvements are needed or desirable to alleviate congestion, improve safety, and bring the roadway into accordance with current design standards. **Table 6-1 Upgrade Existing WV 9 Proposed Improvements** identifies twenty-two (22) locations where potential improvements were identified. The locations are shown on **Figure 6-2 Upgrade Existing WV 9 Proposed Improvements**. The improvements are further classified as short term, mid-term and long term. Short term projects could be done almost immediately and would generally cost less than $100,000. Mid-term projects could be completed within a few years and cost less than $2,000,000. Long term projects would take several years or more to complete the project development process, could involve significant property acquisition, and cost more than $2,000,000. The total estimated cost if all of the proposed improvements would be constructed is approximately $34,100,000. The estimated cost for each improvement is in **Appendix A Upgrade Existing WV 9 Cost Estimate**. Note that Locations 7 and

> The initial analysis of adding a truck climbing lane showed it does not meet the recommended threshold for traffic or truck volumes.

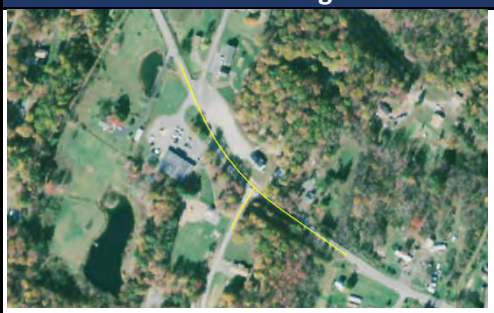
[7] WV 9 Road Safety Audit (2018): https://c666713d-dd04-4e6d-b967-64f6e43533a8.filesusr.com/ugd/116f69_e319696671fd49a7aa6b439ae882aef1.pdf

15 identify possible long-term solutions to address deficiencies but are shown as "Not Recommended" due to extensive excavation that would be required. If the Upgrade Existing WV 9 Alternative is ultimately advanced, more detailed engineering studies could be undertaken at these locations to establish their feasibility and cost. The projects are conceptual in nature and would be studied in more detail and further developed in the future, but together serve as a comparison to the Build corridor alternatives.

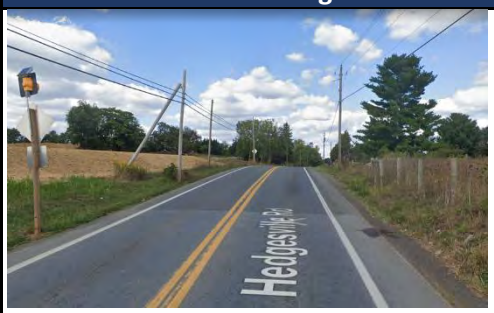
Table 6-1: Upgrade Existing WV 9 Proposed Improvements

Map ID	Identified Problem	Proposed Improvement	Location Image
1	Substandard horizontal curve currently meets 30 mph design speed	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Realign roadway with increased radius	
2	Poor sight distance due to substandard horizontal geometry	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Realign roadway with increased radius	
3	Substandard sight distance due to vertical geometry	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Realign roadway	
4	Substandard sight distance due to vertical geometry	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Realign roadway	

Map ID	Identified Problem	Proposed Improvement	Location Image
5	Series of three reverse curves with substandard radii and substandard sight distance	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Realign roadway with a single horizontal curve	
6	Series of substandard horizontal curves do not meet design speed for radius or stopping sight distance	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers, high friction surface treatment on curves **Long-term:** Topography would require substantial excavation and realignment of Spohrs Road and Potomac Road intersections	
7	Series of 3 reverse curves of substandard Radii and substandard stopping sight distance	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Not recommended because roadway realignment would require substantial excavation due to topography	
8	Excessive long grade (1,500' at 8%) for eastbound traffic from Sleepy Creek to Michael's Chapel Rd	**Short term:** Advance warning signage **Long-term:** Eastbound truck climbing lane	
9	Substandard stopping sight distance and deficient radius	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Realign roadway with increased radius	

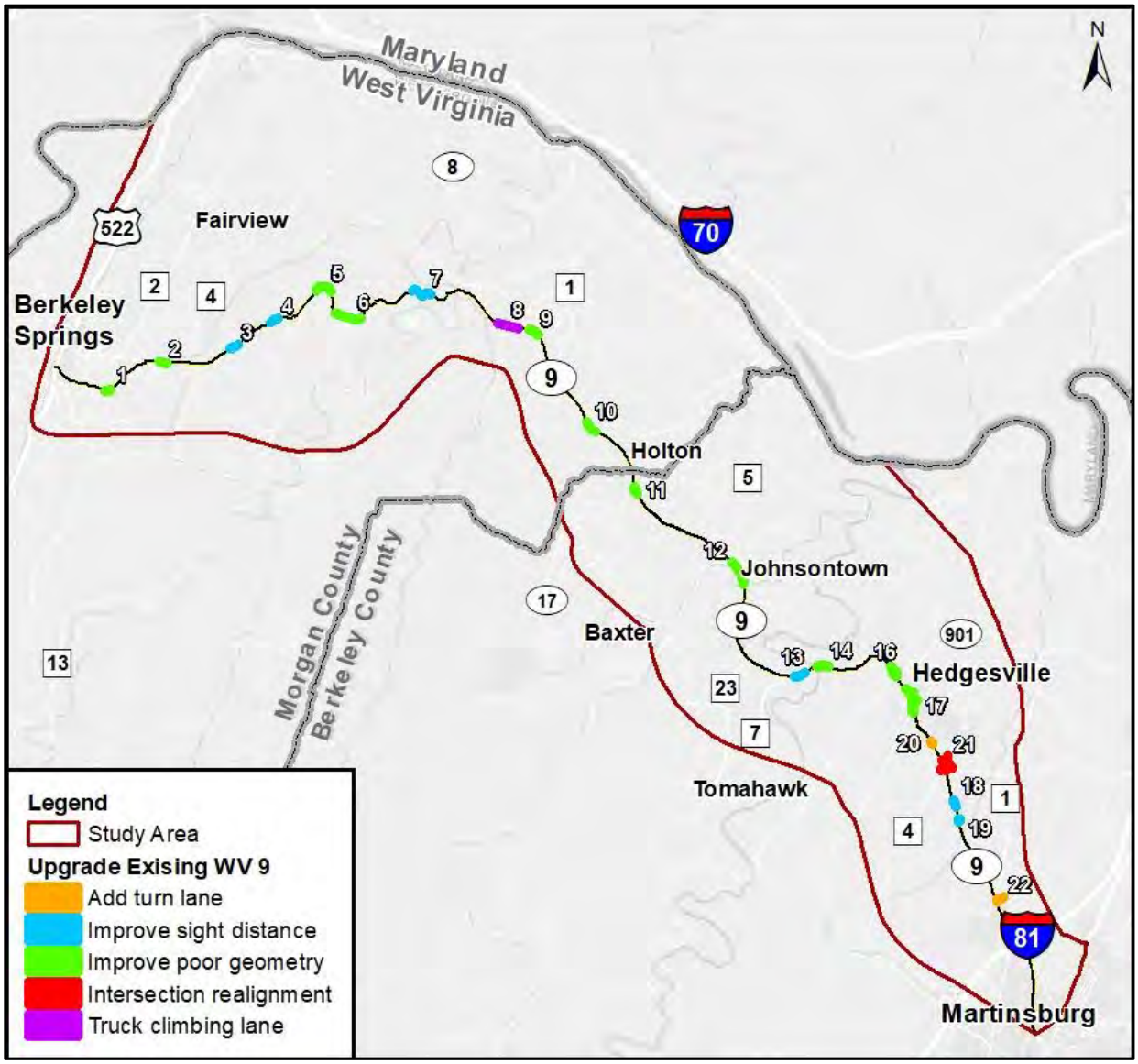
Map ID	Identified Problem	Proposed Improvement	Location Image
10	Substandard radius and vertical crest curve results in poor stopping sight distance	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Realign roadway with increased radius	
11	Substandard stopping sight distance and deficient radius. Poor intersection sight distance at Mountain Lake Road	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Realign roadway with increased radius	
12A	Poor intersection sight distance for cars turning left from Cherry Run Road. Poor stopping sight distance for EB traffic yielding to turn left onto Cherry Run Road.	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Conduct speed study to lower speed limit and add left turn lanes to Baxter/Cherry Run Roads **Long-term:** Relocate Cherry Run Road intersection approximately 1000' to the west	
12B	Inconsistent and undulating series of reverse horizontal curves	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Mid-term:** Add left turn lane to Travers Store and channelize Travers store driveway to be one-way (north to south) with narrower entrance and exit **Long-term:** Straighten horizontal alignment	

Map ID	Identified Problem	Proposed Improvement	Location Image
13	Substandard stopping sight distance due to vertical crest curve at exit from Tomahawk Intermediate School	**Short-term:** Install advance warning signage **Long-term:** Relocate school exit to Leisure Way and realign roadway to flatten vertical curve	
14	Substandard horizontal curve	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Realign roadway with increased radius.	
15	Series of horizontal curves with substandard radii between BJ Dennie Drive and Kate's Hollow Road	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Not recommended because roadway realignment would require substantial excavation due to topography	
16	Series of substandard reverse horizontal curves	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Realign roadway and slight realignment of intersections of Town Spring Road and Potato Hill Street	
17	Series of substandard reverse horizontal curves	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers, lighting **Mid-term:** Realign Ben Speck Road to intersect WV 9 perpendicular to curve **Long-term:** Realign roadway and connecting neighborhood streets	

Map ID	Identified Problem	Proposed Improvement	Location Image
18	Substandard stopping sight distance due to vertical crest curve	**Short-term:** Centerline rumble strips, additional signing, and raised pavement markers **Long-term:** Vertically realign roadway	
19	Poor intersection angle and poor intersection sight distance for vehicles turning right out of Collins onto westbound WV9 due to existing retaining wall	**Short-term:** Install advance warning signage on westbound WV 9 **Mid-term:** Remove retaining wall and regrade slope to improve sight distance **Long-term:** Realign intersection to be perpendicular	
20	Safety crash cluster with a high number of rear end crashes at Eagle Plaza	**Mid-term:** Replace pedestrian crossing pavement markings with MUTCD compliant application, install detection system and rectangular rapid flashing beacons, and upgrade to ADA compliant pedestrian crossing **Long-term:** Add left and right turn lanes into Eagle Plaza and add right turn decel lanes for Ridge Road	
21	Safety crash cluster with a high number of rear end crashes at Ridge Road and Cumbo Road intersection	**Short-term:** Add reflectorized back plates to all signal heads to address potential lack of signal visibility and add additional advance SIGNAL AHEAD signs with flashing beacons **Long-term:** Realign western leg of Ridge Road to intersect Cumbo Road, realign eastern leg of Ridge Road to a signalized intersection at existing Cumbo Road, and realign WV 9 to improve intersection sight distance	

Map ID	Identified Problem	Proposed Improvement	Location Image
22	Substandard intersection truck turning radii and short queuing capacity	**Short-term:** Increase intersection radius of SE quadrant **Long-term:** Add an additional left-turn lane on the north side of GM Access Road to EB WV 9	

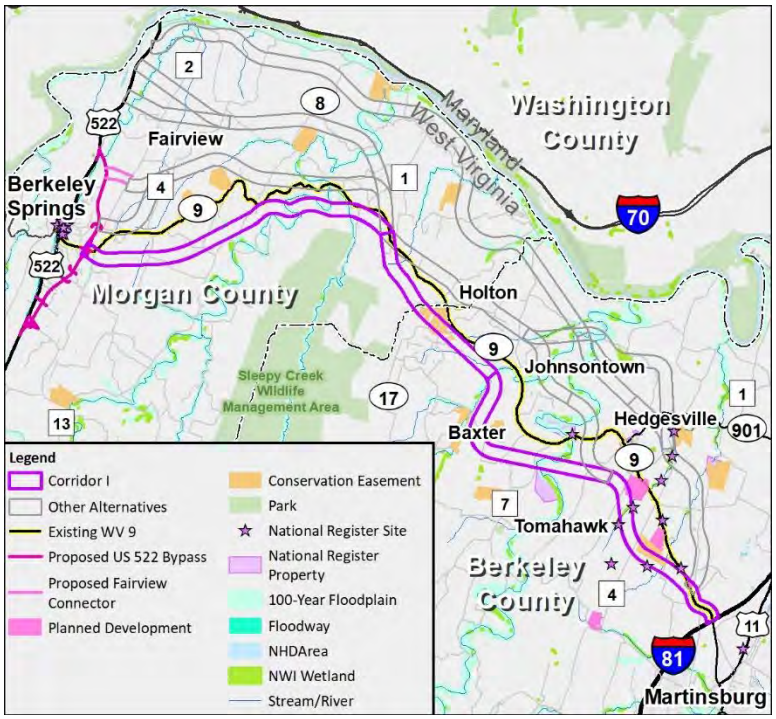
Figure 6-2 Upgrade Existing WV 9 Proposed Improvements



Corridor I

Corridor I is a 1,500-foot wide corridor that would contain a new road on new alignment beginning at the proposed US 522 Bypass just east of Berkeley Springs, generally keeping to the south of existing WV 9 and Hedgesville, and rejoining existing WV 9 just west of I-81 near Martinsburg as shown on **Figure 6-3 Corridor I**. The alignment is approximately 20.7 miles long. A 4-lane roadway with access limited to significant crossroads would be identified within the corridor.

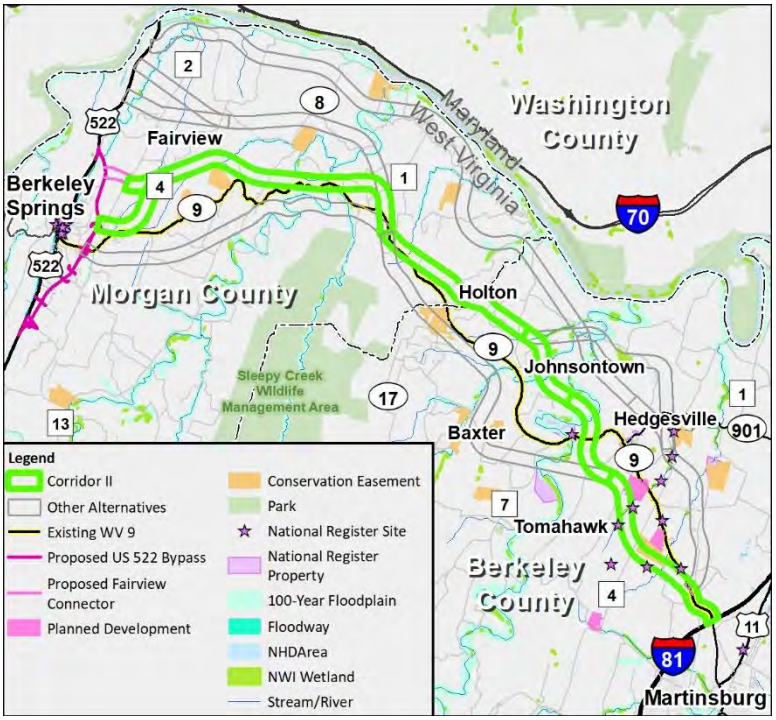
Figure 6-3 Corridor I



Corridor II

Corridor II is a 1,500-foot wide corridor that would contain a new road on new alignment beginning at either the proposed Fairview Connector or US 522 Bypass near Berkeley Springs. The corridor stays north of existing WV 9 to just west of Hedgesville where it crosses to the south of WV 9, similar to Corridor I, rejoining existing WV 9 just west of I-81 near Martinsburg as shown on **Figure 6-4 Corridor II**. The alignment is approximately 21.2 miles long. A 4-lane roadway with access limited to significant crossroads would be identified within the corridor.

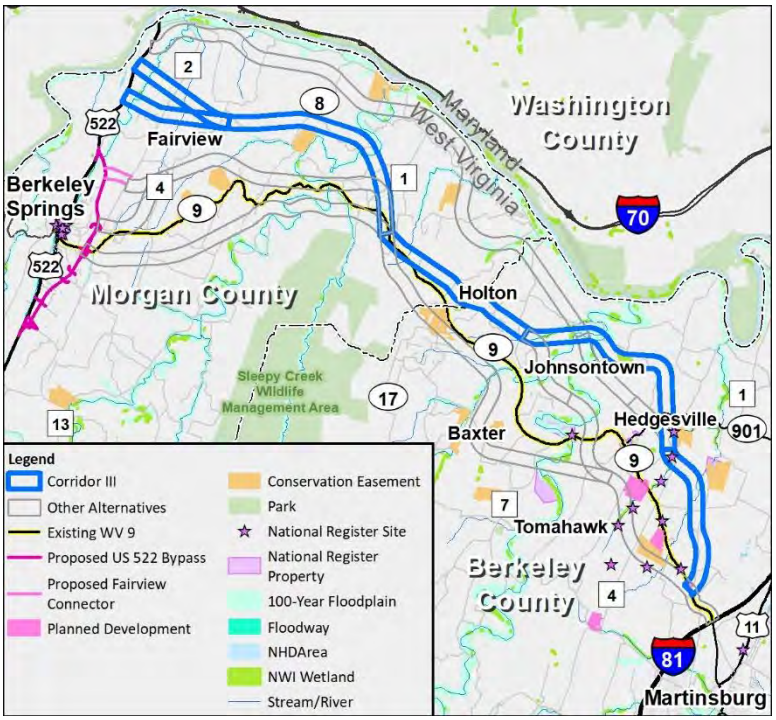
Figure 6-4 Corridor II



Corridor III

Corridor III is a 1,500-foot wide corridor that would contain a new road on new alignment beginning at existing US 522 north of Berkeley Springs at one of two possible intersection locations. The corridor is located north of existing WV 9 staying north of Johnsontown and Hedgesville then rejoining WV 9 near Harlan Springs Road just west of I-81 near Martinsburg as shown on **Figure 6-5 Corridor III**. The alignment is approximately 20.2 miles long. A 4-lane roadway with access limited to significant crossroads would be identified within the corridor.

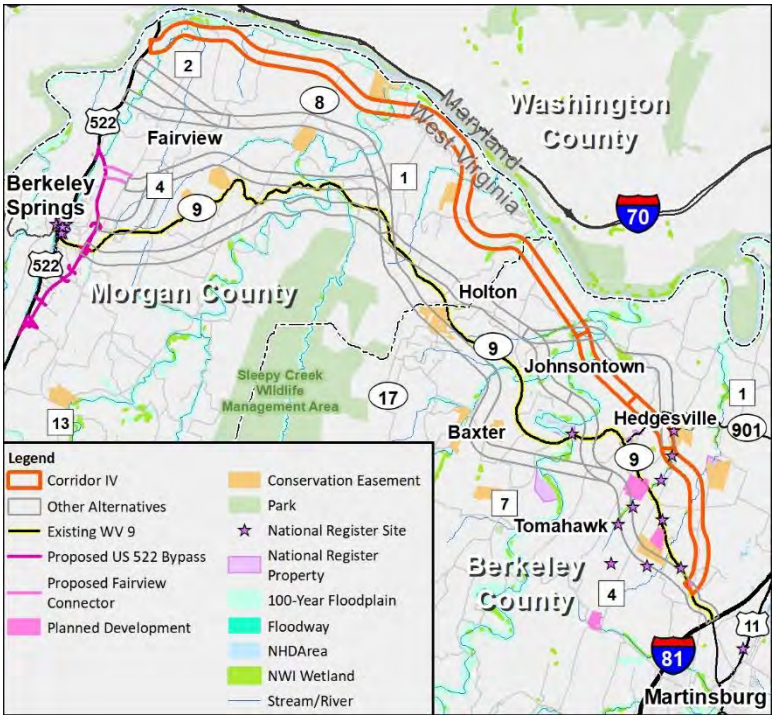
Figure 6-5 Corridor III



Corridor IV

Corridor IV is a 1,500-foot wide corridor that would contain a new road on new alignment beginning at existing US 522 just south of the Potomac River Bridge. The corridor stays north along the state border and north of Hedgesville rejoining WV 9 near Harlan Springs Road just west of I-81 near Martinsburg as shown on **Figure 6-6 Corridor IV**. The alignment is approximately 20.2 miles long. A 4-lane roadway with access limited to significant crossroads would be identified within the corridor.

