VI. ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental impacts of Alternative 1: No-Build, Alternative 3A, Alternative 3B, and Alternative 3C on the following resources: socioeconomics, cultural resources, Section 4(f), natural resources, hazardous materials, air quality, noise, vibration, and indirect and cumulative impacts. The direct and indirect, long and short term impacts of each alternative are evaluated for each resource.

Because the majority of the alternative alignments are below ground, impacts generally occur where the alternatives intersect with the ground surface, such as at the portals and proposed ventilation plant locations in the east Jones Falls area and Reservoir Hill, Rosemont, and Midtown-Edmondson neighborhoods. Due to their small size, emergency egresses would not cause impacts to the environment. Detailed resource impact mapping is located in **Appendix A**.

A. Socioeconomics

1. Population

Impacts to population are estimated based on residential displacements and relevant Census data on average persons per household. No impacts to the Study Area population, including its characteristics such as age distribution, racial composition, educational level, poverty, and linguistic isolation, are expected from Alternative 1 or Alternative 3A. However, journey to work for the Study Area population may be improved for MARC train users.

See **Figure 36** for a depiction of Alternatives 3A, 3B, and 3C in relation to census tracts and block groups. Based on field-verified data, an estimated 70 to 95 percent of the potentially impacted residential buildings are currently occupied. Field assessments considered residential properties with boards covering most or all doors and windows to be vacant; the range of occupancy percentage represents the margin of error given that some partially boarded-up residential properties may be occupied.

a. Alternative 1: No-Build

Alternative 1 would not require any residential displacements; therefore, Alternative 1 would have no impact to the population of the Study Area.

b. Alternative 3A

Alternative 3A would not require any residential displacements; therefore, Alternative 3A would have no impact to the population of the Study Area.

c. Alternative 3B

Alternative 3B would displace an estimated 48 residential buildings. Because relocation opportunities are available and could occur within or proximal to the impacted neighborhoods, minimal impact to the Study Area population is anticipated under Alternative 3B. Individuals relocated would likely experience temporary adverse effects from relocation.

d. Alternative 3C

Alternative 3C would displace an estimated 24 residential buildings. Because relocation opportunities are available and could occur within or proximal to the impacted neighborhoods, minimal impact to the Study Area population is anticipated under Alternative 3C. Individuals relocated would likely experience temporary adverse effects from relocation.

Figure 36: Alternatives within Census Tracts and Block Groups

e. Mitigation

Because minimal impacts to overall population in the Study Area would occur under Alternatives 1, 3A, 3B, and 3C, mitigation efforts are not required. Affected property owners would receive assistance in accordance with federal and/or state requirements depending on the funding source. Additional information on mitigation for displaced people is located in **Section VI.5**.

2. Land Use and Zoning

Study Area land use and zoning are shown on **Figure 37** and **Figure 38**. The alignments of Alternatives 3A, 3B, and 3C would be bored to an average depth of 130 feet below the existing surface. As a result, surface land use impacts and zoning changes would be minimized and restricted to primarily portal and ventilation plant area locations.

Because the three Build Alternatives have similar proposed locations for the north portal, north portal ventilation plant, and intermediate ventilation plant, land use impacts at these locations are generally common for Alternatives 3A, 3B, and 3C. However, land use impacts do vary among the alternatives as a result of the differences at the south portals. Construction of any Build Alternative would require a change of land use classification to transportation use.

The north portal and north portal ventilation plant location would be the same for Alternative 3A, Alternative 3B, and Alternative 3C. Construction of the north portal and north portal ventilation plant, on the east end of the alignment in the east Jones Falls area, would impact the Baltimore City Department of Transportation's North Avenue Facility Maintenance Yard. The north portal would pass below MTA's North Avenue Light Rail Station platform and/or adjacent tracks. The north portal would not cause a substantial land use change and would be consistent with current land use.

The intermediate ventilation plant is proposed to be located at a parcel not occupied by buildings at the south side of the intersection of Brookfield Avenue and Whitelock Street in the Reservoir Hill neighborhood. The parcel is currently owned by the City of Baltimore and used by the Reservoir Hill neighborhood as a community garden. As shown in **Figure 38**, the parcel is currently zoned as Neighborhood Business District/Community Business District (Baltimore Municipal Zoning Administration, 2015).

Table 37 shows the calculated land use impacts specific to Alternative 3A, Alternative 3B, and Alternative 3C. The calculations include all land required by each alternative that is not in existing NEC right-of-way, including the north portal ventilation plant and intermediate ventilation plant. The south portal ventilation plant itself would have no land use impact due to its proposed location on the cut-and-cover portion above the south portal. Each of these total impacted acreages would be rezoned as transportation land uses.

Table 37: Land Use Impacts

Land Use	Alternative 3A (acres)	Alternative 3B (acres)	Alternative 3C (acres)
Residential	0.0	1.9	0.9
Industrial	2.5	5.1	6.2
Commercial	<0.1	3.1	1.7
Other	5.3	7.0	7.1
Total	**7.8**	**17.1**	**15.9**

Notes: *Other includes Undeveloped, Institutional, Transportation and Parks/Open space land uses*

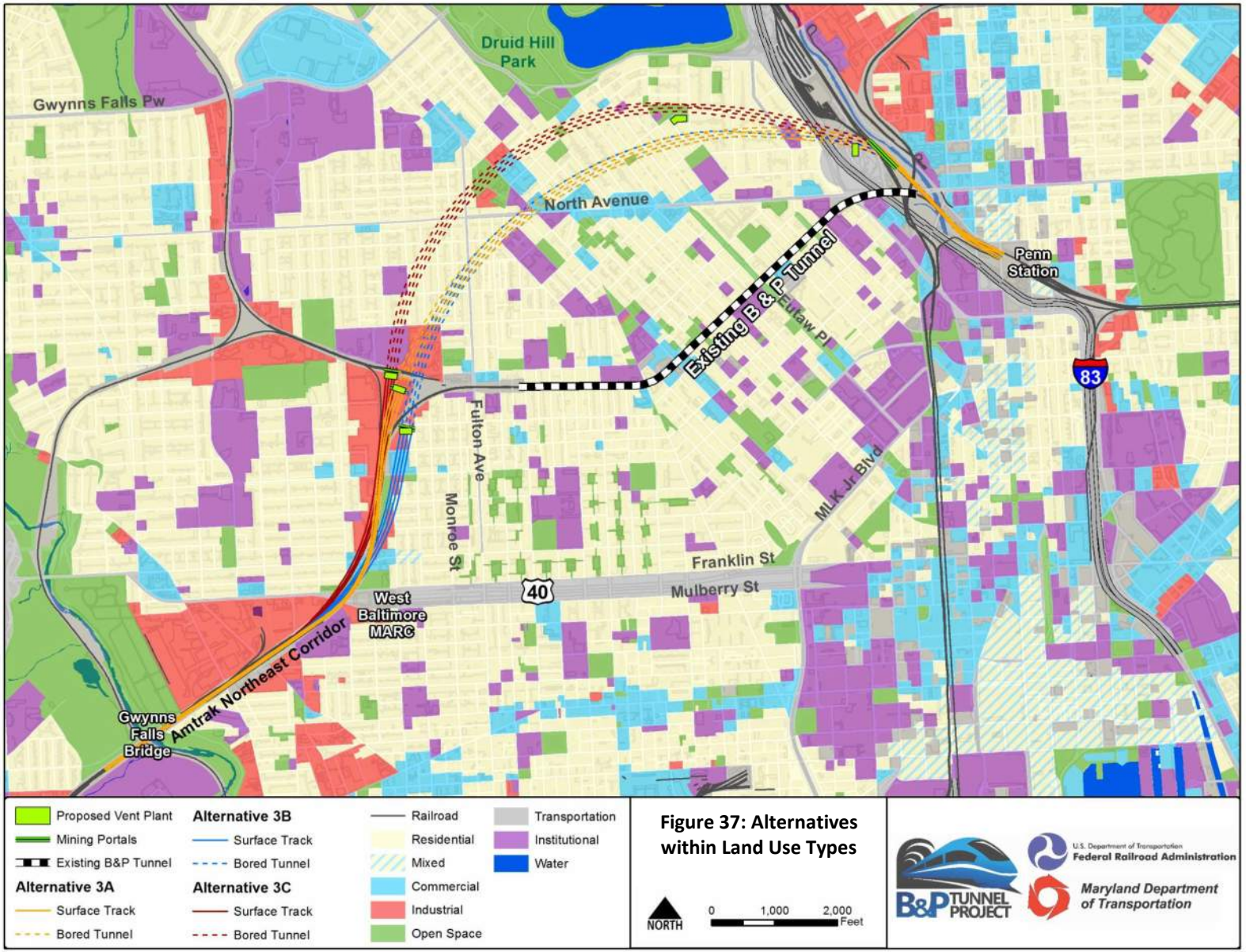

Figure 37: Alternatives within Land Use Types

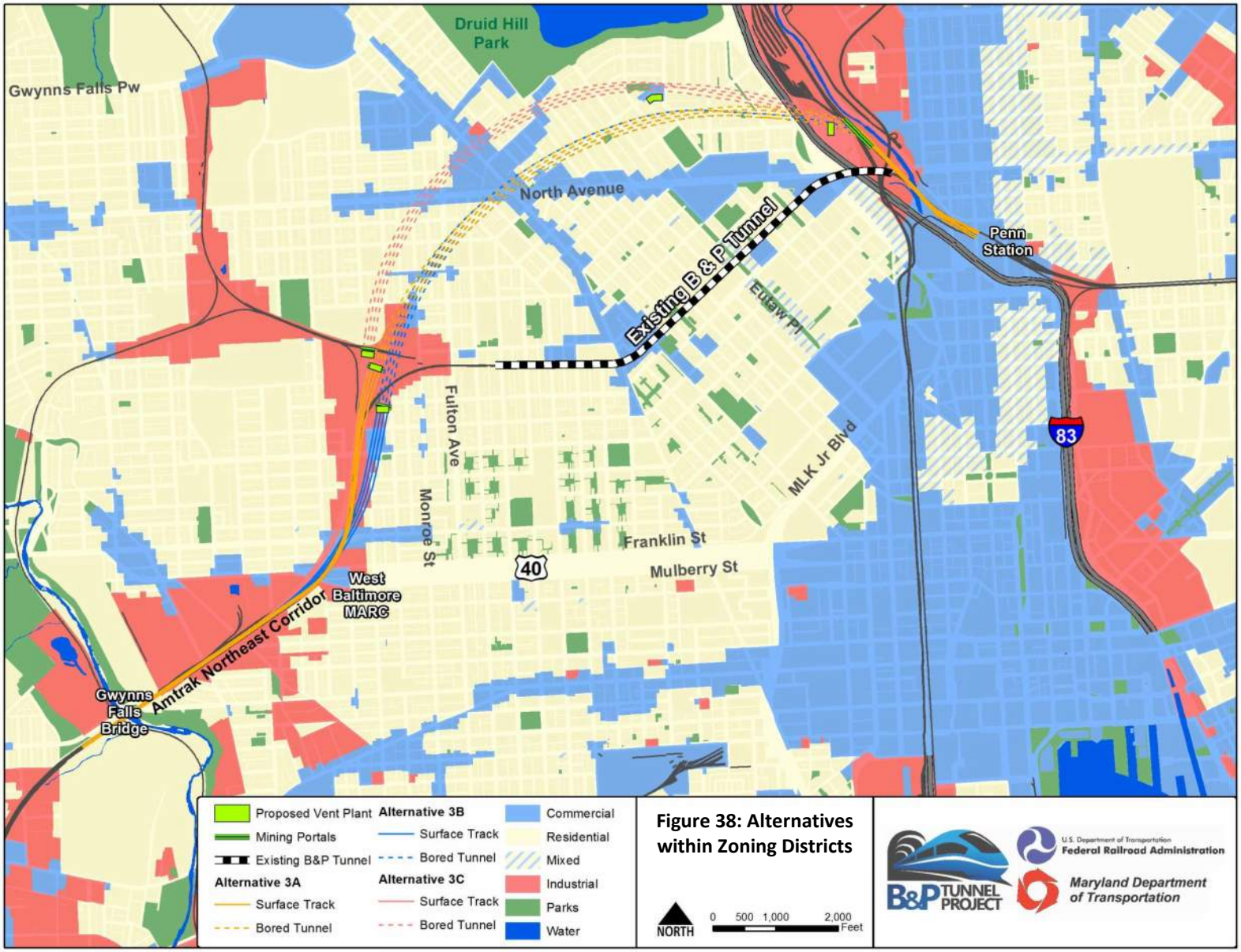

Figure 38: Alternatives within Zoning Districts

a. Alternative 1: No-Build

No changes to land use or zoning would occur as a direct result of Alternative 1: No-Build. Temporary construction impacts would also not occur under this alternative.

b. Alternative 3A

Construction of the north and south portals under Alternative 3A would convert approximately 2.5 acres of existing industrial land use and approximately 0.1 acre of existing commercial land use in the Rosemont and Midtown-Edmondson neighborhoods to transportation land uses. Alternative 3A would require a total of 7.8 acres of right-of-way, of which 4.7 acres is existing transportation land. There would be no change in residential land use under this alternative.

Approximately 4.6 acres of this impacted area would undergo cut-and-cover construction. The cut-and-cover portions of land are assumed to result in open space after completion of the B&P Tunnel Project. Alternative uses of the cut-and-cover land may be feasible but are not yet determined.

Changes in zoning may occur to land surrounding impacted land uses; however, these changes are unknown.

Construction impacts to land use may include temporary conversion of land use to transportation while construction takes place.

c. Alternative 3B

Construction of the north and south portals under Alternative 3B would convert approximately 5.1 acres of industrial land use, approximately 3.1 acres of commercial land use, and approximately 1.9 acres of residential land use in the Rosemont and Midtown-Edmondson neighborhoods to transportation land use. Alternative 3B would require a total of 16.0 acres of right-of-way, of which 5.3 acres is existing transportation land use.

Approximately 2.4 acres of this impacted area would undergo cut-and-cover construction. The cut-and-cover portions of land are assumed to result in open space after completion of the B&P Tunnel Project. Alternative uses of the cut-and-cover land may be feasible but are not yet determined.

Changes in zoning may occur to land surrounding impacted land uses; however, these changes are unknown.

Construction at the south portal would result in the acquisition of the northwest corner of the American Ice House property, located at 2100 West Franklin Street in the Midtown-Edmondson neighborhood. This site is one of nine identified for future development in the Baltimore City *West Baltimore MARC Transit Centered Community Development Plan* (Baltimore City and MDOT, 2008). The site is proposed to incorporate large retail development, and would be the main anchor for MARC transit in this location. However, no improvements have been made to the property to date. As Alternative 3B would impact a small area on the edge of the property, which is not yet developed, impacts to the planned land use for this parcel would be minor.

Construction impacts to land use may include temporary conversion of land use to transportation while construction takes place.

d. Alternative 3C

Construction of the north and south portals under Alternative 3C would convert approximately 0.9 acres of residential land use, approximately 1.7 acres of commercial land use, and approximately 6.2 acres of industrial land use in the Bridgeview/Greenlawn, Midtown-Edmondson, and the southeast corner of the Rosemont

neighborhood to transportation land use. Alternative 3C would require 14.8 acres of right-of-way, of which 6.7 acres are existing transportation land use.

Approximately 4.2 acres of this impacted area would undergo cut-and-cover construction. The cut-and-cover portions of land are assumed to result in open space after completion of the B&P Tunnel Project. Alternative uses of the cut-and-cover land may be feasible but are not yet determined.

Changes in zoning may occur to land surrounding impacted land uses; however, these changes are unknown.

Construction impacts to land use may include temporary conversion of land use to transportation while construction takes place.

e. Mitigation

Coordination among federal, state, and local agencies, as well as community members, has been continuous throughout the B&P Tunnel Project. Continued coordination among these agencies and community members, including affected property owners, would promote compatibility with local land use policies and plans. Land use temporarily converted to transportation for use during construction would likely revert to its original land use after construction is complete.

Changes to land use and zoning from the acquisition of right-of-way would be identified for the Preferred Alternative and coordinated with the City of Baltimore.

3. Transportation

a. Alternative 1: No-Build

Alternative 1: No-Build would have minimal impacts to the existing road network and transportation services. The existing B&P Tunnel primarily runs below Wilson Street and Winchester Streets, where routine maintenance would take place. This would result in periodic disruptions to the roadway network and existing passenger and freight rail system to conduct repairs. Impacts to existing Amtrak, MARC, and NS freight operations would likely occur, including scheduled maintenance during off-peak hours and potential significant delays from emergency repairs. In the long-term, the frequency and magnitude of repairs required, and resulting impacts to Amtrak, MARC, and freight operations, would increase.

b. Alternative 3A

The Alternative 3A alignment would intersect with West Lafayette Avenue and join the existing NEC tracks in the south portal area in the Rosemont and Midtown-Edmondson neighborhoods. Because West Lafayette Avenue crosses the NEC via an above-ground structure, Alternative 3A would not impact bus, automobile, pedestrian, or bicycle travel across West Lafayette Avenue. Improvements to the West Lafayette Avenue Bridge under this alternative would also be consistent with Baltimore City plans for the bridge, which entail rehabilitating the bridge's deteriorated pier and spans (Baltimore Metropolitan Planning Organization, 2014).

There is little potential for the construction of ventilation plants to have long-term transportation impacts. The north and south portal ventilation plants would be located either near (north portal ventilation plant) or above (south portal ventilation plant) their respective portals, and would not cause any long-term impacts to transportation outside of what is anticipated for the north and south portal areas. The intermediate ventilation plant would be located outside of existing transportation right-of-way.

Alternative 3A would benefit passenger rail through Baltimore City by providing more efficient travel and elimination of delays for users of Baltimore Penn Station and the West Baltimore MARC Station. Relative to Alternative 1, travel times (in minutes:seconds) between the Gwynns Falls Bridge and Baltimore Penn Station under this alternative would improve by an estimated 1:56 (Amtrak Acela), 1:46 (Amtrak Regional) and 1:26

(MARC) relative to existing conditions. This could encourage automobile users to use transit, ultimately reducing vehicle miles traveled. Additionally, this alternative would add rail capacity to the NEC, which, subsequently, could allow for additional freight rail service; however, specific changes to freight operations cannot be determined and therefore are assumed to remain the same as existing conditions based on current track agreements. Further discussion of potential impacts to freight rail is included in **Section VI.M**.

Short-term construction impacts to bus, automobile, pedestrian and bicycle travel routes, including temporary street closures and detours, may occur during construction, particularly at the locations for the north and south portals and associated facilities (including the north and south portal ventilation plants, the proposed aerial structure across West Lafayette Avenue, and the existing aerial structure across Edmondson Avenue) and intermediate ventilation plant locations in the east Jones Falls, Reservoir Hill, Rosemont, and Midtown-Edmondson neighborhoods. Other short-term impacts may include temporary disruption to the operation of the North Avenue Light Rail Station. No permanent street closures or permanent loss of on-street parking are anticipated under Alternative 3A.

Relatively minor disruptions to Amtrak, MARC, and NS freight operations would be expected during construction of this alternative. Most work would be performed without affecting these NEC operations. However, the final cutover and track shifts from the existing tunnel to the new tunnel would cause impacts to NEC operations. Alternative 3A would not facilitate improvements to the West Baltimore MARC Station.

c. Alternative 3B

Alternative 3B would cause long-term impacts to the roadway network in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods. These impacts include the permanent closure of North Pulaski Street from Harlem Avenue to West Lafayette Avenue, West Lanvale Street from North Brice Street to Pulaski Street, and North Brice Street from West Lanvale Street to West Lafayette Street. Additionally, the alternative is anticipated to eliminate an estimated 150 on-street parking spaces. There is little potential for the construction of ventilation plants to have long-term transportation impacts. The north and south portal ventilation plants would be located either near or above their respective portals, and would not cause any long-term impacts to transportation outside of what is anticipated for the north and south portal areas. The intermediate ventilation plant would be located outside of existing transportation right-of-way.

Alternative 3B would require reconstruction of the West Baltimore MARC Station in order to align with the new trackway. The MARC Station would be shifted, but would still remain in the same general location between Franklin and Mulberry Streets and adjacent to existing West Baltimore MARC parking facilities. Alternative 3B would orient the reconstructed MARC station along a flatter curve, thus allowing the proposed station to be constructed with Americans with Disabilities Act (ADA)-compliant high-level platforms. A rebuilt station, likely featuring high-level platforms, would improve accessibility at the station relative to existing conditions and be consistent with FTA and MTA goals for having the station comply with ADA requirements. The issues with the West Baltimore MARC Station platforms have been the subject of previous planning studies conducted by MTA.

Alternative 3B would benefit passenger rail through Baltimore City by providing more efficient travel and elimination of delays for users of Baltimore Penn Station and the West Baltimore MARC Station. Relative to Alternative 1, travel times (in minutes:seconds) between the Gwynns Falls Bridge and Baltimore Penn Station under this alternative would improve by an estimated 2:32 (Amtrak Acela), 2:26 (Amtrak Regional) and 1:53 (MARC) relative to existing conditions. This could encourage automobile users to use transit, ultimately reducing vehicle miles traveled. Additionally, this alternative would add rail capacity to the NEC, which, subsequently, could allow for additional freight rail service; however, specific changes to freight operations cannot be determined and therefore are assumed to remain the same as existing conditions based on current track agreements. Further discussion of potential impacts to freight rail is included in **Section VI.M**.

Construction of Alternative 3B would temporarily impact east-west travel along West Franklin and West Mulberry Streets, Edmonson Avenue, and West Lafayette Avenue. Short-term impacts to bus, automobile, pedestrian and bicycle travel routes, including temporary street closures and detours, may occur during construction, particularly at the locations for the north and south portals and associated facilities (including the north and south portal ventilation plants, the proposed aerial structure across West Lafayette Avenue, and the existing aerial structure across Edmondson Avenue) and the intermediate ventilation plant location. Other short-term impacts may include temporary disruption to the operation of the North Avenue Light Rail Station. Once construction has been completed, travel would resume to previous conditions.

Relatively minor disruptions to Amtrak, MARC, and NS freight operations would occur during construction of this alternative. Most work would be performed without affecting these NEC operations. However, the final cutover and track shifts from the existing tunnel to the new tunnel would cause impacts to NEC operations. Service at the West Baltimore MARC Station could be temporarily impacted during reconstruction of the station platforms.

d. Alternative 3C

Alternative 3C would cause long-term impacts to the roadway network in the Rosemont neighborhood. The alternative would require permanent street closures of North Bentalou Street from Edmondson Avenue to Lauretta Avenue, Lauretta Avenue from near Wheeler Avenue to North Bentalou Street, and Wheeler Avenue at Franklin Street in the southeast corner of the Rosemont neighborhood. An estimated 40 on-street parking spaces would be permanently eliminated.

Alternative 3C would require reconstruction of the West Baltimore MARC Station in order to align with the new trackway. The MARC Station would be shifted, but would still remain in the same general location between Franklin and Mulberry Streets and adjacent to existing West Baltimore MARC parking facilities. Alternative 3C would orient the reconstructed MARC station along a flatter curve, thus allowing the proposed station to be constructed with ADA-compliant high-level platforms. A rebuilt station, likely featuring high-level platforms, would improve accessibility at the station relative to existing conditions.

Alternative 3C would benefit passenger rail through Baltimore City by providing more efficient travel and elimination of delays for users of Baltimore Penn Station and the West Baltimore MARC Station. Relative to Alternative 1: No-Build, travel times between the Gwynns Falls Bridge and Baltimore Penn Station under this alternative would improve by an estimated (minutes:seconds) 2:30 (Amtrak Acela), 2:23 (Amtrak Regional) and 1:44 (MARC). Users of the West Baltimore MARC and Baltimore Penn Stations in Baltimore and passengers of Amtrak, as well as freight rail would experience improved transit times. Additionally, this alternative would add rail capacity to the NEC, which, subsequently, could allow for additional freight rail service; however, specific changes to freight operations cannot be determined and therefore are assumed to remain the same as existing conditions based on current track agreements. Further discussion of potential impacts to freight rail is included in **Section VI.M**.

Construction of Alternative 3C, would cause short-term impacts to bus, roadway, pedestrian and bicycle travel routes, including temporary street closures and detours, particularly at the locations for the north and south portals and associated facilities (including the north and south portal ventilation plants, the existing aerial structure across West Lafayette Avenue, and the proposed aerial structure across Edmondson Avenue) and the intermediate ventilation plant location. Other short-term impacts may include temporary disruption to the North Avenue Light Rail Station. Once construction has been completed, travel would resume to previous conditions.

Short-term impacts to Amtrak, MARC, and NEC operations would occur during construction, including track shifts and temporary cutovers, resulting in potential temporary closure of the station or other moderate impacts to NEC operations. Service at the West Baltimore MARC Station could be temporarily impacted during reconstruction of the station platforms.

e. Mitigation

Mitigation measures for long-term transportation impacts, including the permanent closure of roadways and loss of parking spaces, would be determined through coordination with the public during project design and construction.

Short-term transportation impacts, including impacts to bus, automobile, pedestrian, bicycle, and rail transit travel routes, would be mitigated by route detours, signage, and other methods to provide advanced notice to inform residents of upcoming construction activities and potential delays. Accesses to residences and businesses would be maintained to the maximum extent possible, and access for fire and emergency vehicles would be maintained.

During the various stages of construction, additional roadway traffic would be generated by the hauling of construction debris, excavation material, and building materials. Maintenance of traffic and construction staging would be planned and scheduled to minimize traffic delays and interruptions to the extent possible.

4. Businesses

The B&P Tunnel Project would have varying short-term and long-term impacts to businesses in the Study Area. These impacts include temporary construction impacts and permanent impacts.

As shown on **Figure 39**, displacements potentially occurring as a result of Alternatives 3A, 3B, and 3C are distributed among zip codes 21223, 21216, and 21217. The displacements are also shown on the Environmental Resource Mapping in **Appendix A**.

Data on potentially affected businesses along the proposed alignments was collected via Baltimore City Geographic Information Systems (GIS) data and field research. Numbers of potentially affected businesses are approximations based on this information. The active or inactive statuses of the businesses, including storefront retail and industrial warehouses, regularly change and thus would be further refined as the Project advances.

a. Alternative 1: No-Build

The No-Build alternative entails routine maintenance of the existing tunnel with no significant improvements. This would not cause any immediate change to the economics of the Study Area

In the long-term, implementation of Alternative 1: No-Build could result in economic losses to the Baltimore metropolitan region, as the B&P Tunnel would continue to exist as a bottleneck for passenger and freight rail service along the NEC, and would not support projected travel demand for high-speed regional and commuter passenger services.

b. Alternative 3A

Two industrial business displacements would potentially occur under Alternative 3A. These businesses are located in the Bridgeview/Greenlawn neighborhood and include:

- P. Flanigan & Sons, Inc. (1320 North Monroe Street) and
- Warehouse, Name Unknown (2120 Lafayette Avenue).