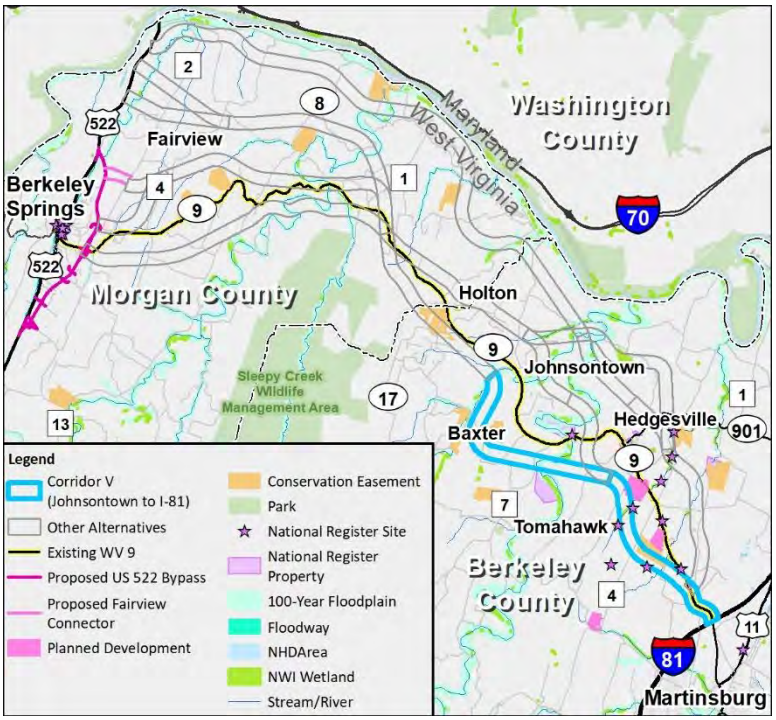
Figure 6-6 Corridor IV



Corridor V

Corridor V is a 1,500-foot wide corridor that would contain a new road on new alignment only between I-81 and Johnsontown and with upgrades to existing WV 9 from Johnstontown to Berkeley Springs. The corridor follows the same alignment as Corridor I, staying south of existing WV 9 and Hedgesville then rejoining WV 9 just west of I-81 near Martinsburg as shown on **Figure 6-7 Corridor V**. The new roadway alignment is approximately 8.9 miles long and 14.6 miles of upgrades to existing WV 9. A 4-lane roadway with access limited to significant crossroads would be identified within the corridor.

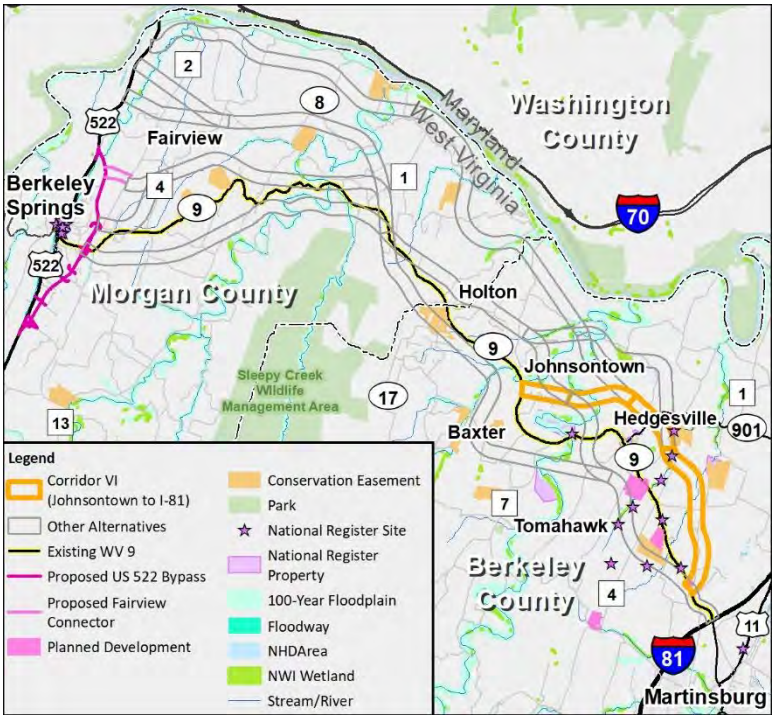
Figure 6-7 Corridor V



Corridor VI

Similar to Corridor V, Corridor VI is a 1,500-foot wide corridor that would contain a new road on new alignment only between I-81 and Johnsontown and with upgrades to existing WV 9 from Johnstontown to Berkeley Springs. The corridor stays north of existing WV 9 and Hedgesville and then rejoins WV 9 near Harlan Springs Road just west of I-81 near Martinsburg as shown on **Figure 6-8 Corridor VI**. The new roadway alignment is approximately 7.4 miles long with 14.6 miles of upgrades to existing WV 9. A 4-lane roadway with access limited to significant crossroads would be identified within the corridor.

Figure 6-8 Corridor VI



Preliminary Cost Estimate

A preliminary cost estimate was developed for each alternative. **Table 6-2 Cost Estimate** summarizes the preliminary costs including preliminary engineering, final design, construction and contingency. Roadway construction unit costs per mile for a new four-lane roadway were obtained from WVDOH and are based on a range of actual construction costs on similar projects. A unit cost range of $54 million to $71 million per mile was used to calculate the estimated cost for the Build alternatives. The cost to construct an adjacent multi-use path was also added to the cost of the Build alternatives. Unit costs for similar multi-use path projects were obtained and averaged $1 million per mile.

Roadway construction unit costs for the upgrade existing WV 9 proposed improvements are based on similar improvements. Preliminary engineering is calculated at 4% of construction, final design is calculated at 6% of construction and a contingency cost of 20% of engineering and construction are included based on industry standards for planning level studies. Right-of-way and utility costs are not included in the estimate and would be estimated during the Preliminary Design / NEPA phase.

Table 6-2: Cost Estimate

Alternative	Length (Miles)	Estimated Cost ($ in Millions)
No Build	21.6 miles	$0
Upgrade Existing WV 9	21.6 miles	$31.4 M*
Corridor I	20.7 miles	$1,200 - $1,490 M
Corridor II	21.2 miles	$1,228 - $1,525 M
Corridor III	20.2 miles	$1,170 - $1,452 M
Corridor IV	20.2 miles	$1,174 - $1,457 M
Corridor V	23.5 miles	$534 - $659 M
Corridor VI	22.0 miles	$445 - $548 M

* does not include Right-of-Way and Utility Costs

7. Evaluating Future Travel Demand

The HEPMPO regional travel demand model was used to estimate future traffic volume growth and to assess the impacts of alternative strategies. Forecast information on traffic volume growth and diversions for each alternative was based on projections from the HEPMPO regional travel demand model. Additional traffic engineering analyses were also conducted at several intersections to identify the potential impact that alternatives may have on traffic congestion and safety. The original travel model encompasses the three county HEPMPO region that includes Washington County in Maryland, and Jefferson and Berkeley Counties in West Virginia. A travel model provides value in assessing the potential relationship between land use growth and traffic volume projections. The travel model was updated and enhanced for this study as follows:

- Model Expansion – The regional model was expanded to include Morgan County in West Virginia. The expansion allows for the representation and modeling of US 522 to I-70. This expansion was conducted to evaluate the potential impact the proposed alternatives may have on traffic diversions from I-70 to Hagerstown.
- Additional Projects Added to Model – The model was updated to include the US 522 bypass and Fairview Connector projects. These projects were included in the modeling since they will impact the WV 9 proposed alignment connections and projected traffic volumes.
- Model Validation – Model adjustments were conducted in the Study Area to improve base year model results in comparison to traffic counts. This included the expansion of the roadway network at select locations.

Land use forecasts input to the travel model were developed by integrating the forecasts used for the HEPMPO's Direction 2045 Long Range Transportation Plan (LRTP) with other recent land development data assembled for this study. Most of the developments that have been identified are south of Hedgesville as discussed earlier in Land Cover/Land Use section of **5.0 Linking Planning to the Environment**.

Forecasted Traffic Growth on WV 9

Despite historic traffic count trends that indicate no significant traffic volume growth from 2000-2017, the HEPMPO model does forecast some traffic growth on WV 9 due to the recent and forecast regional land development. On average, WV 9 traffic volume is projected to increase by 10% over the next 25 years. This increase correlates to about a 0.5% growth in traffic volume per year. **Figure 7-1 Projected Maximum 2045 Daily Volumes** highlights the estimated 2045 daily traffic volumes for each section of the WV 9 corridor.

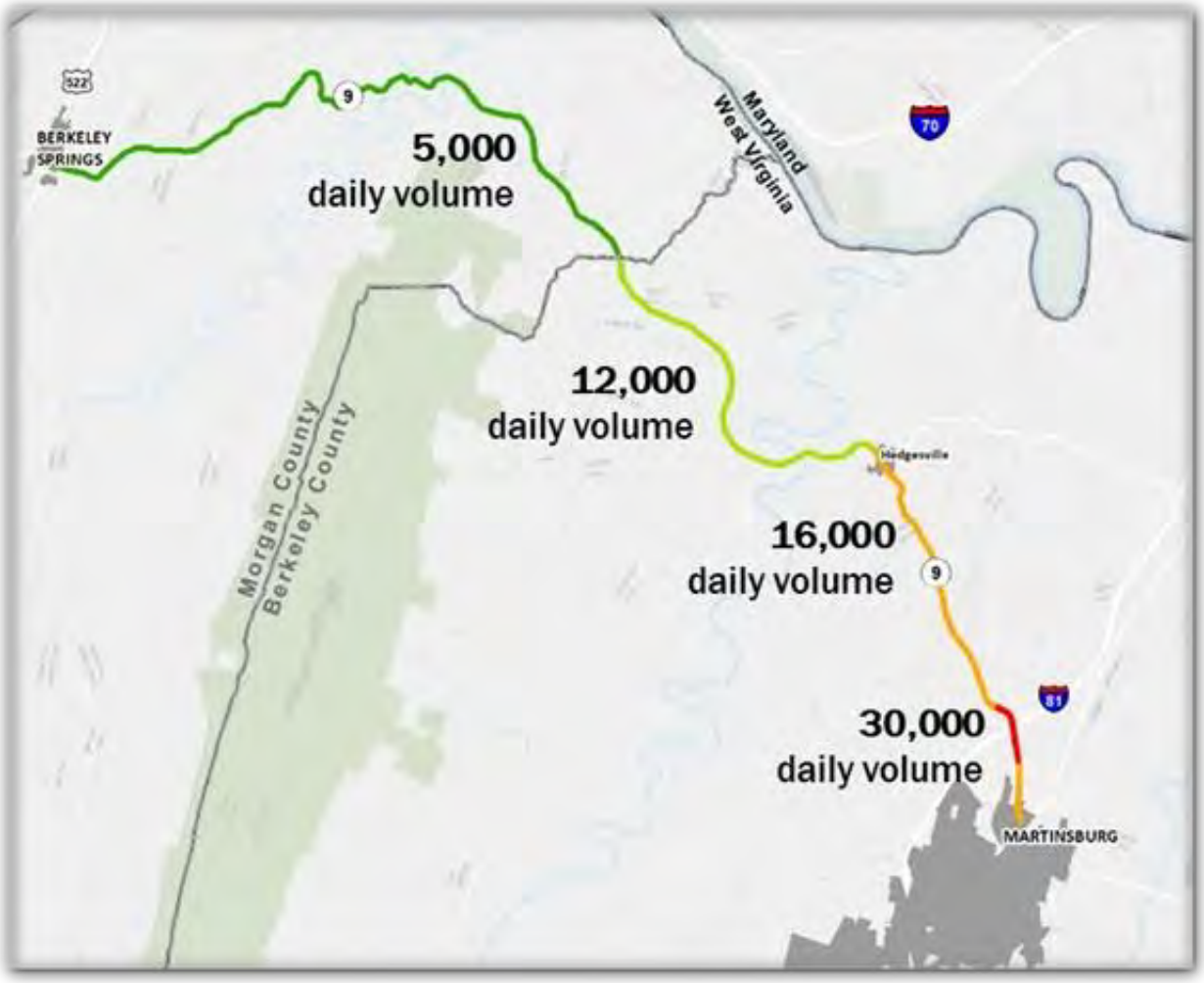
Travel modeling indicates that WV 9 traffic volumes may grow by 10% or more over the next 25 years based on anticipated development in the region.

A travel demand model is a valuable tool for forecasting traffic related to assumed development patterns; however, the tool does have limitations. Travel patterns and behavior can be significantly altered by a variety of external factors including changes to the economy, gas prices, the addition of major new industries or employers not reflected in the model inputs, and other major events. The impacts of COVID-19 have had significant impacts on travel in many regions of the country. This has included increases to teleworking that may have longer term trends even after COVID-19. Future studies will need to assess recent changes to travel demand and behavior within the corridor and how that might impact the future growth of traffic volume on WV 9.

Estimating Project Diversions for Alternatives

The alternatives under consideration in this study have been evaluated using the regional travel model to estimate future traffic volumes and diversions. **Figure 7-2 Percentage of Traffic Change on Existing WV 9** provides a summary of the projected changes to WV 9 traffic volumes under each alternative.

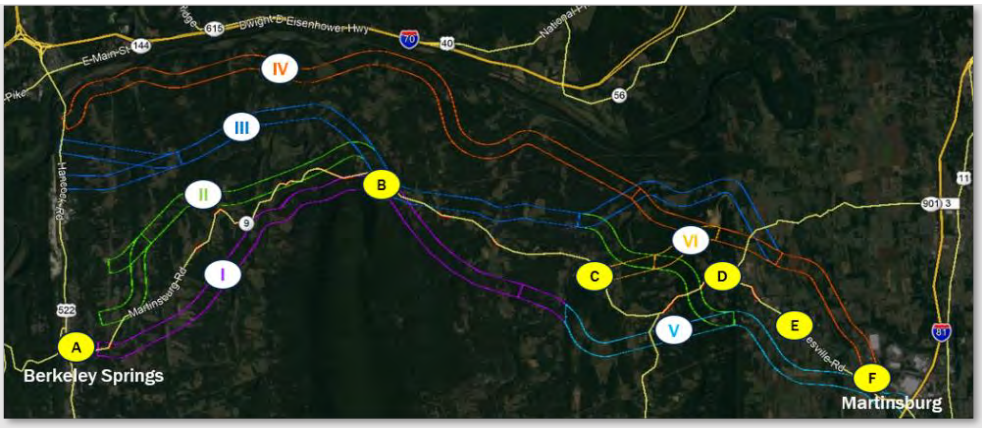
Figure 7-1: Projected Maximum 2045 Daily Volumes by Section



The upgrade of existing WV 9 includes spot improvements throughout the corridor. These improvements are projected to have minor impacts on traffic volumes as the modeling projects small increases in traffic (0-5%) due to the improvements. This traffic may be attracted from other nearby roads or generated based on increased commuting between Berkeley Springs and Martinsburg.

The Build corridor alternatives (Build alternatives) represent different configurations and alignments for a new roadway that would bypass existing WV 9. In general, the Build alternatives from US 522 to I-81 (Corridors I - IV) are projected to divert more volume from existing WV 9 and from I-70 than partial Build alternatives that only go from Hedgesville to I-81 (Corridors V and VI). However, the partial Build alternatives still provide significant relief to the key congested locations on WV 9. Reductions in WV 9 volumes vary by section and can be as high as 60-80% in the eastern portions of the corridor. Under all Build alternatives, the estimated diversions from I-70 are relatively small; however, the northern Build alternatives provide the potential for higher diverted traffic and truck volumes. Additional improvements to US 522 over the Potomac River may also increase I-70 diversions to a new WV 9 roadway.

Figure 7-2: Percentage of Traffic Change on Existing WV 9 For Each Alternative by Section



Legend:

V Corridor Alternative #

Road Segment Locations:

A Berkeley Springs (US522)

A Meridian Road

B Johnsontown

C Hedgesville

D Hedgesville High School

E Harlan Springs Road

F

Road Segment	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
		South of Existing WV 9		North of Existing WV 9		Johnsontown to I-81	
A – B	Small Traffic Increases 0-5%	-96%	Similar to Corridor I		-56%	+ 7%	+ 12%
B – C		-43%			-31%	+ 15%	+ 16%
C – D		-73%			-28%	-78%	-71%
D – E		-63%			-43%	-63%	-57%
E – F		-53%			-18%	-50%	-41%

In all cases, the current projected traffic volumes in 2045 on a new roadway alternative may be as low as 5,000 vehicles per day in the western sections to as high as 15,000 vehicles per day in the eastern section. These projections are relatively low for a 4-lane limited access freeway. Future NEPA studies may consider other design options that may be consistent with the expected volumes, such as building two lanes but reserving right of way for four lanes if future conditions warrant roadway expansion. Another important consideration for future traffic usage will be new "induced" land use that is not accounted for in the modeling. As typical of new roadway construction in other areas of the country, new development not presently accounted for could be generated in future years especially near interchanges. This development can have significant impacts on projected volumes and new roadway usage. Future studies should consider the potential for "induced" land

Key Modeling Insights

- A WV 9 bypass significantly reduces traffic volume on existing WV 9
- Diversion percentages are impacted by the location of interchanges and the alignment of the bypass
- Bypass alternatives south of WV 9 may divert more volume than northern alternatives
- Bypass alternatives north of WV 9 support regional truck travel including access to the land fill
- The full northern alternative diverts more vehicles from I-70 than southern alternatives. (<500 vehicles per day)

use and its impact on alternative selection and design. FHWA has developed resource documents for consideration during NEPA on these topics.[8]

Assessment of Corridor Alternatives on WV 9 Congestion Hotspots

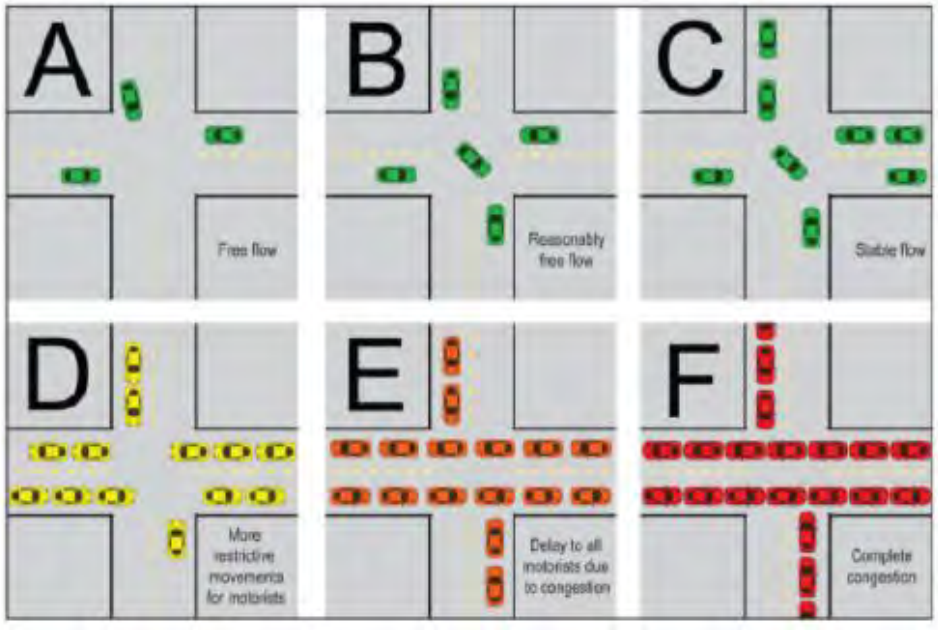
As highlighted in the previous section, the WV 9 Build alternatives are expected to result in significant reductions in traffic volume on WV 9. This section assesses how those potential diversions may impact several key intersections where traffic congestion currently exists.

The analyses were conducted at the following three (3) signalized intersections:

- WV 9 /WV 901 in Hedgesville
- WV 9 / Ridge Road near Hedgesville High School
- WV 9 / GM Access Road near I-81

Highway Capacity Analyses were conducted at each of the three (3) intersections using the Synchro traffic engineering software. Existing signal timing data, intersection configurations (i.e. number of lanes, turning lanes, etc.) and available 2017 turning movement counts were obtained from WVDOT. Analyses were run for existing conditions (to support validation of the model) and for a future year scenario that incorporate corridor volume growth and reflect the diversions due to the Build alternatives. The software estimated a "Level of Service" (LOS) for each intersection approach. LOS is a qualitative measure used to assess the level of traffic congestion and is commonly used in traffic engineering studies. LOS values range from an "A" to and "F" scale as illustrated in **Figure 7-3 Level of Service (LOS) Descriptions**. Generally, transportation projects focus on improving LOS to an "acceptable" range, typically between LOS "A" and LOS "C".

Figure 7-3: Level of Service (LOS) Descriptions



[8] https://www.environment.fhwa.dot.gov/nepa/Travel_LandUse/forecasting_reviewer_guidance.aspx

Intersection Analysis Results

WV 9 Build alternatives will provide congestion relief to congested intersections but may not supersede the need for other intersection improvements.

Based on the intersection modeling, an overall intersection LOS was estimated using the worst-case approach for each scenario. The results of the intersection analyses are provided in **Table 7-1 Intersection Analysis Results**. Detailed analysis results are provided in **Appendix B Synchro Analysis Reports**. Under the "with new roadway" and "without new roadway" scenarios, signal timings for each intersection were also optimized. These runs evaluate how signal timing changes may affect traffic congestion in comparison to the current timing using at each intersection.

Table 7-1: Intersection Analysis Results on WV 9 Corridor

Intersection	LOS without new roadway		LOS with new roadway	
	Current Timing	Optimized Timing	Current Timing	Optimized Timing
WV 9 / WV 901	F	F	E	C
WV 9 / Ridge Road	F	D	E	D
WV 9 / GM Access Road	B	B	C	C

The results of the analyses highlight the forecast traffic congestion and vehicle queuing on WV 9 at each intersection (i.e. LOS values of "F" without a new roadway). The analyses did not indicate significant congestion at the GM Access Road. Further monitoring of traffic and truck conditions is recommended based on newer traffic counts as GPS data has indicated worsening traffic queues in the 2019-2020 timeframe. The WV 9 Build alternatives provide congestion relief to the WV 9 intersections with WV 901 and Ridge Road. Of specific importance are the benefits to the WV 901 intersection where there are limited strategies available to relieve the congestion due to physical constraints within the town of Hedgesville. Some specific notes on each intersection analysis are included below:

WV 9 / WV 901 in Hedgesville

WV 9 / WV 901 Intersection Conclusions:

- A new roadway does provide significant relief to intersection LOS in combination with signal timing changes
- Without a roadway, further optimization of signal timing does not benefit signal operations. Providing more green time or turn phasing (e.g. thru+left turn) for WV 9 EB approach to WV 901 EB significantly degrades WV 9 operations.

WV 9 / Ridge Road South Of Hedgesville High School

WV 9 / Ridge Road Intersection Conclusions:

- A new roadway does provide some relief to intersection LOS. Additional strategies may be needed for Ridge Road approaches to the intersection
- Intersection turn lanes and/or reconfiguration in combination with signal timing changes may provide intermediate congestion relief at the intersection.

WV 9 / GM Access Road

WV 9 / GM Access Road Conclusions:

- Further monitoring of traffic and truck conditions is recommended based on newer traffic counts. GPS data has indicated worsening traffic queues in the 2019-2020 timeframe
- A new roadway will likely connect back into WV 9 northwest of this intersection. Volumes may increase with the new roadway creating a worsening of traffic congestion.

8. Agency Coordination

Initial coordination with various public agencies in the Study Area has been undertaken as part of the planning process and will be continued as the project advances into the Preliminary Design/NEPA phase. Agency coordination includes an agency coordination letter and agency workshop.

Early consultation with resource and regulatory agencies can help integrate resource agency goals and plans into the transportation planning process.

Agency Coordination Letter

Initial formal agency contact was undertaken through a letter inviting the agencies to attend a virtual Agency Workshop on January 28, 2021 and solicited their input on the project. Coordination letters were sent on January 8, 2021 to the agencies listed below. Copies of the letters are included in **Appendix C Agency Coordination.**

- Berkeley-Morgan County Health Department
- City of Martinsburg Floodplain Coordinator
- Federal Highway Administration
- Morgan County Floodplain Coordinator
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency

- U.S. Fish and Wildlife Services
- USDA Natural Resources Conservation Service
- WV Department of Environmental Protection
- WV Department of Health and Human Resources
- WV Division of Culture and History
- WV Division of Natural Resources
- WV Regional Planning and Development Council

Agency Workshop

The virtual Agency Workshop introduced the project and solicited input from the agencies on the study goals and objectives, traffic and safety concerns, environmental resources in the Study Area and preliminary alternatives. The workshop was attended by the Federal Highway Administration, City of Martinsburg Floodplain Coordinator, U.S. Army Corp of Engineers, U.S. Environmental Protection Agency, WV Conservation Agency, WV Department of Health and Human Resources, WV Division of Natural Resources, WV Department of Environmental Protection, and the WV State Historic Preservation Office.

Written comments were received from the WV Conservation Agency and the WV Department of Health and Human Resources. The WV Conservation Agency commented on minimizing the impacts on area waterways and riparian areas. The WV Department of Health and Human Resources recommended coordinating with the Berkeley County and Berkeley Springs Public Service Water District to ensure their current or future planned infrastructure would not be adversely affected by the proposed improvements.

A workshop summary, including the presentation, comments, and attendees, along with the written comments received after the workshop are included in **Appendix C Agency Coordination**.

9. Stakeholder and Public Coordination

Initial coordination with area stakeholders and the public was undertaken as part of the planning process and will be continued as the project advances into the Preliminary Design/NEPA phase. A list of stakeholders invited to participate in the study is included in **Appendix D Stakeholder and Public Coordination**. Coordination included stakeholder and public workshops, project field view, and an on-line survey.

Stakeholder Workshops

Virtual Stakeholder Workshops were held to engage interested stakeholders and to solicit input early in the planning process.

Stakeholders were engaged early in the planning process to solicit their input on transportation needs and issues in the Study Area.

The initial virtual Stakeholder Workshop was held on October 1, 2020 to introduce the project and solicit input from stakeholders on the study goals and objectives, planned development within the region, traffic and safety concerns, environmental resources and preliminary

alternative corridors. The attendees identified potential project goals and objectives that included improving mobility, promoting economic development, supporting the corridor land use vision, improving safety and protecting the environment.

A final virtual Stakeholder Workshop was held on May 5, 2021 to update the stakeholders on the status of the project, present the preliminary study findings and solicit input on those findings and the preliminary alternatives to be recommended to move forward to a future NEPA study.

Workshop summaries, including the presentation, discussion and comments, and list of attendees are included in **Appendix D Stakeholder and Public Coordination**.

Stakeholder and Public Workshop

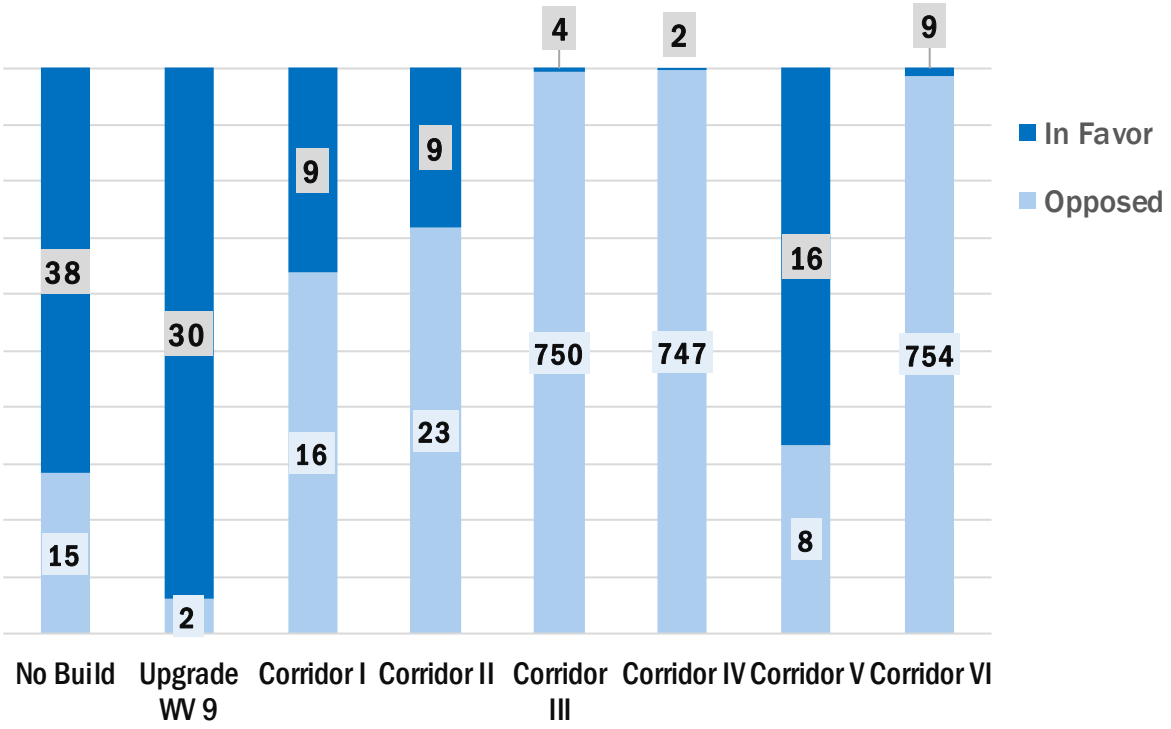
An inclusive public involvement process not only improves the likelihood that the study will be acceptable for use during NEPA, it can lead to more public support.

A combined virtual Stakeholder and Public Workshop was held on March 4, 2021 to introduce the project to the stakeholders and the public, solicit input on the preliminary alternatives being considered and discuss ways they could provide input on the study. Specifics about the workshop date, time, and information needed to join the virtual workshop were publicized in area newspapers and on the West Virginia Department of Highways (WVDOH) website. Legal advertisements announcing the public workshop appeared in The Journal (Martinsburg) and the Charleston Gazette-Mail on February 24, 2021. A notice of the workshop was also posted online at WVLegals.com. Additionally, a notice with information on how to join the virtual workshop was posted on the WVDOH website. See **Appendix D Stakeholder and Public Coordination** for a copy of the newspaper notifications along with a workshop summary. Comments during the workshop were primarily regarding potential impacts to residential areas and farmlands.

Over 850 public comments were received following the first public workshop primarily regarding avoidance of Speck Spring Farm.

A formal comment period followed the workshop from March 4th through April 15th. The comment period initially was to close on April 5th but was extended an additional ten (10) days to allow more time for the public to provide comments. The public could provide comments by submitting a comment form through WVDOH's website or in writing by downloading or requesting a comment form and submitting via email or mail to the WVDOH addresses provided. Over 850 comment forms were submitted and are included in **Appendix D Stakeholder and Public Coordination**. The comments were reviewed and tallied based on whether the comment supported or opposed a specific alternative. A majority of the comments, 85%, were regarding Speck Spring Farm which is on the National Register of Historic Places and an active farm in the community. The farm is located within Corridors III, IV and VI. As shown on **Figure 9-1 March Public Comments Summary** there were many comments opposed to those corridor alternatives as a result. The remainder of the comments were nearly split between support and opposition for the remainder of the alternatives, with the No Build receiving the most support followed closely by Upgrade Existing WV 9.

Figure 9-1: March Public Comments Summary



Public Workshop

A virtual Public Workshop was held on May 11, 2021 at two times (4:30 PM and 6:30 PM) to accommodate an expected large attendance due to the recent amount of public interest. The purpose of the workshop was to update the public on the status of the project, present the preliminary study findings and solicit input on those findings and the preliminary alternatives to be recommended to move forward to a future NEPA study. Specifics about the workshop date, time, and information needed to join the virtual workshop were publicized in area newspapers and on the West Virginia Department of Highways (WVDOH) website. Legal advertisements announcing the public workshop appeared for three consecutive weeks prior to the workshop, from beginning April 21st and ending May 5th, in the Charleston Gazette-Mail, The Journal (Martinsburg) and The Morgan Messenger. A notice of the workshop was also posted online to WVLegals.com. Additionally, a notice and information on how to join the virtual workshop was posted on the WVDOH website. See **Appendix D Stakeholder and Public Coordination** for a copy of the newspaper notifications along with a workshop summary. Comments during the workshop were primarily regarding when the project could potentially be constructed if funding is available, potential impacts on residential properties and farmlands, and the lack of need for a new roadway within Morgan County.

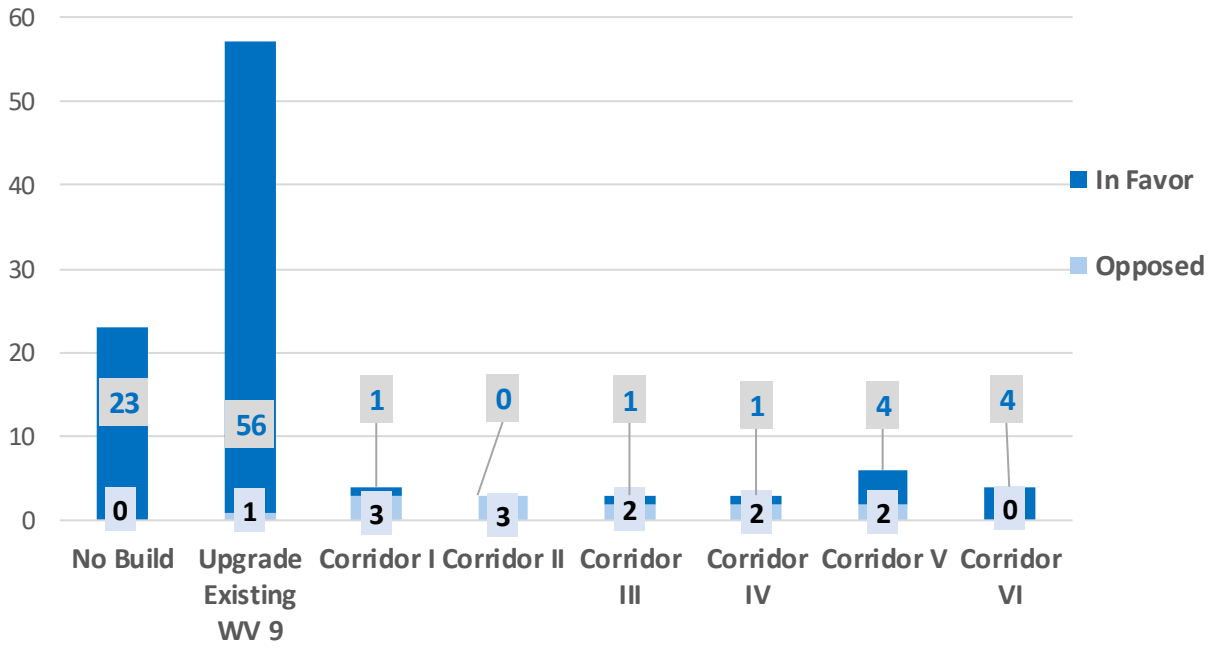
A two-week formal comment period followed the second Public Workshop from May 12th through May 25th, 2021. The public could provide comments by submitting a comment form through WVDOH's website or in writing by downloading or requesting a comment form and submitting via email or mail to the WVDOH addresses provided. 79 comment forms were submitted and are included in **Appendix D**

Stakeholder and Public Coordination. The comments were reviewed and tallied based on the if the comment supported or opposed a specific alternative as shown on **Figure 9-2 May Public Comments Summary**. A majority of the comments, 71%, support the Upgrade Existing WV 9 alternative and 29% support the No Build. The comments supported making improvements to the existing WV 9 to avoid impacts to farmlands and residential properties.

79 public comments, primarily supporting the Upgrade Existing WV 9 alternative, were received following the second public workshop.

Workshop summaries, including the presentation, questions and comments, list of attendees and comment forms are included in **Appendix D Stakeholder and Public Coordination**.

Figure 9-2: May Public Comment Summary



WV 9 Field View

A field view of the WV 9 corridor between Berkeley Springs and Martinsburg was conducted on November 20, 2020. Area stakeholders requested the field view to share their knowledge of the corridor and community. The purpose of the field view was to identify safety and congestion concerns and areas of planned/potential development within the WV 9 Study Area. Nine (9) locations were identified through coordination with area stakeholders prior to the field view as the "must see" locations. Due to COVID-19 restrictions and per CDC guidance, the number of individuals participating in the field view was limited. Input received during the field view helped the Study Team better understand local issues and concerns and problems along the existing WV 9 corridor.

Area stakeholders requested a field view of existing WV 9 to discuss safety and congestions concerns and share insights with the project team.

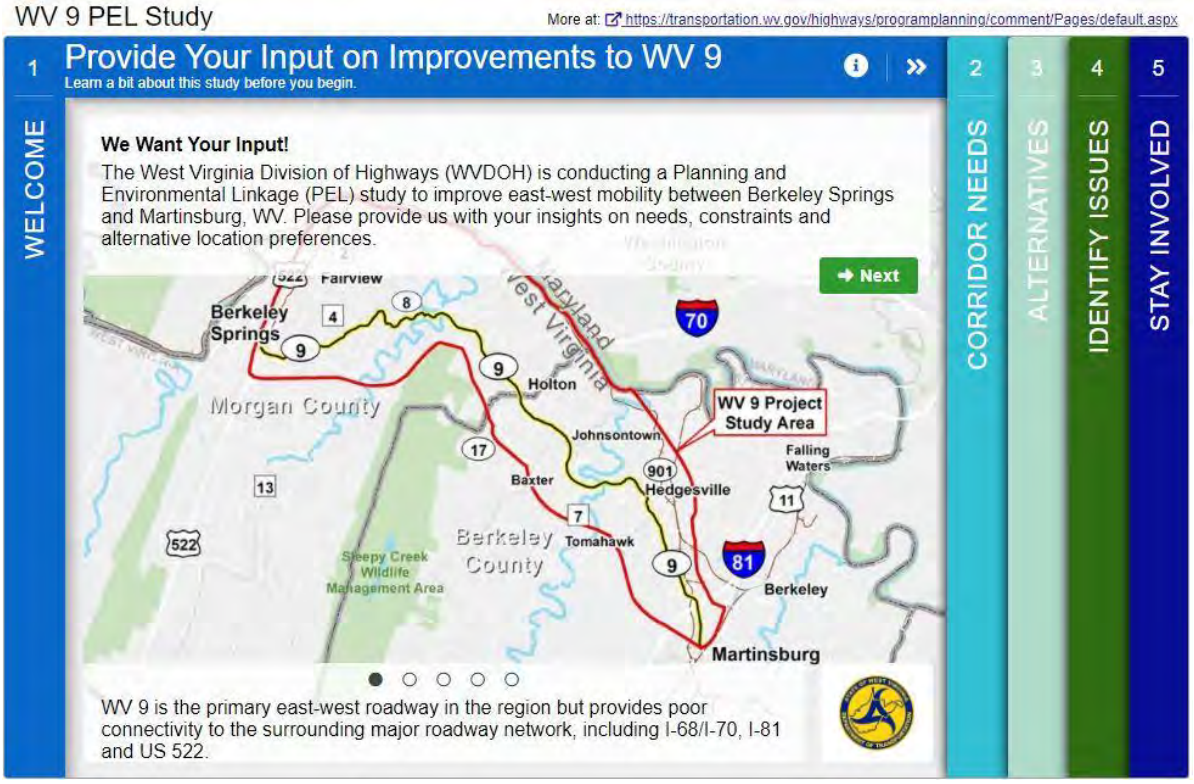
A field view summary, including field view materials, field notes, and list of attendees is included in **Appendix D Stakeholder and Public Coordination**.