The potential loss of property tax revenue under Alternative 3A from these displaced businesses would affect Baltimore City and Maryland revenue. Impacts to the Study Area would also potentially include loss of employment and loss of income to people working at these businesses.

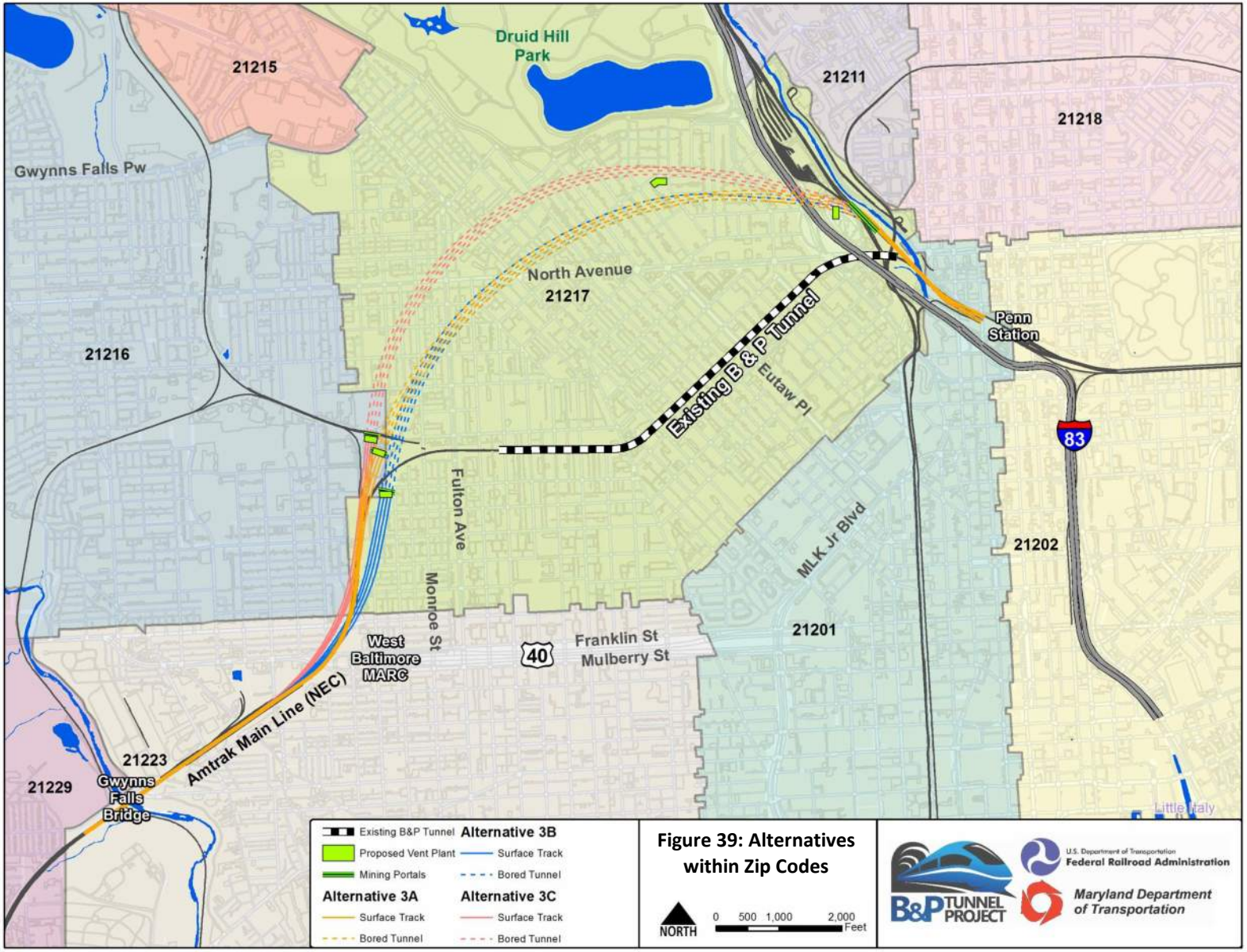

Figure 39: Alternatives within Zip Codes

The potential displacement of P. Flanigan & Sons (F&S) Inc. would impact the existing concrete recycling operation, the electrical substation and a maintenance building. In addition to surface impacts resulting from Alternative 3A, there is a 114-inch storm drain located beneath the F&S property that crosses the proposed tunnel location for this Alternative. This storm drain would need to be relocated under Monroe Street, which would cause temporary disruptions to local businesses' trucking routes during construction.

Alternative 3A could cause temporary construction impacts to businesses, such as temporary disruptions or modifications to trucking routes.

The economic impacts as a result of these business displacements could extend to the surrounding community. Impacts may include loss of employment and loss of income to people working and living in the Study Area, as well as property tax loss to Baltimore City.

No residential displacements would occur, thus no impact to residential property tax revenues would occur.

c. Alternative 3B

Under Alternative 3B, business displacements would occur in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods. The potentially displaced businesses are a mix of Accommodation and Food Services, Retail Trade, and Transportation and Warehousing categories. Alternative 3B would potentially result in the following nine business displacements:

- Carpet Warehouse, LLC (2335 West Franklin Street);
- Grocery and Beauty Supply (2235 Edmondson Avenue);
- Pocopico Restaurant (2235 Edmondson Avenue);
- Wonder Enterprises, Inc. (2237 Edmondson Avenue);
- Warehouse, Name Unknown (1034 North Payson Street);
- Storage Lot, Name Unknown (740 North Pulaski Street);
- Goldmar Sales Corp (2126 Edmondson Avenue);
- Best Used Appliances (2126 Edmondson Avenue); and
- Gentlemen Ten Lounge (2127 Edmondson Avenue).

The potential loss of property tax revenue under Alternative 3B from these displaced businesses and 48 residential properties would affect Baltimore City and Maryland revenue. Impacts to the Study Area would also potentially include loss of employment and loss of income to people working at these businesses.

Alternative 3B could cause temporary construction impacts to businesses, such as temporary disruptions or modifications to trucking routes.

d. Alternative 3C

Under Alternative 3C, the following ten businesses, located in Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods, and the southeast corner of the Rosemont neighborhood, would potentially be displaced:

- P. Flanigan & Sons, Inc. (1320 North Monroe Street);
- Price Busters Furniture (2415 West Franklin Street);
- Warehouse, Name Unknown (2335 West Franklin Street);
- Warehouse, Name Unknown (2415 West Franklin Street);
- Carpet Warehouse, LLC (2335 West Franklin Street);
- J.J. Adams Fuel Oil Company (2113 West Lafayette Ave);
- Pocopico Restaurant (2235 Edmondson Ave);
- Grocery and Beauty Supply (2235 Edmondson Avenue);

- Wonder Enterprises, Inc. (2237 Edmondson Avenue); and
- Spincycle Coin Laundry (2200 Edmondson Avenue).

These potentially displaced businesses are a mix of types including Accommodations and Food Service, Retail Trade, Construction and Other (energy, laundry), or unknown types.

The potential loss of property tax revenue under Alternative 3C from these displaced businesses and 24 residential properties would affect Baltimore City and Maryland revenue. Impacts to the Study Area would also potentially include loss of employment and loss of income to people working at these businesses.

Alternative 3C could cause temporary construction impacts to businesses, such as temporary disruptions or modifications to trucking routes.

Alternative 3C would potentially displace P. Flanigan & Sons (F&S) Inc. Impacts would be the same as assessed for Alternative 3A.

e. Mitigation

Property acquisition activities, including relocations, would be performed in accordance with the *Uniform Relocation Assistance* and *Real Properties Acquisition Act of 1970* (Uniform Act) as amended. Displaced people and businesses may be eligible for benefits under Maryland's Relocation Assistance Program. Benefits could include: advisory services, moving and reestablishment costs and other payments and services as provided by law.

The owner of a displaced business is entitled to receive payment for actual reasonable expenses incurred in moving the business, or personal property; for actual direct losses of tangible personal property; and for actual reasonable expenses incurred in the search for a replacement site. For larger businesses impacted by the Project, finding suitable replacement sites could be more difficult. For example, the largest business potentially relocated by the Project is F&S Inc. The current location supports multiple benefits for material transportation, as it utilizes the CSX freight line spur to transport stockpiles of aggregate and it is in close proximity to several major highways and facilities, including I-95, I-695, I-70, U.S. Route 1, U.S. Route 40, MD-295, the Port of Baltimore and BWI Airport. Finding a suitable replacement site to relocate such a large business would require a large search area potentially outside of the Project Study area.

Fair market value would be provided to all property owners as compensation for land acquisition. A displaced small business owner may be eligible for reestablishment expenses.

5. Economy

Alternative 1: No-Build would have no economic impact. The most immediate economic effect of Alternatives 3A, 3B and 3C is the impact on construction activity in the region. Additional economic effects will be generated through its use and the market response to the additional rail activity accommodated by its greater capacity. Project alternatives could also have implications for economic development in West Baltimore area. These economic impacts (both positive and negative) are described below.

a. Economic Development Assessment of B&P Tunnel Alignment Options, West Baltimore

Alternatives 3A, 3B and 3C are similarly located through West Baltimore. The location of Alternative 3A would not impact the existing West Baltimore MARC Station. Alternatives 3B and 3C would require station reconstruction, which could potentially affect Transit Oriented Development (TOD) within the area. To further explore these possibilities, FRA and MDOT conducted an economic assessment to analyze the economic development opportunities each alternative may create.

Each alternative may impact the West Baltimore MARC station in the following ways:

- Alternative 3A: does not impact the MARC Station, though MTA proposes to relocate the station south away from the existing curved tracks to provide a fully Americans with Disabilities Accessibility (ADA) compliant facility.
- Alternative 3B: Impacts the MARC Station by shifting the new tracks slightly east, and reconstructs the Station along the new track alignment that could accommodate high level platforms meeting the ADA accessibility requirements.
- Alternative 3C: Impacts the MARC Station by shifting the tracks slightly west, and reconstructs the Station along the new track alignment that could accommodate high level platforms meeting the ADA accessibility requirements.

This analysis evaluated demographic data for a half-mile radius around the West Baltimore MARC Station. A half-mile was used because this distance is traditionally considered to be the walk shed from transit stops. Demographic data of the City of Baltimore and the Baltimore-Columbia-Towson Metropolitan Statistical Area (MSA) were also collected to provide a point of comparison and general idea of overall regional market conditions. Demographic conditions of the area are described below.

Between 2000 and 2010, populations within a half-mile radius of the West Baltimore MARC Station have declined by an average 1.9 percent. Similarly, the number of households have decreased by 15.8 percent. This trend slowed between 2010 and 2015, where the area experienced a 2.6 percent decrease. Across this same time period, average household sizes have also decreased from 2.91 to 2.83. The median age of the half-mile radius population is 41 years old. Generally, the educational attainment of the area is low. 28.7 percent of the population has less than a high school education, while 58.1 percent have a high school diploma. The racial composition of the area is mostly Black or African American (95.9 percent) and 1.6 percent identify as white. Currently, the median household income within the half-mile radius is $26,994, with a third of these households earning below $15,000, suggesting a high poverty rate within the area. Comparison of this data to Baltimore City and the MSA are described in the *Economic Development Assessment of BP Tunnel Alignment Options, West Baltimore, Maryland report.*

Majority of households are renter-occupied within the half-mile radius of the West Baltimore MARC Station (52.5 percent), who pay a median rent of $690 per month. 49.2 percent of the owner-occupied houses are worth between $60,000 and $124,999; the median home value is $74,878. Homes are generally older, with 90.7 percent being built in 1950 or earlier.

The average annual spent per household on retail goods was $11,829.88 (compared to $18,850.10 in Baltimore City and $31,097.52 in the MSA). 54.8 percent of people within the area are employed in the services industry. This is the largest employment industry in the area, the second largest being retail and trade, where14.6 percent are employed.

The inventory of 38 retail buildings and rentable building area of 120,371 square feet has remained the same from 2010 to 2015. The vacancy rate has also remained the same at 1.5 percent annual average. There is minimal office supply within this area, which also has remained the same in the last five years. Rentable building area remained the same at 9,755 square feet and vacancy rate has remained zero percent in the last five years. The industrial market is the most prominent commercial use in the station area and has also experienced decreasing vacancy rates. Vacancy rate dropped significantly from 9.68 percent in 2010 to 6.63 percent in 2011; and from 4.9 percent in 2012 to 0.6 percent in 2013.

Over the past ten years, ridership for the West Baltimore MARC Station has been increasing. From 2005 to 2015, ridership at this station increased by 17.38 percent and had a 1.62 percent compound annual growth rate (CAGR). However, in the past five years there has been a decrease in ridership, with a negative 0.71 percent CAGR and an overall negative 3.51 percent change. Despite this decrease in more recent years, the overall

ridership trend is slowly growing at the West Baltimore MARC Station. The travel patterns of area residents show a majority of boardings in Washington DC, which had an average of 10,549 out of the 13,474 boardings in the 12 other stations on the MARC Penn Line, suggesting that the majority of passengers have Washington as their destination.

Looking at work locations of residents within the half-mile radius of the station, the majority work within the City of Baltimore or other locations not serviced by the MARC Penn Line. This suggests that the majority of commuters at the West Baltimore MARC station are not residents within the half-mile.

A previous study, the *West Baltimore MARC Transit-Centered Community Development Strategy* was conducted for West Baltimore in September, 2008 by the Maryland Department of Transportation, the West Baltimore Coalition and the City of Baltimore. This strategy recommended the following Economic Development Principles:

- Cultivate Large-Scale Economic Development Opportunities
- Attract/Develop Businesses/Facilities to Serve the Local Population
- Promote Small Business Development and Entrepreneurship
- Enhance Local Workforce, Employment Opportunities, and Local Business Participation

Each of the alternatives were evaluated in the context of these principles, as well as in light of the current demographic, economic and political changes that impact the neighborhoods. Details of the evaluation of these principles in relation to the alternatives are discussed below. The Project could potentially provide some development opportunities for the communities.

i. *Cultivate Large-Scale Economic Development Opportunities*

This principle focuses on redevelopment potential and inclusion of mixed-use developments to boost population of the area and spending power. It also suggests a marketing strategy for the area and removing barriers to investment for developers and businesses. The strategy specifically names several potential redevelopment sites including the MARC station parking lots, the Ice House and the Southwest Industrial Area (Warwick Triangle), which are all adjacent to the MARC station.

The three alternatives neither help nor harm this principle. Because the tracks will mostly follow the existing right-of-way, they are not anticipated to impact large portions of the developable land. The same challenges apply to land assembly and developing private and public partnerships.

ii. *Attract/Develop Businesses/Facilities to Serve the Local Population*

This principle emphasizes the inclusion of businesses and services that the neighborhoods identified as needs, including supermarkets, food stores, restaurants and cafes, a pharmacy, entertainment, dry cleaners, a hardware store, a bookstore, a pet store, medical offices, and public facilities such as a library, police substation, workforce development center, a community center, recreational/fitness facilities, playgrounds, charter schools and a business incubator.

The three identified alternatives neither help nor harm this principle. Potential positive impacts could occur if the project temporarily increases employment opportunities for area residents, which could increase spending power and make it a more attractive business location.

iii. *Promote Small Business Development and Entrepreneurship*

This principle emphasized the importance of developing small business in addition to large-scale economic development for the area.

The three alternatives will not impact this principle. If however, local, small businesses are required to be used for construction of the new tunnel, this could potentially enhance development of these services; as could a temporary construction period increase in spending on food, beverage and materials.

iv. *Enhance Local Workforce, Employment Opportunities, and Local Business Participation*

This principle emphasizes better jobs and wages for area residents, participation of local businesses and the importance of education for workforce development.

None of the alternatives impact this principle any more or less than the other. However, this principle can be most directly impacted by the tunnel construction. Employing local tradespeople and companies and hiring at the level of the area neighborhoods for construction of the tunnel would directly impact area residents and would also enhance the potential for the other principles to have greater success. Implementing trade development programs in conjunction with construction would enable the economic impact of the construction-period employment to continue after tunnel construction is complete.

Transit-Oriented Development (TOD) is defined as "type of development that includes a mixture of housing, office, retail and/or other amenities integrated into a walkable neighborhood and located within a half-mile of quality transportation" (Reconnecting America, n.d.). The factors that make TOD successful from an economic development and real estate development standpoint include Market Demand; Fixed Guideway Transit; Available Land Sites; Community and Political Support and Joint Development/Partnership Potential. West Baltimore and the alternatives were evaluated, as applicable, qualitatively for the potential strengths and challenges of TOD.

v. *Market Demand*

West Baltimore is generally economically depressed, which creates difficulty in attracting new market-rate investment. It is also not located immediately proximate to an employment center which can add to this difficulty. In order to attract TOD, other measures would need to be taken in order for it to be successful, and it is less likely to be a value-capture on land than in other areas where demand is high and land is at a premium. Currently, MARC ridership is not sufficient to encourage development. Average daily ridership in 2015 was 773 passengers, in contrast to Odenton, a successful TOD, which had 2,730 and Baltimore Penn Station, which had 3,639 passengers. From a retail perspective, if every passenger spent $10 per day, totaling approximately $2 million in weekday sales, and considering a sales per square foot ratio of $250 per square foot, only 8,000 square feet of retail space, the approximate size of one medium to large sized restaurant or large convenience store or pharmacy would be supported.

Based solely on the examined demographic and real estate data presented, there is unlikely to be sufficient demand for higher-end residential or office space without intervention.

vi. *Fixed-Guideway Transit*

The type of transit available can impact the nature of TOD development. In West Baltimore, the primary TOD opportunity is at the West Baltimore MARC station. MARC, though fixed-guideway transit, which tends to have a higher impact on property values and the ability to capture value from investment, is a commuter train, not used for intra-city transit and has overall low relative ridership. There is some potential however to boost ridership through spurring development if a market analysis suggests such. With the cancellation of the Red Line (another fixed-guideway system), which would have connected at the West Baltimore MARC, it is less likely to attract significant investment.

vii. *Available Land Sites*

The *West Baltimore MARC Transit-Centered Community Development Strategy* identified available land and redevelopment opportunities around the station (the Ice House, the MARC station parking lots and adjacent industrial property). It is not known the extent or quantity of parcels that are likely to be impacted in a way that could suggest redevelopment by the tunnel alignment alternatives.

viii. *Community and Political Support*

Completion of the *West Baltimore Marc Transit-Centered Community Development Strategy* indicates there is community and stakeholder support for development of West Baltimore. However, no other plans, programs or initiatives were found since this strategy development.

The three tunnel alignments do not necessarily impact the community or political support for TOD. However, if the project provides opportunities and a positive experience in large-scale development in the area, it can set the stage for future positive relationships between the community and other external players such as developers, MARC, or other entities involved in the development of TOD.

ix. *Joint Development/Partnership Potential*

There is the potential for Joint Development in the area, once the appropriate private partners and the right opportunity are found, which are impacted by the other factors previously mentioned. None of the tunnel alignment alternatives offer any more or less potential for joint-development or public-private partnerships. However, through land acquisition or other assistance, it is possible that the tunnel project could assist in this effort.

Overall, the three tunnel alignments will not have a significant impact on the potential for TOD or area community economic development through real estate development. The primary impacts that the project can have on the community's economic health will come from:

- Project-related employment opportunities
- Construction-period spending, which has ripple effects throughout the economy
- If applicable, enhanced freight/passenger rail service (time savings and efficiency) though this is not as related to the immediate surrounding neighborhoods except to the extent these services are used by area residents/businesses.

Other large area projects, such as the University of Maryland BioPark, have successfully integrated in to the neighborhood through establishing relationships with area non-profits and community development corporations, working with educational programs and job-development. These are not the result of one particular alignment opportunity, nor are they a forgone conclusion to result from the tunnel construction, but are available as potential tools for the project to positively impact the economy of the local community beyond the associated substantial infrastructure cost and the related expenditures on goods, labor and services.

b. Construction Impacts

A project of this magnitude will require specialized labor and equipment, and draw supplies and services from a large market. Therefore, net effects generated by construction activity from Alternatives 3A, 3B, and 3C have been considered for two geographies: (1) the combined counties included in the Washington-Baltimore-Arlington Combined Statistical Area (CSA), Philadelphia-Reading-Camden CSA, Harrisburg-York-Lebanon CSA, Lancaster County, PA, Kent County, MD and Caroline County, MD, and (2) the State of Maryland. The economic effects are estimated in terms of net earnings and employment.

The economic impacts associated with construction expenditures are measured using regional multipliers from the Bureau of Economic Analysis (BEA) within the U.S. Department of Commerce. Derived from the Regional Input-Output Modeling System, the so-called RIMS II multipliers measure the total change (direct, indirect, and induced effects) in output, employment, and earnings that results from an incremental change to a particular industry. Two sets of multipliers are used. The first set was constructed by BEA to reflect the combined counties noted above. The second set of multipliers corresponds to the State of Maryland's economy. The multipliers are based on the 2007 Benchmark Input-Output Table for the nation and 2013 regional accounts data; they represent the most updated version available at the time this analysis was prepared.

i. *Earnings and Employment Effects from Capital Expenditures*

Construction of Alternative 3A, 3B or 3C would represent a significant capital investment in the regional economy. This spending will increase the employment and earnings for the duration of the construction process. This section describes the spending and the anticipated economic impacts.

ii. *Capital Expenditures*

Cost estimates for Alternative 3A, 3B, and 3C varies by Alternative. **Table 38** summarizes the preliminary design estimates by Alternative using six major cost categories: Construction, Force Account and Flagging, Right-of-way, Engineering, Design Development/Risk, and Escalation.

Table 38: Preliminary Design Cost Estimates

Category	Alternative 3A	Alternative 3B	Alternative 3C
01- Construction Cost	$1,606.01	$1,735.45	$1,760.13
02 - Force Account and Flagging	$24.00	$24.00	$24.00
03 - Right-of-Way	$64.24	$69.41	$70.40
05 - Engineering Cost	$549.99	$584.94	$591.56
06 - Design Development / Risk	$707.24	$763.44	$773.72
08 - Escalation	$908.11	$980.93	$988.09
Total	**$3,859.59**	**$4,158.18**	**$4,207.90**

Costs in Millions of Dollars (2015)

The economic impact of these expenditures will vary significantly by type and depends on the amount of locally produced goods and services embodied in the purchase.

Construction goods and services will be purchased in the local economy. Although every building material required for the project is not produced locally, the RIMS II multipliers reflect the supplier linkages for the industry, and thus account for this leakage from the local economy. These include costs within categories 01 and 08.

Boring Tunnel Machine purchases, by contrast, will not be purchased from the Study Area as this very specialized type of machinery is not widely produced[14]. Therefore, it is assumed that no local labor is used to produce the machinery and no impact is generated by this purchase. These items, which fall within category 01, are included in costs shown in **Table 38**; however, they are excluded from the construction costs when estimating the economic impact of the project.

It is also assumed that **motor vehicle purchases** will not be purchased from the local economy. The Study Area does not appear to produce motor vehicles, limiting the potential impact this purchase can have. Thus, as no

[14] The analysis assumes that the associated substation and switch gear plus the spare parts will not be manufactured locally.

local labor is used to produce the vehicles, no local impact is generated by their purchase. Although there is likely to be some assembly required upon delivery of the vehicles and it is possible that a component of the vehicle might be made by a supplier in the Study Area, these possibilities represent a negligible share of the vehicles' cost and are excluded from this analysis. Vehicle costs fall within category 01 and are captured in **Table 38**; however, they are excluded from the construction costs when estimating the economic impact of the project.

The **Right-of-Way (ROW) expenditures** are for real property only. As there is no labor associated with the ROW expenditures, there is no economic impact to the pure land costs. Because of this, costs for ROW are excluded from the economic impact estimation.

The **Engineering and Design Development costs**, by contrast, are purchased in the local economy and thus have an impact in the local economy. These include costs within categories 02, 05, 06, and 08.

In sum, there are two types of capital expenditures that are expected to impact the economy: General Construction and Soft Costs. Construction goods and services are considered General Construction, and Engineering and Design Development costs are considered Soft Costs.

iii. *Funding Sources*

In order to isolate the potential economic effects of the project to the regional economy and to the State of Maryland, it is necessary to distinguish those resources that are either a) new to the economy and that would not be invested in the Study Area but for Alternatives 3A, 3B or 3C; or b) those that would still be spent in the region with similar economic effects (for example, funds that would be allocated to other transportation construction projects in the region). The analysis assumes that the funding for the project represents 100% net new resources that are being invested in the region because of the project.

Applying the Multipliers for the Construction (General Construction) and Professional, Scientific, and Technical services (Soft Cost) industries to the amount of new funding that will be used for capital expenditures provides estimates of the net earnings and employment impacts generated by each alternative by region.

Construction and soft costs that will generate economic impacts are shown in **Table 39** and **Table 40**. Construction costs include total construction plus total escalation costs less the costs associated with the Tunnel Boring Machines (purchase, substation and switch gear, spare parts, and truck tractor and flatbed vehicle costs used to break down the Tunnel Boring Machine), management staff vehicle purchase costs, and design development, engineering, and ROW escalation costs. Professional, Scientific, and Technical Service costs include Force Account and Flagging, Engineering, Design Development/Risk, and total escalation costs less construction and ROW escalation costs. **Table 41** shows the multipliers that are applied to the construction and soft costs shown in **Table 39** and **Table 40**, respectively, which are expected to impact the economy.

Table 39: Construction Costs

	Alternative 3A	Alternative 3B	Alternative 3C
01 Construction Cost	$1,606.01	$1,735.45	$1,760.13
Tunnel Boring Machines and Vehicle Purchase Costs excluded from the analysis	($67.12)	($67.12)	($67.12)
08 Escalation	$908.11	$980.93	$988.09
Escalation Design Development & Risk and Engineering Costs that are applied to Professional Services Costs and excluded from the construction costs	($370.07)	($396.90)	($401.87)
Escalation ROW excluded from the analysis	($12.06)	($13.03)	($13.21)
Construction Costs Used in the Analysis	**$2,064.87**	**$2,239.34**	**$2,266.01**

Costs in Millions of Dollars (2015)

Table 40: Professional, Scientific, and Technical Services Costs

	Alternative 3A	Alternative 3B	Alternative 3C
02 Force account and flagging	$24.00	$24.00	$24.00
05 Engineering Cost	$549.99	$584.94	$591.56
06 Design Development / Risk	$707.24	$763.44	$773.72
Design Development/Risk ROW costs excluded from the analysis	($9.64)	($10.41)	($10.56)
08 Escalation	$908.11	$980.93	$988.09
Escalation Costs applied to Construction Costs and are excluded from professional services costs	($525.98)	($571.01)	($573.00)
Escalation ROW excluded from the analysis	($12.06)	($13.03)	($13.21)
Professional, Scientific, and Technical Services Costs Used in the Analysis	**$1,641.66**	**$1,758.87**	**$1,780.60**

Costs in Millions of Dollars (2015)

Table 41: RIMS II Multipliers by Region

Region	Industry	Final Demand	
		Earnings (dollars)	Employment (jobs)[15]
Aggregated Counties	Construction	0.6076	12.9737
	Professional, Scientific, and Technical Services	0.6654	12.659
State of Maryland	Construction	0.5931	12.249
	Professional, Scientific, and Technical Services	0.7457	14.0355

Source: Bureau of Economic Analysis, U.S. Department of Commerce.

[15] As the Final Demand Employment Multiplier is based on 2013 data, the capital expenditure is deflated to 2013 dollars for this calculation. Non-defense direct capital deflator is used for construction impacts and the GDP (chained) price index is used for professional services impacts. Source: Office of Management and Budget, Table 10.1-Gross Domestic Product and Deflators used in the Historical Tables: 1940-2020, https://www.whitehouse.gov/omb/budget/Historicals

The interpretation of the RIMS II employment multipliers used in the analysis is as follows. The Construction industry is used as an example.

The **Final Demand Earnings Multiplier** represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the Construction industry. Based on the multipliers in **Table 41**, every $1 (in 2015 dollars) in construction goods and services delivered to final demand in the aggregated counties and in the State of Maryland yields $0.61 ($2015) and $0.59 ($2015) of earnings in all industries for the aggregated counties and for the State of Maryland, respectively.

The **Final Demand Employment Multiplier** represents the total change in number of jobs that occur in all industries for each $1 million (in 2013 dollars) of output delivered to final demand by the Construction industry. Based on the multipliers in **Table 41**, every $1 million in construction goods and services delivered to final demand in the aggregated counties and in the State of Maryland (in 2013 dollars) yields 12.97 job years and 12.25 job years in all industries for the aggregated counties and for the State of Maryland, respectively.

iv. *Construction Impacts*

There are no long-term economic impacts generated by capital expenditures. Construction-related impacts last for the duration of the project's construction cycle from the third quarter of 2019 through the fourth quarter of 2026.

v. *Earnings Impacts*

The results of construction spending on earnings in the aggregated counties from Alternatives 3A, 3B, and 3C would result in a total of $2,347 million ($2015), $2,531 million ($2015) and $2,562 million ($2015), respectively over an approximate 84-month construction period. The results of construction spending on earnings in the State of Maryland from Alternatives 3A, 3B, and 3C would result in a total of $2,449 million ($2015), $2,640 million ($2015) and $2,672 million ($2015), respectively over an approximate 84-month construction period. **Table 42** shows the net effects of total earnings from construction activity across the aggregated counties and for the State of Maryland.

Table 42: Net Effects of Construction Activity on Total Earnings

Region	Industry	Total Earnings ($2015M)		
		Alternative 3A	**Alternative 3B**	**Alternative 3C**
Aggregated Counties	Construction	$1,254.62	$1,360.62	$1,376.83
	Professional Services	$1,092.36	$1,170.35	$1,184.81
	Total	**$2,346.98**	**$2,530.98**	**$2,561.64**
State of Maryland	Construction	$1,224.68	$1,328.15	$1,343.97
	Professional Services	$1,224.19	$1,311.59	$1,327.79
	Total	**$2,448.86**	**$2,639.74**	**$2,671.76**

Costs in Millions of Dollars (2015)

vi. *Employment Impacts*

Employment impacts assessed would include one-time impacts that last for the duration of the project's construction. The employment effects are expressed in job years, which are defined as one full-time job for one

person for one year. For example, three job years are equal to three people doing a job for one year, or one person doing a job for three years.

The results of construction spending on employment in the aggregated counties from Alternatives 3A, 3B, and 3C would result in a total of 46,233 job years, 49,875 job years and 50,478 job years respectively over the approximate 84-month construction period. The results of construction spending on employment in the State of Maryland from Alternatives 3A, 3B, and 3C would result in a total of 46,975 job years, 50,650 job years and 51,264 job years respectively over the approximate 84-month construction period. **Table 43** shows the net effects of total employment from construction activity across the aggregated counties and for the State of Maryland.

Table 43: Net Effects of Construction Activity on Total Employment

Region	Industry	Total Employment (job years)		
		Alternative 3A	**Alternative 3B**	**Alternative 3C**
Aggregated Counties	Construction	26,035	28,235	28,571
	Professional Services	20,197	21,639	21,907
	Total	**46,233**	**49,875**	**50,478**
State of Maryland	Construction	24,581	26,658	26,975
	Professional Services	22,394	23,992	24,289
	Total	**46,975**	**50,650**	**51,264**

c. Economic Effects Beyond Construction

The tunnel is used by Amtrak and MARC's commuter rail services. Because of the central role of the NEC (of which the tunnel is a key asset) in the region's transportation network, the range of potential categories of economic effects extends to congestion relief to the other modes that operate in the Northeast region and which connect to the NEC. The benefits of Alternatives 3A, 3B and 3C thus extend beyond intercity rail passengers to existing and future rail commuters and highway drivers. Beyond the immediate construction impacts described above, there are four broad classes of benefits: 1) Costs avoided; 2) User and environmental benefits; 3) Capacity on other modes or services; and 4) Market response. The discussion below identifies and describes qualitatively these potential economic effects.

i. *Costs Avoided*

The new tunnel will have a modern design that accommodates current train specifications and operating standards, as well as greater capacity. This feature could benefit rail travelers and shippers whose goods utilize the tunnel, as well as Amtrak, MARC and NS. These benefits are realized through the following potential economic effects:

- Ability to avoid disruptions to existing rail service during construction if new tunnels are built before the existing one is rehabilitated or taken out of service.
- The avoidance of tunnel maintenance costs (may be offset by the expansion of tunnel capacity).
- Operating cost savings for rail service providers who now avoid delays.
- Greater redundancy in the event of a disruption to rail service (freight and passenger rail).
- Greater resiliency to climate change.

ii. *User and Environmental Benefits*

The modern designed and expanded tunnel will remove a chokepoint along the NEC that will allow service providers to offer improved service. These user benefits have economic value. User benefits can be realized as commuters, business travelers and tourists travel the corridor more efficiently and with greater safety. The capacity benefits operations in two ways: ability to accommodate higher volumes, and greater flexibility to accommodate trains of different sizes and speeds. Because of operating rules and differences in speed, one *Acela* train takes up the same rail network capacity as 2 to 3 extended peak commuter slots. To the degree that greater numbers of rail travelers can be accommodated, auto travelers have the ability to divert from autos to rail. As operations become more efficient, environmental benefits are generated through the avoidance of emissions and through energy savings. These are recurring benefits that support the region's economy over time:

- Improved rail service reliability.
- Faster rail travel speeds.
- Ability to accommodate greater intercity passenger rail travel.
- Ability to accommodate greater commuter rail service.
    - Safety
    - Travel cost savings
    - Reduced auto emissions and energy savings
- The two NS freight trains would experience greater reliability.

Capacity on Other Modes/Rail Services

Highway travelers who divert to rail will free up capacity on the road system. This additional capacity has value for the auto travelers who remain on the highway. The degree of capacity gain will depend on the mix of services that use the tunnel. Intercity travel is a comparatively small share of the overall regional highway travel market.

The degree to which rail traffic shifts from other congested parts of the rail network to utilize the tunnel will eliminate conflicts between passenger and freight services, as well as between different types of passenger rail services that travel at different speeds.

These are recurring benefits that benefit both the surrounding Baltimore region but extend to a multistate region because of the impacts on intercity travel and the national freight rail network:

- As new auto or rail travelers who are accommodated through the greater tunnel capacity and associated expansion of service divert to rail, this frees up capacity on the region's roads, benefiting non-rail travelers.
- The degree to which passenger service can be rerouted through the expanded tunnel frees up capacity elsewhere in the rail network, potentially benefiting freight operations in the region.

iii. *Market Response*

The magnitude and type of economic development response that could occur due to alleviating the current tunnel chokepoint on the corridor depends on how the additional capacity is utilized. Greater intercity connectivity and service has one type of impact; greater commuter service has another. To date, no service plan for how the tunnel will be used is available. However, recent work for the NEC FUTURE Tier 1 EIS asked stakeholders in Baltimore and elsewhere along the NEC about whether and how improved rail service could benefit their economy[16]. The following summarizes some of the key points from that work relevant to the tunnel.

- Stakeholders all along the NEC uniformly valued reliability of service as the most important or among the leading qualities of service. Stakeholders in the southern (including Baltimore) and central parts of the corridor indicated that travel time was secondary, and that frequency of service and connectivity to target markets were the most important qualities needed for enhanced rail service to spur development in their communities. The improved tunnel supports all of these performance objectives.
- Stakeholders maintained that increasing connections to the north invites businesses to Baltimore. People can get to locations north, which provides an opportunity for existing industries to grow because they are more accessible.
- Economic development stakeholders reported difficulty attracting young workers to Baltimore—a challenge to technology growth in the city. Greater accessibility and connectivity to other nearby cities on the corridor could expand this labor market.

6. Housing

a. Alternative 1: No-Build

Housing displacements that would potentially occur under the alternatives are shown on the Environmental Resource Mapping in **Appendix A**.

b. Alternative 3A

No housing displacements would occur under Alternative 3 Option A.

c. Alternative 3B

Alternative 3B would potentially displace 48 housing units in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods as a result of south portal construction, where the alignment connects with the existing NEC. Specifically, the displacements would occur to those living in the homes located west of North Payson Street and east of North Pulaski Street, between Riggs Avenue and Edmondson Avenue.

An estimated 70 to 95 percent of the potentially impacted residential buildings are currently occupied. Field assessments considered residential properties with boards covering most doors and windows to be vacant; the range of occupancy percentage represents the margin of error given that some partially boarded-up residential properties may be occupied. Based on this estimation, an estimated 34 to 46 of the potentially displaced housing units are occupied.

Construction of the north portal ventilation plant and intermediate ventilation plant is not anticipated to cause any housing displacements. Construction of the south portal ventilation plant would be located above the cut-and-cover portion of the south portal; as such, the south portal ventilation plant itself would not result in any residential displacements.

[16] NEC FUTURE TIER 1 EIS, Economic Development Workshops – Summary, July 2015. Accessed November 29, 2015 at http://www.necfuture.com/pdfs/2015_0720_economic_development_workshop_summary.pdf

d. Alternative 3C

Alternative 3C would potentially displace 24 housing units in the Rosemont neighborhood as a result of south portal construction. These residential displacements would occur in the south portal area in the southeast corner of the Rosemont neighborhood, where the alignment connects with the existing NEC. Specifically, the displacements would occur to those living in the homes located east of Wheeler Avenue and west of the existing NEC alignment, between Edmondson Avenue and Route 40.

An estimated 70 to 95 percent of the potentially impacted residential buildings are currently occupied. Field assessments considered residential properties with boards covering most doors and windows to be vacant; the range of occupancy percentage represents the margin of error given that some partially boarded-up residential properties may be occupied. Based on this estimation, an estimated 17 to 23 of the potentially displaced housing units are occupied.

e. Mitigation

The *Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* requires that the project developer shall not proceed into any phase which will cause the relocation of any people, or proceed with any construction project, until it has furnished assurances that all displaced people will be satisfactorily relocated to comparable decent, safe and sanitary housing within their financial means, or that such housing is in place and has been made available to the displaced person. Payments for the cost of moving are also provided. The owner of a displaced business is entitled to receive payment for actual reasonable expenses incurred in moving the business, or personal property; for actual direct losses of tangible personal property; and for actual reasonable expenses incurred in the search for a replacement site. Fair market value would be provided to all property owners as compensation for land acquisition.

7. Neighborhoods and Community Facilities

Neighborhood impacts from the proposed alternatives were assessed in terms of neighborhood character and cohesion and isolation. This evaluation determined if the proposed alternatives would bisect neighborhoods or isolate one or more portions of a neighborhood from others. It also determined if the construction of the proposed alternatives would create a barrier that would isolate one neighborhood from another.

Neighborhood and community facility impacts are shown on **Figure 40** and **Figure 41**. Alternative 1: No-Build and Alternatives 3A, 3B, and 3C would have varying impacts on neighborhoods and community facilities within the Study Area. The majority of the alignments for Alternatives 3A, 3B, and 3C would be bored underground; therefore, neighborhood and community facility impacts are most likely to occur at the north and south portals and intermediate ventilation plant locations. The impacts from the proposed north portal, north portal ventilation plant, and intermediate ventilation plant are the same for Alternatives 3A, 3B, and 3C, and are presented below.

The north portal and north portal ventilation plant would be constructed in the east Jones Falls Area neighborhood on existing transportation right-of-way, which includes Baltimore City Department of Transportation's North Avenue Facility Maintenance yard and MTA's North Avenue Light Rail Station. Construction of the north portal and north portal ventilation plant in this area would blend with the industrial transportation character of the existing land use. Therefore, construction of the north portal and north portal ventilation plant for each Build Alternative would not result in any impact to neighborhood character or cohesion, and would not cause neighborhood isolation.

Neighborhood and community facility impacts from the proposed intermediate ventilation plant would be similar for Alternative 3A, Alternative 3B, and Alternative 3C. The intermediate ventilation plant is proposed for construction at a parcel not occupied by buildings at the south side of the Brookfield Avenue and Whitelock

Street intersection in the Reservoir Hill neighborhood. This parcel is owned by the City of Baltimore Mayor and City Council and managed by the Reservoir Hill Association through the Adopt-A-Lot Program. Per the Baltimore City Department of Housing and Community Development, and confirmed through discussions with neighborhood residents at various B&P Tunnel Project Community Meetings, a community garden (Whitelock Farm) is maintained and utilized by residents at this parcel, with additional potential uses for the parcel proposed by the community. The community garden and existing use of this parcel as a community gathering and learning space is considered integral to the neighborhood character of Reservoir Hill by its residents. The intermediate ventilation plant for Alternatives 3A, 3B, and 3C would impact this site and the neighborhood's community activities at this location.

Construction of the south portal ventilation plant is proposed to be located on the cut-and-cover portion above the south portal. The south portal ventilation plant itself would not cause any neighborhood impacts outside of those caused by construction of the south portal.

a. Alternative 1: No-Build

As the existing conditions under this alternative would not change, no impacts to neighborhoods and community facilities would occur.

b. Alternative 3A

No community facilities would be displaced under Alternative 3A.

Under Alternative 3A, the south portal and south portal ventilation plant would be constructed in the industrial land use area adjacent to the existing NEC alignment in the Bridgeview/Greenlawn neighborhood. The proposed land use change from industrial to transportation would have little change on the neighborhood character. Furthermore, the alternative would have no long-term effect on neighborhood cohesion and access, as it closely follows the existing NEC alignment at the south portal, and does not create new divisions within the neighborhoods. No new barriers to inter-neighborhood interaction would occur. Existing travel access across the tracks would be maintained.

Temporary lane closures on the West Lafayette Avenue structure spanning the existing tracks may be required during construction of Alternative 3A. Construction of Alternative 3A could also result in temporary air, noise, and dust impacts during construction to nearby industrial and residential properties in the Bridgeview/Greenlawn, Midtown-Edmondson, and Rosemont and neighborhoods.

c. Alternative 3B

Under Alternative 3B, five community facilities would be displaced, as shown in **Table 44**, one community facility would be partially acquired, and one would experience temporary impacts due to construction. These displacements and acquisitions would occur in the Bridgeview/Greenlawn, Midtown-Edmondson, and Rosemont neighborhoods; the temporary community facility impacts would occur in the Penrose/Fayette neighborhood.

The south portal of Alternative 3B would require the displacement of five places of worship, as well as the partial acquisition of an athletic (basketball) court in Lafayette and Payson Park. The places of worship and park are located at the edges of residential blocks that are adjacent to an industrial area in the Bridgeview/Greenlawn and Midtown-Edmonson neighborhoods. The displacement of these places of worship and partial acquisition of the park would disrupt their respective operations, resulting in potential impacts to community services and networks. Existing community ties would likely be lost if facilities are not relocated within the same neighborhoods.

Table 44: Potential Community Facility Impacts

Community Facility	Address	Impact Type
Faith Christian Worship Center	700 N Pulaski Street	Displaced
The Old Time Way Church of Deliverance	2100 W Lanvale Street	Displaced
Freedom Church and Ministries	813 N Pulaski Street	Displaced
Life Celebration Center Church	2100 Edmondson Avenue	Displaced
Supreme Harvest Temple Ministries	2031-41 W Lafayette Avenue	Displaced
Lafayette and Payson Park	2001 W Lafayette Avenue	Partial Acquisition
Mary Ann Winterling Elementary School	220 N Bentalou Street	Temporary Construction Air/ Noise/Dust

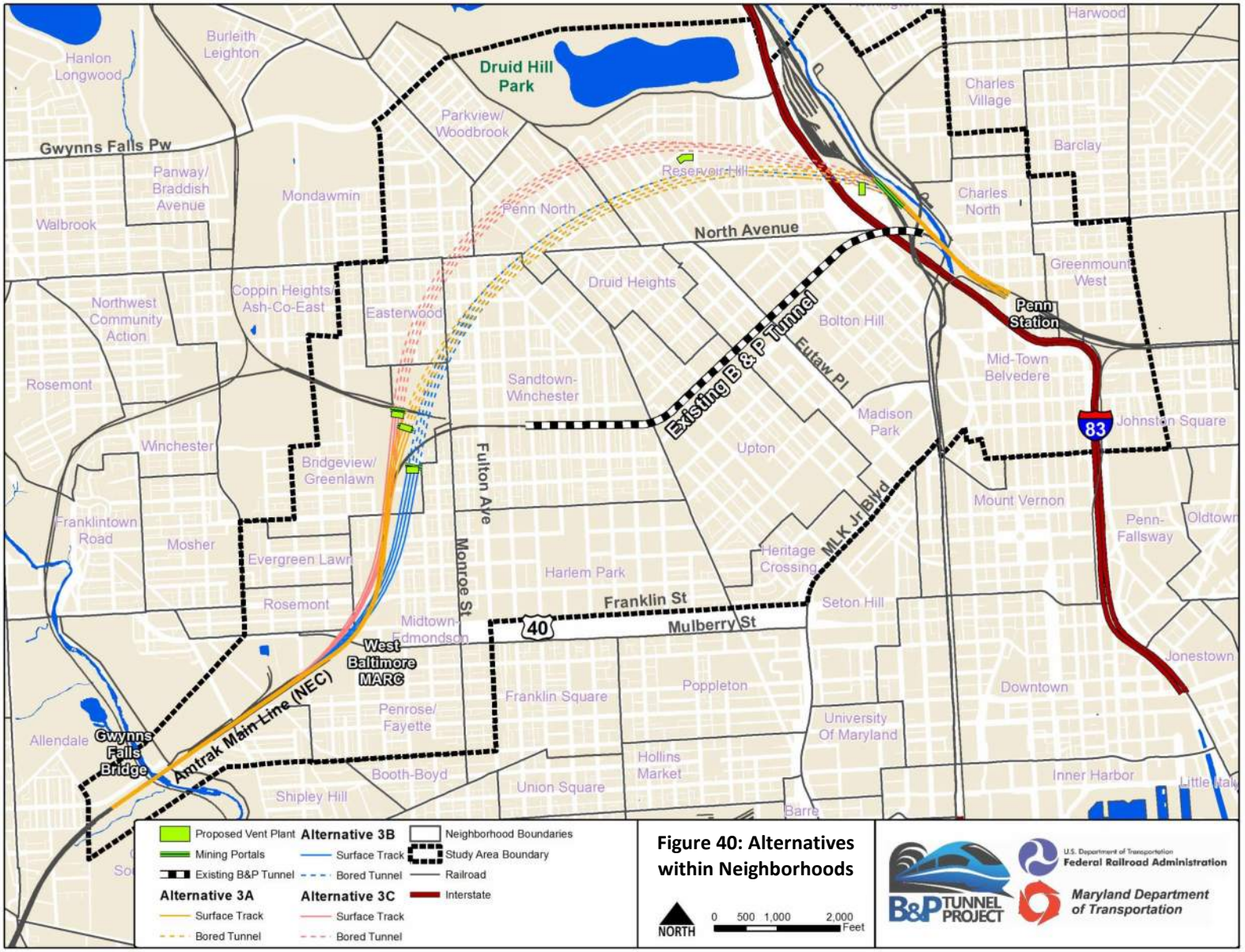

Figure 40: Alternatives within Neighborhoods

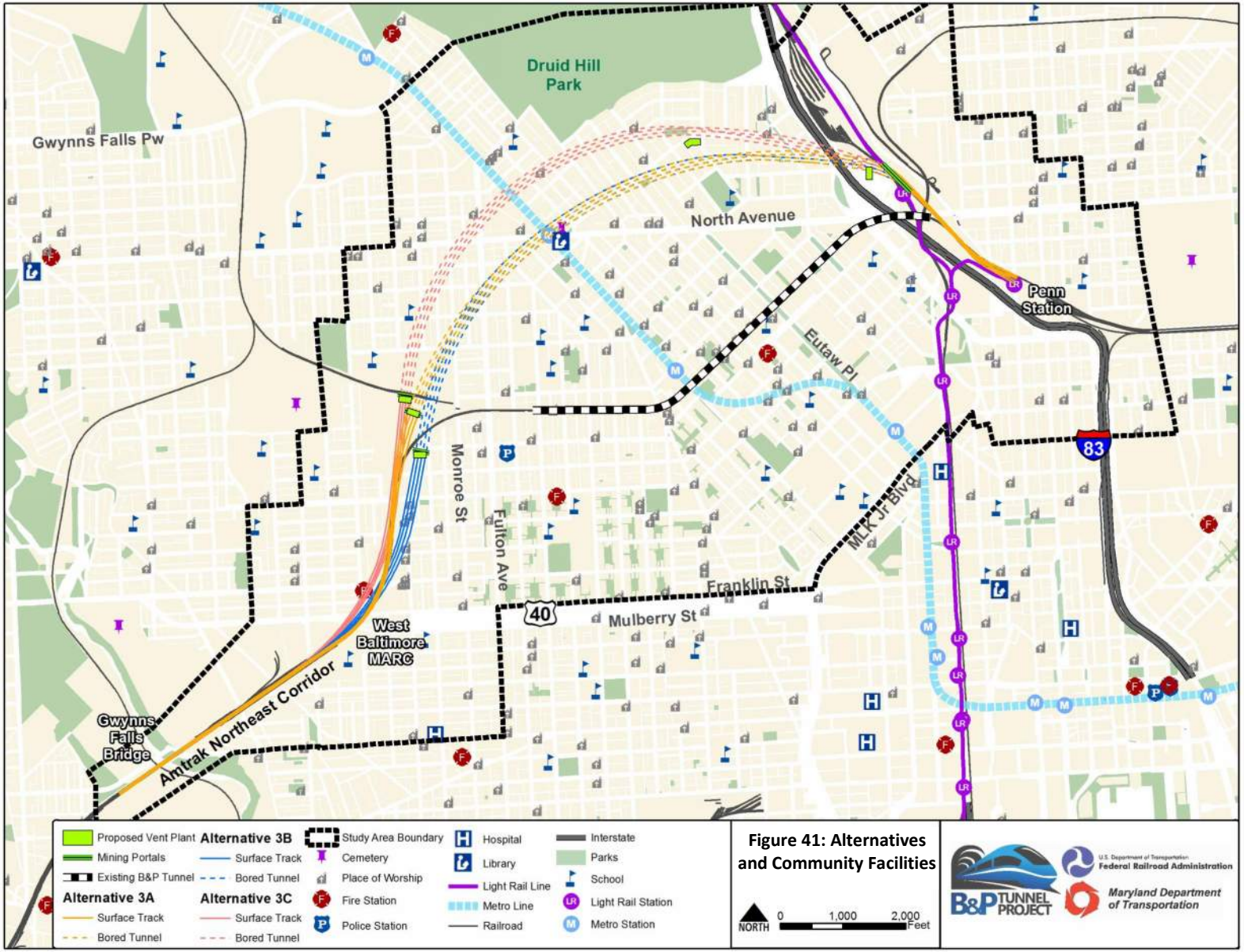

Figure 41: Alternatives and Community Facilities

The south portal and south portal ventilation plant of Alternative 3B would be located slightly to the east of the existing NEC railway in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods. In addition to the displaced five community facilities, the alternative would displace 48 residential properties and nine commercial and industrial properties, causing conversions in land use from industrial, residential, and commercial, to transportation land use. The conversion of residential and commercial land uses to transportation land use would alter the character of this majority residential urban neighborhood. However, the alternative would roughly parallel the existing NEC railway and would not create new physical divisions or isolated pockets within the neighborhood.

Alternative 3B would cause permanent roadway closures, resulting in impacts to neighborhood access. Permanent roadway closures include North Pulaski Street from Harlem Avenue to West Lafayette Avenue; West Lanvale Street from North Brice Street to North Pulaski Street; and North Brice Street from West Lanvale Street to West Lafayette Street. Existing neighborhood access would be disrupted as these closures would likely create dead-end streets out of West Lanvale and Rayner Avenue and eliminate the connections at these street intersections. Existing travel access across the tracks would be maintained.

The neighborhoods surrounding Alternative 3B, including Bridgeview/Greenlawn and Midtown-Edmondson, would experience short-term construction impacts. These may include short-term lane or roadway closures causing changes in travel patterns and access to businesses, temporary closure of parking areas, possible noise and vibration disturbances, dust, and visual impacts from construction equipment and signing.

d. Alternative 3C

Under Alternative 3C, one community facility, the Charles R. Thomas Fire Station, would be displaced in the in the south portal and south portal ventilation plant area. The fire station is located at 2249 Edmondson Avenue. The displacement of the fire station could result in a disruption to community services, which may be exacerbated if a proximate replacement facility is not established within the same neighborhood. Displacement of this community facility may also result in a change to the Rosemont neighborhood's historic urban character, due to the station building's historic architecture. (See **Section VI.C** for additional information.)

The south portal and south portal ventilation plant of Alternative 3C would be located slightly to the west of the existing NEC railway in the Bridgeview/Greenlawn, Midtown-Edmondson, and Rosemont neighborhoods. In addition to the displaced fire station, the alternative would displace 24 residential buildings and ten commercial and industrial properties near the intersection of Lauretta Avenue and North Bentalou Street in the southeast corner of the Rosemont neighborhood. This would cause conversions in land use from industrial, commercial, and residential to transportation land use. The displacement of these properties and conversion of this land use, particularly at the eastern entrance to the Rosemont neighborhood along Edmondson Avenue, would alter the character of Rosemont neighborhood boundary, which is defined in part by residential properties and historic commercial storefronts along a main thoroughfare. However, the alternative would roughly parallel the existing NEC railway and would not create new physical divisions or isolated pockets within the neighborhood.