Online Survey

An online survey, hosted by MetroQuest, was available via the internet from March 5 through April 15, 2021 to provide stakeholders and the public an opportunity to share their insights and recommendations for the project. 3,330 individuals participated in the survey, providing meaningful input with over 3,000 comments.

The survey consists of five (5) tabs by topic, including Welcome, Corridor Needs, Rate Alternatives, Identify Issues, and Stay Involved as shown on **Figure 9-3 Online Survey**.

Figure 9-3 Online Survey



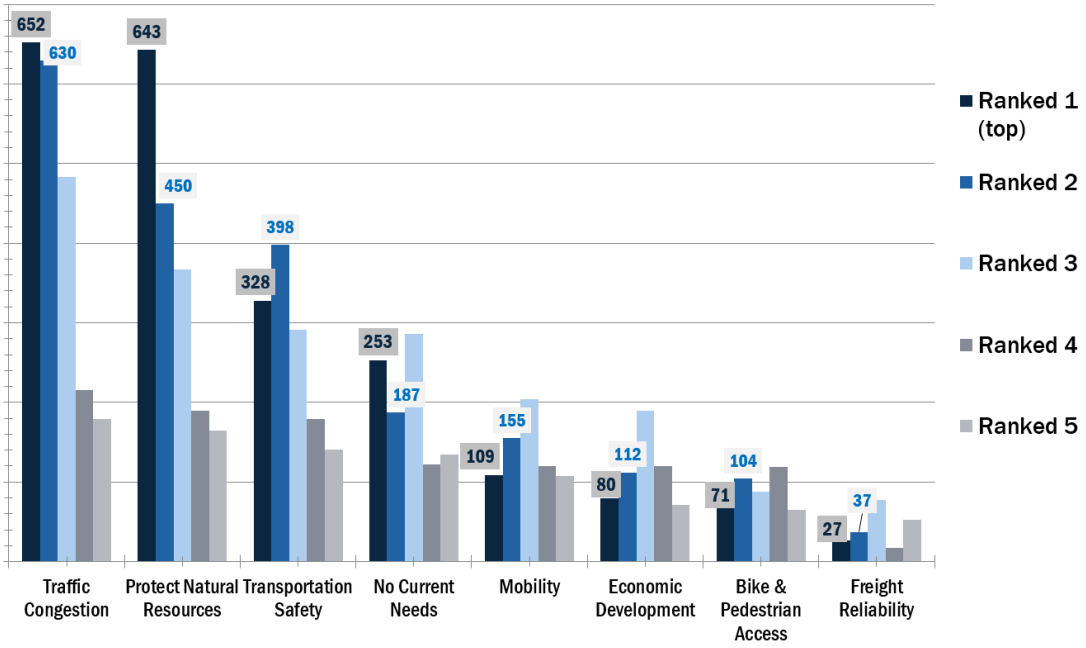
Rank Corridor Needs

The first tab, Rank Corridor Needs asked participants to rank what they thought are the most important transportation needs for the region. The survey listed eight (8) needs that were based on the Goals and Objectives identified for the project as discussed in **Section 3.0 Goals and Objectives**. The corridor needs identified included: Mobility, Traffic Congestion, Transportation Safety, Economic Development, Protect Natural Resources, Bike and Pedestrian Access, Freight Reliability and No Current Needs. Participants were asked to rank the most important corridor needs in the region from most important to least important.

The survey results show Traffic Congestion as the top corridor need, ranked first or second by over 1,200 participants. Protect Natural Resources followed by Transportation Safety were the next most highly ranked corridor needs as shown on **Figure 9-4 Corridor Needs Results**. Many of the comments that were provided were related to traffic congestion, specifically in the Hedgesville area especially during peak periods.

Traffic Congestion was ranked as the first or second transportation need by 78% of the participants.

Figure 9-4 Corridor Needs Results



Rate the Alternatives

The Rate the Alternatives tab asked participants to rate each alternative including the No Build, Upgrade Existing WV 9, and the six Build corridor alternatives. Maps showing the location of each alternative and a description of each was included on the survey. Participants were asked to rate each proposed alternative with 1 to 5 stars, with 5 stars being the highest-ranking.

The Upgrade Existing WV 9 alternative was highest ranked with 1,182 participants giving the alternative 5 stars followed by the No Build alternative with 1,017 5-star ratings and Corridor IV with 835 5-star ratings as shown on **Figure 9-5 Rate the Alternatives**. However, the No Build alternative also received a significant number of 1-star rankings, with 741 participants ranking it as the least desirable alternative. Although the Upgrade Existing WV 9 and the No Build Alternatives were the highest individual alternatives, the total number supporting one of the Build Corridor alternatives was higher than the number supporting Upgrade or No Build alternative. **Table 9-1 Rate the Alternatives** summarizes the results by totaling the number of participants supporting an alternative, giving it 4 or 5 stars, and the number of participants opposing an alternative, giving it 1- star.

The Upgrade Existing WV 9 alternative was ranked highest by 22% of the participants.

The input received was not straight forward, as some alternatives had nearly as many participants rank an alternative as the most desirable as the least desirable, such as for Corridors I, III and VI. Corridor II was clearly shown as the least desirable alternative with the least 5-star ratings (225) and most 1-star ratings (1,250). The majority of comments opposed to Corridor II were because it follows too close to the existing WV 9, will add congestion to the future US 522 Bypass because it connects directly to the proposed Fairview Connector, and due to Corridor II's proximity to Camp Frame, a previous 4H camp located north of WV 9 off Camp Frame Road.

Figure 9-5 Rate the Alternatives

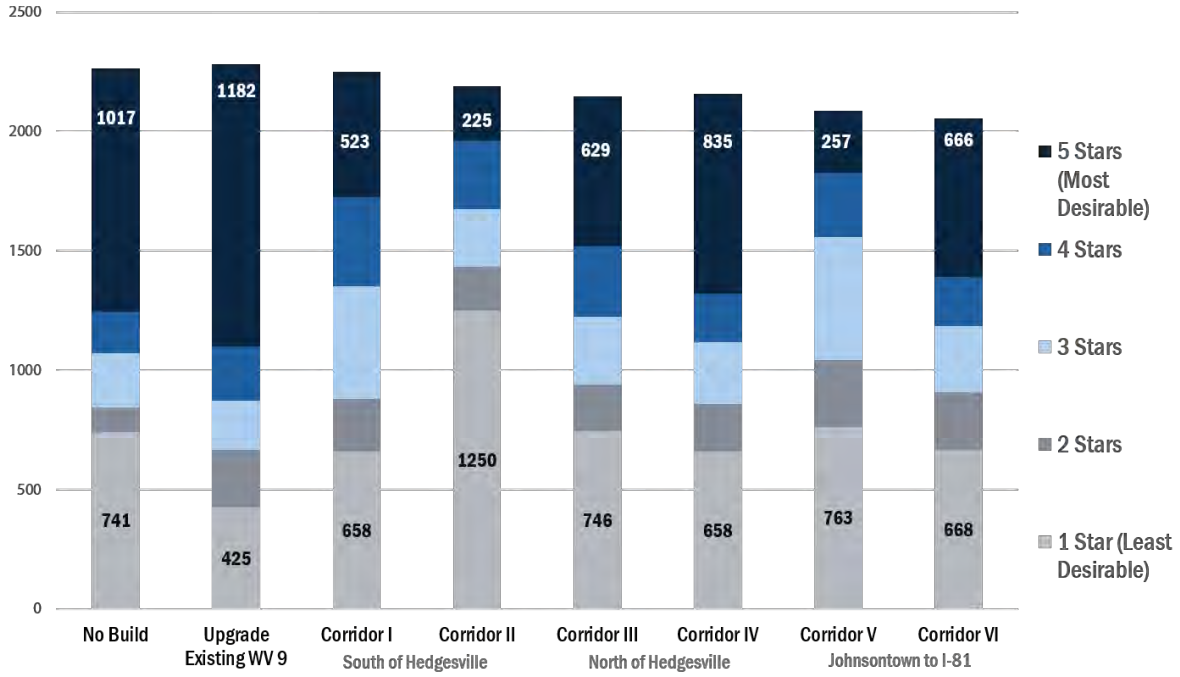


Table 9-1 Rate the Alternatives

Alternative	Supports (4 or 5 Stars)	Opposed (1 or 2 Stars)
No Build	1,193	845
Upgrade Existing WV 9	1,409	667
Corridor I	899	882
Corridor II	516	1,434
Corridor III	924	939
Corridor IV	1,039	857
Corridor V	530	1,042
Corridor VI	871	909

Identify Issues

The Identify Issues tab allowed participants to identify key issues within the Study Area by placing markers on a specific location to identify an important feature or concern. Environmental, Historic & Cultural, Congestion, Safety Concern, Property and Other Comment markers could be placed on the map along with a description and comment. Over 5,000 markers were placed to identify key issues as identified **Table 9-2 Identify Issues**. Mirroring the results on the Corridor Needs ranking, Congestion had the most identified locations with over 1,500 markers placed followed next by Environmental with 1,183 markers.

Table 9-2 Identify Issues

Type of Marker	# Markers Placed
Congestion	1,581
Environmental	1,183
Property	1,093
Safety Concern	896
Historic & Cultural	701
Other Comment	163
TOTAL MARKERS	**5,817**

Congestion markers placed by participants indicate that congestion is an issue primarily in the area between Hedgesville and Martinsburg along with a cluster near Berkeley Springs as shown on **Figure 9-6 Congestion Markers**. Many of the comments mentioned the large amount of development in the area near Hedgesville that has resulted in heavy congestion especially during the evening peak period.

Congestion was identified most often as an issue in the Study Area, by 29% of the participants.

Environmental markers placed by participants show there are environmental concerns across the Study Area with the most markers placed as Other Comment followed by Farmlands and Wildlife as shown on **Figure 9-7 Environmental Markers**. Comments stressed the importance of preserving farmland and many of the comments in the Other category were regarding Camp Frame, a previous 4H camp.

About You

The final tab, About You, collected information about the participants such as how often they travel on existing WV 9, home zip code, work zip code, and age. Participants also had the opportunity to enter an email address to stay involved with future updates to the project with 1,160 email addresses collected.

Results from the survey show that most participants (52%) travel on WV 9 daily and only 8% travel it occasionally as shown **Figure 9-8 How Often Participants Travel on WV 9**.

Also, the survey results show that most of the participants live (80%) and work (60%) within the Study Area as shown on **Figure 9-9 Home and Work Zip Codes.**

Figure 9-6 Congestion Markers

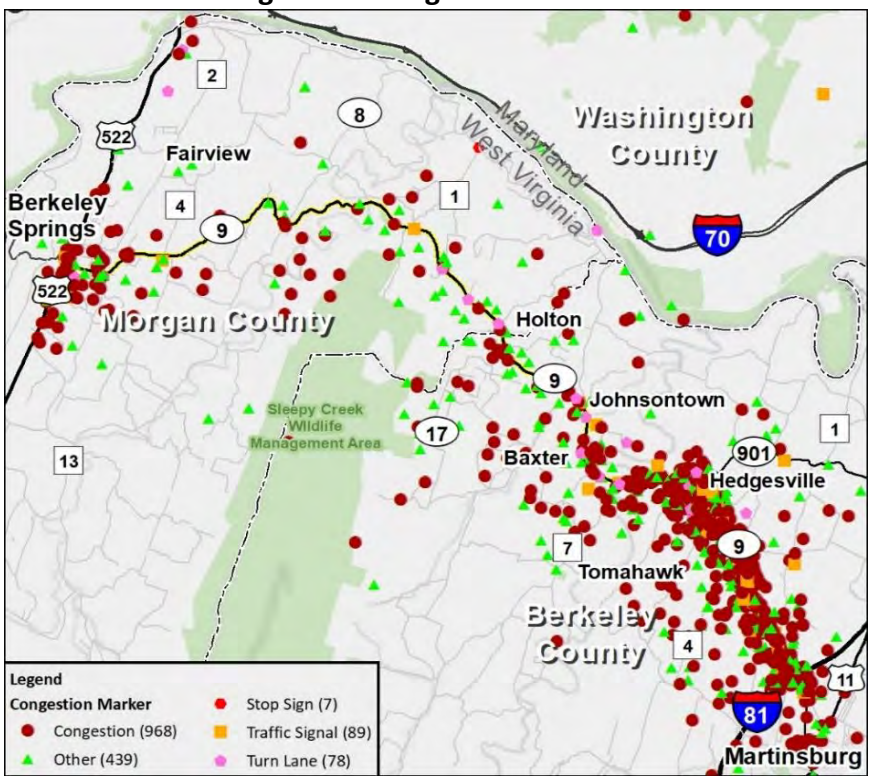


Figure 9-7 Environmental Markers

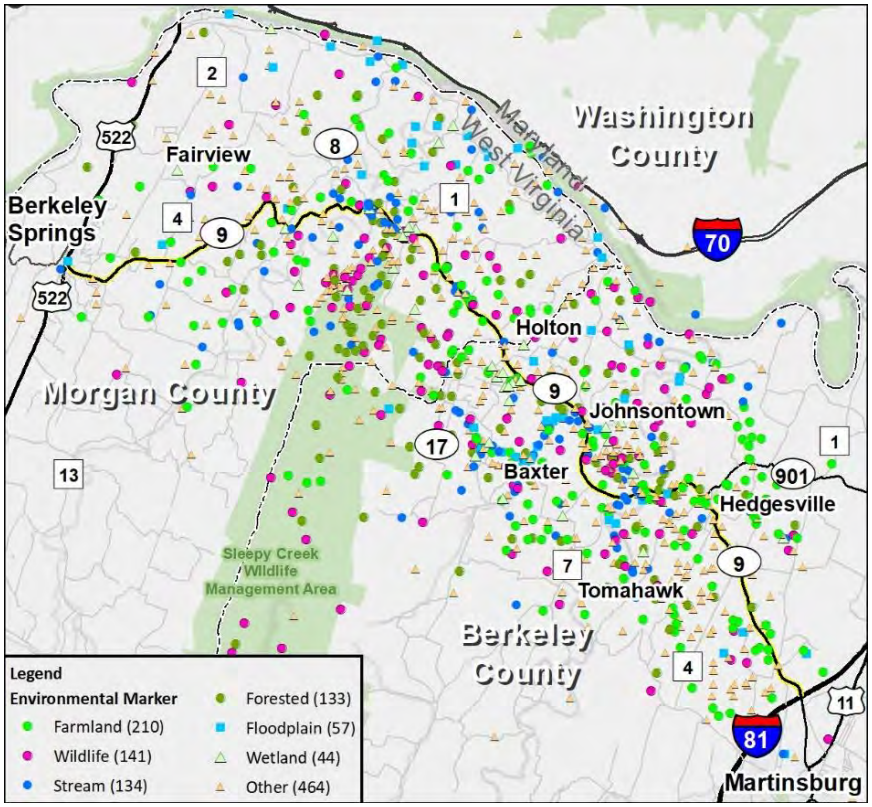


Figure 9-8 How Often Participants Travel on WV 9

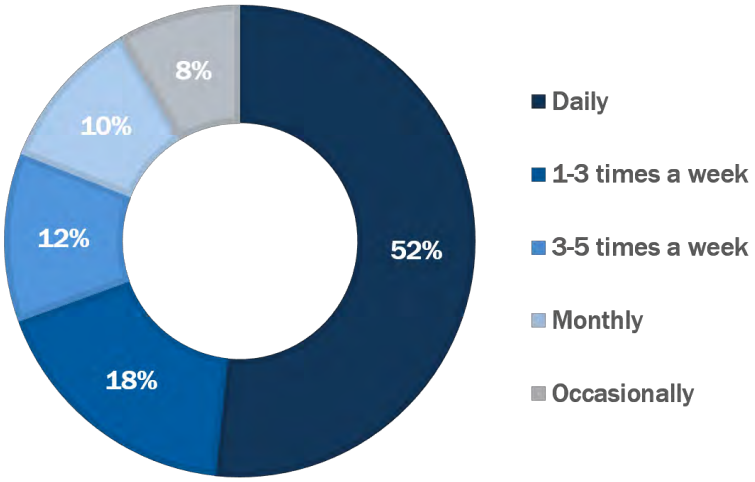
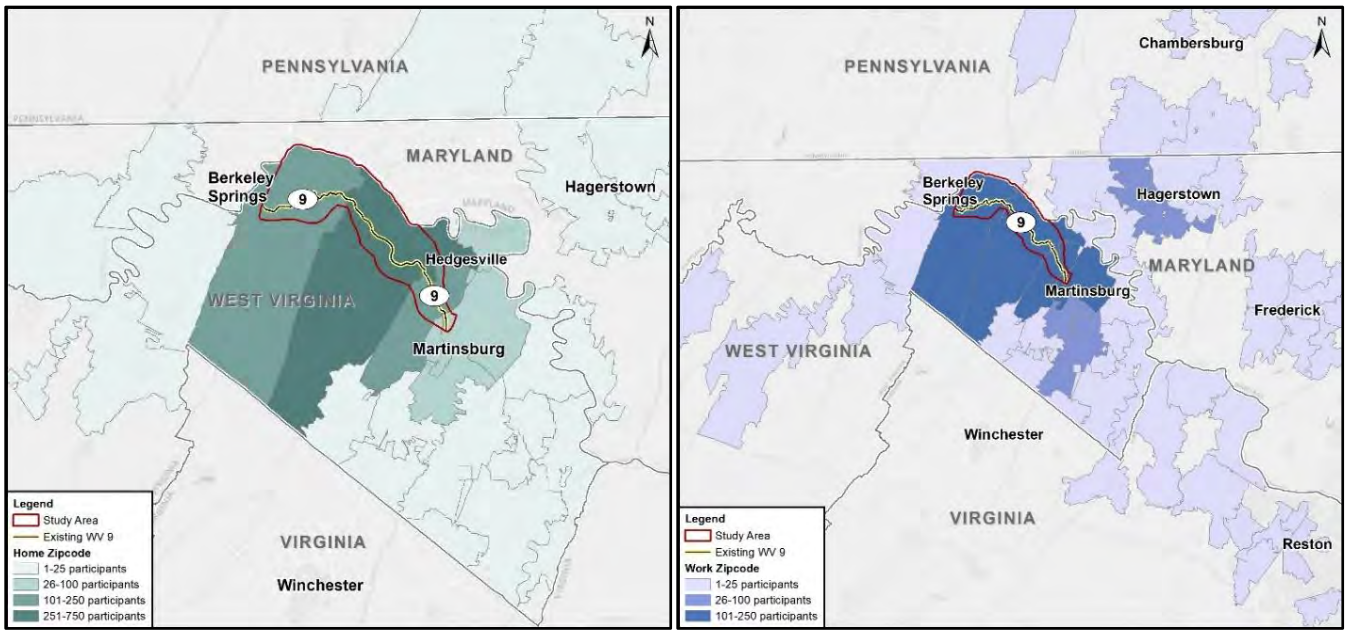


Figure 9-9 Home and Work Zip Codes



10. Preliminary Screening

A preliminary screening of the alternatives was conducted to help identify if any alternatives are considered unreasonable so that no alternative(s) is needlessly carried forward into the NEPA process. The PEL screening process was conducted in several phases by evaluating each alternative, described in **Section 6 Possible Solutions**, in terms of the following screening criteria:

Preliminary Screening identifies if any alternatives are considered not feasible or unreasonable to carry forward into the NEPA phase.