Alternative 3C would cause permanent roadway closures of North Bentalou Street from Edmondson Avenue to Lauretta Avenue; Lauretta Avenue from near Wheeler Avenue to North Bentalou Street; and Wheeler Avenue at Franklin Street in the southeast corner of the Rosemont neighborhood. Existing neighborhood access would be disrupted as these closures, particularly of the south portion of Wheeler Avenue at West Franklin Street, would interrupt existing through-neighborhood travel patterns.

The neighborhoods surrounding Alternative 3C, including Bridgeview/Greenlawn, Midtown-Edmondson, and Rosemont, would experience short-term construction impacts. These may include short-term lane or roadway closures causing changes in travel patterns and access to businesses, temporary closure of parking areas, possible noise and vibration disturbances, dust, and visual impacts from construction equipment and signing.

e. Mitigation

Property acquisition activities, including relocations of the community facilities, will be performed in accordance with the *Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*. Under this Act, the owner of a displaced business, or, in this case, community facility, is entitled to receive payment for actual reasonable expenses incurred in moving the business, or personal property; for actual direct losses of tangible personal property; and for actual reasonable expenses incurred in the search for a replacement site. Fair market value would be provided to all property owners as compensation for land acquisition.

Impacts to community character from various alternative elements, including the intermediate ventilation plant in the Reservoir Hill neighborhood, and the south portal and south portal ventilation plant in the Bridgeview/Greenlawn, Midtown-Edmondson, and Rosemont neighborhoods, would be mitigated through aesthetic treatment to blend into the respective neighborhoods. Specific mitigation efforts, including aesthetic treatments, would be identified through continued coordination with affected neighborhoods.

8. Visual and Aesthetic Resources

Each alternative of the B&P Tunnel Project would incur visual and aesthetic quality changes to the surrounding environment, during and/or after construction. The following analysis assesses changes to existing viewsheds and is based on the methodology presented in **Section V.A.7**.

A majority of the project is an underground tunnel and would not be visible. Changes to visual and aesthetic resources by each alternative would result from three project components: tunnel portals, ventilation plants, and the new tracks and railroad bed at each end of the portals (trackway). Changes are assessed in terms of contextual compatibility, changes to visual landscape, and viewer sensitivity. These changes would occur within four viewsheds along the general project corridor, including: 1) the location proposed for the new northern trackway, the north portal, and north portal ventilation plant in the east Jones Falls area; 2) the location proposed for the intermediate ventilation plant in the Reservoir Hill neighborhood; 3) the location proposed for the south portal and south portal ventilation plant in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods; and 4) the new trackway south of the proposed south portal location.

a. Alternative 1: No-Build

There would be no long- or short-term impacts to visual and aesthetic resources associated with this alternative. The existing visual conditions would not change.

b. Alternative 3A

The proposed northern trackway, north portal and north portal ventilation plant are in the east Jones Falls area. Under Alternative 3A, introduction of the north portal, north portal ventilation plant, and trackway into the respective viewshed would result in overall low impacts to the viewshed.

The north portal, north portal ventilation plant, and trackway are visually compatible to the existing transportation land use context. The components would not obstruct the existing transportation-heavy landscape from residential, commercial, or institutional properties, resulting in a low visual effect. Finally, the components would have low general visual sensitivity, as the primary viewer groups at this location are transitory. The change in visual and aesthetic resources at the proposed location for the north portal and north portal ventilation plant under Alternative 3A is shown in **Image 3 (Section IV.C)**; this existing and proposed viewshed is the same for Alternatives 3B and 3C.

The proposed location for the intermediate ventilation plant is in the Reservoir Hill neighborhood, south of the Brookfield Avenue intersection with Whitelock Street. Introduction of the intermediate ventilation plant would result in overall high impacts to the viewshed. The intermediate ventilation plant would not be visually

compatible with the existing community garden context, and would be surrounded by primarily residential properties. The intermediate ventilation plant would have high general visual sensitivity, as the primary viewer groups at this location are permanent residents.

The proposed south portal and south portal ventilation plant are adjacent to industrial buildings and existing tunnel trackway in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods; the proposed trackway railroad south of the south portal is also located in this area, where it ties into the existing NEC trackway. Introduction of the south portal, south portal ventilation plant, and trackway into the respective viewshed would result in low visual effect with respect to context and landscape changes. These components would occur only within existing industrial and transportation land uses, and would be visually compatible with these land uses. The components would not cause new obstructions from residential, commercial, or institutional properties within the existing landscape, resulting in a low visual effect. The components would have high general visual sensitivity, as the primary viewer groups, including residents and business owners, are permanent.

The trackway located south of the proposed south portal would have low visual effects. The trackway would tie in to the existing transportation right-of-way used by the B&P Tunnel as it crosses below the existing roadway bridges at West Lafayette Avenue and Edmondson Avenue; therefore, it would not change any elements of the existing visual landscape. Viewer sensitivity is low due to the transitory nature of the primary viewer groups.

The change in visual and aesthetic resources at the proposed location for the south portal and south portal ventilation plant under Alternative 3A is shown in **Image 4 (Section IV.C)**.

c. Alternative 3B

The proposed north portal and north portal ventilation plant are in the east Jones Falls area; the proposed trackway located north of the north portal is also located in the east Jones Falls area, where it ties into the existing NEC trackway. Under Alternative 3B, introduction of the north portal, north portal ventilation plant, and trackway into the respective viewshed would result in overall low impacts to the viewshed. The north portal, north portal ventilation plant, and trackway are visually compatible to the existing transportation land use context. The components would not obstruct the existing transportation-heavy landscape from residential, commercial, or institutional properties, resulting in a low visual effect. Finally, the components would have low general visual sensitivity, as the primary viewer groups at this location are transitory. The change in visual and aesthetic resources at the proposed location for the north portal and north portal ventilation plant under Alternative 3B is shown in **Image 5 (Section IV.D)**; this existing and proposed viewshed is the same for Alternatives 3A and 3C.

The proposed location for the intermediate ventilation plant is in the Reservoir Hill neighborhood, south of the Brookfield Avenue intersection with Whitelock Street. Introduction of the intermediate ventilation plant would result in overall high impacts to the viewshed. The intermediate ventilation plant would not be visually compatible with the existing community garden land use context, and would be surrounded by primarily residential properties. The intermediate ventilation plant would have high general visual sensitivity, as the primary viewer groups at this location are permanent residents.

The proposed south portal and south portal ventilation plant are adjacent to industrial buildings and existing tunnel trackway in the Bridgeview/Greenlawn and Midtown-Edmondson neighborhoods; the proposed trackway railroad south of the south portal is also located in this area, where it ties into the existing NEC trackway. Introduction of the south portal and south portal ventilation plant into the respective viewshed would result in overall high impacts to the viewshed. While the components would be partially located within and adjacent to existing industrial and transportation land uses, they would also be located within existing residential land use, and would not be visually compatible with this land use. The components would result in a medium visual effect, as they would obstruct the existing visual landscape from residential properties that are proximal,

but not directly adjacent to, the existing B&P Tunnel. Finally, the components would have high general visual sensitivity, as the primary viewer groups, including residents and business owners, are permanent.

The trackway located south of the proposed south portal would have overall medium visual effects from the surrounding transportation right-of-way viewshed. The trackway would cross below a modification of the existing roadway bridge at West Lafayette Avenue, and would cross below the existing roadway bridge at Edmondson Avenue; therefore, it would not change any elements of the existing visual landscape. Viewer sensitivity is low due to the transitory nature of the primary viewer groups.

The change in visual and aesthetic resources at the proposed location for the south portal and south portal ventilation plant under Alternative 3B is shown in **Image 6 (Section IV.D)**.

d. Alternative 3C

The proposed north portal and north portal ventilation plant are in the east Jones Falls area; the proposed trackway north of the north portal is also located in the east Jones Falls area, where it ties into the existing NEC trackway. Under Alternative 3C, introduction of the north portal, north portal ventilation plant, and trackway into the respective viewshed would result in overall low impacts to the viewshed. The north portal, north portal ventilation plant, and trackway are visually compatible to the existing transportation land use context. The components would not obstruct the existing transportation-heavy landscape from residential, commercial, or institutional properties, resulting in a low visual effect. Finally, the components would have low general visual sensitivity, as the primary viewer groups at this location are transitory. The change in visual and aesthetic resources at the proposed location for the north portal and north portal ventilation plant under Alternative 3C is shown in **Image 7**; this existing and proposed viewshed is the same for Alternatives 3A and 3B.

The proposed location for the intermediate ventilation plant is in the Reservoir Hill neighborhood, south of the Brookfield Avenue intersection with Whitelock Street. Introduction of the intermediate ventilation plant would result in overall high impacts to the viewshed. The intermediate ventilation plant would not be visually compatible with the existing community garden land use context, and would be surrounded by primarily residential properties. The intermediate ventilation plant would have high general visual sensitivity, as the primary viewer groups at this location are permanent residents.

The proposed south portal and south portal ventilation plant are adjacent to industrial buildings and existing tunnel trackway in the Bridgeview/Greenlawn, Midtown-Edmondson and Rosemont neighborhoods; the proposed trackway railroad south of the south portal is also located in this area, where it ties into the existing NEC trackway. Introduction of the south portal, south portal ventilation plant, and trackway into the respective viewshed would result in overall high impacts to the viewshed. While the components would be partially located within and adjacent to existing industrial and transportation land uses, they would also be located within existing residential land use, and would not be visually compatible with this land use. The components would result in a medium visual effect, as they would obstruct the existing visual landscape from residential properties that are proximal, but not directly adjacent to, the existing B&P Tunnel. Finally, the components would have high general visual sensitivity, as the primary viewer groups, including residents and business owners, are permanent.

The trackway located railroad south of the proposed south portal would have overall medium visual effects from the surrounding transportation right-of-way viewshed. The trackway would cross below the existing roadway bridge at West Lafayette Avenue, and would cross below a new roadway bridge at Edmondson Avenue, just east of North Bentalou Street. While the trackway at this viewshed would introduce a new aerial structure, this element would blend into the existing transportation land use and visual landscape. Viewer sensitivity is low due to the transitory nature of the primary viewer groups.

The change in visual and aesthetic resources at the proposed location for the south portal and south portal ventilation plant under Alternative 3C is shown in **Image 8**.

A summary of effects to visual and aesthetic resources is presented in **Table 45.**

Table 45: Summary of Effects to Aesthetics and Visual Resources

Alternative	Project Components	Contextual Compatibility	Change in Visual Landscape	Viewer Sensitivity	Overall Visual Effect
Alternative 3A	North Portal, Ventilation Plant, and trackway	Low Visual Effect	Low visual effect	Low general sensitivity	MEDIUM
	Intermediate Ventilation Plant	High visual Effect	High Visual Effect	High general sensitivity	
	South Portal and Ventilation Plant	Low visual effect	Low Visual Effect	High general sensitivity	
	South Trackway	Low Visual Effect	Low Visual effect	Low general sensitivity	
Alternative 3B	North Portal, Ventilation Plant, and trackway	Low visual effect	Low visual effect	Low general sensitivity	HIGH
	Intermediate Ventilation Plant	High visual Effect	High Visual Effect	High general sensitivity	
	South Portal and Ventilation Plant	Medium visual Effect	High visual Effect	High general sensitivity	
	South Trackway	Medium visual Effect	Medium visual Effect	Low general sensitivity	
Alternative 3C	North Portal, Ventilation Plant, and trackway	Low visual effect	Low visual effect	Low general sensitivity	HIGH
	Intermediate Ventilation Plant	High visual Effect	Medium Visual Effect	High general sensitivity	
	South Portal and Ventilation Plant	Medium visual Effect	High visual Effect	High general sensitivity	
	South Trackway	Medium visual Effect	Medium visual Effect	Low general sensitivity	

e. Mitigation

For Alternatives 3A, 3B, and 3C, adverse effects to the majority of the Study Area visual landscape are avoided, as the majority of each alternative's alignment (52 percent of Alternative 3A, 56 percent of Alternative 3B, and

58 percent of Alternative 3C) would be located underground. Where the portals, ventilation plants, and day lighted trackway are located, landscaping such as tree buffers would be used to minimize visual impacts.

The ventilation plants would be designed with material and architectural treatments that fit into the aesthetic character of the surrounding area. Wherever there is a potential for high visual effects, such as at the intermediate ventilation plant location, design of the ventilation plant structure would reduce the impacts to the visual landscape and affected viewer groups. Aesthetic treatment of the vent plants would be coordinated with the surrounding communities and other stakeholders through continued public involvement efforts.

9. Environmental Justice

The U.S. Environmental Protection Agency has defined environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, signed by the President on February 11, 1994, directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

The U.S. DOT has defined a “disproportionately high and adverse effect” on minority and low-income populations as an adverse effect that:

- Is predominantly borne by a minority population and/or a low-income population; or
- Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non- low-income population.

The identification of a disproportionately high and adverse effect on EJ populations does not preclude a project from moving forward. USDOT Order 5601.2a states that a project with disproportionately high and adverse effects on low-income and minority populations may be carried out under the following conditions:

- Programs, policies, and activities that would have a disproportionately high and adverse effect on minority populations or low-income populations would only be carried out if further mitigation measures or alternatives that would avoid or reduce the disproportionately high and adverse effects are not practicable. In determining whether a mitigation measure or an alternative is "practicable,” the social, economic (including costs) and environmental effects of avoiding or mitigating the adverse effects would be taken into account.
- Programs, policies or activities that would have a disproportionately high and adverse effect on populations protected by Title VI ("protected populations") would only be carried out if:

  (1) A substantial need for the program, policy or activity exists, based on the overall public interest; and

  (2) Alternatives that would have less adverse effects on protected populations (and still satisfy the need identified in subparagraph (1) above) have either:

  (a) adverse social, economic, environmental, or human health impacts that are more severe; or

  (b) would involve increased costs of an extraordinary magnitude.

Determinations of whether a project would have disproportionately high and adverse effects must take into consideration "mitigation and enhancements measures that will be taken and all offsetting benefits to the affected minority and low-income populations…" USDOT Order, Section 8.b.

a. Methodology

As a tool for evaluating the proportionality of beneficial and adverse effects, this analysis identifies EJ populations within the Study Area. An EJ population is defined to include any Census Block Group in which the minority or low-income population meets either of the following thresholds:

a) The minority or low-income population exceeds 50 percent, or

b) The percentage of a low-income population in the affected area is "meaningfully greater" than the percentage of low-income people in the general population.

The methodology for identifying EJ populations is based on the Council on Environmental Quality (CEQ) guidance document, *Environmental Justice Guidance under NEPA* (CEQ, 1997). Since CEQ Environmental Justice guidelines do not define specific thresholds for "meaningfully greater", for this Project, FRA in coordination with the US EPA is defined it as at least 10 percentage points higher than the percentage of the low-income population of Baltimore City (22 percent). Thus, Census Block Groups that contain 32 percent or higher low-income households are also considered EJ populations. FRA has not applied the "meaningfully greater" threshold is to the minority population, as minorities comprise 74 percent of Baltimore City, already meeting the 50 percent or greater threshold for minority population.

To determine whether effects would be disproportionately high and adverse to identified EJ populations, the analysis identifies the potential for adverse effects on human health and safety and environmental resources in the Study Area based on analysis of other environmental impacts identified in this DEIS. Those effects by alternative, geographic areas and type of effects are identified and determined whether they occur to EJ populations. When effects to EJ populations are identified, the effects experienced by the affected population are compared to those experienced by others residing in the entire project boundary.

Additionally, measures to avoid or reduce adverse effects and the benefits to minority and low-income populations from the alternatives analyzed are considered in making the determination of whether an effect is disproportionately high or adverse to EJ populations in the Study Area. Overall, of the 77 Census Block Groups in the Study Area, 72 contain minority race and/or ethnicity populations of 50 percent or more. Thirty-six Census Block Groups contain 32 percent or higher low-income households.

Appendix D presents the minority race and/or ethnicity and low-income data for each Study Area Block Group. Two Block Groups meet the EJ population threshold for low-income composition only, and 38 Block Groups meet the EJ population threshold for minority race and/or ethnicity composition only; 34 Block Groups meet the threshold for both minority race and/or ethnicity as well as low-income composition. Three Study Area Block Groups do not meet the criteria for EJ populations: 1101.001, 1401.001, and 1401.002. This data is also represented in **Figure 42**. Therefore, of the 77 Block Groups within the Study Area, a total of 74 meet the criteria to be identified as EJ populations (minority and/or low-income).

All of the Census Block Groups proximal to the Build Alternatives are primarily occupied by minority and/or low-income populations and are therefore considered EJ populations. The following environmental resources are not directly, indirectly, or cumulatively impacted by the proposed alternatives: ecological resources, wetlands, water quality, flood hazards and floodplain management. Therefore, they would pose no disproportionately high and adverse effects to EJ populations in the Study Area and are not further discussed.

FRA considered environmental impacts from the proposed alternatives for their potential effects to low-income and minority populations as well as their potential for disproportionately high and adverse effects to these

populations. Effects of the alternatives are described based on the potential to disrupt community cohesion; change access to services, community facilities, and transportation; change the character and use of communities by land use changes or important cultural resource effects; impact quality of life through increased noise or vibration; or pose potential health issues such as changes to air quality or public safety. These effects may be beneficial or adverse.

Because the Build Alternatives are mostly within EJ populations in the Study Area, the effects of the Build Alternatives would be borne primarily by minority and low-income populations. The following identifies the severity of potential effects and whether adverse effects may be mitigated. **Table 46** summarizes and compares potential effects to low-income and minority communities by Build Alternative.

b. Impacts

Impacts to EJ populations were assessed by determining potential disruption in the interaction among people and groups within a community from the following:

- Possible displacements.
- Loss of housing and community facilities and access to services,
- Substantial change in land use,
- Creating physical barriers,
- Loss of important historic and archaeological resources, and
- Visual quality changes.
- Noise
- Air quality
- Transportation

FRA considered the displacements of households, businesses, and community facilities for their potential to alter the physical shape, character, or function of communities or neighborhoods with predominately minority or low-income residents or use. The availability of suitable replacement housing and business locations was also examined.

Because temporary easements for construction purposes are anticipated to be relatively short term and would not preclude access to or impact major uses of a given property, potential effects during construction are not considered high or adverse to protected low-income and minority populations. The discussion below describes the permanent impacts to EJ populations which could occur as a result of Alternatives 3A, 3B and 3C. There would be no negative impact to EJ populations from Alternative 1: No Build and there would be no positive impact of improved transit times.

Overall, Alternative 3A would not have a disproportionately high and adverse effect to EJ populations. Alternatives 3B and 3C would have disproportionately high and adverse effects to EJ populations as a result of property acquisition and impacts to housing, land use/zoning, community facilities, visual quality, and noise, as described in **Table 46**.

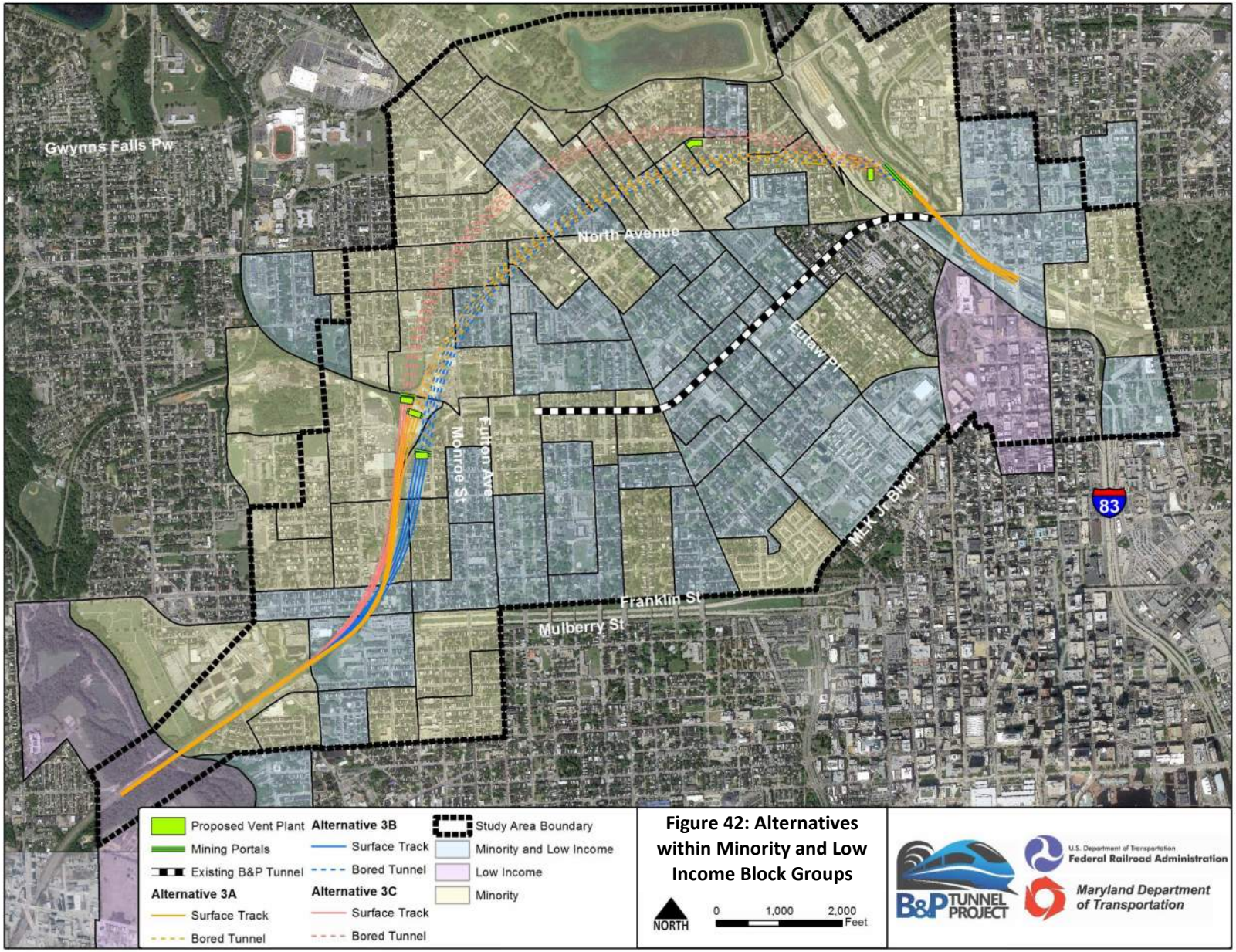

Figure 42: Alternatives within Minority and Low Income Block Groups

Table 46: Summary of Potential Effects to Low-Income and Minority Populations

Environmental Element	Alternative 1: No-Build Effect	Alternative 3A Effect	Alternative 3B Effect	Alternative 3C Effect
Property Acquisition	No property acquisitions would occur. No high and adverse effects to EJ populations would occur.	Alternative 3A would not result in any residential displacements. One business would be displaced. No high and adverse effects to EJ populations would occur.	Alternative 3B would result in 48 residential property and 9 commercial property displacements within EJ population areas. High and adverse effects would occur to EJ populations.	Alternative 3C would result in 24 residential and 10 commercial displacements within EJ population areas. High and adverse effects would occur from property acquisition.
Housing	No impacts to housing would occur. No high and adverse effects to EJ populations would occur.	No housing units would be displaced by this alternative. No high and adverse effects to housing within EJ populations would occur.	Alternative 3B would result in impacts to 48 housing units. High and adverse effects would occur to EJ populations from housing loss.	Alternative 3C would result in impacts to 24 housing units. High and adverse effects would occur to EJ populations from housing loss.
Land Use/Zoning	No impacts to land use/zoning would occur. No high and adverse effects to EJ populations would occur.	Less than 0.1 acres of residential and commercial land use would be converted to transportation. No high and adverse effects would occur.	5.0 acres of residential and commercial land uses would be converted to transportation use in areas with EJ populations. High and adverse effects would occur to land use/zoning.	2.6 acres of residential and commercial land uses would be converted to transportation use in areas with EJ populations. High and adverse effects would occur to land use/zoning.
Community Facilities	No impacts to community facilities would occur. No high and adverse effects to EJ populations would occur.	One planned community facility, the future Whitelock Community Farm expansion, could be impacted by this alternative. No high and adverse effects would occur to community facilities in areas with EJ population.	Impacts to the Whitelock Community Farm would be the same as Alternative 3A. In addition, six places of worship in Midtown-Edmondson neighborhood would be displaced. The west edge of Lafayette-Payson park would be acquired. High and adverse effects would occur to community facilities in areas with EJ population.	Impacts to the Whitelock Community Farm would be the same as Alternative 3A. In addition, the Charles R. Thomas Fire Station would be displaced. High and adverse effects would occur to community facilities in areas with EJ population.