- Ability to meet the overall project goals and specific objectives,
- Ability to meet the identified transportation needs,
- Public support,
- Project cost and implementability,
- Potential impacts to environmental and cultural resources.

For each screening criteria, alternatives were rated on how well each met the screening criteria and assigned a green, yellow or red rating per the following:

- Green: alternative meets the criteria or is favorable
- Yellow: alternative moderately meets criteria
- Red: alternative does not satisfy the criteria or is not favorable

Goals and Objectives Screening

The PEL screening process began with an analysis of how well the alignments meet the project Goals and Objectives, described in **Section 3 Project Goals and Objectives**. The Goals and Objective ratings are qualitative at this stage of the project development but are supported by quantitative analysis of related screening criteria as presented below. For example, the Environmental Goal rating is based on the results of the environmental screening. For each overall goal, the corresponding objective was rated then rolled up to reflect a rating for the overall goal. **Table 10-1** presents the results of the Goals and Objectives preliminary screening.

The PEL screening process began with an analysis of how well the alternatives meet the PEL Goals and Objectives.

Table 10-1: Goals and Objectives Screening

Goals and Objectives Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Improve Mobility								
Eliminate Congested Areas								
Improve Connections to I-81, US 522 Bypass & Major Crossroads								
Improve left turn movements								
Evaluate Hedgesville Bypass								

Goals and Objectives Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Improve Safety								
Reduce overall crash rates and improve high crash locations								
Include warranted wildlife crossings								
Improve bicycle / pedestrian safety								
Provide truck climbing lanes and improved passing zones								
Support Economic Development								
Improve access to growth areas								
Improved truck travel								
Protect the Environment								
Minimize impacts to the Sleepy Creek Watershed and other resources								
Improve stormwater runoff and related issues								
Improve water quality and protect drinking water								
Support and Enhance All Travel Modes			*	*	*	*	*	*
Accommodate Pedestrian & Bike Access								

Goals and Objectives Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Improve Trail Connectivity & Evaluate Multi-use Path between Martinsburg and Berkeley Springs			*	*	*	*	*	*
Facilitate Access to Local Transit Service and Regional Trains								
Support Corridor Land Use Vision								
Improve Recreational Areas			**	**	**	**	**	**
Improve Access to Recreational Areas								
Minimize impacts to Farmland Conservation Easements								
Support Town of Hedgesville Zoning Plans or Restrictions								

* assumes inclusion of multimodal trail on new alignments

** to be determined in future phases

The Goals and Objectives screening shows :

- Other than avoiding environmental impacts, the No Build alternative does not satisfy any of the project Goals and Objectives
- The Upgrade Existing WV 9 Alternative partially satisfies the goals of improving mobility, improving safety, supporting economic development, supporting all travel modes, and supporting the corridor land use vision by improving the existing roadway where feasible. This alternative does not completely satisfy these goals since the inherent nature of the two-lane road will still result in some congestion and safety issues. This alternative does avoid environmental impacts to a high extent.
- Corridors I and II, south of Hedgesville, completely satisfy the mobility, safety and economic development goals by bypassing all congested areas on an inherently safe four-lane divided roadway. They also satisfy supporting all modes with the inclusion of a new, separated multi-use

path in the right of way. Corridors III and IV, north of Hedgesville generally satisfy these goals also, but to a slightly lesser extent since they do not divert as much traffic from WV 9 as the southern corridors. Since they traverse 20+ miles of new roadway on new alignment, all four corridors would have some environmental impacts, but the southern Corridors I and II would have fewer potential impacts than Corridors III and IV and were thus given a lower environmental rating. Northern corridors are further from the Sleepy Creek Wildlife Management Area and were given a lower rating for recreation access.

- Partial Build Corridors V and VI improve mobility and support economic development by bypassing most of the congested areas, but do not provide full completion of a high-speed roadway network between US 522 and I-81. Similarly, they improve safety by diverting traffic from some of the higher crash areas, but still require vehicles to traverse a significant length of two-lane undivided roadway. They partially improve bicycle travel with a new multi-use trail, but again, the trail would not extend the length of the study area. Both corridors have some potential environmental impacts, but northern Corridor VI would have potentially more and was thus given a lower environmental rating than Corridor V to the south. Corridor V does have more potential farmland easement impacts.

Transportation Needs Screening

Next, the PEL screening process assesses whether each alternative meets the identified transportation needs.

Overall project performance was evaluated based on their ability to provide the desired facility performance and meet the identified transportation needs discussed in **Section 4 Transportation Deficiencies and Needs**. Results from the travel modeling and safety assessment were used to quantitatively measure the following criteria for each alternative:

- Travel time (in minutes) from US 522 to I 81
- Miles of road segments with congestion
- Projected annual crashes on WV 9 corridor

The travel time and segment miles of congestion address the project goal to improve mobility between Berkeley Springs and Martinsburg. The travel times between Berkeley Springs and Martinsburg were calculated from the travel model outputs for each alternative scenario. The miles of congestion were based on the output travel model measure of "volume/capacity" (V/C). Any roadway segment with a V/C > 0.80 was classified as a congested segment and the mileage for those segments were totaled.

Each Build alternative was evaluated based on their ability to improve the level of safety for motorists and pedestrians. Crash modification factors (CMF) were used to compute the expected benefits of strategies along the WV 9 corridor including the impacts of the bypass alternatives. FHWA provides a detailed instruction on implementation techniques with project examples in their clearinghouse

website.[9] Based on the strategy, existing crash types, and the area, CMFs were estimated and applied to existing crash numbers to evaluate a potential crash reduction.

The results of the traffic and safety screening assessment are provided in **Table 10-2 Transportation Needs Screening**. Green shading indicates the alternatives that provide the most benefit for each criterion, while red shading highlights the alternatives providing the least benefit. The Build alternatives (Corridors I-VI) provide a 20-25% savings in travel time from Berkley Springs to Martinsburg. As expected, the full Build alternatives (Corridor I to Corridor IV) provide the highest benefits while the two partial Build alternatives (Corridor V and VI) provide slightly lower benefits. However, the partial Build alternatives do provide benefits in reducing overall traffic congestion along the corridor, primarily since most of the congestion is on the eastern portion of the corridor.

The traffic and safety screening assessment does not clearly indicate any alternatives that should not be carried to the NEPA phase. The No Build alternative does not fully address project goals but is required to be carried forward to future project planning phases.

For safety impacts, a new four-lane roadway is expected to reduce the number of crashes. The southern Build alternatives (Corridors I and II) provide the most benefits, since those alternatives divert more traffic from existing WV 9.

Table 10-2: Transportation Needs Screening

Transportation Needs Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Corridor Travel Time (min)	**30**	**28** *(-7%)*	**23** *(-23%)*	**23** *(-23%)*	**24** *(-20%)*	**24** *(-20%)*	**27** *(-10%)*	**26** *(-13%)*
Segment Miles of High Congestion	**1.9**	**1.5** *(-21%)*	**0.3** *(-84%)*	**0.3** *(-84%)*	**0.8** *(-68%)*	**1.2** *(-37%)*	**0.3** *(-84%)*	**0.3** *(-84%)*
Projected Crashes Per Year	**116**	**111** *(-4%)*	**94** *(-19%)*	**94** *(-19%)*	**105** *(-10%)*	**105** *(-10%)*	**103** *(-11%)*	**111** *(-4%)*

[9] http://www.cmfclearinghouse.org/

Public Support Screening

Public support was evaluated by tallying the input received throughout the PEL public outreach process as discussed in **Section 9 Stakeholder and Public Coordination**. The input received is summarized in **Table 10-3 Public Support Screening** for each public outreach method. The alternatives that received the most support are shaded in green and those that had the most opposition are shaded in red. Overall, the Upgrade Existing WV 9 had the most support and least opposition. As discussed earlier in the report, the other alternatives had competing results of support versus opposition, with several alternatives having nearly as many individuals supporting the alternative as opposing.

Public support is screened by the number of comments supporting and opposing each alternative measured by the comments received and the online survey.

Table 10-3: Public Support Screening

Public Support Screening Criteria	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Total Comments Supporting	1,254	1,495	909	461	929	1,042	550	1,347
Total Comments Opposed	756	428	678	1,276	1,498	1,407	773	1,422
March Public Comments								
Comment Supporting	38	30	9	9	4	2	16	9
Comment Opposed	15	2	16	23	750	747	8	754
MetroQuest Online Survey Summary								
Top Rated (4 and 5 stars)	1,193	1,409	899	452	924	1,039	530	1,334
Low Rating (1 star)	741	425	659	1,250	746	658	763	668
May Public Comments								
Comment Supporting	23	56	1	0	1	1	4	4
Comment Opposed	0	1	3	3	2	2	2	0

Project Cost and Implementation

The project cost and implementation screening compares the estimated cost of each alternative (discussed in **Section 6 Possible Solutions**) and the ability to implement each alternative in sections as shown in **Table 10-4 Project Cost and Implementation**. The cost to maintain either the existing WV 9 or a new roadway are not included in the estimated cost, therefore no cost is associated with the No Build. The cost to Upgrade Existing WV 9 has the next lowest cost, estimated at $31.4 million. The estimated

cost to construct a new roadway between Berkeley Springs and Martinsburg has the highest cost, ranging from $1.2 billion to $1.5 billion, while the alternatives to construct a new roadway between I-81 and Johnsontown with upgrades to WV 9 from Berkeley Springs to Johnsontown are less, ranging from $445 million to $659 million.

Implementability was evaluated as the ability to construct the alternative in sections. For a 20-25 mile corridor, it is likely the project would be built in multiple sections of 4 to 5 miles each. It is feasible to construct all of the alternatives in sections, with Corridor IV, the northern most alternative, being slightly less feasible because it doesn't provide connectivity to local roadways as well as the other alternatives.

Table 10-4: Project Cost and Implementation

Project Cost & Implementation Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Length (Miles)	NA	21.6	20.7	21.2	20.2	20.2	23.5	22.0
Total Cost ($ in Millions)	$0	$31.4	$1,200 - $1,490	$1,228 - $1,525	$1,170 - $1,452	$1,174 - $1,457	$534 - $659	$445 - $548
Project Implementability	NA							

Environmental Screening

The environmental screening aids in identifying the alternatives that represent the best opportunity to minimize impacts to the environment.

An inventory of environmental resources within each alternative was performed to identify any "red flags" that could render an alternative as not feasible or unreasonable. The environmental inventory is based on secondary data collected for this study, as described in **Section 5 Linking Planning to the Environment**. A footprint for the Upgrade Existing WV 9 alternative was estimated by identifying the limits for each identified improvement and then buffering each 80 feet to create an approximate footprint for screening this alternative. The screening of the Build alternatives (Corridors I-VI) is based on an environmental inventory within the entire 1,500-foot wide corridors. An approximately 200-foot wide new roadway would be positioned within the 1,500-foot corridor to avoid or minimize environmental impacts to the extent possible. Actual impacts for the Build Alternatives will be substantially less when new roadway alternatives, approximately 200-foot wide, are developed during the NEPA phase.

Land Cover / Land Use

Land cover / land uses were evaluated for the amount of developed areas and farmlands within each alternative. Additionally, the number of parcels within each alternative was evaluated to help identify

areas of dense development. Berkeley and Morgan County (2020) parcel data was used to identify the land cover / land use type as discussed in **Section 5 Linking Planning to the Environment**. **Table 10.5 Land Cover / Land Use Screening** presents a summary of the screening.

Land cover / land uses within each of the alternatives is primarily residential and farmlands.

Corridor IV has the highest residential acreage while the Upgrade Existing WV 9 has the least. Corridor I has the highest number of farmland acres and the Upgrade Existing WV9 has the least. The Upgrade Existing WV 9 and Corridor VI contain the lowest number of parcels while Corridors I-IV, the full Build alternatives, contain the highest number of parcels. Corridor IV is slightly less because the northern portion of the Study Area is less developed.

Table 10.5 Land Cover / Land Use Screening

Land Cover / Land Use Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Residential (acres)	0	16	1,566	1,882	1,957	**2,086**	461	375
% Residential	0	30.6%	42.6%	48.8%	47.7%	**56.8%**	28.7%	28.1%
Farmland (acres)	0	4	**1,696**	1,589	1,507	904	901	718
% Farmland	0	7.7%	46.1%	41.2%	36.8%	24.6%	**56.0%**	53.8%
# of Parcels	0	96	723	**882**	728	564	342	183

Protected Farmland Easements and Farmland Soils

Table 10.6 Protected Farmland Easements and Farmland Soils Screening presents the acres of protected farmland easement and farmland soils within each alternative. The evaluation used the most recent farmland easements (March 2021). Current protected farmland easements should be requested from the farmland protection board for each county during the NEPA Phase.

The Upgrade Existing WV 9, Corridors III, IV and VI are expected to have minimal to no impact on protected farmland easements. Corridor I contains the most protected farmland easements, with three (3) farmland easements located within the corridor as shown on **Figure 10-1 Protected Farmland Easements and Farmland Soils**. Two of the easements were recently identified by the Berkeley County Farmland Protection Board. Corridor I should be further evaluated during the NEPA phase to avoid those two easements. The other easement within Corridor I is also located within Corridors II and V where these corridors connect to existing WV 9, avoidance or minimization should be further evaluated during the NEPA phase.

All of the alternatives will impact prime farmland soils, farmland soils of local importance and farmland soils of statewide importance. Corridor IV has the highest prime farmland soil acres while the Upgrade

Existing WV 9 has the least. Overall Corridor III has the highest acres of all farmland soil types. Note the acres of farmland soils shown for the Build alternatives (Corridors I-VI) represents all farmland soils within the 1,500-foot wide corridor.

Current protected farmland easements should be requested from each counties Farmland Protection Board during the NEPA phase.

Figure 10-1 Protected Farmland Easements and Farmland Soils Screening depicts the acreage of farmland soils in relation to the alternatives. A Farmland Conversion Impact Rating Form will need to be completed and coordinated with NRCS for review and completion during the NEPA phase.

Figure 10-1 Protected Farmland Easements and Farmland Soils Screening

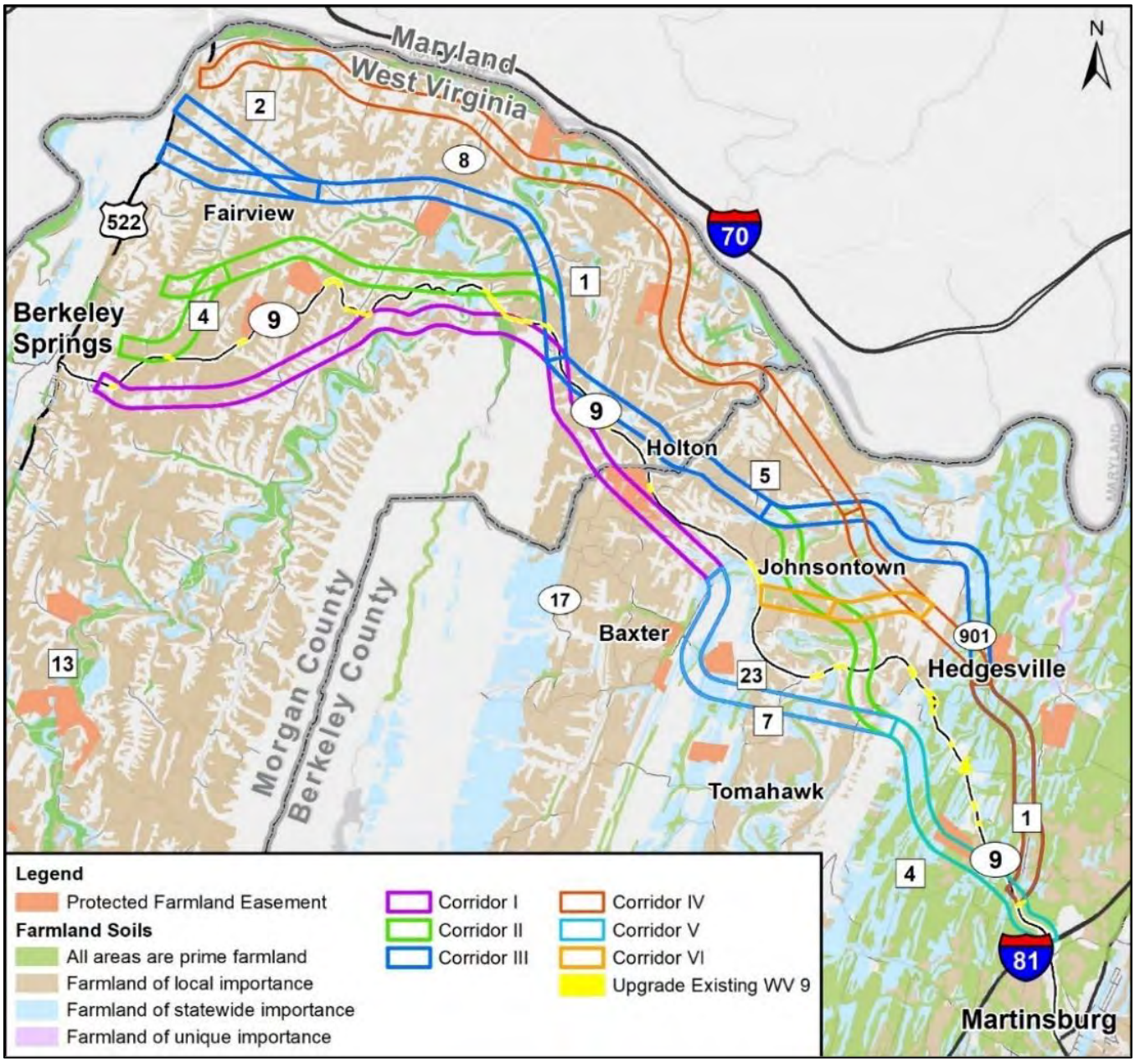


Table 10-6: Protected Farmland Easements and Farmland Soils Screening

Environmental Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Protected Farmland Easement (acres)	0	0.03	**197.65**	69.99	5.37	10.19	69.99	0
Prime Farmland Soils (acres	0	14.6	472.9	456.9	480.5	**501.9**	417.3	380.8
Farmland Soils of Local Importance (acres)	0	21.5	1,293.6	**1,943.7**	1,718.3	1,308.9	201.1	410.1
Farmland Soils of Statewide Importance (acres)	0	9.4	562.1	356.8	**606.3**	603.6	505.0	320.5
TOTAL FARMLAND SOILS	0	45.5	2,328.5	2,757.4	**2,805.1**	2,414.3	1,123.4	1,111.4

Aquatic Resources

Streams

Table 10-7 Aquatic Resources Screening presents the total length of streams in miles and the number of streams and associated tributaries that are within each alternative. The length and number of streams shown for the Build alternatives (Corridors I-VI) represents all streams within the 1,500-foot wide corridor. Several named streams and unnamed tributes will be impacted by all of the alternatives. Corridor III and IV have the greatest potential to impact streams.

Figure 10-2 Aquatic Resources Screening shows the streams in relation to the alternatives. During NEPA, the number of times a stream or creek is crossed by an alternative should be minimized along with minimizing impacts to the riparian areas adjacent to waterways. Watershed protection plans for the area watersheds identify protection and restoration best management practices. Consultation for the Clean Water Act Section 404 permit and the Section 401 Water Quality Certification will be required during the NEPA process.

During NEPA, the number of times a stream or creek is crossed by an alternative should be minimized.