Environmental Element	Alternative 1: No-Build Effect	Alternative 3A Effect	Alternative 3B Effect	Alternative 3C Effect
Neighborhoods /Physical Barriers	No impacts to neighborhoods or implementation of physical barriers would occur. No high and adverse effects to EJ populations would occur.	Alternative 3A would result in no new physical barriers in EJ communities because the proposed alignment would be underground over most of its length. No high and adverse effects from physical barriers would occur to EJ populations.	Alternative 3B would result in no new physical barriers in EJ communities because the proposed alignment would be primarily underground, and new above ground alignment would be adjacent to the existing NEC. No high and adverse effects from physical barriers would occur to EJ populations.	Alternative 3C would result in no new physical barriers in EJ communities because the proposed alignment would be primarily underground, and new above ground alignment would be adjacent to the existing NEC. No high and adverse effects from physical barriers would occur to EJ populations.
Visual Quality	No impacts to visual quality would occur. No high and adverse effects to EJ populations would occur.	Alternative 3A would construct the south tunnel portal and ventilation plant in a primarily industrial area and the intermediate ventilation plant in the Reservoir Hill residential area. FRA will work with the Reservoir Hill community to develop a ventilation plant design that fits within existing community character and context. No high and adverse effects to visual quality would occur in EJ population areas.	Alternative 3B would construct the south tunnel portal and ventilation plant in the Midtown-Edmondson residential area and the intermediate ventilation plant in the Reservoir Hill residential area. FRA will work with the Reservoir Hill community to develop a ventilation plant design that fits within existing community character and context. High and adverse effects to EJ populations would occur from visual quality.	Alternative 3C would construct the south tunnel portal and vent plant in the Edmondson residential area and the intermediate ventilation plant in the Reservoir Hill residential area. FRA will work with the Reservoir Hill community to develop a ventilation plant design that fits within existing community character and context. High and adverse effects to EJ populations would occur from visual quality.
Transportation	Minor impacts to roadway transportation would occur. However, no high and adverse effects to EJ populations would occur.	Alternative 3A would improve transit times and reliable connections for transit-dependent residents in Midtown-Edmondson using the West Baltimore MARC station. All existing bridges over the NEC would remain.	Alternative 3B would improve transit times and reliable connections for transit-dependent residents in Midtown-Edmondson using the West Baltimore MARC station. Both platforms at the West Baltimore MARC Station would be improved to	Alternative 3C would improve transit times and reliable connections for transit-dependent residents in Midtown-Edmondson using the West Baltimore MARC station. Both platforms at the West Baltimore MARC

Environmental Element	Alternative 1: No-Build Effect	Alternative 3A Effect	Alternative 3B Effect	Alternative 3C Effect
		No high and adverse effects to EJ populations would occur from transportation effects.	accommodate high-level boarding. Major existing crossings of the NEC would be maintained, however there may be short-term impacts during construction. No high and adverse effects to EJ populations would occur from transportation effects.	Station would be improved to accommodate high-level boarding. Major existing crossings of the NEC would be maintained, however there may be short-term impacts during construction. No high and adverse effects to EJ populations would occur from transportation effects.
Noise	No impacts to noise would occur. No high and adverse effects to EJ populations would occur.	Alternative 3A would impact residential noise receptors within EJ population areas near the south portal. A total of 254 residential and institutional buildings would potentially experience moderate noise impacts. There would be no severe noise impacts. No high and adverse effects to EJ populations would result from noise impacts.	Alternative 3B would impact residential noise receptors within EJ population areas near the south portal. A total of 1,078 residential and institutional buildings would potentially experience moderate noise impacts; 175 residential and institutional buildings would potentially experience severe noise impacts. High and adverse effects to EJ populations would occur from noise impacts.	Alternative 3B would impact residential noise receptors within EJ population areas near the south portal. A total of 979 residential and institutional buildings would potentially experience moderate noise impacts; 111 residential and institutional buildings would potentially experience severe noise impacts. High and adverse effects to EJ populations would occur from noise impacts.
Air Quality	No impacts to air quality would occur. No high and adverse effects to EJ populations would occur.	Alternative 3A would have no impact to air quality. There would be no high or adverse effects from air quality on EJ populations.	Alternative 3B would have no impact to air quality. There would be no high or adverse effects from air quality on EJ populations.	Alternative 3C would have no impact to air quality. There would be no high or adverse effects from air quality on EJ populations.

More detailed housing impacts will be assessed as alternatives and environmental analysis move forward.

c. Full and Fair Access

Executive Order 12898 requires federal agencies ensure effective, meaningful involvement of low-income and minority populations in project planning and development and potentially affected EJ populations have fair and equal access to information. Consequently, an EJ public and agency outreach program is being conducted throughout the EIS process and will continue through design and construction phases. Many meetings were held with local officials; public, local, and regional organizations; and government agencies, as well as with representatives of affected communities along the evaluated alternative alignments. Direct mailings to residents in the Study Area, project scoping notices, open houses, small group meetings, and presentations have occurred. Meetings were also offered to community based on their requests. Additionally, a project website posts meeting notices, the scoping comments received, project information, and avenues to comment. Publications including print advertisements, newsletters, and fliers have been distributed.

d. Mitigation

Determinations of whether a project would have disproportionately high and adverse effects must take into consideration "mitigation and enhancements measures that will be taken and all offsetting benefits to the affected minority and low-income populations…" USDOT Order, Section 8.b.

Efforts would be made to relocate impacted condemned businesses, and community facilities within the same community. The displaced would receive fair compensation and relocation assistance, minimizing impacts to community cohesion. Mitigation measures for impacts to neighborhoods and community facilities would include advanced and frequent notice before changes in travel patterns, plentiful signage for detours, restrictions on work hours to daytime hours, methods to reduce dust and construction worker parking in surrounding lots to avoid disrupting existing area parking.

Specific noise mitigation measures would be considered for areas of severe and moderate impact, once a Preferred Alternative is selected. At that time, mitigation measures such as operational restrictions, control measures to eliminate rail gaps at crossovers, noise barriers, buffer zones, and building noise insulation will be evaluated. Mitigation for temporary noise construction impacts are discussed in **Section VI.I.4.**

Property acquisition activities would be performed in accordance with the Uniform Relocation Assistance and Real Properties Acquisition Act of 1970 (Uniform Act) as amended. Additionally, impacted property owners may be eligible for benefits under Maryland's Relocation Assistance Program, including advisory services, moving and reestablishment costs and other payments and services as provided by law. Fair market value would be provided to all property owners as compensation for land acquisition.

B. Public Health and Safety

1. Alternative 1: No-Build

No impacts to public health would occur under this alternative. While the current tunnel is safe to operate, potential impacts to public safety may occur in the long-term under this alternative, as the existing B&P Tunnel would not include current comprehensive life safety approaches.

2. Alternatives 3A, 3B, and 3C

No impacts to public health from Alternatives 3A, 3B, and 3C are anticipated. Each alternative would conform to federal and state air quality standards, as discussed in **Section VI.H**. As discussed in **Section VI.F**, additional detail is needed regarding the potential for an alternative to encounter contaminated soil and groundwater during construction near sites contaminated with hazardous material. If a public health and safety concern is identified during future hazardous materials investigations, provisions within the investigation Health and Safety Plan

(HASP) will be implemented and regulatory authorities notified to appropriately mitigate the hazardous material concerns. This information would be presented in the Final EIS.

As with the implementation of any new transportation project, there is the potential for impacts to occur to the general Study Area public as well as users of the proposed infrastructure. These potential impacts to general public safety may occur during alternative construction and/or operation. However, these potential safety impacts would be mitigated to the fullest possible extent.

3. Mitigation

The alternatives would be designed to prevent public access and ensure safety to permanent and transitory individuals in the surrounding areas during operation. Particular attention will be given to maintaining public safety during the construction period. Public access to construction areas will be limited to the greatest extent possible. This can be accomplished with temporary fencing, warning signs and other safety precautions.

In order to mitigate potential emergency situations, particularly for users of the proposed tunnel, Alternatives 3A, 3B, and 3C would implement comprehensive life safety approaches. The alternatives would be designed and constructed in accordance with the National Fire Protection Association's Standard for Fixed Guideway Transit and Passenger Rail Systems—NFPA 130. Systems that will be designed and constructed in accordance with NFPA 130 will include:

a. Emergency Ventilation

A mechanical ventilation system is required for tunnels longer than 1,000 feet. The system can be comprised of either a set of ventilation buildings that provide exhaust and supply at specific locations, a set of jet fans for each track, or a combination. If used, jet fans should be located on the opposite side of the egress walkway to prevent excessive air speeds in the egress path. The fans will be capable of 100 percent reversible flow in order to control the propagation of smoke and hot gases away from the direction of egress. The final size and power requirements for the fans will need to be determined by a tunnel ventilation analysis. This analysis and subsequent final design will ensure the proper delineation of ventilation zones typically related to the longest operating train consist and the operating characteristics of the tunnel needed to meet projected travel demand, and to ensure proper isolation and mitigation of smoke and hot gases within an area occupied by an incident train.

b. Emergency Exits

Emergency exits will be designed in accordance with NFPA 130 as well as NFPA 101, Life Safety Code. Typically, the emergency exit locations will also provide tunnel access for emergency responders. A Fire Alarm Control Panel (FACP) and other incident command response interfaces will be accessible at the designated access locations. The maximum distance between exits to surface will not exceed 2,500 feet. Exits consist of fire-resistant enclosed stairways and passageways. Emergency exit enclosures will be separate from ventilation plants, although they may be adjacent to them.

Exit stairs should have maximum riser heights of 7 inches, minimum tread depths of 11 inches, and minimum clear widths of 44 inches with allowance for handrail encroachment of 3-1/2 inches. Landings can be a maximum of 12 feet apart, and a minimum clear height should be 6 feet 8 inches.

In a multi-track tunnel environment with an appropriate rated divider wall or separate track tunnels, cross passageways may be used in lieu of or as a complement to conventional exits. The cross passageway would convey people to a tenable environment isolated through fire rated openings. Where incorporated, cross passageways are situated at 800-foot intervals.

All emergency exits will be properly labeled at the point of exit along with additional signage at intervals within the tunnel delineating the distances to the next exit point in either direction.

c. Walkways

Walkways are designed to allow passengers to evacuate a train at any point along the tunnels and proceed to the nearest position of safety. The walkways provide an unobstructed clear width transitioning from a minimum of 24 inches at the walkway surface to 30 inches at 62 inches above the walkway surface to 17 inches at 80 inches above the walkway surface. Although NFPA 130 does not state the maximum gap between the train and the walkway, the walkways are designed to minimize the gap between the walkway and the train such that evacuating passengers can safely exit the train onto the walkway without falling into the gap or injuring themselves.

d. Blue Light Stations

A Blue Light Station is a location along the tunnel, indicated by a blue light fixture, designating where an emergency exit is located and where emergency service or authorized personnel can use an emergency phone to communicate with the Operations Control Center (OCC). If necessary, trained personnel can disconnect traction power from an adjacent track via switches within the Blue Light Station's protective enclosure. In addition, the Blue Light Stations will provide access and storage to firefighting equipment including extinguishers, hose lines, and standpipe connections.

Blue Light Stations will be located in accordance with NFPA 130, which includes but is not necessarily limited to, emergency exits, cross-passageways at 800 feet (where utilized), emergency access points, and any other approved locations.

Each Blue Light Station has a unique identification code as established by Amtrak. This identification will be marked on the enclosure in a prominent manner and be well known to the staff at the OCC to aid in response.

e. Fire Standpipe Systems

The tunnels will be provided with standpipe systems, which will be predominantly dry systems in unattended, unoccupied environments exposed to freezing temperatures. The fire standpipe system will be Class I Fire designed in accordance with appropriate Maryland fire codes and AMTRAK requirements.

The standpipe system for each sectionalized zone will consist of a fire standpipe main (minimum 6 inches in diameter due to the fill time requirement of NFPA 130 and tunnel length) and hose valves installed at the regular intervals of 250 feet spacing (maximum 275-foot limit). The fire hose valves should be 2-1/2 inches, and be provided with caps and chains. These valves will be located so that any point within the tunnel may be reached with 125 feet of hose length brought in by first responders. Each fire hose valve will be provided with a specific identifying nameplate consistent with Amtrak standards which also shows location identification.

Each trainway of the tunnel will have its own separate complete fire standpipe main. It will have fire department connections (FD.C.s), hose valves, sectionalizing valves and alarms. The standpipe mains will remain accessible for easy inspections, maintenance and repair. The standpipe system will be maintained with fire department connections at grade. The FD.C.s would be used by the fire department to supply water and pressurize the system. Each FD.C. will be located within 100 feet of fire truck access and within 100 feet of a fire hydrant. FD.C.s will be provided at tunnel emergency exit locations. If there are no existing street fire hydrants which are suitable for fire department use within 100 feet of the FD.C., then the existing hydrants should be upgraded, or new hydrants should be installed, in coordination with the municipal water supply.

Water flow and supervisory alarms will be provided for the standpipe systems in each tunnel, and the signal will be sent to the local Amtrak FACP. All FACP's should interface with the Amtrak Central Command Center.

C. Cultural Resources

1. Historic Architecture

Eighteen historic properties were identified within the APE (**Figure 43** and **Table 47**). An effect to an historic property may occur when there is an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR Part 800.16(I)). For those properties with an effect, the criteria of adverse effect from Section 106 of the NHPA were applied [36 CFR Part 800.5(a)(1)]. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualifies it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Relevant examples of adverse effects (36 CFR Part 800.5(a)(2)) were applied to historic properties in relation to each of the four alternatives. The four adverse effect examples in the Section 106 regulations that apply to this undertaking are:

- 36 CFR Part 800.5(a)(2)(i)--Physical destruction of or damage to all or part of the property,
- 36 CFR Part 800.5(a)(2)(iii)--Removal of the property from its historic location,
- 36 CFR Part 800.5(a)(2)(iv)--Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance, and
- 36 CFR Part 800.5(a)(2)(v)--Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.

Project effects were assessed by applying the Section 106 criteria of adverse effect (36 CFR Part 800.5). The effects assessment concluded that all three Alternatives: 3A, 3B, and 3C would have an adverse effect on historic properties. Alternative 1: No-Build would not have an effect on historic properties. Alternative 3A would have an adverse effect on six historic properties, Alternative 3B would have an adverse effect on eight historic properties, and Alternative 3C would have an adverse effect on ten historic properties. With respect to sections of the NEC taken out of service as a result of the undertaking, including the NRHP-eligible B&P Railroad and the contributing B&P Tunnel, the final disposition of the ROW and tunnel structure have not yet been determined and no assessment of effects is possible at this time. Details of individual historical property effects are provided in the *Architectural Historic Properties Effects Assessment Report.*

FRA incorporated comments and feedback from the consulting parties during the Section 106 process into the effects determination. Over the course of the four Consulting Parties meetings, consulting parties provided the following comments in regards to the effects to historic properties:

- The effects to the B&P Railroad tunnel as a result of this undertaking.
- The size and location of the intermediate tunnel vent plant in the Reservoir Hill Historic District, and the overall high historic integrity of this District.
- Effects to the American Stores Company Warehouse, a contributing element to the Midtown Edmondson Historic District.
- The importance of the Ward Baking Company.
- Effects to contributing elements to the Midtown Edmondson Historic District.
- Effects to historic properties along Edmondson Avenue, which has historically been a main thoroughfare for the West Baltimore area.
- The importance of the American Ice Company, especially its historic significance and visual in the community.
- Effects to the Fire Department Engine House No. 36.

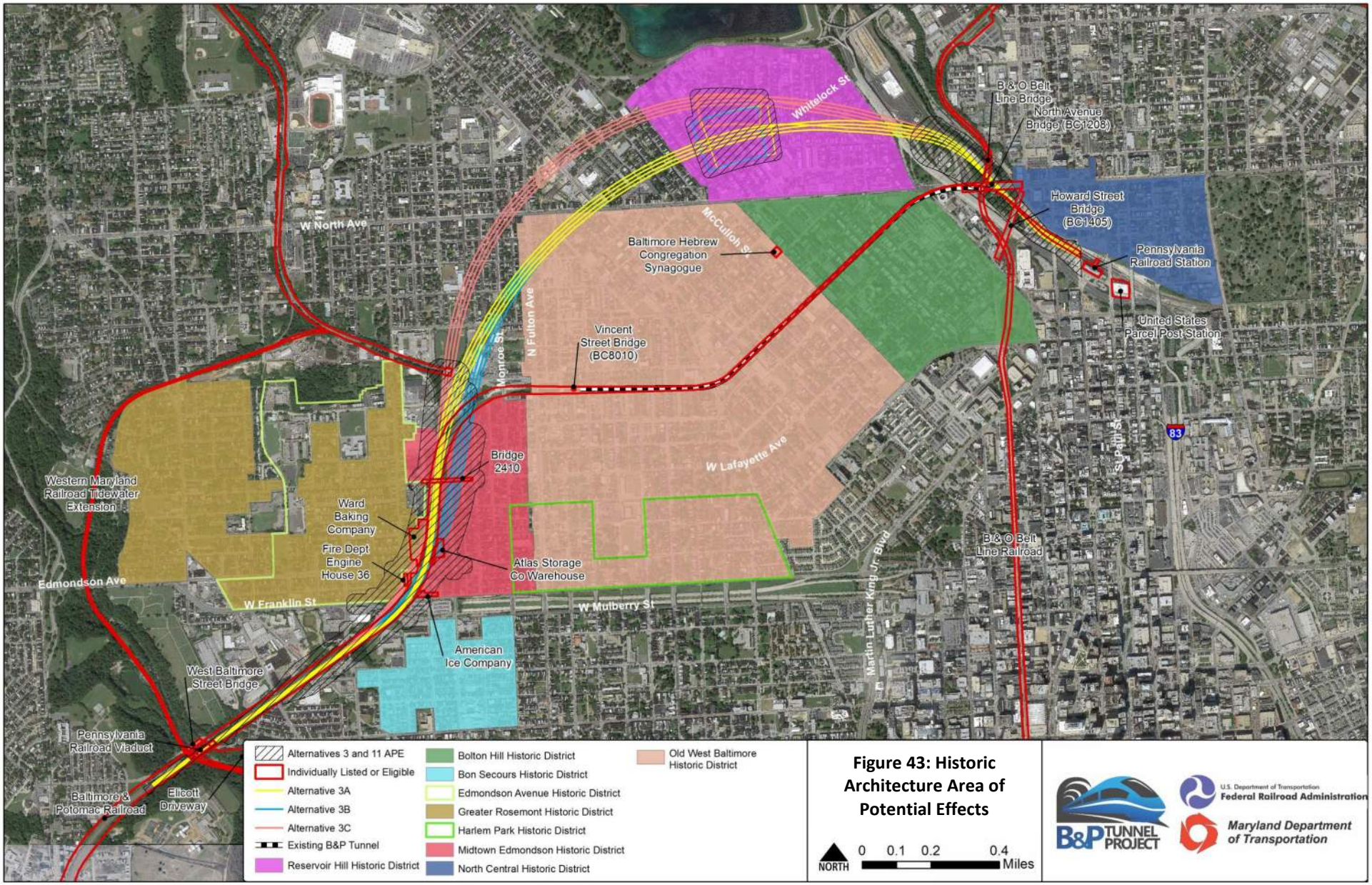

Figure 43: Historic Architecture Area of Potential Effects

Table 47: Section 106 Effects on Historic Properties

#	NAME	MIHP/NR #	3A	3B	3C
1	Baltimore and Ohio Belt Line Railroad	B-5287	**Adverse Effect** (1 contributing element in direct APE)	**Adverse Effect** (1 contributing element in direct APE)	**Adverse Effect** (1 contributing element in direct APE)
2	Baltimore and Ohio Belt Line Bridge over Jones Falls Valley	B-5288	**Adverse Effect**	**Adverse Effect**	**Adverse Effect**
3	Baltimore & Potomac Railroad (Philadelphia, Baltimore & Washington Railroad)	B-5164	**Adverse Effect** (2 contributing elements in direct APE; possible conditional no adverse effect)	**Adverse Effect** (5 contributing elements in direct APE)	**Adverse Effect** (3 contributing elements in direct APE)
4	Howard Street Bridge (BC 1405)	B-4529	No Adverse Effect	No Adverse Effect	No Adverse Effect
5	North Avenue Bridge (BC 1208)	B-4521	No Adverse Effect	No Adverse Effect	No Adverse Effect
6	Reservoir Hill Historic District	B-1379	**Adverse Effect** (possible conditional no adverse effect)	**Adverse Effect** (possible conditional no adverse effect)	**Adverse Effect** (possible conditional no adverse effect)
7	David Bachrach House (Gertrude Stein House)	B-4098	No Adverse Effect	No Adverse Effect	No Adverse Effect
8	Carver Vocational-Technical High School	B-5294	N/A	N/A	No Adverse Effect
9	Western Maryland Railroad	B-5293	N/A	N/A	No Adverse Effect
10	Midtown Edmondson Historic District	(None)	**Adverse Effect** (3 contributing elements in direct APE)	**Adverse Effect** (73 contributing elements in direct APE)	**Adverse Effect** (7 contributing elements in direct APE)

#	NAME	MIHP/NR #	3A	3B	3C
11	Bridge BC 2410 (Lafayette Avenue over Amtrak)	B-4553	**Adverse Effect**	**Adverse Effect**	**Adverse Effect**
12	Atlas Safe Deposit and Storage Company Warehouse Complex	B-5188-2	No Effect	**Adverse Effect** (3 contributing elements in direct APE)	No Effect
13	American Ice Company	B-1040	N/A	No Adverse Effect	No Effect
14	Greater Rosemont Historic District	B-5112	No Effect	**Adverse Effect** (5 contributing elements in direct APE)	**Adverse Effect** (61 contributing elements in direct APE)
15	Edmondson Avenue Historic District	B-5187	No Effect	No Adverse Effect	**Adverse Effect** (58 contributing elements in direct APE)
16	Ward Baking Company	B-5112-2	No Effect	No Adverse Effect	**Adverse Effect** (2 contributing elements in direct APE)
17	Fire Department Engine House No. 36	B-5112-4	N/A	No Adverse Effect	**Adverse Effect**
18	Pennsylvania Railroad Viaduct	B-5064	No Adverse Effect	No Adverse Effect	No Adverse Effect
TOTAL HISTORIC PROPERTIES WITH ADVERSE EFFECT			**6**	**8**	**10**

On November 20, 2015, the SHPO concurred with FRA's finding of an Adverse Effect for the three alternatives. This concurrence letter can be found in **Appendix B**.

After the Preferred Alternative is identified, an executed Memorandum of Agreement or Programmatic Agreement will serve to document project stipulations in order to resolve adverse effects to historic properties and conclude the Section 106 process.

2. Archaeology

The results of the Phase IA Archaeological Study show that although large portions of the Study Area have been disturbed, the potential for both pre- and post-contact archaeological sites still exists. While the subsurface integrity of most sites that may be in the Project Area of Potential Effect (APE) is probably poor, it is also believed that an occasional intact archaeological site could be encountered. By comparison, it is anticipated that the Study Area has a higher potential for containing post contact sites than pre-contact sites. These suppositions are based on previous discoveries of intact archaeological sites in and around the Study Area, as well as the land use history of this portion of Baltimore City.

Due to the preliminary stage of the project at this time, the scale of the project APE, as well as the uncertainty of project variables pertaining to anticipated ground disturbance (e.g., cut-and-cover locations, cut locations, ventilation plants), it has been deemed prudent to suspend detailed archaeological impact studies until the identification of a Preferred Alternative.

D. Draft Section 4(f) Evaluation

In accordance with 49 USC § 303, FRA may approve use of publicly owned land of a public park, recreation area, or land of an historic site of national, State, or local significance only if:

(1) There is no prudent and feasible alternative to using that land; and

(2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

FRA may determine that a transportation program or project will have a *de minimis* impact on a historic site only if, pursuant to the Section 106 consultation process:

- The transportation program or project will have no adverse effect on the historic site; or
- There will be no historic properties affected by the transportation program or project; and
- FRA's finding has received written concurrence from the applicable State historic preservation officer; and
- FRA has developed its finding in consultation with parties consulting as part of the Section 106 consultation process.

With respect to parks, recreation areas, or wildlife or waterfowl refuges, FRA may make a finding of *de minimis* impact only if:

- After public notice and opportunity for public review and comment, FRA finds that the transportation program or project will not adversely affect the activities, features, and attributes of the park, recreation area, or wildlife or waterfowl refuge eligible for protection under this section; and
- The finding has received concurrence from the officials with jurisdiction over the park, recreation area, or wildlife or waterfowl refuge.

FRA has prepared this Draft Section 4(f) Evaluation to assess the impacts of the B&P Tunnel Project alternatives upon Section 4(f) properties and to evaluate alternatives that could potentially avoid or minimize impacts caused by the proposed action to those properties. Based on this draft evaluation, there are no feasible and prudent

alternatives that would avoid use of all Section 4(f) properties. FRA will address comments received on this Draft Section 4(f) Evaluation and continue to incorporate all possible planning to minimize harm to the Section 4(f) properties.

This draft evaluation also provides notification of FRA's intent to pursue *de minimis* impact findings for some Section 4(f) properties. The potential for *de minimis* impacts are currently based on best professional judgment and preliminary coordination with the officials with jurisdiction. FRA will base final *de minimis* impact determinations on impacts associated with a preferred alternative and continued coordination with the officials with jurisdiction over the resources. All potential *de minimis* impacts are being presented for public review and comment with this DEIS, in conjunction with the requirements of the National Environmental Policy Act (NEPA).

1. Use of Section 4(f) Properties

This section discusses the potential impacts to Section 4(f) properties that would be caused by the B&P Tunnel Project Build Alternatives (Alternatives 3A, 3B, and 3C). If a *de minimis* impact finding is identified FRA will coordinate with the officials of jurisdiction for the resources following the consideration of public comments. For park properties, FRA will ask the official(s) with jurisdiction to concur in writing that the project will not adversely affect the activities, features, or attributes of the resource(s) for which FRA has made a *de minimis* impact finding. For historic properties, FRA will request written concurrence from the State Historic Preservation Officer (SHPO) that there would be no adverse effect or no effect to the property in accordance with 36 CFR Part 800. Should the official(s) with jurisdiction or SHPO concur with this position, FRA will proceed with the *de minimis* impact determination concurrently with the final Section 4(f) Evaluation provided in the FEIS. If, however, the official(s) with jurisdiction or SHPO do not concur or respond to requests for concurrence, the FRA may make a final determination as to whether the impact is *de minimis* in the final Section 4(f) Evaluation, pursuant to FRA's Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999).

a. Alternative 1: No-Build

No use of Section 4(f) properties would occur under this alternative.

b. Alternative 3A

Alternative 3A would result in potential use of five Section 4(f) properties including the B&O Belt Line Railroad, the B&O Belt Line Bridge over Jones Falls Valley, the Baltimore and Potomac Railroad, Midtown Edmondson Historic District, and Bridge 2410 / Lafayette Avenue over Amtrak. Additionally, the alternative would require the acquisition of land from the Reservoir Hill Historic District and the Edmonson Avenue Historic District, but would not impact contributing elements in the district; therefore the impact would not constitute a Section 4(f) "use."

Removal of major substructural pier elements of the B&O Belt Line Bridge over Jones Falls Valley would be required to construct Alternative 3A (**Figure 44**). This would alter historic characteristics in a manner that would diminish historic integrity, resulting in an adverse effect per 36 CFR Part 800.5 to the individually eligible Belt Line Bridge and to the Baltimore and Ohio Belt Line Railroad district.

Alternative 3A would result in modifications to elements of the historic Baltimore and Potomac Railroad alignment, such as trackwork and catenary. The modifications to the historic site would alter historic characteristics of the rail line in a manner that would not diminish historic integrity and would result in no adverse effect per 36 CFR Part 800.5. Potential harm caused by the disposition of the existing B&P Tunnel, a contributing element of the historic district, may result in an adverse effect to the historic district. Dependent on the impacts associated with the disposition, the impact could constitute use of the property under Section 4(f).

Construction of the south portal approach for Alternative 3A would require demolition of three historic buildings that have been identified as contributing elements to the Midtown Edmondson historic district (**Figure 45**). The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

Use of Bridge 2410 / Lafayette Avenue over Amtrak for Alternative 3A could include raising the bridge superstructure and potentially modifying the substructure to allow for four tracks. The alternative would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

Alternative 3A would impact land within the Edmonson Avenue Historic District for construction of the south portal approach. However, no historic elements contributing to the district would be directly affected. Therefore, Alternative 3B would not require a Section 4(f) use of the Edmonson Avenue Historic District.