NWI Wetlands

Table 10-7 Aquatic Resources Screening presents the acres of NWI wetlands within each alternative. The Build alternatives (Corridors I-VI) includes all NWI wetlands within the 1,500-foot wide corridors.

Corridor III has the largest inventory of wetlands and ponds, which could be avoided or minimized during the NEPA phase. Upgrade Existing WV 9 is likely to have little to no impact on NWI wetlands.

Figure 10-2 Aquatic Resources Screening shows the NWI wetlands in relation to the alternatives. Consultation for the Clean Water Act Section 404 permit will be required during the NEPA process.

Table 10-7: Aquatic Resources Screening

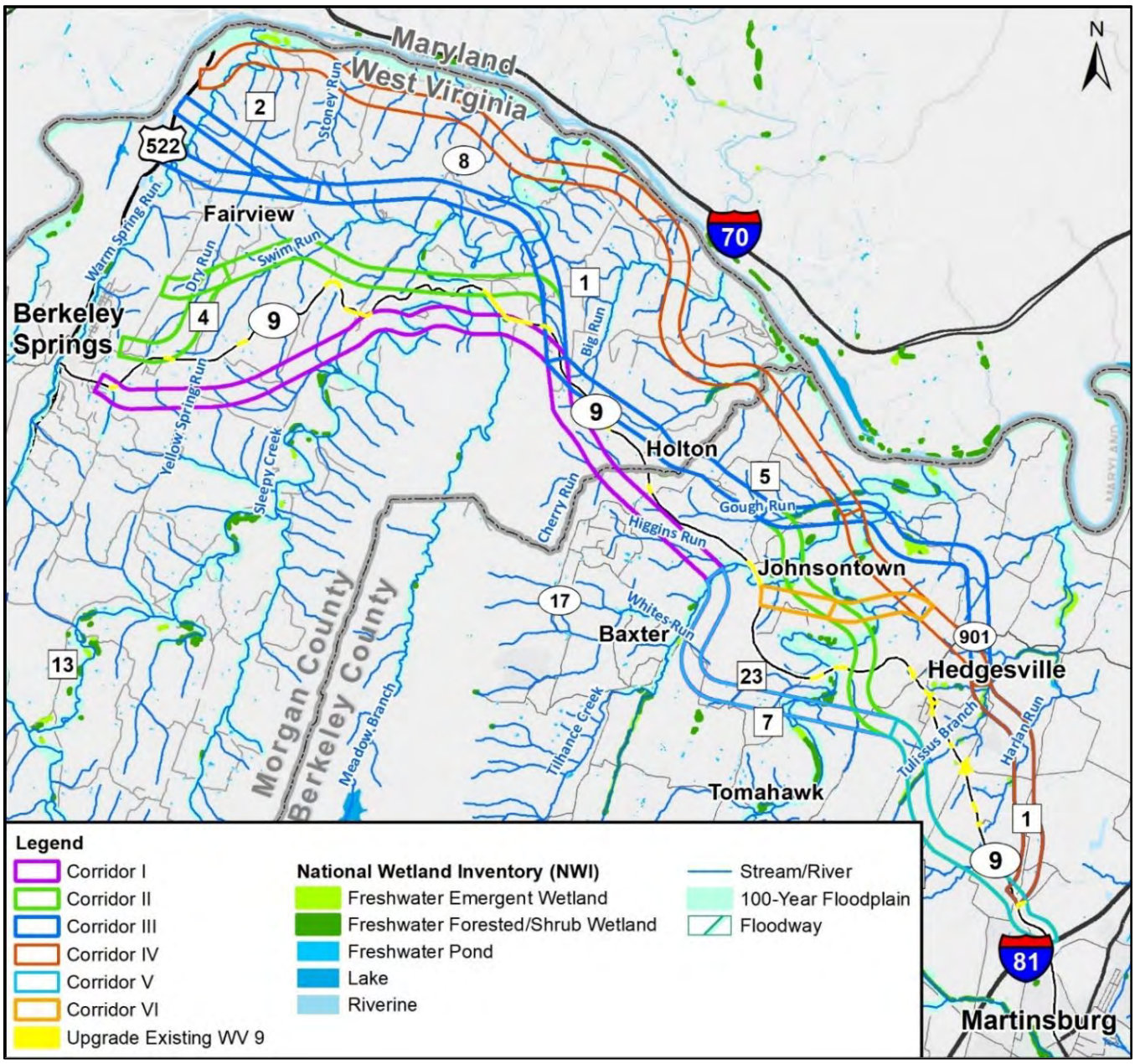
Environmental Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Streams								
Length of Streams Crossed (miles)	0	0.1	11.3	14.0	**16.8**	15.2	4.3	3.9
# of Streams and Tributaries Crossed	0	2	38	35	46	**47**	16	12
NWI Wetlands								
Freshwater Forested Shrub Wetland (acres)	0	0	2.9	1.8	**11.8**	4.7	2.3	0
Freshwater Emergent Wetland (acres)	0	0	2.7	3.9	**23.1**	5.8	2.7	5.0
TOTAL WETLANDS	0	0	5.6	**5.7**	**34.9**	10.5	5.0	5.0
Freshwater Pond (acres)	0	0	9.3	**12.7**	11.1	4.3	4.9	3.8
Floodplains								
100-year Floodplain (acres)	0	2.4	248.4	188.0	246.2	**466.8**	122.9	54.7

Floodplains

Table 10-7 Aquatic Resources Screening presents the acres of 100-year Floodplain within each alternative. There are no floodways located within the alternatives. The Build alternatives (Corridors I-VI) include all floodplains within the 1,500-foot wide corridors. Corridor IV has the largest acreage of 100-year floodplain due the abundance of water resources in the northern portion of the Study Area. The Upgrade Existing WV 9 has the least acreage of 100-year floodplains.

Figure 10-2 Aquatic Resources Screening shows the 100-year floodplains in relation to the alternatives. Coordination with local floodplain management will be required during the NEPA process.

Figure 10-2 Aquatic Resources Screening



Species of Special Concern

Two (2) Federally endangered plant species, the Northeastern bulrush (*Scirpus ancistrochaetus*) and Harperella (*Ptilimnium nodosum*) were identified within all of the alternatives. Additionally, two (2) Federally endangered mammals, the Indiana bat (*Myotis sodalis*) and Northern long-eared bat (*Myotis septentrionalis*) are known to have range throughout Morgan and Berkley Counties. State recognized mussel streams are also located within all of the alternatives. Additional consultation with the WVDNR Wildlife Resources section will be required during the NEPA phase.

Gas Pipeline

The Mountaineer Gas pipeline traverses the Study Area and is within several of the alternatives. **Table 10-8 Gas Pipeline Screening** presents the miles of pipeline within each alternative and the number of times the gas pipeline traverses each of the alternatives. The Build alternatives (Corridors I-VI) include all length of pipeline within the 1,500-foot wide corridors. Corridor II has the longest length and greatest number of crossings of the Mountaineer Gas pipeline. The Upgrade Existing WV 9 and Corridor V both would have no impact on the pipeline. Coordination with Mountaineer Gas will be required during the NEPA phase.

Table 10-8: Gas Pipeline Screening

Gas Pipeline Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Mountaineer Gas Pipeline (miles)	0	0.0	0.18	**3.54**	2.14	0.42	0.0	0.91
Mountaineer Gas Pipeline (# Crossings)	0	0	1	**6**	5	1	0	2

Cultural Resources

Archaeology

A preliminary screening of known archaeological sites which was identified through a review of West Virginia Division of Culture and History Archaeological Site Forms and via examination of the WV SHPO Interactive Map Viewer (WVDCH 2021) identified twenty-four (24) sites within, or adjacent to, all of the alternatives as shown in **Table 10-9 Previously Recorded Archaeology Sites Within All Alternatives**. The Build alternatives (Corridors I-VI) include known archaeological sites within the 1,500-foot wide corridors. Of these twenty-four (24) sites, thirteen (13) are indicated as prehistoric, ten (10) are defined as historic, and one (1) is classified as a multicomponent prehistoric and historic locus.

TABLE 10-9: Previously Recorded Archaeological Sites Within All Alternatives

Site #	Temporal Affiliation	Temporal Period	Site Type	Topo Setting	Identification Type	Identifier / Year	Site Condition	NRHP Eligibility	Alter-natives
46-BY-87	Prehistoric	Archaic & Woodland (?)	Camp (greenstone celt and pestle)	Hilltop/ Orchard	Informant – Private Collection	K. Carr (1978)	**Windshield Survey Assessment**: Obscured due to trees (2021)	Not Indicated	Corridor III
46-BY-117	Historic	1750 – 1850	Domestic - Possible Slave Quarters	Saddle	Reconnaissance Survey & Intensive Testing	Thunderbird Archaeological Assoc. (1998)	**Site Form:** Site area has been plowed; subsurface feature identified in sub-plowzone. **Windshield Survey Assessment:** Probably	Not Indicated	Corridor III, IV & VI

Site #	Temporal Affiliation	Temporal Period	Site Type	Topo Setting	Identification Type	Identifier / Year	Site Condition	NRHP Eligibility	Alter-natives
							destroyed by construction		
46-BY-118	Historic	1801 – 1950	Trash Scatter	Open field in very low-relief hills	Reconnaissance Survey	Thunderbird Archaeological Assoc. (1998)	**Site Form:** Site area has been plowed **Windshield Survey Assessment:** Appears undisturbed	Not Indicated	Corridor III, IV & VI
46-BY-120	Historic	1851 – 1950	Trash Scatter	Low-Relief Hills	Reconnaissance Survey	Thunderbird Archaeological Assoc. (1998)	**Site Form:** Site area has been plowed **Windshield Survey Assessment:** Appears undisturbed	Not Indicated	Corridor III, IV & VI
46-BY-121	Historic	1801 – 1900	Domestic	Saddle	Reconnaissance Survey	Thunderbird Archaeological Assoc. (1998)	**Site Form:** Site area has been plowed **Windshield Survey Assessment:** Appears undisturbed	Not Indicated	Corridor III, IV & VI
46-BY-123	Historic	1851 – 1950	Rural Farm Complex Ruins	Low-Relief Hills	Reconnaissance Survey	Thunderbird Archaeological Assoc. (1998)	**Site Form**: Structures are in ruins and surrounding area has been plowed **Windshield Survey Assessment:** Appears undisturbed	Not Indicated	Corridor III, IV & VI
46-BY-127*	Prehistoric	Unassigned	Isolated Find	Ridge Spur	Reconnaissance Survey	Highlands Archaeology, Inc. (1995)	**Site Form:** Site area has been plowed **Windshield Survey Assessment:** Site area likely destroyed due to development	Not Eligible	Corridor III, IV & VI
46-BY-254	Prehistoric	Late Archaic	Isolated Find – Brewerton Ear-Notched Pp/k	Floodplain	Reconnaissance Survey - STPs	WV DOT 2017	**Site Form:** Site found in area of undisturbed pasture grasses. **Windshield Survey:** Site area unchanged since 2017 survey.	Not Eligible	Upgrade Existing WV 9
46-BY-255	Prehistoric	Unassigned	Lithic Scatter	Toeslope	Reconnaissance Survey - STPs	Skelly & Loy, Inc. (2017)	**Site Form:** Site disturbed through plowing. Site area between woods and road has been graded and ditched. **Windshield Survey Assessment:** Portion of site outside of disturbed graded and ditched berm is obscured by treeline; likely unchanged since 2017 assessment.	Not Evaluated - Survey insufficient to determine NRHP eligibility	Corridor VI

Site #	Temporal Affiliation	Temporal Period	Site Type	Topo Setting	Identification Type	Identifier / Year	Site Condition	NRHP Eligibility	Alter-natives
46-BY-256	Historic	1801 – Present	Residential/ Farmstead	Hillside/ Bench	Reconnaissance Survey - STPs	Skelly & Loy, Inc. (2018)	**Site Form:** According to neighbor, site disturbed during razing of 19th-century house and subsequent grading by bulldozer **Windshield Survey Assessment:** Site area in open grassy field; appears unchanged since 2018 assessment.	Not Eligible	Corridor VI
46-MN-10	Prehistoric	Unassigned	Lithic Scatter	Ridgetop Pasture	Surface Survey	D. Rogers (1976)	**Site Form:** Site area has been plowed **Windshield Survey Assessment:** General area containing site appears undisturbed, although access via road was blocked.	Not Indicated	Corridor III
46-MN-71	Prehistoric	Unassigned	Camp/ Village	Terrace	Surface Survey	D. Rogers (1976)	**Site Form:** Likely undisturbed **Windshield Survey Assessment:** Access Denied, Private Property	Not Indicated	Corridor IV
46-MN-72	Prehistoric	Unassigned	Camp	Terrace	Surface Survey	D. Rogers (1976)	**Site Form:** Likely undisturbed **Windshield Survey Assessment:** Access Denied, Private Property	Not Indicated – no follow up necessary recommended by Rogers.	Corridor IV
46-MN-73	Prehistoric	Unassigned	Camp	Terrace	Surface Survey	D. Rogers (1976)	**Site Form:** Likely undisturbed **Windshield Survey Assessment:** Access Denied, Private Property	Not Indicated – no follow up necessary recommended by Rogers.	Corridor IV
46-MN-74*	Prehistoric	Unassigned	Rockshelter	Slope	Surface Survey/Informant	D. Rogers (1976)	**Site Form**: Shallow Rockshelter with no artifacts reported **Windshield Survey Assessment:** Access Denied, Private Property	Not Indicated; however, D. Rogers recommended "probably not worth pursuing."	Corridor IV
46-MN-78*	Prehistoric	Unassigned	Lithic Scatter with Pp/ks	Ridgetop	Surface Survey/Informant	D. Rogers (1976)	**Site Form and Windshield Survey Assessment:** Possibly disturbed by house currently constructed on location	Not Indicated	Corridor II

Site #	Temporal Affiliation	Temporal Period	Site Type	Topo Setting	Identification Type	Identifier / Year	Site Condition	NRHP Eligibility	Alter-natives
46-MN-81	Prehistoric	Unassigned (contained both corner notched and triangular pp/ks)	Open Camp	Hilltop/ Ridgetop	Surface Survey	D. Rogers (1970)	**Site Form:** Likely undisturbed **Windshield Survey Assessment:** Likely undisturbed	Not Evaluated	Corridor I
46-MN-82	Prehistoric	Unassigned (reported pp/ks during farming)	Unknown	Ridgetop	Informant	D. Rogers (1977)	**Site Form:** Likely undisturbed **Windshield Survey Assessment:** Likely undisturbed	Not Evaluated	Corridor I
46-MN-127	Prehistoric	Unassigned	Isolated Find (single flake)	Ridge Spur above Dry Run Floodplain	Reconnaissance Survey	Highlands Archaeology, Inc. (1995)	**Windshield Survey Assessment:** Possibly reworked/graded terrace area	Not Eligible	Corridor II
46-MN-155	Historic	1851 – 1950 (mainly mid-20th century)	Domestic	Floodplain /Hillside Bench	Reconnaissance Survey	Wilbur Smith & Assoc. (2000)	**Site Form:** Disturbed by Rt 9 roadway construction **Windshield Survey Assessment:** Dilapidated historic structure still standing in site vicinity.	Not Indicated	Corridor I
46-MN-156*	Historic	1851 – 1950	Domestic/ Trash Dump	Gap/ Saddle	Reconnaissance Survey	Wilbur Smith & Assoc. (2000)	**Site Form:** Undisturbed **Windshield Survey Assessment:** Unable to view from roadway	Not Indicated	Corridor I
46-MN-160	Historic	1920s – Present	Domestic	Ridge Top/Yard with associated house	Reconnaissance Survey	Wilbur Smith & Assoc. (2000)	**Windshield Survey Assessment**: Undisturbed	Not Indicated	Corridor II
46-MN-184*	Prehistoric and Historic	Unassigned Prehistoric and 19th Century	Lithic Scatter and Limited Historic Artifact Scatter	Upland Bench	Reconnaissance Survey	Cultural Resource Analysts, Inc. (2017)	**Site Form:** Disturbed as cleared pastureland with past plowing likely **Windshield Survey Assessment:** Unable to access; view obstructed	Not Eligible	Corridor II & III
46-MN-185	Historic	19th – early 20th century	Artifact Scatter	Hillside/ Bench	Reconnaissance Survey	Cultural Resource Analysts, Inc. (2017)	**Site Form:** Disturbed **Windshield Survey Assessment:** Likely further disturbed by residential development	Not Eligible	Corridor II & III

* Site located immediately adjacent to the alternative

Table 10-10 Previously Recorded Archaeology Sites Screening summarizes the previously recorded archaeology sites within or adjacent to each alternative. At ten (10) sites each, both Corridors III and IV share the majority of the previously recorded archaeological sites within the 1,500-foot wide corridor.

Corridor VI is next, with eight (8) sites situated within the corridor. Corridor's I and II have four (4) and five (5) sites, respectively. The Upgrade Existing WV 9 alternative has one recorded prehistoric site within the proposed improvements. No previously identified archaeological resources were indicated within Corridor V.

Table 10-10 Previously Recorded Archaeology Sites Screening

Previously Recorded Archaeology Site Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Prehistoric Archeology Sites	0	1	2	2	**3**	5	0	6
Historic Archeology Sites	0	0	2	2	6	**5**	0	2
Prehistoric and Historic Archaeology Sites	0	0	0	1	1	0	0	0
TOTAL Previously Recorded Archaeology Sites	0	1	4	5	**10**	**10**	0	8

Archaeology Probability Area Screening

A preliminary assessment of archaeological probability was conducted for the Study Area as discussed in **Section 5 Linking Planning to the Environment**. The probability area acreage within each alternative is presented in **Table 10-11 Archaeology Probability Area Screening**. The Build alternatives (Corridors I-VI) include probability acreage within the 1,500-foot wide corridors. Based on this evaluation, Corridor III has the largest high probability area acreage at 3,270 acres while Corridor V has the least at 1,056 acres. Corridor III also has the largest combined high and moderate probability area acreage at 3,603 acres. It is pertinent to note that Corridor III also contains the greatest number of previously recorded archaeological sites. Similarly, Corridor V, the partial Build alternative, has the smallest combined high and medium probability area acreage at 1203 acres, and there were no previously recorded archaeological resources located within that alternative. In all cases, an upgrade to existing WV 9 will have the least involvement with high and/or medium probability areas, even in combination with Corridors V and VI.

Table 10-11 Archaeology Probability Area Screening

Archaeology Probability Area Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
High Probability (acres)	0	45	2,592	2,765	**3,270**	2,790	1,056	1,107
Medium Probability (acres)	0	3	365	**403**	333	320	147	115
Low Probability (acres)	0	1	512	499	518	**557**	192	122

Historic Resources

Above-ground, historic-age resources (45 years of age or older at the time of study; constructed in or prior to 1976) that lie within, or whose parcel boundary intersect with the alternatives were grouped into the following categories:

- **Historic Properties**: Any historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior (36 CFR 800.16[l][1]).
- **Previously Recorded Historic Resources**: Resources documented through the West Virginia Historic Property Inventory (WVHPI), including those that have since been demolished. Note that some resources documented through the WVHPI also meet the definition of historic property above.
- **Cemeteries**: All known cemeteries (visible from the public right of way or identified on historical mapping). It is possible additional cemeteries exist on private property not accessible to the public.
- **Newly Identified Historic Resources**: All of the remaining historic resources that were identified as part of this investigation.
- **Historic Resources of Concern**: Resources from the above lists, including everything identified as a "historic property," all cemeteries, and any previously recorded or newly identified resources that have the potential for NRHP eligibility.

Historians meeting the ***Secretary of the Interior's Professional Qualification Standards*** for history and architectural history (36 CFR Part 61), identified historic resources effort through background research; a review of existing information, including assessment data, historical maps, and aerial photographs; and a windshield survey.