Alternative 3A would require construction of a mid-tunnel ventilation plant located in the Reservoir Hill Historic District (**Figure 46**). FRA and MDOT have identified a potential site for the ventilation plant along Whitelock Street which would require no direct impacts to historic elements contributing to the district, as no building is currently located on the site. Based on this location, Alternative 3A would not require a Section 4(f) use of the Reservoir Hill Historic District.

c. Alternative 3B

Alternative 3B would result in potential use of 11 Section 4(f) properties including the Baltimore and Ohio Belt Line Railroad, Baltimore and Ohio Belt Line Bridge over Jones Falls Valley, Baltimore and Potomac Railroad, Midtown Edmondson Historic District, Bridge 2410 / Lafayette Avenue over Amtrak, Greater Rosemont Historic District, Fire Department Engine Company No. 36, American Ice Company, Atlas Safe Deposit and Storage Company Warehouse, the Ward Baking Company, and Lafayette & Payson Park. Additionally, the alternative would impact the Reservoir Hill Historic District and Edmonson Avenue Historic District in a manner that would not constitute a Section 4(f) use.

Removal of major substructural pier elements of the B&O Belt Line Bridge over Jones Falls Valley would be required to construct Alternative 3B (**Figure 47**). This would alter historic characteristics in a manner that would diminish historic integrity, resulting in an adverse effect per 36 CFR Part 800.5 to the individually eligible Belt Line Bridge and to the Baltimore and Ohio Belt Line Railroad district.

Construction of Alternative 3B would require modifications to elements of the historic Baltimore and Potomac Railroad such as the trackwork, catenary, and right-of-way. The alternative would bisect the existing alignment and shift the alignment east. The harm to the historic site would alter historic characteristics of the rail line in a manner that diminishes historic integrity and results in an adverse effect per 36 CFR Part 800.5 and thus result in a Section 4(f) use of this property.

Construction of the south portal approach for Alternative 3B would require demolition of 82 historic buildings or other contributing elements to the Midtown Edmondson Historic District (**Figure 48**). The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5. The harm would be substantially severe and likely cause the district to be ineligible for the National Register.

Use of Bridge 2410 / Lafayette Avenue over Amtrak for Alternative 3B could include raising the bridge superstructure and potentially modifying the substructure to allow for four tracks. The harm to the historic site could alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

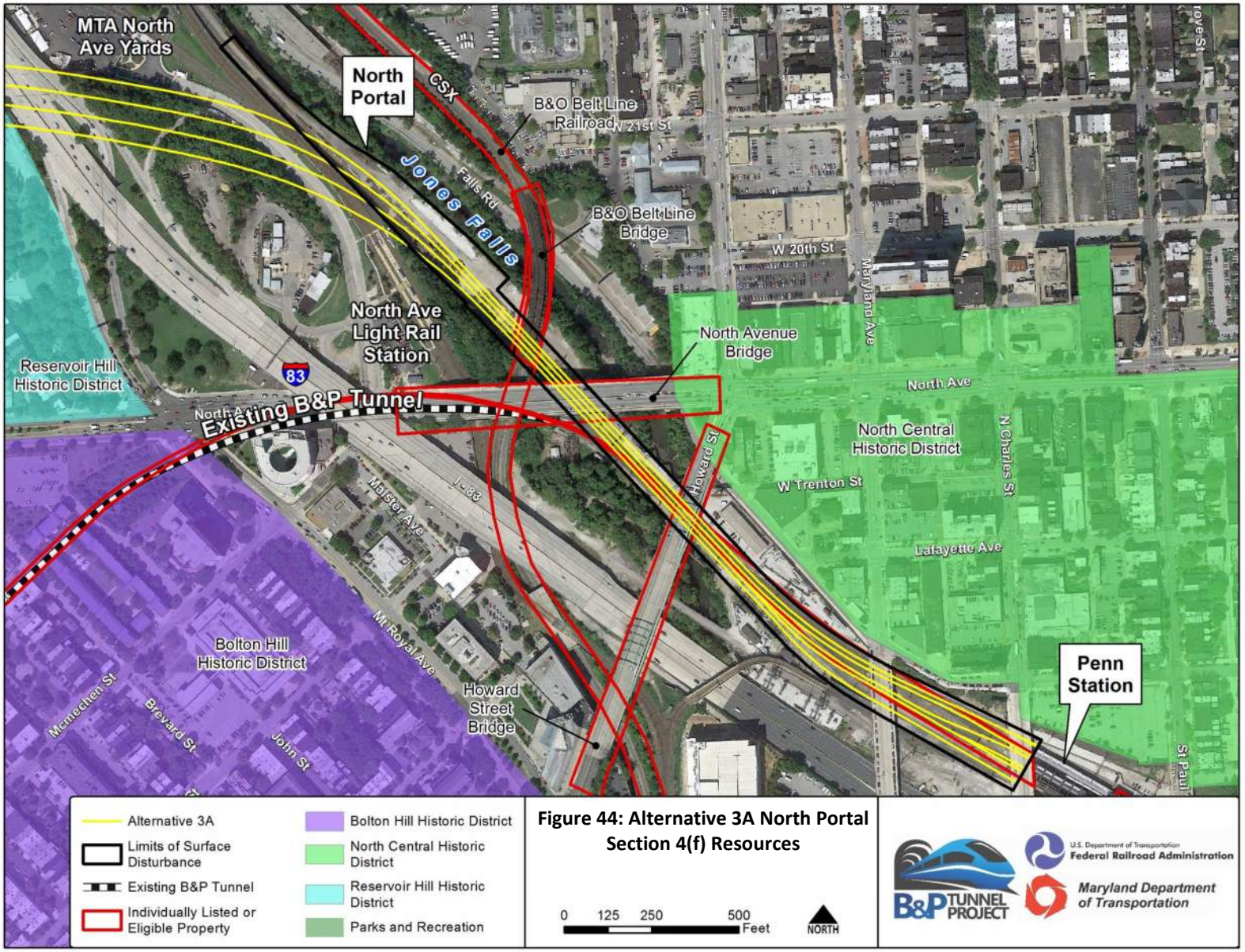

Figure 44: Alternative 3A North Portal Section 4(f) Resources

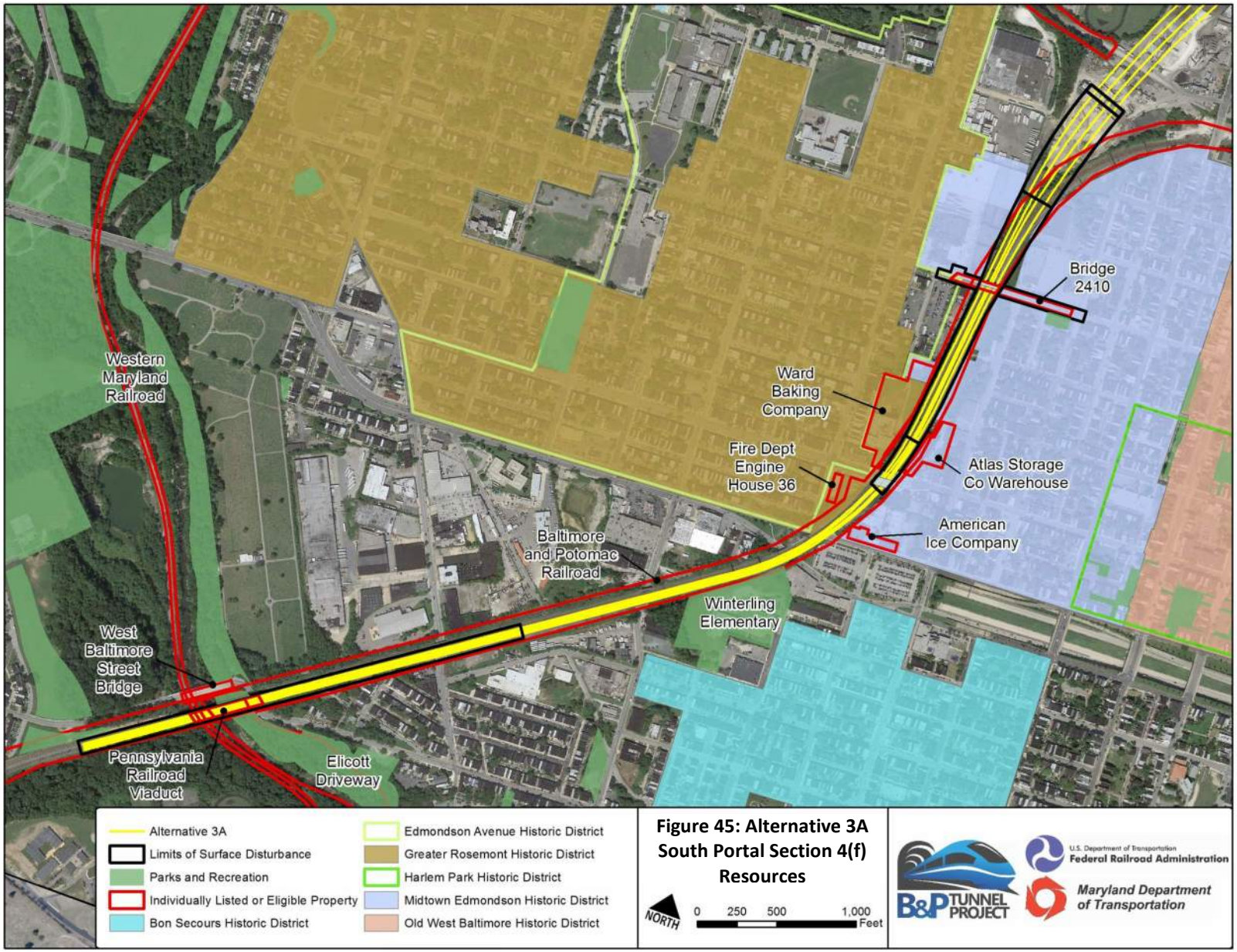

Figure 45: Alternative 3A South Portal Section 4(f) Resources

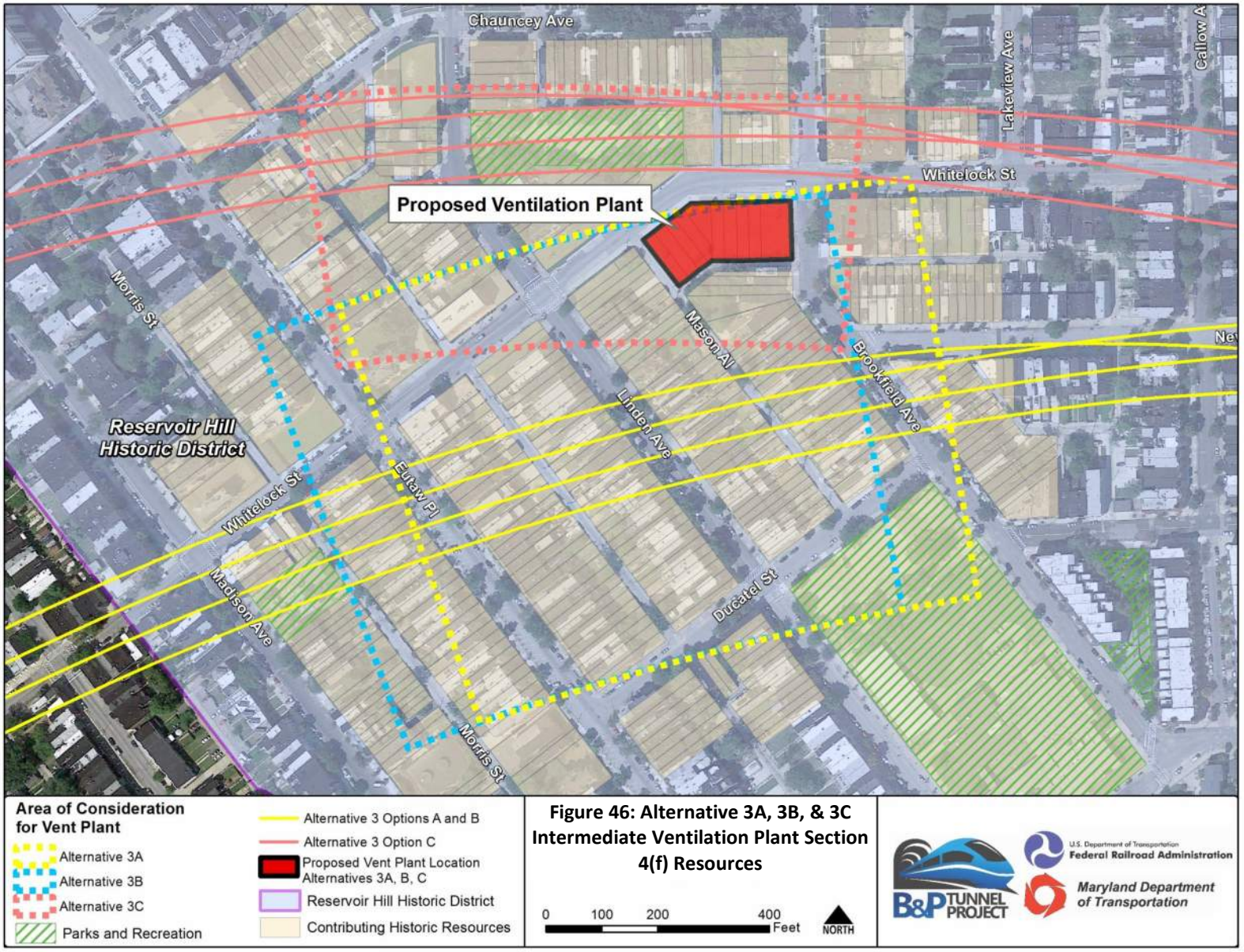

Figure 46: Alternative 3A, 3B, & 3C Intermediate Ventilation Plant Section 4(f) Resources

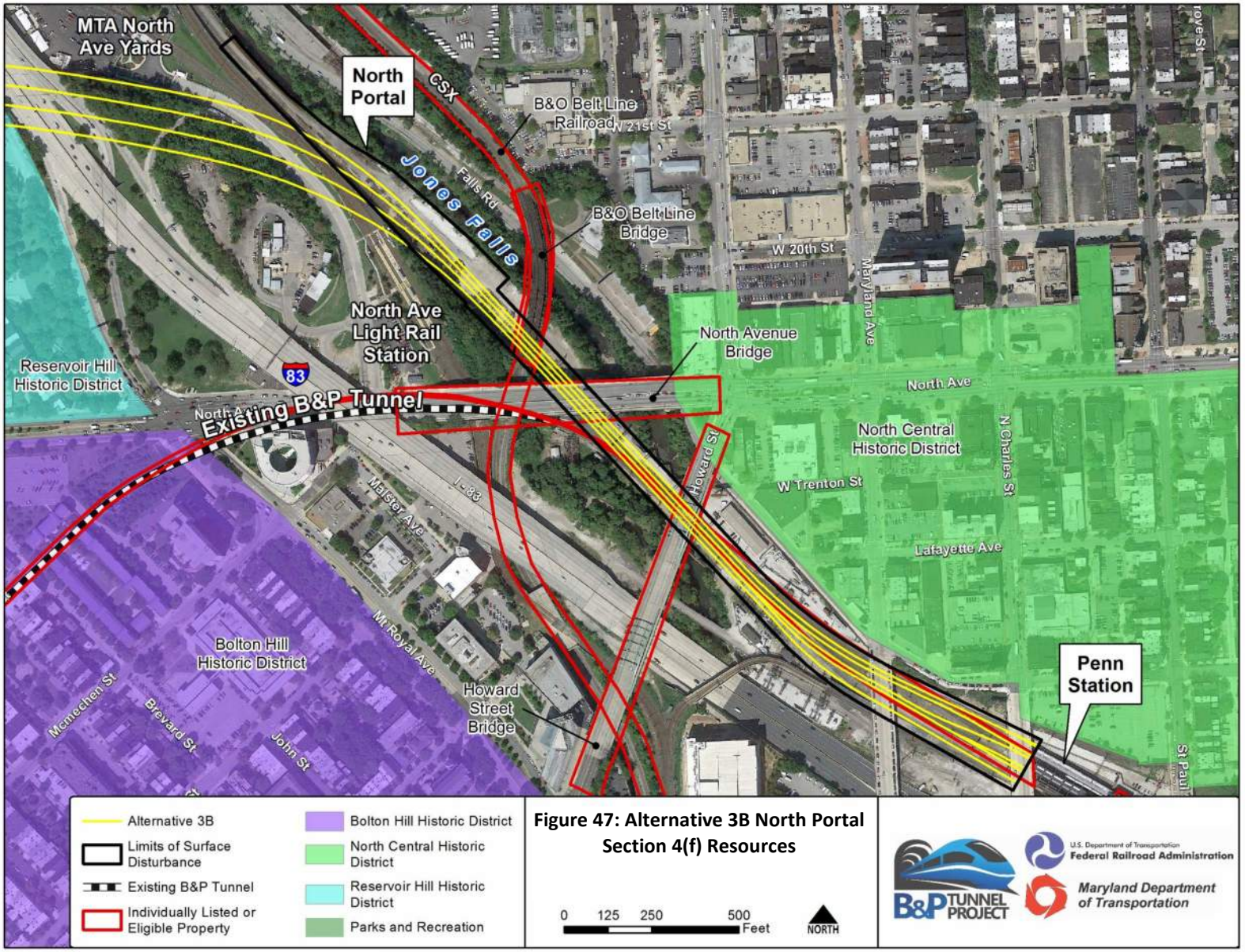

Figure 47: Alternative 3B North Portal Section 4(f) Resources

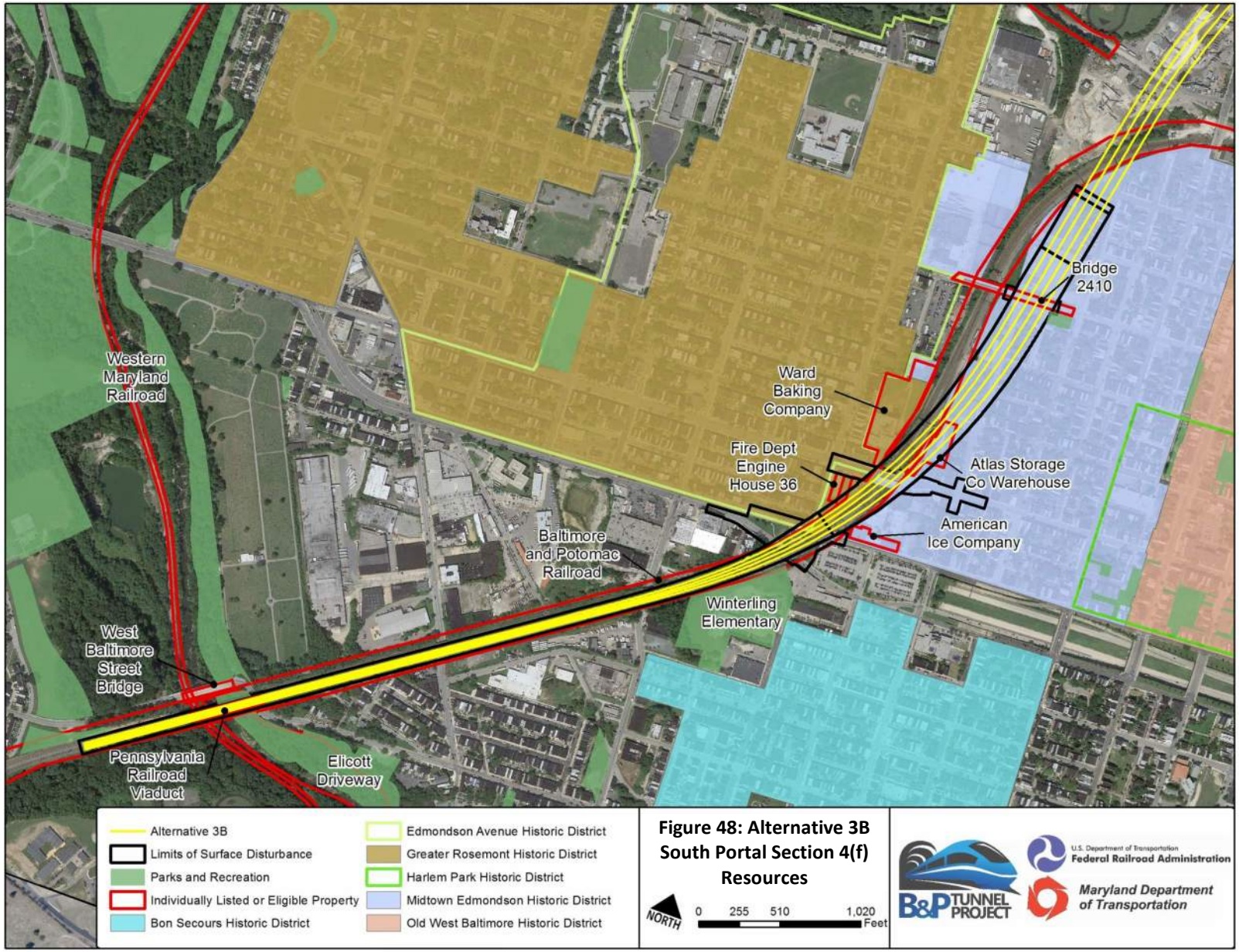

Figure 48: Alternative 3B South Portal Section 4(f) Resources

Construction of the south portal approach for Alternative 3B would require demolition of five historic buildings or other contributing elements to the Greater Rosemont Historic District. The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

Use of the Fire Department Engine Company No. 36 property would include impact to the parking lot located at the rear of the building. The harm to the historic site would not diminish historic integrity and would result in no adverse effect per 36 CFR Part 800.5. Therefore, the use may be considered *de minimis* pursuant to Section 4(f).

Use of the American Ice Company property resulting from Alternative 3B would include modifications to the back and west portion of the building property; however there would be no impact to the historic building. The harm to the historic site would alter historic characteristics but would not diminish historic integrity; therefore, the alternative would not result in an adverse effect per 36 CFR Part 800.5, and the use may be considered *de minimis* pursuant to Section 4(f).

Alternative 3B would require demolition of the Atlas Safe Deposit and Storage Company Warehouse in order to construct the south portal approach. Harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity and would thus constitute an adverse effect per 36 CFR Part 800.5. The harm would be substantially severe and cause the property to be ineligible for the National Register.

Alternative 3B would require a minor impact to the extreme southern portion of the Ward Baking Company property in order to construct the south portal approach. The alternative would alter historic characteristics of the property but would not diminish historic integrity; therefore, the alternative would not result in an adverse effect per 36 CFR Part 800.5, and the use may be considered *de minimis* pursuant to Section 4(f).

Construction of the south portal for Alternative 3B would require right-of-way impact to Lafayette and Payson Park of approximately 350 square feet (of approximately 12,000 square feet total). Impacts would occur to the basketball court on the west side of the park property. Temporary or permanent closure of the basketball courts may be required.

Alternative 3B would impact land within the Edmonson Avenue Historic District for construction of the south portal approach. However, no historic elements contributing to the district would be directly affected. Therefore, Alternative 3B would not require a Section 4(f) use of the Edmonson Avenue Historic District.

Alternative 3B would require construction of an intermediate ventilation plant located in the Reservoir Hill Historic District (**Figure 46**). A potential site for the ventilation plant has been identified along Whitelock Street which would require no direct impacts to historic elements contributing to the district, as no building is currently located at the site. Based on this location, Alternative 3B would not require a Section 4(f) use of the Reservoir Hill Historic District.

d. Alternative 3C

Alternative 3C would result in potential use of 10 Section 4(f) properties including the Baltimore and Ohio Belt Line Railroad, the Baltimore and Ohio Belt Line Bridge over Jones Falls Valley, the Baltimore and Potomac Railroad, Midtown Edmondson Historic District, Bridge 2410 / Lafayette Avenue over Amtrak, Greater Rosemont Historic District, Edmondson Avenue Historic District, Fire Department Engine Company No. 36, the Western Maryland Railroad, and the Ward Baking Company. Additionally, the alternative would impact the Reservoir Hill Historic District in a manner that would not constitute a Section 4(f) use of this historic property.

Removal of major substructural pier elements of the B&O Belt Line Bridge over Jones Falls Valley would be required to construct Alternative 3C (**Figure 49**). This would alter historic characteristics in a manner that would diminish historic integrity, resulting in an adverse effect per 36 CFR Part 800.5 to the individually eligible Belt Line Bridge and to the Baltimore and Ohio Belt Line Railroad district.

Alternative 3C would result in modifications to elements of the historic Baltimore and Potomac Railroad such as the trackwork, catenary, and right-of-way. The alternative would shift the existing alignment west. The harm to the historic site would alter historic characteristics of the rail line in a manner that diminishes historic integrity and results in an adverse effect per 36 CFR Part 800.5.

Alternative 3C would result in demolition of seven historic buildings or other contributing elements to the Midtown Edmondson Historic District (**Figure 50**). The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

Use of Bridge 2410 / Lafayette Avenue over Amtrak for Alternative 3C could include raising the bridge superstructure and potentially modifying the substructure to allow for four tracks. The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

Demolition of 31 historic buildings or other contributing elements to the Greater Rosemont Historic District would be required for construction of Alternative 3C. The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5. The harm would be substantially severe and could potentially result in the District being ineligible for the National Register.

Under Alternative 3C, use of the Edmondson Avenue Historic District would include demolition of 28 historic buildings or other elements contributing to the district. The harm to the historic district would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5.

Alternative 3C would require demolition of the Fire Department Engine Company No. 36 historic site. Mitigation could not reduce harm to the demolished building. The harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity, and thus meets the criteria of adverse effect per 36 CFR Part 800.5. The harm would be substantially severe and cause the property to be ineligible for the National Register.

Use of the Western Maryland Railroad would include impact to the historic railroad right-of-way but would not affect the alignment or operation of the railroad. The harm to the railroad would not diminish historic integrity and would result in no adverse effect per 36 CFR Part 800.5. Therefore the use may be considered *de minimis* pursuant to Section 4(f).

Alternative 3C would require demolition of the Ward Baking Company building in order to construct the south portal approach. Harm to the historic site would alter historic characteristics in a manner that would diminish historic integrity and would thus constitute an adverse effect per 36 CFR Part 800.5. The harm would be substantially severe and potentially cause the property to be ineligible for the National Register.

Alternative 3C would require construction of an intermediate ventilation plant located in the Reservoir Hill Historic District (**Figure 46**). A potential site for the ventilation plant has been identified along Whitelock Street which would require no direct impacts to historic elements contributing to the district, as no building is currently located on the site. Based on this location, Alternative 3C would not require a Section 4(f) “use” of the Reservoir Hill Historic District.

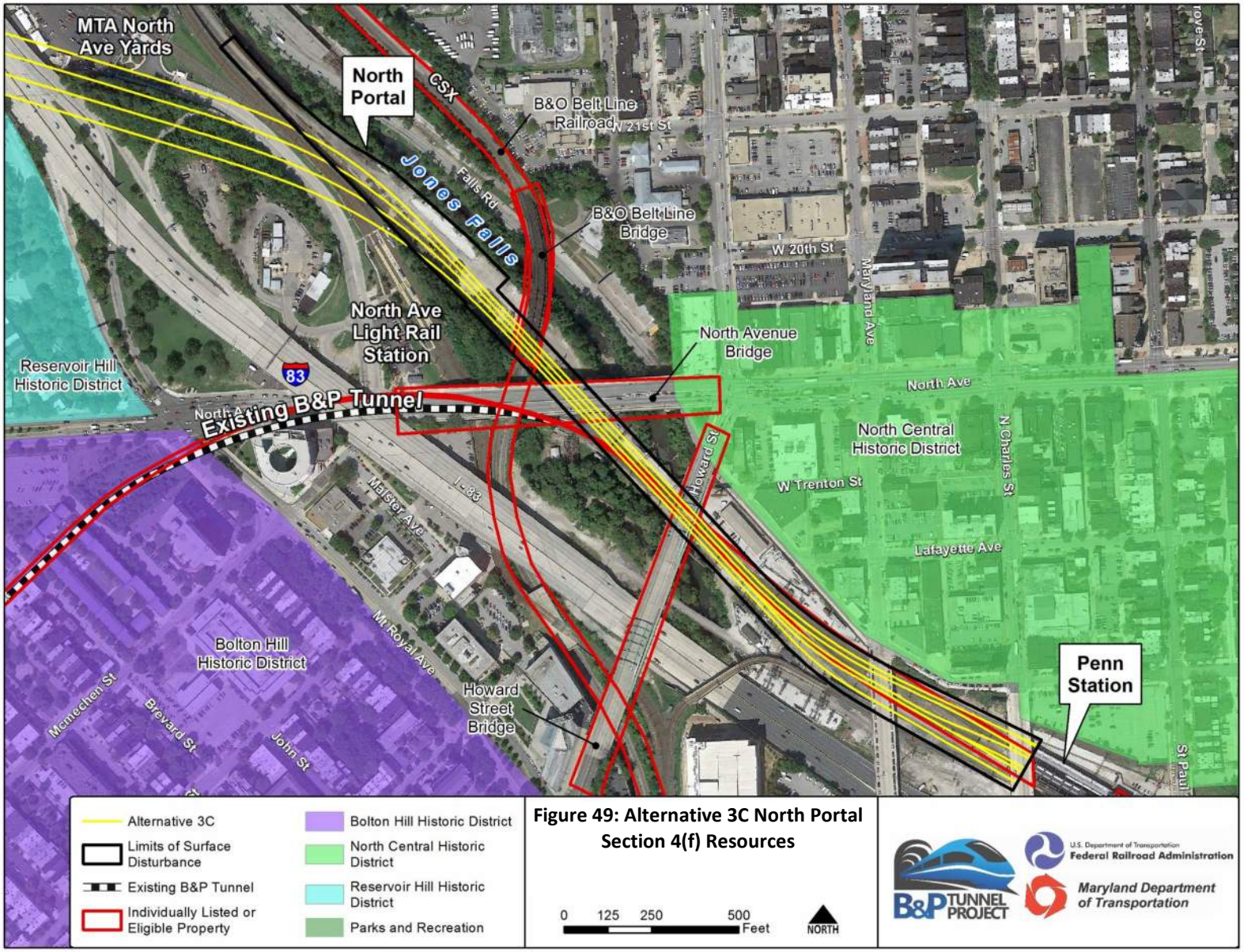

Figure 49: Alternative 3C North Portal Section 4(f) Resources

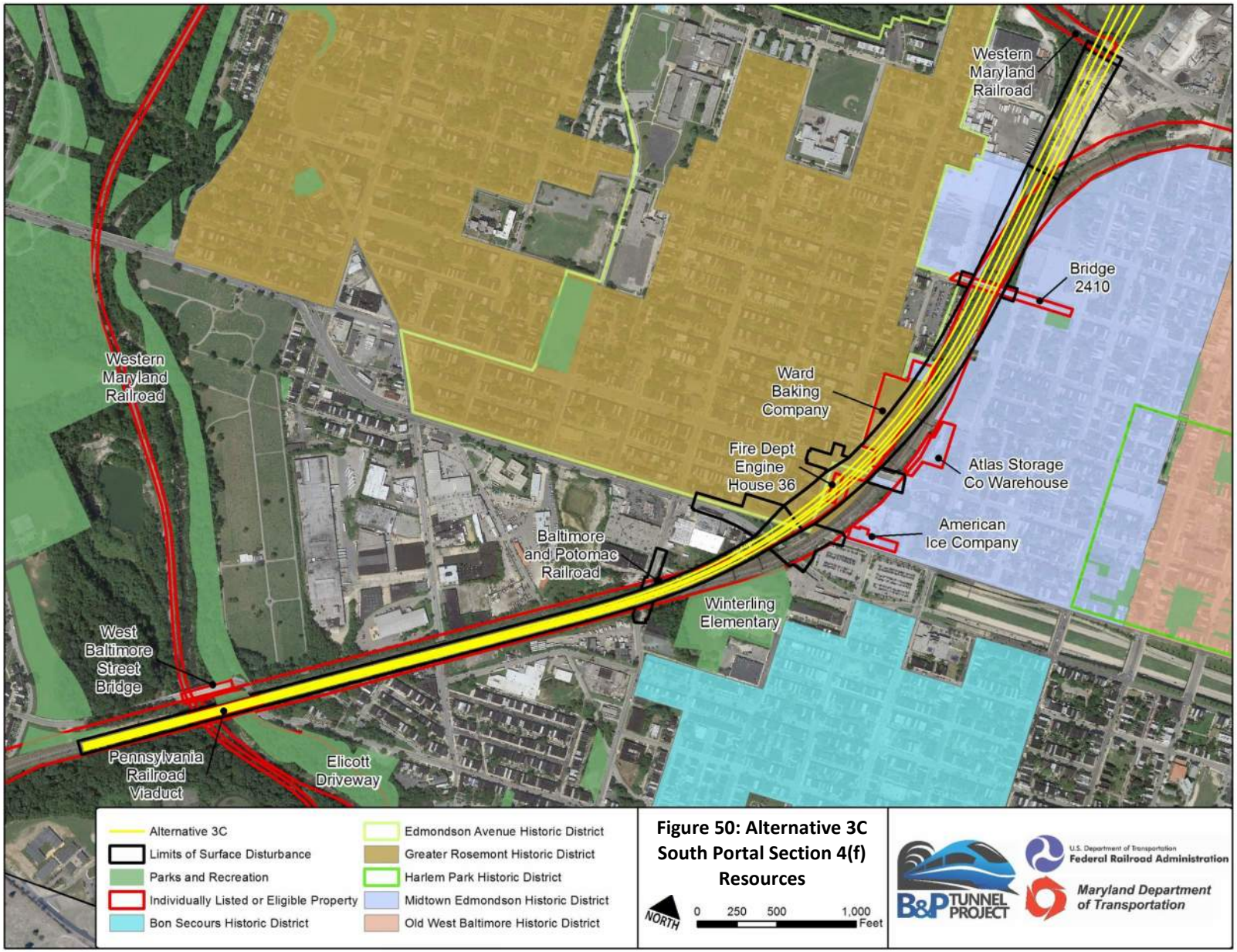

Figure 50: Alternative 3C South Portal Section 4(f) Resources

2. Avoidance Analysis

Consistent with FRA's Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999) and using the Federal Highway Administration's (FHWA) regulations as guidance (23 CFR Part 774), a ***feasible and prudent avoidance alternative*** would avoid using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property. FHWA regulations are not binding on FRA; however, in the absence of applicable FRA regulations, FRA has chosen to use 23 CFR Part 774 for reference and guidance in this Section 4(f) avoidance analysis.

An alternative is not ***feasible*** if it cannot be built as a matter of sound engineering judgment.

An alternative is not ***prudent*** if:

- It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
- It results in unacceptable safety or operational problems;
- It causes severe social, economic, or environmental impacts even after reasonable mitigation; severe disruption to established communities; severe disproportionate impacts to minority or low income populations; or severe impacts to environmental resources protected under other Federal statutes;
- It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
- It causes other unique problems or unusual factors; or
- It involves multiple factors above that while individually minor, cumulatively cause unique problems, or impacts of extraordinary magnitude.

a. Avoidance Alternatives

Each of the three Build Alternatives that FRA considered in this DEIS would require use of Section 4(f) properties. Eleven of the 16 preliminary alternatives previously evaluated and documented in the *Preliminary Alternatives Screening Report*, are located in the same vicinity as Alternative 3A, 3B, and 3C between the West Baltimore MARC Station and Baltimore Penn Station, and thus would require similar north and south portal impacts to Section 4(f) properties.

Nearly the entire area surrounding the existing NEC through West Baltimore is designated within one or more NRHP listed or eligible districts, which extend continuously from Druid Hill Park in the north to the Route 40 corridor in the south. Additionally, any alternatives that would require Section 4(f) use of the historic Baltimore and Potomac Railroad (currently Amtrak's NEC) between the Baltimore City/County Line and Baltimore Penn Station could not be considered an avoidance alternative. Therefore, FRA has identified three avoidance alternatives Alternative 1: No Build, Preliminary Alternative 6: Locust Point, and Preliminary Alternative 7: Sports Complex.

Alternative 1: No-Build would avoid use of any Section 4(f) property. Preliminary Alternatives 6 and 7 would each bypass the historic Baltimore and Potomac Railroad, as well as Baltimore Penn Station, and thus could potentially avoid the numerous Section 4(f) resources clustered around the existing B&P Tunnel. Thus, these three potential avoidance alternatives have been identified for this Section 4(f) avoidance analysis (see **Figure 51**).

b. Alternative 1: No-Build

The No-Build Alternative would entail continued operation of the existing B&P Tunnel with no significant improvements aside from the routine maintenance currently being conducted. The tunnel's basic geometry and structure would not be improved and the existing tunnel and tracks would be left in place. This alternative would not modernize the tunnel or bring it into a "state of good repair," but would rather maintain the existing service and ongoing maintenance as currently practiced with minimal disruption. Because no improvements would be completed under this alternative, no use of Section 4(f) property would result.

Alternative 1: No Build would not, however, meet the B&P Tunnel Project's Purpose and Need of addressing the structural and operational deficiencies of the B&P Tunnel, reducing travel times, accommodating projected travel demand for passenger services, eliminating impediments to existing and projected operations along the NEC, or providing operational reliability.

c. Preliminary Alternative 6: Locust Point

Alternative 6: Locust Point originated in the 2011 *Baltimore's Railroad Network: Analysis and Recommendations* (FRA and MDOT, 2011) report and was further analyzed in the B&P Tunnel *Preliminary Alternatives Screening Report*. The alignment would, from the south, depart from the existing NEC at Halethorpe Interlocking in Baltimore County, just outside of the I-695 Baltimore Beltway, to travel along the CSX main line to Curtis Bay Junction in southwest Baltimore City. At a location east of Curtis Bay Junction, the alignment would diverge to the east from CSX right-of-way. It would continue to the northeast, crossing over local roads and streets, to Westport. Trains would then cross the Middle Branch of the Harbor on an elevated structure above the former Western Maryland moveable bridge. The alignment would enter tunnels to pass below a portion of Locust Point and the Northwest Branch of the Inner Harbor before rising to ground level north of I-95 in Canton. The alternative would then curve to the north and follow existing NS tracks to rejoin the existing NEC at Bay Interlocking.

The alternative would avoid Section 4(f) properties by following existing CSX alignment and bypassing the densely developed and historic central portion of Baltimore and traveling through several largely industrial areas in southern Baltimore City. While the conceptual alternative does not appear to necessitate use of Section 4(f) properties, further engineering analysis and identification of potential historic properties would need to be completed in order to determine whether any use of Section 4(f) properties would be required. For the purposes of this evaluation it is assumed that Alternative 6 would result in total avoidance of Section 4(f) properties.

Alternative 6 was eliminated from consideration during the Preliminary Alternatives Screening phase of the project, as documented in the PASR. The alternative would not use the existing infrastructure at Baltimore Penn Station or the West Baltimore MARC Station, which is a critical component in achieving the project's stated Purpose and Needs. The alignment would also result in a slow and circuitous route through existing freight railroad alignment, and would therefore not improve passenger travel time. Furthermore, the avoidance alternative would require Amtrak, CSX, NS, and MARC to all operate on the already overburdened CSX corridor resulting in unacceptable operational problems. Because the improvements for this alternative would follow a much longer route, the construction costs would be of an extraordinary magnitude. Thus, the alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need. Alternative 6: Locust Point is therefore not considered a prudent avoidance alternative.

d. Preliminary Alternative 7: Sports Complex

Preliminary Alternative 7: Sports Complex was conceptualized to serve, in particular, the Inner Harbor area of downtown Baltimore. The alignment would divert from the Amtrak NEC about 0.5 miles north of the I-695 Baltimore Beltway over crossing in southwest Baltimore. The alignment would follow Wilkins Avenue and transition into a tunnel section, continuing eastward to a location between the Oriole Park at Camden Yards baseball stadium and the M&T Bank football stadium. This would be the site for a downtown underground station in lieu of service to Baltimore Penn Station. The alignment would continue eastward in tunnels under the Northwest Branch, past Fells Point to the vicinity of Boston Street where the alignment would curve to the northeast. Cut-and-cover tunneling would begin near Boston Street with a portal located near Eastern Street on an existing NS route. The NS tracks would be used until Bayview Junction where the alignment would rejoin Amtrak's NEC.

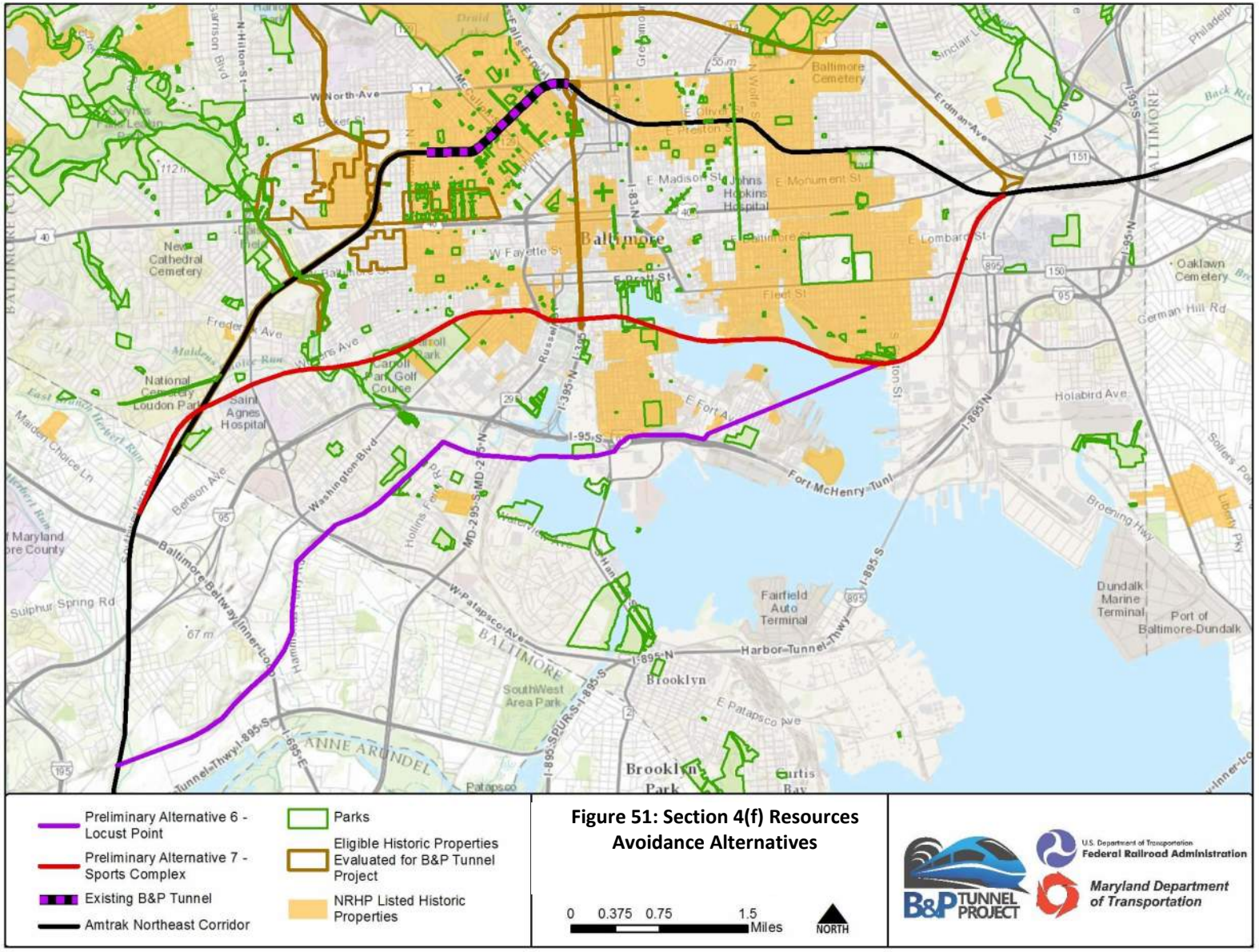

Figure 51: Section 4(f) Resources Avoidance Alternatives

The alternative would avoid Section 4(f) properties by bypassing the more densely developed and historic central portion of Baltimore near Baltimore Penn Station and traveling through a tunnel below the heart of downtown Baltimore and the Inner Harbor. While the alternative does not appear to necessitate use of Section 4(f) properties, further engineering analysis would need to be completed in order to determine whether any use of Section 4(f) properties would be required. However, for the purposes of this evaluation it is assumed that Alternative 7 would result in total avoidance of Section 4(f) properties.

FRA eliminated Alternative 7 from consideration during the Preliminary Alternatives Screening phase of the project, as documented in the PASR. The alternative would be unable to use Baltimore Penn Station and the West Baltimore MARC Station, which is considered a critical component in achieving the project's stated Purpose and Needs. Because the improvements for this alternative would follow a much longer route, the construction costs would be greater than Alternative 3. Furthermore, the alternative would involve an underground station below the heart of downtown Baltimore, resulting in substantial additional construction, maintenance, or operational costs. Thus, the alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need. Therefore, FRA does not consider Alternative 7: Sports Complex to be a prudent avoidance alternative.

3. No Avoidance Alternative and All Possible Planning to Minimize Harm

Through the avoidance analysis, FRA has not identified any feasible and prudent avoidance alternative for this Project. FRA has not identified a preferred alternative at this time and will continue to develop the alternatives to incorporate all possible planning to minimize harm to Section 4(f) properties. FRA is continuing to review measures and plans to minimize harm, such as shifts to the alternative alignments or reduced property easements, and will incorporate the completed minimization measures in the analysis of least overall harm in the Final EIS and final Section 4(f) Evaluation.

"All possible planning" as defined in 49 USC § 303 includes all reasonable measures to minimize harm and mitigate for adverse impacts and effects. At this stage of the Project, the alternative designs have not been refined to the extent that many minimization measures could be included. Such measures could eventually include tree planting and landscaping, sound barriers, context-sensitive architecture, and minor right-of-way adjustments.

For Section 4(f) uses that cannot be avoided or further minimized, FRA will consider all reasonable and feasible mitigation measures. Mitigation would be commensurate with the severity of the impact on the Section 4(f) resource. FRA would determine Section 4(f) mitigation through consultation with the officials having jurisdiction over each resource. Examples of possible mitigation include documenting of historic properties, posting information signage, replacing or enhancing parkland, and the context-sensitive treatment of historic properties.

Mitigation for Section 4(f) use of historic properties would be specified in a Memorandum of Agreement (MOA) if the Project results in adverse effects to the resources. FRA would prepare the MOA in accordance with Section 106 of the National Historic Preservation Act, as amended and would develop potential mitigation measures in coordination with the SHPO (Maryland Historical Trust) and, as appropriate, the Advisory Council on Historic Preservation (ACHP).

E. Natural Resources

Impacts to natural resources are shown on **Figure 52**. No impacts to natural resources would occur under Alternative 1: No-Build. Additional information regarding impacts to natural resources, is available in the *Natural Resources Technical Report.*

1. Soils

The project will remove large quantities of soil through either tunnel boring or cut-and-cover construction. Soil types within the Study Area will not likely be significantly impacted by the B&P Tunnel Project, as the soil is already highly urbanized.

2. Topography, Geology, Aquifers, and Groundwater

The elevations used in assessing topography, geology, aquifers, and groundwater were based on a review of the *Map of Baltimore City Showing the Configuration of the Underlying Rock Floor* (Baltimore City, 1935). These elevations were based on the datum in use in 1935, not the accepted present day datum, and should be considered approximate.

For Alternatives 3A, 3B and 3C most of the alignment would be located below the upper contour of the mapped surface of the rock, except south of Presstman Street where it would start to emerge from the rock into mixed face conditions. A similar situation would be encountered east of Mt. Royal Avenue to the North Portal. Dewatering would likely be needed in excavating this tunnel option as well, but the excavations would likely be in stiffer materials with lower water flow rates in the rock, thereby reducing the risk of surface subsidence. Care will need to be exercised during construction to avoid settlements of the existing utilities and structures and monitoring of settlements will be necessary. This will be crucial when boring under the existing Metro tunnel and when excavating in the mixed face and unconsolidated material near the portals.

The Study Area overlies the Piedmont Crystalline Rock Aquifer, an underground layer of water-bearing rock. Groundwater recharge is highly variable in this region, since it is almost entirely dependent on precipitation and local runoff that is absorbed through the regolith and into rock fractures (Trapp, H. and M.A. Horn, 1997).

No Sole Source Aquifers, active water supply reservoirs, or wells are located near the B&P Tunnel Project. Surface water from rainfall and snowmelt is the source of the Baltimore City drinking water supply. See **Section V.E.2** for more information.

3. Water Resources

a. Streams and Navigable Waterways

The Jones Falls, the Gwynns Falls, and a tributary of the Gwynns Falls are within the Study Area. These waterways would not be directly impacted by the proposed tunnel alignments. Alternatives 3A, 3B, and 3C would remain on existing structures over the Jones Falls and Gwynns Falls and its tributary.

b. Wetlands

The two NWI wetlands located near the Study Area would not be impacted by any of the potential B&P Tunnel alignments. No additional wetlands were identified within the Study Area.

c. Water Quality

Water quality may be negatively impacted by the construction of alternatives that cross Jones Falls. Minor impacts to water quality are anticipated from sediment and other construction-related runoff.

The Gwynns Falls and a tributary of the Gwynns Falls would not be directly impacted by the proposed tunnel; however, indirect and minor impacts to water quality may occur due to stormwater runoff.

4. Floodplains and Flood Hazards

Alternatives 3A, 3B, and 3C would each impact approximately 3.5 acres of the Jones Falls' 100-year and 500-year floodplains. None of the alignments under Alternative 3A, 3B, or 3C would impact the floodplain of the Gwynns Falls.

5. Coastal Zones

Coastal zones are not a resource within the Study Area; therefore, they are not included in this DEIS.

6. Wildlife and Habitat

The B&P Tunnel will have minor impacts on wildlife and their habitat, since most of the project will take place underground and above-ground trackwork and vents will primarily impact urban areas with little habitat value. Aquatic habitats will not be impacted, since Alternatives 3A, 3B, and 3C will remain on an existing structure over the Jones Falls and the Gwynns Falls.

a. Aquatic Habitat

The Jones Falls, Gwynns Falls, and a tributary of the Gwynns Falls are located within the Study Area. These waterways and associated aquatic habitats would not be directly impacted by the proposed tunnel alignments. Since the Study Area is located within a highly urbanized area, the project is anticipated to have no adverse impact on aquatic habitat.

b. Terrestrial Habitat

Street trees within Alternatives 3A, 3B, and 3C, are only likely to be affected due to construction impacts near the tunnel portals. Approximate impacts to street trees within portal locations of the potential alignments are compared in **Table 48**. No specimen street trees were identified in the Study Area. No street tree impacts are currently expected for the proposed intermediate ventilation plant location for Alternative 3, 3B, or 3C; however, further evaluation will be required when a preferred alternative is chosen.

Table 48: Potential Street Tree Impacts within Portal Locations

Alternative	Impact
Alternative 3A	0 street trees
Alternative 3B	2 street trees
Alternative 3C	1 street tree

c. Invasive Species

A full characterization of plant species was not conducted in the preliminary field investigation. More detailed assessment of the impacts of invasive species will be identified as the design advances.

7. Rare, Threatened and Endangered Species

No Maryland or federally-listed threatened or endangered species are known to exist within the Study Area. Alternatives 3A, 3B, and 3C would therefore not impact threatened or endangered species. Agency correspondence regarding rare, threatened, and endangered species is included in **Appendix B** as well as the *Natural Resources Technical Report*.