Once the NRHP-listed historic properties and previously recorded historic resources within the Study Area were mapped, additional historic resources located within, or intersecting with, any of the

alternatives were identified. These additional resources were first identified at the desktop level, using historical USGS topographic mapping, historical aerial photographs, and Morgan County and Berkeley County assessment data. Historians later field checked and photographed each of the identified properties that were visible from a public right of way, during a windshield survey conducted between March 22 and March 26, 2021. Each resource was assigned a unique survey ID and historians notated the predominant or significant style of buildings, the number of associated resources, types of outbuildings, level of historic integrity, and comments on potential NRHP eligibility (see **Appendix E Historic Resources**).

Historic Properties

Within the alternatives, six (6) historic properties are individually listed in the NRHP, one of which includes a NRHP boundary increase (Snodgrass Tavern). Only one NRHP-listed historic district overlaps with any of the alternatives, the Hedgesville Historic District, which includes twelve (12) buildings with parcels that intersect the Upgrade Existing WV 9 alternative as shown on **Table 10-12 NRHP-Listed Properties Within All Alternatives**.

Table 10-12 NRHP-Listed Properties Within All Alternatives

Type	Survey ID	Name/Address	NRHP Number	Alternative(s)
Hedgesville Historic District	135	103 W Main Street	NRHP-80004419	Upgrade Existing WV 9
	136	105 W Main Street		
	137	107 W Main Street		
	138	109 W Main Street		
	139	113 Main Street		
	140	102 W Main Street		
	141	108 Main Street		
	142	Main Street		
	143	202 N Spring Street		
	144	201 Town Spring Street		
	145	117 W Main Street		
	146	103 Potato Hill Street		
Individually Listed	025	Hedges, Decatur, House	NRHP 84003473	Corridor III, IV & V
Individually Listed	046	Speck, Peter, House	NRHP-02001526	Corridor III, IV & V
Individually Listed	053	Hedges-Robinson-Myers House	NRHP-80004418	Corridor III, IV & V
Individually Listed	092	Hedges, Samuel, House	NRHP-76001931	Corridor I, II & VI
Individually Listed	093	Nadenbousch, Moses, House	NRHP-04000032	Corridor I, II & VI
Individually Listed	208	Snodgrass Tavern & Boundary Increase	NRHP 73001896, NRHP 06000172	Corridor II & Upgrade Existing WV 9

Previously Recorded Historic Resources

Ninety-seven (97) historic resources previously documented in the WVHPI (some of which are also listed in the NRHP) are located within the alternatives. Of these, fifteen (15) were found to be demolished at the time of the windshield survey. The previously recorded historic resources are enumerated in **Appendix E Historic Resources**.

Cemeteries

There are six (6) cemeteries with parcels that intersect at least one of the alternatives. The cemeteries are listed in **Table 10-13 Cemeteries Within All Alternatives**.

Table 10-13 Cemeteries Within All Alternatives

WVHPI No.	Survey ID	Name and Address	Integrity	Alternative(s)
N/A	166	Allensville Cemetery Allensville Road (CR 3/2), Hedgesville, WV	Medium	Corridor III
46-BY-252	221	World Evangelism Worship Center Cemetery / Open Arms Ministries 8958 Hedgesville Road, Hedgesville, WV	Not Visible	Upgrade Existing WV 9
N/A	260	Hedgesville Assembly of God, Butts Mill Road, Hedgesville, WV	Medium	Corridor I & VI
N/A	328	Chestnut Grove Cemetery Potter Road, near Schoolhouse Way	High	Corridor II & III
N/A	398	Spohrs Crossroads Cemetery (Mt. Zion UMC) 5377 Martinsburg Road, Berkeley Springs, WV	Medium	Upgrade Existing WV 9
46-MN-135	452	Off WV Route 15	High	Corridor I

Newly Identified Historic Resources

The identification effort revealed four-hundred and eight (408) historic resources within the alternatives that had not been previously identified or documented. These resources are discussed below.

Potentially NRHP-Eligible Historic Resources

After completing the windshield survey, project historians identified twenty-two (22) previously recorded and newly identified historic properties that are potentially eligible for listing in the NRHP due to high levels of historic integrity and potential significance under the National Register Criteria for Evaluation. Due to the preliminary nature of the investigation, these resources fall primarily under Criterion C, for their embodiment of "distinctive characteristics of a type, period, or method of construction, or that represent the work of a master" (U.S. Department of the Interior, National Park Service, 1991). Resources identified as "Potentially Eligible" should be treated as "eligible" during the planning phases of this project; however, additional research is needed before final recommendations of eligibility can be made. These resources are listed in **Table 10-14 Potentially NRHP-Eligible Historic Resources Within All Alternatives**.

Table 10-14 Potentially NRHP-Eligible Historic Resources Within All Alternatives

WVHPI Number	Survey ID	Address	Construction Date (Approx.)	Integrity	Alternative(s)
BY-0033-0121	16	244 Harlan Springs Road	Early 19th century	High	Corridor III, IV, V
BY-0052-0046	57	WV Route 3	1869	Medium	Corridor III
BY-0052-0048	60	WV Route 3	1886 c. 1850	High	Corridor IV, V
BY-0052-0089	81	87 Allensville Road	1909	High	Corridor IV, V
BY-0052-0075	83	1425 Hammonds Mill Road	1909	Medium	Corridor III
	88	2787 Welltown School Road	1830	High	Corridor I, II, VI
	91	Off Butler Chapel Road	1900	High	Corridor I, II, VI
BY-0009	129	Off WV 9	1880	High	Upgrade Existing WV 9
BY-0052-0087	152	806 Hammonds Mill Road	1972	High	Corridor IV, V
	179	1886 Allensville Road	1900	High	Corridor III
	181	1917 Allensville Road	1900	Medium	Corridor III
BY-0033-0157	227	178 Gristmill Lane		Medium	Corridor II
	254	WV Highway 1/5	1900	Medium	Corridor IV
	258	Harpers Lane	1874	High	Corridor I, VI
MN-0235	364			High	Corridor II
	381	Drivens Potomac	1930	Medium	Corridor III
	392	369 Kesecker Factory Lane		High	Corridor I
	396	5460 Spohrs Crossroads	1910	Medium	Upgrade Existing WV 9
	413	946 Ridersville Road	1900	High	Corridor I
	460	Fulton Road	1957	Medium	Corridor I
MN-0321	462	Radio Station Lane	1960	Medium	Corridor I
	488	32 Middlekauff Trail	1961	High	Corridor II

Not Potentially Eligible Historic Resources

Similarly, resources notated as "Not Potentially Eligible" appear to be not eligible for listing in the NRHP based on low levels of historic integrity, lack of Criterion C significance, or both. With additional research, these properties could prove to exhibit significance under Criteria A or B of the NRHP Criteria for Evaluation, although this cannot be determined through a windshield survey. Resources denoted as "Not Potentially Eligible" must be intensively surveyed prior to making recommendations of ineligibility.

The majority of the identified historic resources (approximately 31 percent) were constructed between 1958 and 1976, with the next largest group (approximately 10 percent) constructed between 1940 and 1958. Unfortunately, data on construction dates is incomplete (and based on assessment data), meaning these numbers are estimates only.

During the windshield survey, historians found that approximately 15 percent of the previously recorded historic resources (15 resources), or 3 percent of the total number of historic resources, had been demolished since the time of their original survey. These resources have no historic integrity and thus

have no potential for NRHP eligibility. Other surveyed resources with low integrity also have little potential for NRHP eligibility. Extant resources with low integrity comprise approximately 31 percent of those surveyed (156 resources). Resources with medium levels of integrity comprise approximately 55 percent of those surveyed (279 resources), while high integrity resources account for only 6 percent of those surveyed (28 resources).

Historic Resources of Concern

Historic resources of concern are those that should be considered during preliminary decision making regarding environmental impacts. These include all historic resources that are listed in, or eligible for listing in the NRHP, including those that have potential for eligibility. Additionally, cemeteries are important cultural resources that are often "red-flagged" during the planning process as resources that should be avoided during construction. Historic Resources of Concern are identified in **Tables 10-12** through **10-14**.

An inventory of the Historic Resources of Concern within each alternative is presented in **Table 10-15 Historic Resources of Concern Screening**. The Upgrade Existing WV 9 has the highest involvement with Historic Resources of Concern while the partial Build Alternatives (Corridors V and VI) have the lowest. Coordination with the SHPO, additional research, and a Historic Resources Survey will be required during the NEPA phase.

Table 10-15 Historic Resources of Concern Screening

Historic Resources Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
NRHP Listed or contributing to a NRHP Historic District	0	**12**	2	3	3	2	2	2
NRHP Historic Districts	0	1	0	0	0	0	0	0
Potentially NRHP-Eligible Resources	0	2	**7**	5	6	5	4	3
Cemeteries	0	2	2	1	2	0	0	1
Total Historic Resources of Concern	0	**17**	11	9	11	7	6	6

Noise

Noise impacts are determined based on the degree to which a proposed improvement causes noise levels to approach, equal or exceed established noise level activity category criteria and/or by how much the predicted sound levels increase over existing conditions as a result of the proposed improvement. (Note: the term "dBA" represents decibels on the A-weighted scale used typically for people's perception of sound and 66 dBA is the approach level to the FHWA 67 dBA criteria).

A straight-line analysis was used to evaluate the potential exterior 66 dBA impact sound level contour distance from the Build alternative centerlines for residences, schools, churches, cemeteries, parks, recreational areas, etc. The straight-line analysis was also used to evaluate the potential sound level contour distance for possible substantial noise increase criteria impacts. FHWA defines these impacts as an increase in noise levels of ≥15 dBA in the design year over the existing conditions noise level. For purposes of this planning analysis, the exterior dBA criteria contour sound level value was assumed to be at 55 dBA. This was calculated on a very conservative and low existing (baseline) sound level of 40 dBA, then adding 15 dBA to that value for a total of 55 dBA.

The noise analysis investigated receptor sound level increases for each of the Build alternatives for the 2045 design year assuming no elevation changes and no intervening building, tree or terrain shielding. Potential displacements were also not considered.

The analysis was performed using a simplified FHWA TNM run. Model validation and noise monitoring are not required for a screening analysis. This simplified noise analysis predicts that receptors located within one-hundred and twenty-five (125) feet of the Build alternative centerlines west of Hedgesville and one-hundred and forty (140) feet of the Build alternative centerlines east of Hedgesville could experience a sound level that approaches, equals or exceeds the 66 dBA criteria. This distance is greater for the portions of the Build alternatives east of Hedgesville due to a higher predicted increase in traffic volumes. Receptors located within three-hundred and fifty (350) feet of the Build alternative centerlines west of Hedgesville and three-hundred and eighty-five (385) feet of the Build alternative centerlines east of Hedgesville are predicted to experience an increase of 15 or more dBA over the existing condition.

For the Upgrade Existing WV 9 alternative, the analysis indicates that potential noise-sensitive receptors located within approximately ninety-five (95) feet of the existing WV 9 centerline are predicted to experience sound levels that do not exceed the 66 dBA criteria. There are no predicted substantial increase criteria impacts of ≥15 dBA because the traffic is not expected to grow sufficiently along existing WV 9 with the Upgrade Existing WV 9 alternative to cause a significant design year sound level increase. It would require a doubling of traffic (100% growth) just to increase the existing sound levels by 3 dBA.

The number of potential impacts for the Upgrade Existing WV 9 Alternative includes the entire existing WV 9 from Berkeley Springs to Martinsburg even though there are only scattered improvements along the corridor. According to FHWA 23 CFR 772, Section 772.5 Definitions, Type I Project (8), "If a project is determined to be a Type I project under this definition then the entire project area as defined in the environmental document is a Type I project." Therefore, impacts must be predicted for noise-sensitive sites throughout the entire corridor even though there might not be an improvement project in the vicinity.

The potential number of sensitive receptors that equal or exceed the noise criteria are presented in **Table 10-16 Noise Screening**. Note the noise analysis assumes that the potential 66 dBA impacts are also included in the substantial increase totals. Since the impacts are exclusive, the 66 dBA impacts were subtracted from the total substantial increase to develop the exclusive number of substantial increase criteria potential impacts. Based on this preliminary analysis, the Upgrade Existing WV 9 alternative has

the highest number sensitive receptors equaling or exceeding noise level criteria, primarily to residential homes. Corridor IV, the northern most alternative, has the lowest number of sensitive receptors.

Table 10-16 Noise Screening

Noise Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Sensitive Receptors Equaling or Exceeding Noise Criteria ≥ 66 dBA	0	**281**	59	75	53	36	32	16
Residential	0	252	53	70	51	36	29	16
Apartment Residential	0	3	1	0	0	0	0	0
Place of Worship	0	7	1	3	2	0	1	0
Mixed Residential/ Commercial	0	15	4	2	0	0	2	0
Recreational/ Institutional	0	4	0	0	0	0	0	0
Sensitive Receptors with Substantial Noise Increase Criteria ≥ 15 dBA	0	0	108	**121**	96	87	56	28
Residential	0	0	103	117	96	87	52	28
Apartment Residential	0	0	1	0	0	0	0	0
Place of Worship	0	0	0	0	0	0	0	0
Mixed Residential/ Commercial	0	0	4	4	0	0	4	0
Total Number of Sensitive Receptors	0	**281**	167	196	149	123	90	44

During a future NEPA phase, alternative alignments within the selected corridor(s) will be developed to minimize noise impacts to the extent possible. A detailed noise analysis will be required during the NEPA phase to evaluate possible substantial noise criteria impacts and receptors approaching, equaling or exceeding the noise level criteria. If noise impacts are predicted, a mitigation analysis will be required to determine if noise abatement measures are required for any of the impacted sites.

Screening Summary

Key project issues were selected from the preliminary screening discussed above to aid in identifying whether there are any alternatives that are clearly unreasonable or not feasible to carry forward to a future NEPA study. The number of red, green and yellow boxes within each screening measure was

totaled to determine how well each alternative overall met the screening criteria. The summary is shown in **Table 10-17 Preliminary Screening Summary**.

The No Build alternative is a required baseline for comparison during the NEPA phase and will automatically be carried forward. The summary shows that while there are several red and yellow boxes shaded there are no alternatives that stand out at this phase as being clearly not feasible (mostly red).

Table 10-17 Preliminary Screening Summary

Screening Measure	No Build	Upgrade Existing WV 9	Corridor I	Corridor II	Corridor III	Corridor IV	Corridor V	Corridor VI
			South of Hedgesville		North of Hedgesville		Johnsontown to I-81	
Goals and Objectives								
Traffic Impacts								
Projected Crashes Per Year								
Public Input								
Environmental Impacts								

The following discusses the overall advantages and disadvantages of each alternative:

No Build

The No Build does not address the corridor's transportation needs nor the project goals and objectives. It does have significant public support and would avoid environmental impacts in the Study Area. It will be carried forward and used as a basis of comparison for the other alternatives during the NEPA phase.

Upgrade Existing WV 9

The Upgrade Existing WV 9 only partially addresses the transportation needs as it does not alleviate all of the congestion between Hedgesville and I-81, does not have as many safety benefits as a new road, and does not provide a reliably high speed link between US 522 and I-81 to complete the regional highway network. It does have significant public support, is the least costly of the Build alternatives, and has the potential to minimize environmental impacts.

Corridor I

Corridor I satisfies the project goals and objectives, meets all of the transportation needs, and, along with Corridor II, diverts the most traffic off WV 9 with attendant benefits to communities along WV 9. It garners moderate opposition by the public, has high construction costs and has high potential for

environmental impacts, with three farmland conservation easements located within the corridor which can try to be avoided through future alignment shifts.

Corridor II

Corridor II satisfies the project goals and objectives, meets all of the transportation needs, and, along with Corridor I, diverts the most traffic off WV 9 with attendant benefits to communities along WV 9. It garners significant opposition by the public, has high construction costs and has moderate to high potential for environmental impacts.

Corridor III

Corridor III satisfies the project goals and objectives, meets all of the transportation needs, and diverts significant traffic off WV 9 with attendant benefits to communities along WV 9. It garners significant opposition by the public, has high construction costs and would have the highest potential for environmental impacts, although one historic resource which resulted in significant public opposition can possibly be avoided through future alignment shifts.

Corridor IV

Corridor IV satisfies the project goals and objectives, meets all of the transportation needs, and diverts significant traffic off WV 9 with attendant benefits to communities along WV 9. It garners moderate opposition by the public, has high construction costs, and has moderate potential environmental impacts. One historic resource which resulted in significant public opposition can possibly be avoided through future alignment shifts. It is more difficult to build this alternative in segments due to poor connectivity to WV 9 west of Hedgesville, possibly requiring upgrades to potential connecting roads.

Corridor V

Corridor V partially satisfies the project goals and objectives and transportation needs by addressing congestion and safety issues between Hedgesville and I-81. It diverts significant traffic off WV 9 with attendant benefits to communities along WV 9 from Hedgesville to I-81. Congestion and safety issues west of Hedgesville could be partially addressed through implementation of the Upgrade Existing WV 9 alternative west of Hedgesville in conjunction with the partial new roadway between Johnsontown and I-81. It garners moderate opposition by the public and would have moderate potential environmental impacts with moderate construction costs.

Corridor VI

Corridor VI partially satisfies the project goals and objectives and transportation needs by addressing congestion and safety issues between Hedgesville and I-81. It diverts significant traffic off WV 9 with attendant benefits to communities along WV 9 from Hedgesville to I-81. Congestion and safety issues west of Hedgesville could be partially addressed through implementation of the Upgrade Existing WV 9

alternative west of Hedgesville in conjunction with the partial new roadway between Johnsontown and I-81. It garners moderate opposition by the public and would have moderate potential environmental impacts with moderate construction costs.

11. Conclusions and Recommendations

Conclusion

The preliminary screening of the alternatives was conducted to identify whether any of the alternatives were determined to not be feasible or practical and should thus not be carried forward into the NEPA process. This screening showed that each alternative has advantages and disadvantages and that there was no significant public support or public opposition for any of the alternatives. A prime point of public opposition to Corridors III, IV and VI was centered around possible impacts to one historic resource, the Speck Spring Farm. It appears that it is feasible to adjust these corridors in the future to avoid or minimize impacts to this resource, although possible impacts to a portion of a nearby farmland conservation easement would have to be studied and balanced. At this stage in the process, the potential impact to these resources is not considered to be a fatal flaw for these corridors. The No Build alternative does not address the significant transportation needs in the Study Area, but will be carried forward into the NEPA phase to serve as a basis for comparison of the other alternatives in accordance with NEPA regulations. It is important to remember that the final determination regarding elimination and reasonable alternatives will be made during the NEPA process.

Recommendations

Based on the results of the alternatives analysis and screening, the following recommendations are made:

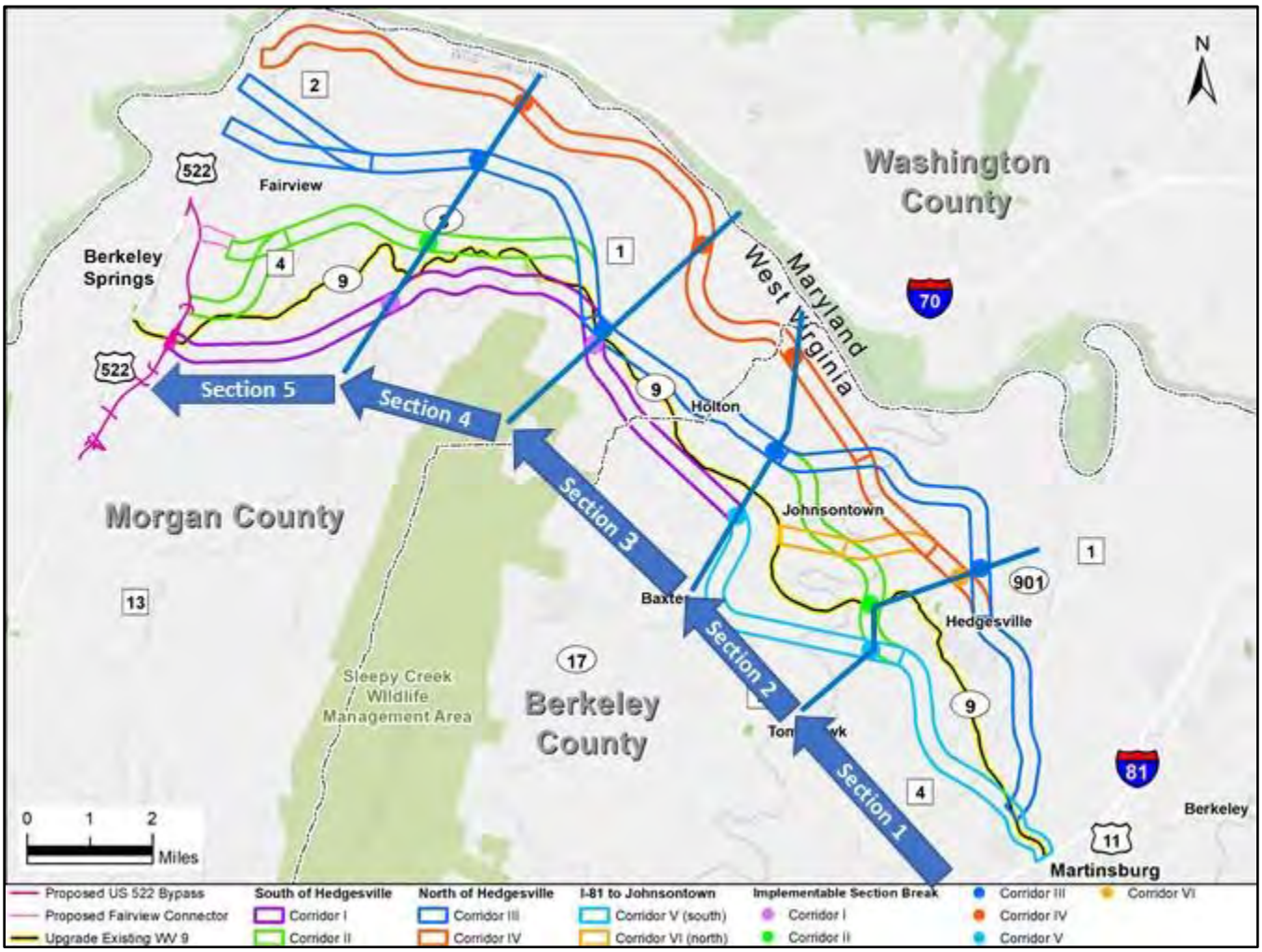
- Carry all alternatives into the NEPA Phase,
- Evaluate a Corridor I shift to avoid impact to a Farmland Conservation Easement that was identified late in the study process,
- Develop and evaluate a shift of Corridors III, IV and VI to avoid impact to the Speck Spring Farm,
- In general, evaluate refinements to minimize impacts to farmlands, residences and historical sites, the three areas of most concern identified in the public involvement process,
- For the Upgrade WV 9 alternative, further evaluate the truck climbing lane and other improvements to existing WV 9 based on more detailed engineering studies to determine feasibility, costs and impacts to adjacent parcels,
- Evaluate combining segments in different current corridors to develop the best overall corridor to minimize impacts and provide access to existing WV 9 during any staged implementation of the ultimate recommendation,

- Monitor traffic volumes in the future to assess whether COVID has permanently impacted development, traffic growth and traffic patterns and whether any such impacts would influence the outcomes of this study.

Implementable Project Sections

Multiple corridors have been identified as being feasible and should be carried forward into the NEPA phase. However, while the most transportation benefit would be realized by construction of an alignment in its entirety, funding levels would not allow for construction of the entire 20+ mile project from Berkeley Springs to Martinsburg in one construction project. For the Build Alternatives, project lengths of approximately 4 to 5 miles could be constructed for $200 million to $300 million each and have been used to identify potential project staging in implementable sections. The potential staging of each of the Alternatives is described below and shown on **Figure 11-1 Implementable Project Sections**.

Figure 11-1 Implementable Sections



Any stand-alone, subsequent project would need to demonstrate independent utility and logical termini to illustrate that a functional transportation system is provided in the absence of constructing the entire alignment. 23 CFR 771.111(f) outlines three general principles to ensure meaningful evaluation of alignments, and to avoid commitments to transportation improvements before they are fully evaluated in an environmental document. The alignments evaluated shall:

- Connect logical termini and be of sufficient length to address environmental matters on a broad scope;
- Have independent utility or independent significance (i.e., be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made); and
- Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Section 1

For the corridors running generally south of Hedgesville, Corridors I and V, Section 1 would run from the eastern terminus of the project just west of I-81 to a point just west of Hedgesville where it intersects with Cannon Hill Road (CR 9/9), a distance of 4.7 miles. Corridor II, which crosses WV 9 just west of Hedgesville and then runs south of WV 9, Section 1 could extend to this crossing point at existing WV 9 for a total distance of 5.4 miles. These sections, especially for Corridor II, could provide immediate congestion relief for WV 9 between Hedgesville and I-81 by diverting traffic to the new road. For Corridors I and V, through traffic from west of Hedgesville would have to turn right in Hedgesville and backtrack to the west somewhat on Cannon Hill Rd to reach the new bypass, which could reduce the number of diversions.

For the corridors north of Hedgesville, Corridors III, IV, and VI, Section 1 would run from the eastern terminus to a point just northeast of Hedgesville at Hammonds Mill Road (WV 901), a distance of 4.2 miles. This section would provide some congestion relief on existing WV 9 by diverting traffic, although through traffic from west of Hedgesville would have to turn left on WV 901 in Hedgesville, which is a congested movement, and may result in fewer diversions than for the southern corridors.

Section 2

Corridors I and V, Section 2 would run from Cannon Hill Road to the corridor's intersection with Baxter Rd just west of Johnsontown, a distance of 4.2 miles. Corridors II and III, Section 2 would run from the end of Section 1 to a terminus at Cherry Run Rd (CR 9/5) 0.9 miles north of Johnsontown, a distance of 3.1 and 4.6 miles, respectively. Corridor IV would also terminate at Cherry Run Rd, an additional 1.6 miles north of Johnsontown. Baxter Rd and Cherry Run Rd would have to be investigated to determine whether short term improvements are needed to accommodate additional traffic. Corridor V would end at its ultimate western terminus, 0.5 miles east of Johnsontown at WV 9.

Combined with Section 1, these sections would accommodate an additional portion of the ultimate traffic diversions from WV 9 and provide significant congestion relief. Corridors V and VI would be complete, but could be combined with upgrades to WV 9 to the west to realize the most benefits from these alternatives. These WV 9 upgrades would be done independently.

Section 3

Corridor I, Section 3 would run from Baxter Rd to Goller Hill Rd, a distance of 3.6 miles. Corridors II and III would terminate nearby, at their intersection with River Rd, a section distance of 3.4 miles. Both intersections are within 0.25 miles of WV 9, but some short-term improvements may be needed to provide a successful section terminus. Corridor IV, Section 3 would terminate at Householder Rd (CR 10), a section distance of 2.9 miles. This terminus is nearly 5 miles north of WV 9, and thus would not likely divert additional traffic. Householder Rd would have to be investigated to determine whether it could accommodate additional traffic.

Section 4

Corridor I, Section 4 would terminate at Spohrs Rd (CR 8), a distance of 4.0 miles. The terminus would be 0.5 mile south of WV 9. Corridors II and III would terminate at Potomac Rd (CR 8), a section distance of 3.8 miles. These terminii would be 0.6 miles and 2.2 miles north of WV 9, respectively. Corridor IV would also terminate at Potomac Rd for a section distance of 4.0 miles, but would be about 3.5 miles north of WV 9. This terminus would be within 0.5 miles of River Road, and could thus divert some through traffic between Martinsburg and Hancock, MD from WV 9. Generally, this section would not divert enough WV 9 traffic to impact congestion, but would allow longer distance traffic to avoid more of the poorer geometry of existing WV 9. Spohrs Rd and Potomac Rd would have to be investigated to determine whether they could accommodate additional traffic at the section termini.

Section 5

Section 5 would complete the full new roadway alternatives to US 522 or the proposed US 522 bypass. Section distances would range from 3.5 to 4.6 miles, depending on which western connection is chosen for each alternative. Upon completion of Section 5, the full benefit of the Build corridor would be realized in terms of avoiding congestion and providing improved safety.

Next Steps

If funding is secured and the project moves forward, a comprehensive environmental evaluation of potential alternatives will be performed in accordance with the National Environmental Policy Act (NEPA). This PEL Study would serve as the starting point, with the data, analysis, and public comments to date being carried forward for further use. Adoption of a Preferred Corridor Alternative would be a task completed initially during the NEPA phase as a result of a complete analysis of the alternatives' satisfaction of the project purpose and need, detailed environmental and socio-economic impacts, public support and project costs. If a new Build Corridor is selected, preliminary design of alternative alignments would then be developed and evaluated within the selected corridor to develop engineering solutions and avoid or minimize adverse impacts.

There are three possible types of NEPA documentation that could be undertaken:

- Environmental impact statements (EISs) are prepared for major Federal actions that significantly affect the quality of the human environment. An EIS is a full disclosure document that details the process through which a transportation project was developed,

includes consideration of a range of reasonable alternatives, analyzes the potential impacts resulting from the alternatives, and demonstrates compliance with other applicable environmental laws and executive orders. The EIS process in completed in the following ordered steps: Notice of Intent (NOI), EIS, and record of decision (ROD).

- Categorical Exclusions (CEs) are prepared for Federal Actions that do not individually or cumulatively have a significant environmental effect are excluded from the requirement to prepare an EA or EIS.
- Environmental Assessments (EAs) are prepared for Federal Actions when the significance of the environmental impact is not clearly established.

EIS's are relatively rare, and are triggered by the presence of the following significant impact considerations:

- Public health or safety
- Uniqueness of area
- Controversy
- Degree of uncertainty or precedent-setting
- Section 106 properties
- Threatened or endangered species
- Violation of law

Two of these considerations have been potentially identified for WV 9 at this stage, controversy and Section 106 properties, but neither appears to be significant enough to warrant initially scoping the NEPA document as an EIS. The Corridor process could begin as an EA until the degree of significance is determined. An EA could later be upgraded to an EIS if warranted, or conversely, the project may result in a series of CE's if the Upgrade Existing WV 9 Alternative is selected. If the project remains as an EA throughout, it would result in a Finding of No Significant Impact (FONSI).

Mitigation and Permitting

Issues that will require further analysis and coordination during a future NEPA phase will include environmental approvals associated with project impacts to the natural environment (such as wetlands, streams and floodplains, and threatened and endangered species) and to the social environment (such as public outreach, noise, cultural resources).

Mitigation efforts will be needed to avoid or minimize project impacts to this resource rich area. The largest effort may be associated with assessing and mitigating for impacts to the protected farmland easements, water resources, threatened and endangered species and cultural resources. In addition to the minimization required through the wetland and waterways permit application, the riparian areas adjacent to area waterways are habitat to multiple mammal and plant species and will need minimization strategies. Watershed base plans for Sleepy Creek and Back Creek will need reviewed and mitigation strategies identified to reduce runoff into area streams.

Stream and Wetland Permitting

Permits will be required prior to construction of the project for stream and wetland impacts. While impacts will be estimated as part of the alternative analysis during the NEPA phase, the permit application/package must be developed alongside the engineering to accurately depict impact quantities but also the impact types (i.e., culvert, fill, etc.). Therefore, permitting will not be developed for the WV 9 corridor as a whole, but each operationally independent build section of the corridor will have its own permit at the time of construction.

The type of permits required for each build section will depend upon the extent of impacts in that section:

- If a build section proposes impacts in excess of 0.5 acres or the section requires special federal coordination such as USFWS formal consultation, the section would likely require an individual Clean Water Act (CWA) Section 404 permit issued by the USACE and an accompanying CWA Section 401 Water Quality Certification (WQC) from the WVDEP.
- If a build section proposes to impact less than 0.5 acres of waters of the U.S., that section may be permitted under a Regional General Permit (RGP), specifically RGP A (USACE, 2019). In this case, an individual permit is not required from the USACE and the WVDOT ensures compliance with the terms of the RGP. The Secretary of the WVDEP may require WQC for any impact greater than 200 linear feet on one or more of the streams identified in the WQC General Conditions (USACE, 2019). For these impacts, the WVDOT must submit a Pre-Construction Notice (PCN)[10] to the USACE District Engineer (DE) prior to any impact:
    1. "if the loss of WOTUS exceeds 1/10 acre for any single and complete project[11];
    2. if there is a discharge in a special aquatic site, including wetlands;
    3. for all regulated activities in Section 10 waters; and
    4. when the discharges of dredged or fill material would result in a loss of 300 linear feet for combined ephemeral, intermittent and perennial streams for any single and complete project." (USACE, 2019)
- The State of WV may also assess certain aquatic sites, such as isolated streams and wetlands, as Waters of the State in accordance with the WV Water Pollution Control Act (CSR 22-11). Any

[10] "For RGP A activities that require a PCN, the PCN must include any other RGP(s), NWP(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require a PCN. The DE will evaluate the PCN in accordance with the DE's Decision section below. The DE may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects" (USACE, 2019).

[11] "For linear transportation projects crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of RGP authorization" (USACE, 2019).

impacts to resources deemed Waters of the State would require a State Waters Permit (SWP) from the WVDEP.

Stream and Wetland Mitigation

Regardless of the permit required, all permanent impacts to jurisdictional streams and wetlands must be mitigated in accordance with the 2008 Mitigation Rule. According to the 2008 Mitigation Rule for implementing the Clean Water Act (USEPA and USACE, 2008), an "appropriate assessment method or other suitable metric must be used to assess and describe the aquatic resource types that will be restored, established, enhanced and/or preserved." In February 2010, USACE issued a Public Notice for the West Virginia Stream and Wetland Valuation Metric (SWVM). The SWVM was developed by West Virginia's Interagency Review Team (WVIRT), consisting of the USACE, Huntington and Pittsburgh Districts, U.S. Environmental Protection Agency (USEPA), U.S. Fish & Wildlife Service (USFWS), U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS), West Virginia Department of Environmental Protection (WVDEP), and the West Virginia Division of Natural Resources (WVDNR). The SWVM is to be used for calculating functional credits and debits in compensatory mitigation plans for losses of aquatic resources (WVIRT, 2010). This system can also be used to assess impacts to Waters of the State.

A summary of debits assessed through the SWVM must accompany any permit proposing impacts to streams and wetlands as well as a commitment to acquire credits through a Mitigation Bank where credits have been constructed and approved by the WVIRT or the In Lieu Fee program run by the WVDEP.

The WVIRT, led by the WVDEP and WVDNR, have developed the WV Wetland Rapid Assessment Method (WVWRAM) for quantitatively assessing the functional values of wetlands. Similar to the stream assessment already implemented within the SWVM, the WVWRAM was developed to better determine functional loss by impacts and mitigate accordingly. While the assessment is fully developed and available for use (WVDEP 2019), the SWVM has not yet been updated to use the assessment for mitigation. It may factor into future permits for wetland impacts.

During NEPA, the West Virginia Stream and Valuation Metric system should be used to identify wetland mitigation areas.

Archaeology Next Steps

A thorough archaeological assessment of each potential corridor must be conducted in accordance with the National Environmental Policy Act (NEPA). The potential steps this process may include are:

Initiating consultation with the WV SHPO pursuant to Section 106 of the National Historic Preservation Act (NHPA):

- Identification of any consulting parties, such as local governments, preservation-related entities, Native American tribes, and/or any other entity or individual(s) who may have an interest in potential impacts to archaeological resources;
- Identification and assessment of effects on archaeological resources;

- Continued consultation with WV SHPO and consulting parties to apprise them of the effects of the project upon previously or newly identified archaeological resources; and
- If necessary, development of alternative and mitigation measures in consultation with the WV SHPO and consulting parties.

Historic Resources Next Steps

This PEL study is part of a phased identification and evaluation process used primarily where project alternatives under consideration consist of corridors or large land areas and where access to properties is restricted. As alternative corridors are refined and advanced for further study, a formal identification and evaluation of historic properties will occur, in accordance with 36 CFR Part 800.4(b) and (c).

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470), requires Federal agencies to take into account the effects of their undertakings on historic properties and to provide the Advisory Council on Historic Preservation (ACHP) with a reasonable opportunity to comment before making decisions. Using the Section 106 consultation process, agencies identify historic properties, assess effects on historic properties, consider alternatives to avoid, minimize, or mitigate any adverse effects, and document their findings and determinations.

Although the NHPA and the National Environmental Policy Act of 1969 (NEPA) (P.L. 91-190; 83 Stat. 852; 42 U.S.C. 4321) are separate laws, their processes and requirements overlap, making integration of the two crucial to overall project planning. Federal agencies are encouraged to coordinate Section 106 compliance with the requirements of the NEPA, in part by starting coordination early, and by planning public participation, analysis, and review in such a way that they can meet the purposes and requirements of both statues in a timely and efficient manner (36 CFR 800.8(a)(1)).

General principles for coordinating the Section 106 process with NEPA are outlined in 36 CFR Part 800.8. The next steps include:

- Identify consulting parties pursuant to 36 CFR Part 800.3(f) or through the NEPA scoping process with results consistent with 36 CFR Part 800.3(f);
- Identify historic properties through an intensive-level historic resource survey;
- Assess the effects of the undertaking on such properties in a manner consistent with the standards and criteria of 36 CFR Part 800.4 through 800.5, provided that the scope and timing of these steps may be phased to reflect the agency official's consideration of project alternatives in the NEPA process and the effort is commensurate with the assessment of other environmental factors;
- Consult regarding the effects of the undertaking on historic properties with the State Historic Preservation Office (SHPO)/Tribal Historic Preservation Office (THPO), Indian tribes and Native Hawaiian organizations that might attach religious and cultural significance to affected historic properties, other consulting parties, and the ACHP, where appropriate, during NEPA scoping, environmental analysis, and the preparation of NEPA documents;
- Involve the public in accordance with the agency's published NEPA procedures; and

- Develop, in consultation with identified consulting parties, alternatives and proposed measures that might avoid, minimize, or mitigate any adverse effects of the undertaking on historic properties and describe them in the Environmental Assessment (EA) or Draft Environmental Impact Statement (DEIS).

Noise Next Steps

A detailed noise analysis will be required during the NEPA phase to refine the potential number of impacts. Additionally, if noise impacts are still identified in the detailed study, a mitigation analysis will be warranted to determine if noise abatement measures are both feasible and reasonable. Typical mitigation measures that are analyzed include speed restrictions, truck restrictions, horizontal and/or vertical design changes, creation of buffer zones between the road and potential noise-sensitive sites, sound proofing for applicable impacted interior noise receptors such as schools and places of worship and the most common of all mitigation measures, noise walls.

Noise walls could be built as earthen berms (if there is enough right-of-way) and as stand-alone vertical structures. Generally, noise walls would have to be constructed so that they would be high enough and long enough to reduce highway traffic noise sound levels by a minimum of 5 dBA (considered to be a noticeable reduction) and for enough benefited noise-sensitive sites to be cost reasonable. "Benefited" sites are the recipients of an abatement measure that receive a noise reduction at or above the minimum threshold of 5 dBA. The noise wall would also have to reduce the noise level by at least 7 dBA for a minimum of 10% of the benefited receptors, pursuant to 23 CFR772.13 (d) (2) (iii).