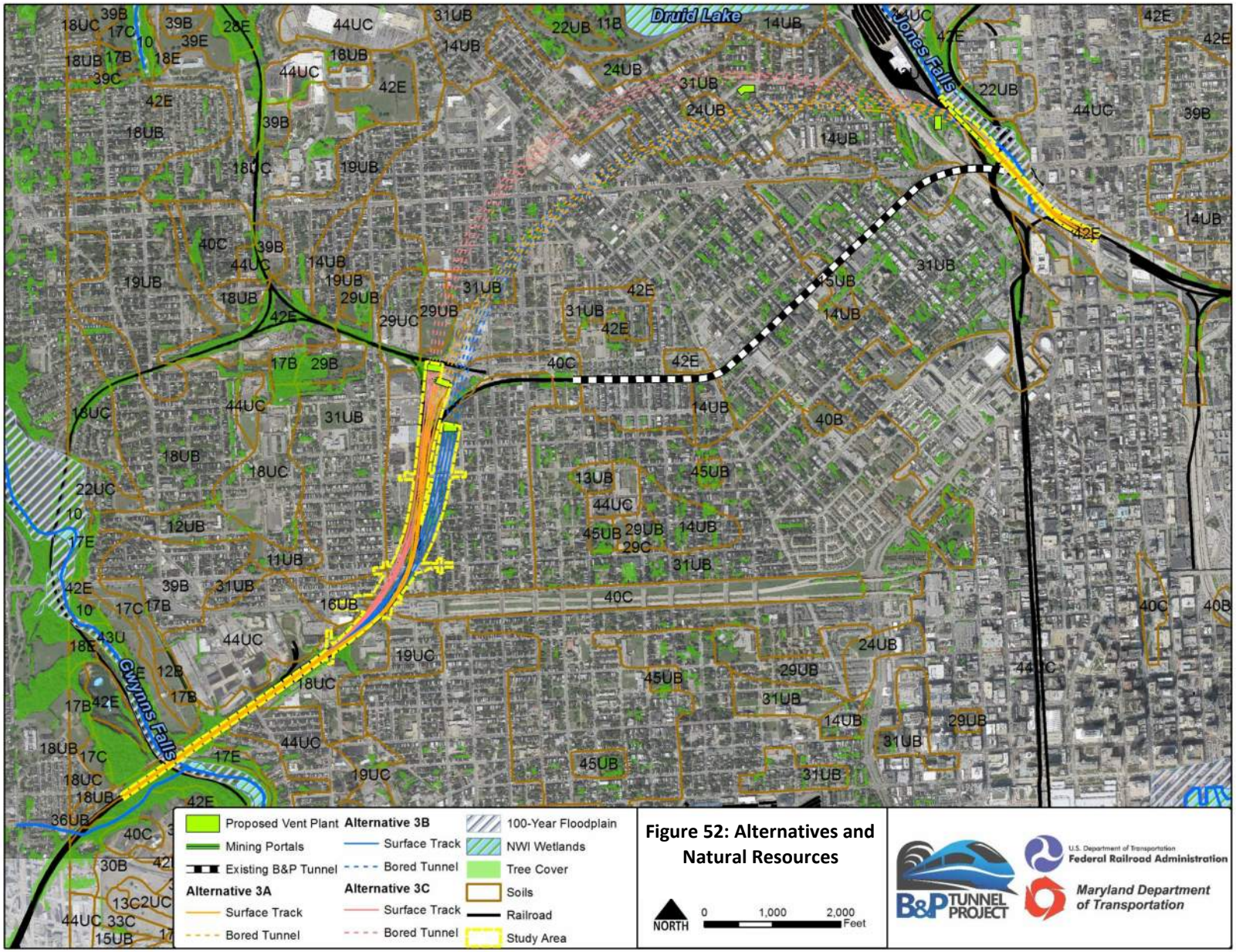

Figure 52: Alternatives and Natural Resources

8. Avoidance and Minimization

Alternatives 3A, 3B, and 3C are proposed within a highly-urbanized environment. Street trees are the primary natural resource that would be potentially impacted by the tunnel project. Specific tree impact avoidance and minimization techniques would be detailed in the Forest Conservation Plan (FCP). Tree protection fencing, as indicated in the FCP, would be installed along the boundary between tree protection area limits of disturbance to prevent access by construction equipment and the staging and stockpiling of materials within tree protection areas. Root pruning may be conducted along the edge of the limits of disturbance where excavation is required, to cleanly cut the roots of retained trees, reduce stress by promoting fibrous root growth, and prevent tearing of the roots beyond the limits of disturbance. Proper branch pruning will reduce construction stress, provide equipment clearance, and correct for any construction-related limb damage. Supplemental watering, fertilization, and mulching may be required to reduce tree stress and promote tree health. Additional construction techniques may be considered to avoid and minimize tree effects including tree wells, retaining walls, air spading, root aeration matting, and at-grade sidewalk construction.

An Erosion and Sediment Control Plan would be developed during the Final Design stage of the project for approval by MDE. The plan minimizes the potential for sediment and other construction-related runoff, including concrete wash-out, to leave the limits of disturbance and contaminate tree protection areas. A Hazardous Spill Prevention Plan would also be developed as part of the Phase I ESA to prevent hazardous materials such as equipment fuel and lubricants from contaminating tree protection areas.

9. Mitigation

Coordination with MDNR and Baltimore City Forestry staff would help to identify street tree planting locations within the road right-of-way in the immediate vicinity of the impact areas and within City property adjacent to the Study Area. Mitigation within the right-of-way would be on a 1:1 basis pursuant to the Roadside Tree Law, and the planting of individual trees would be considered on private property where practicable, and as agreed upon by MDOT and the property owner. Landscaping and street tree replacement would be considered within the immediate vicinity of the resource effects, where possible.

Forest impacts of one acre or more would require mitigation at a 1:1 ratio for tree replacement. When minimization efforts are considered and 1 acre or more of forest clearing is required, forest replacement would occur on a 1:1 basis, pursuant to MD Forest Conservation Law. MDOT, in collaboration with MDNR, would be required to locate state or publicly owned land of equivalent size to be reforested.

F. Hazardous Materials

This hazardous materials review relies on regulatory compliance records to determine which sites have potential for environmental concern during construction. Once a preferred alternative is selected, a review the medium and high priority sites will focus on the type and extent of contamination at each site. Even remediated sites may contain residual subsurface contamination that could be impacted by construction.

All three Alternative 3 options are expected to encounter contaminated soil and groundwater during construction activities near contaminated sites. Typically, alignment sections limited to near surface construction (at-grade sections) involve less excavation and reduced management of contaminated materials, while tunnel sections and deep utility relocations near contaminated sites would require much more effort to remove, handle, and dispose of contaminated materials. Additional site-specific information will be collected once the final alternative is selected and design complete. Once type and extent of contamination and details of construction are known, potential risk and exposure can be assessed and appropriate documentation in place.

Based on the alternative selected, the following information will used for targeted investigations conducted as part of a Phase II ESA or equivalent. Investigations should confirm the presence of subsurface contamination; type and extent of soil and groundwater contamination; migration direction and depth of groundwater

contamination, if present; and proximity, direction, and relative elevation. Data will be used to assess potential effects of contaminated soil and groundwater on design and construction of the tunnel.

1. Alternative 1: No-Build

Alternative 1: No-Build assumes no new tunnel would be constructed; therefore, this alternative presents little to no potential for the mobilization of hazardous materials or contaminants, as no construction activity will occur. Routine maintenance of the existing tunnel infrastructure may expose local residents or the surrounding community to hazardous materials as a result of spills or accidental releases of maintenance chemicals or supplies. Due to the lack of a major construction effort, occupational hazards would be low. Train traffic would continue to use the existing B&P Tunnel. Alternative 1: No-Build would not meet the stated purpose and need of the project, as it would allow the current physical and operational conditions of the existing B&P Tunnel to deteriorate over time. Alternative 1: No-Build serves as a baseline for comparing the impacts of the Build Alternatives.

2. Alternative 3A

There are 92 hazardous material sites, including residences, dry cleaners/laundromats, schools, automotive maintenance facilities, gas stations, fire stations, community resource centers, industrial properties, and railway yards within the Study Area of Alternative 3 Option A. Of the 92 sites, 57 sites are low priority, 29 medium priority, and six high priority. Ten of the potential sites of concern were identified within the ventilation plant construction areas. **Table 49**, **Table 50**, and **Table 51** summarize the low, medium, and high priority sites, respectively, for Alternative 3A. The sites are shown on **Figure 53**.

Table 49: Alternative 3A Low Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-036	Exxon Station	2200 Edmondson Avenue	Petroleum release
BP-039	Apex Oil, Co.	1829 Baker Street	Petroleum release
Bp-043	LA Auto Service	2124 Edmondson Avenue	Petroleum use
BP-047	Matthew A. Henson Elementary School	2218 Reisterstown Road	Petroleum use
BP-048	Keen Leasing, Inc.	700 McKean Avenue	Petroleum release
BP-058	Cloverland Dairy	2200 North Monroe Street	Petroleum release
BP-061	One & One Carry Out	1827 North Fulton Avenue	Automotive history
BP-069	Sunoco Service Station	1568 Clifton Avenue	Automotive history
BP-071	Papa Auto Parts	2600 Madison Avenue	Petroleum release
BP-074	Perfect Cleaners	2335 North Fulton Avenue	Dry-cleaning history
BP-079	Steve Auto	2608 Pennsylvania Avenue	Petroleum release
BP-081	People's Valet Service, Inc.	2600 Pennsylvania Avenue	Dry-cleaning history
BP-088	Parham & Spriggs Laundry	2542 Pennsylvania Avenue	Dry-cleaning history
BP-089	F. A. Taylor	2634 Flora Street	Petroleum release
BP-093	Druid Hill Park	2565 Pennsylvania Avenue	Petroleum use
BP-097	Mel and Logan Auto	2468 Woodbrook Avenue	Automotive history
BP-098	Gilmore Homes, Baltimore Housing Authority	1800 Linden Avenue	Petroleum release
BP-100	National Auto Repair	2523 Pennsylvania Avenue	Automotive history
BP-102	Westside Elementary School	2480 Woodbrook Avenue	Petroleum release
BP-103	Gilmore Homes	401 West North Avenue	Petroleum use
BP-104	Colonial Launderers	1415 Retreat Street	Dry-cleaning history
BP-107	Whitelock Towing	2562 McCulloh Street	Petroleum release

Site ID #	Property Description	Address	Hazard Type
BP-110	Fish Rental Services	2427 Francis Street	Petroleum use, Dry-cleaning history
BP-112	Wareheim's Garage	2560 Madison Avenue	Automotive history
BP-113	Baltimore Transit Co. – Retreat Street Repair Shop	1511 Retreat Street	Automotive history, Railway history
BP-114	residence	1341 Dickson Street	Petroleum release
BP-115	Former auto service facility (Theo Messersmith)	1006 Whitelock Street	Automotive history
BP-116	CVS Pharmacy	2520 Linden Avenue	hazardous waste history
BP-122	H&B Manufacturing Co., Inc.	827 Druid Park Lake Drive	Automotive history
BP-128	City of Baltimore	80 West Oliver Street	Petroleum release
BP-129	Dix residence	1001 West North Avenue	Petroleum release
BP-130	residence	919 Whitelock Street	Petroleum use
BP-134	Accent Displays, Inc.	2270 Brookfield Avenue	Petroleum release
BP-144	Modern Junk & Salvage Co.	2109 West Lafayette Avenue	industrial history
BP-145	Exxon #22758	1201 West North Avenue	Petroleum release
BP-147	Former auto service facility (Jason Litchfield)	841 Whitelock Street	Automotive history
BP-155	Penrose property	701 Whitelock Street	Petroleum release
BP-156	Amoco Station	1600 North Payson Street	Petroleum release
BP-163	Wonder Cleaners & Tailors	954 Whitelock Street	Dry-cleaning history
BP-165	Lee, Sun F	925 Whitelock Street	Dry-cleaning history
BP-167	Housing & Urban Development	410 West North Avenue	Petroleum release
BP-168	Crown Station (Quest Station)	113 West North Avenue	Petroleum use
BP-169	Former Cove One Hour Cleaners	1734 Maryland Avenue	Dry-cleaning history
BP-170	Snow White Self Service Laundry	915 Whitelock Street	Dry-cleaning history
BP-172	Fish Dry Cleaning & Laundry Co.	1800 Linden Avenue	Dry-cleaning history
BP-174	VI Contracting Site	401 West North Avenue	Petroleum release
BP-179	Minor's Cleaners	1900 Elgin Avenue	Dry-cleaning history
BP-194	Tune Up City, Inc.	1341 Dickson Street	Automotive history
BP-205	Sisson Realty Company/Sun Cab	2600 Sisson Street	Petroleum release
BP-208	Baltimore Fire Department, Aerial Tower 111	1410 North Monroe Street	Petroleum use
BP-209	Southern Fuel Company	401 West 26th Street	Petroleum release
BP-210	Lincoln Motor	80 West Oliver Street	Automotive history
BP-211	AAA Mid-Atlantic Inc.	1401 West Mount Royal Avenue	Petroleum use
BP-212	Maryland Institute College of Art - Fox Building	1550 North Monroe Street	Petroleum use
BP-213	Bolton Yard	1500 North Monroe Street	VCP action
BP-215	Maryland Institute College of Art	2109 West Lafayette Avenue	Petroleum release
BP-216	Maryland Community Resource Center	1600 North Payson Street	Petroleum release
BP-218	Penn Esso Station	1716 Maryland Avenue	Automotive history
BP-220	Atlantic Automobile Repairs	6 West Lanvale Street	Automotive history
BP-222	Binswanger, Sylvan W	2 East Lanvale Street	Automotive history

Site ID #	Property Description	Address	Hazard Type
BP-225	National Auto Radiator and Fender Company Inc.	9 East Lanvale Street	Automotive history

Hazards associated with the low priority sites include: Petroleum, automotive, dry-cleaning, railway contamination, and "hazardous materials" as well as industrial history and a VCP site. Over half of the sites have current or historical petroleum use and/or releases.

Table 50: Alternative 3A Medium Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-017	Can-Do Fuel Oil Company, Inc.	2527 Baker Street	Petroleum contamination
BP-020	Emanuel Tire, LLC	1300 Moreland Avenue	Hazardous materials
BP-023	G&M Oil Company, Inc.	1549 Warwick Avenue	Petroleum release
BP-028	Blue Ridge Fuel Co.	1400 Moreland Avenue	Petroleum use
BP-031	Kaufman Products	1330 North Bentalou Street	Petroleum use, Industrial history
BP-038	Alpha One, Inc.	2140 Edmondson Avenue	Petroleum release
BP-040	Emanuel Tire	2120 West Lafayette Avenue	Brownfields
BP-042	Carver Vocational Technical Senior High School	2201 Presstman Street	Petroleum use
BP-045	The Old Time Way Church of Deliverance	2104 West Lanvale Street	Coal history
BP-059	Stop Shop Save	1410 N Monroe Street	Petroleum use
BP-062	Exxon Company	1542 North Monroe Street	Petroleum use
BP-063	E. S. Brady & Co., Inc.	1310 North Monroe Street	Railway history
BP-064	Jolly's Food and Convenience Mart	1704 West North Avenue	Automotive history
BP-066	Former Coliseum Building	2201 North Monroe Street	VCP action, Petroleum use
BP-068	Kim property	1655 North Monroe Street	Petroleum release
BP-077	JJ Adams Fuel Oil Company	1810 Winchester Street	Petroleum use
BP-080	Watkins residence	2037 North Fulton Avenue	Petroleum release
BP-086	American Oil Co., Penn Square II	1655 Old Lane	Petroleum release
BP-099	George G. Ruppersberger & Sons, Inc.	2639 Pennsylvania Avenue	Petroleum release
BP-108	Part Terminal Station	2331 North Fulton Avenue	Petroleum release
BP-119	MTA Terminal	2471 Woodbrook Avenue	Petroleum use
BP-133	Greenwood Towing Inc./Auto Title Service Corp.	1370 West North Avenue	Petroleum use, Automotive history
BP-203	MTA Light Rail Maintenance Facility	344 West North Avenue	Petroleum use, Railway history
BP-206	Baltimore City DPW Highway Maintenance Garage	560 West North Avenue	Petroleum use
BP-214	Amtrak/Jones Falls Substation	151 West Oliver Street	Petroleum release
BP-217	Baltimore Postal Service Vehicle Maintenance	60 West Oliver Street	Petroleum release

Site ID #	Property Description	Address	Hazard Type
BP-219	Maryland Community Resource Center/Sterling Auto Radiator Works	1731 Maryland Avenue	Petroleum release
BP-221	Metro Laundry & Cleaners/La La Auto Repair Inc./Atlantic Auto Service	1700 North Charles Street	Dry-cleaning history, Petroleum use
BP-223	Vincent Gulf Service Station/Hess	1801 North Charles Street	Petroleum release

Hazards associated with the medium priority sites include: Petroleum, automotive, dry-cleaning, railway contamination, and "hazardous materials" as well as industrial history and coal use, Brownfields, and a VCP site. The majority of sites have current or historical petroleum use and/or release.

Table 51: Alternative 3A High Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-037	ABEX Baltimore – ABC Rail Products Corp.	2200 Winchester Street	CERCLIS[1] screening, Industrial history
BP-050	Matrix Metals	2045 Winchester Street	VCP action, Petroleum use
BP-056	The Baltimore Asphalt Paving Co. (P. Flanigan & Sons, Inc., Pen Mar Company, Inc.)	1320 North Monroe Street	Petroleum use, Industrial history
BP-095	Penn Square Property	2632 Pennsylvania Avenue	VCP action, Petroleum release
BP-224	Amtrak Pennsylvania Station	1500 North Charles Street	Petroleum release, Railway history
BP-226	Norfolk Railway Yard	340 West North Avenue	Petroleum release, Railway history

[1]*Comprehensive Environmental Response, Compensation, and Liability Information System. CERCLIS is a program administered by EPA to house Superfund data.*

Hazards associated with the high priority sites include: Petroleum and railway contamination, as well as CERCLIS, industrial history, and VCP sites. The majority of sites have current or historical petroleum use and/or release.

3. Alternative 3B

There are 114 hazardous material sites, including residences, dry cleaners/laundromats, schools, automotive maintenance facilities, gas stations, fire stations, community resource centers, industrial properties, and railway yards within the Study Area. Of the 114 sites, 71 sites are low priority, 37 sites medium priority, and six sites high priority. Thirteen of the potential sites of concern were identified within the ventilation plant construction areas. **Table 52, Table 53, and Table 54** summarize the low, medium, and high priority sites, respectively for Alternative 3B. The sites are shown on **Figure 54**.

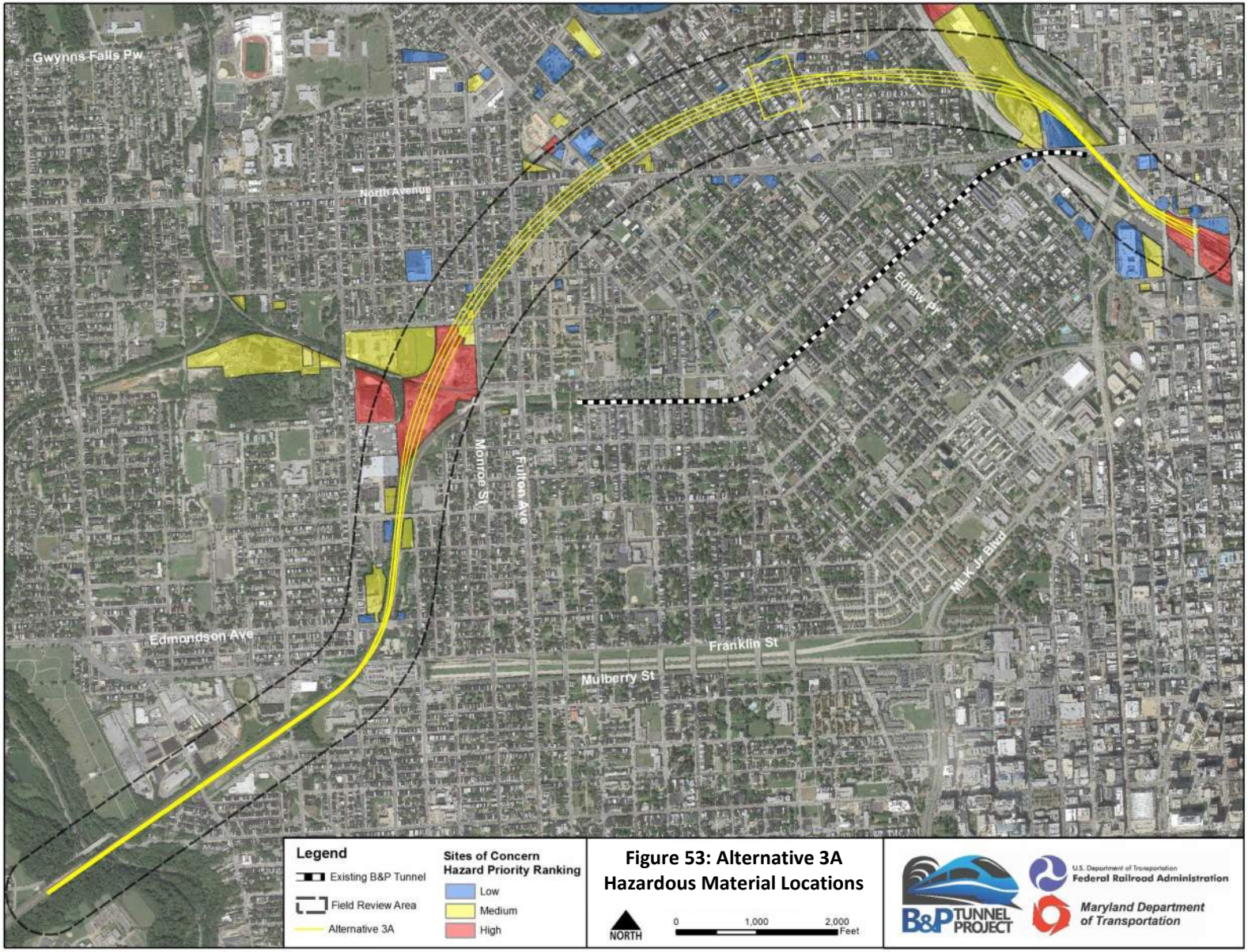

Figure 53: Alternative 3A Hazardous Material Locations

Table 52: Alternative 3B Low Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-011	Baltimore Pre-Release Unit	301 North Calverton Road	Petroleum use
BP-012	Baltimore Substation	239 North Calverton Road	Petroleum release
BP-015	City of Baltimore Franklin Street Yard	231 North Calverton Road	Petroleum release
BP-016	Lexington Auto Service/Motor Pool West	2560 West Lexington Street	Automotive and hazardous waste history
BP-019	Baltimore Uniform Rental, Inc.	2555 West Lexington Street	Petroleum use, Dry-cleaning history
BP-021	Former Acme Pad Factory	330 North Warwick Avenue	Petroleum release
BP-026	unknown	311 North Warwick Avenue	Petroleum release
BP-027	Cosmechem	215 North Warwick Avenue	Hazardous waste history
BP-032	Bentalou Elementary School	220 North Bentalou Street	Petroleum release
BP-033	Baltimore City	2305 W Franklin Street	Automotive history
BP-034	Victor Graphics	200 North Bentalou Street	Petroleum release
BP-039	Apex Oil, Co.	2109 West Lafayette Avenue	Petroleum release
BP-043	LA Auto Service	2124 Edmondson Avenue	Automotive history
BP-044	McDowell's Auto Service	2135 Edmondson Avenue	Automotive history
BP-047	Matthew A. Henson Elementary School	1600 North Payson Street	Petroleum use
BP-048	Keen Leasing, Inc.	1900 Elgin Avenue	Petroleum release
BP-058	Cloverland Dairy	2200 North Monroe Street	Petroleum use
BP-061	One & One Carry Out	1550 North Monroe Street	Automotive history
BP-068	Kim property	1655 North Monroe Street	Petroleum release
BP-069	Sunoco Service Station	1829 Baker Street	Automotive history
BP-071	Papa Auto Parts	2218 Reisterstown Road	Petroleum release
BP-074	Perfect Cleaners	700 McKean Avenue	Dry-cleaning history
BP-079	Steve Auto	2115 North Fulton Avenue	Petroleum release
BP-081	People's Valet Service, Inc.	1827 North Fulton Avenue	Dry-cleaning history
BP-088	Parham & Spriggs Laundry	1704 West North Avenue	Dry-cleaning history
BP-089	F. A. Taylor	1568 Clifton Avenue	Petroleum release
BP-093	Druid Hill Park	2600 Madison Avenue	Petroleum use
BP-097	Mel and Logan Auto	2608 Pennsylvania Avenue	Automotive history
BP-098	Gilmore Homes, Baltimore Housing Authority	1601 Vincent Court	Petroleum release
BP-100	National Auto Repair	2600 Pennsylvania Avenue	Automotive history
BP-102	Westside Elementary School	2335 North Fulton Avenue	Petroleum release
BP-103	Gilmore Homes	1640 Balmor Court	Petroleum use
BP-104	Colonial Launderers	2542 Pennsylvania Avenue	Dry-cleaning history
BP-107	Whitelock Towing	2634 Flora Street	Petroleum release
BP-110	Fish Rental Services	2565 Pennsylvania Avenue	Petroleum use, Dry-cleaning history
BP-112	Wareheim's Garage	2480 Woodbrook Avenue	Automotive history

Site ID #	Property Description	Address	Hazard Type
BP-113	Baltimore Transit Co. – Retreat Street Repair Shop	1511 Retreat Street	Automotive history, Railway history
BP-114	residence	717 Cumberland Street	Petroleum release
BP-115	Former auto service facility (Theo Messersmith)	2468 Woodbrook Avenue	Automotive history
BP-116	CVS Pharmacy	2523 Pennsylvania Avenue	hazardous waste history
BP-122	H&B Manufacturing Co., Inc.	1415 Retreat Street	Automotive history
BP-128	City of Baltimore	2311 Pennsylvania Avenue	Petroleum release
BP-129	Dix residence	2562 McCulloh Street	Petroleum release
BP-130	residence	2427 Francis Street	Petroleum use
BP-134	Accent Displays, Inc.	2560 Madison Avenue	Petroleum release
BP-145	Exxon #22758	1201 West North Avenue	Petroleum release
BP-147	Former auto service facility (Jason Litchfield)	1006 Whitelock Street	Automotive history
BP-155	Penrose property	2520 Linden Avenue	Petroleum release
BP-156	Amoco Station	1101 West North Avenue	Petroleum release
BP-163	Wonder Cleaners & Tailors	954 Whitelock Street	Dry-cleaning history
BP-165	Lee, Sun F	925 Whitelock Street	Dry-cleaning history
BP-167	Housing & Urban Development	827 Druid Park Lake Drive	Petroleum release
BP-168	Crown Station (Quest Station)	1001 West North Avenue	Petroleum use
BP-169	Former Cove One Hour Cleaners	919 Whitelock Street	Dry-cleaning history
BP-170	Snow White Self Service Laundry	915 Whitelock Street	Dry-cleaning history
BP-172	Fish Dry Cleaning & Laundry Co.	2270 Brookfield Avenue	Dry-cleaning history
BP-174	VI Contracting Site	841 Whitelock Street	Petroleum release
BP-179	Minor's Cleaners	1800 Linden Avenue	Dry-cleaning history
BP-194	Tune Up City, Inc.	701 Whitelock Street	Automotive history
BP-205	Sisson Realty Company/Sun Cab	2600 Sisson Street	Petroleum release
BP-208	Baltimore Fire Department, Aerial Tower 111	401 West North Avenue	Petroleum use
BP-209	Southern Fuel Company	401 West 26th Street	Petroleum release
BP-210	Lincoln Motor	410 West North Avenue	Automotive history
BP-211	AAA Mid-Atlantic Inc.	1401 West Mount Royal Avenue	Petroleum use
BP-212	Maryland Institute College of Art - Fox Building	1341 Dickson Street	Petroleum use
BP-213	Bolton Yard	80 West Oliver Street	VCP action
BP-215	Maryland Institute College of Art	113 West North Avenue	Petroleum release
BP-216	Maryland Community Resource Center	1734 Maryland Avenue	Petroleum release
BP-218	Penn Esso Station	1716 Maryland Avenue	Automotive history
BP-220	Atlantic Automobile Repairs	6 West Lanvale Street	Automotive history
BP-222	Binswanger, Sylvan W	2 East Lanvale Street	Automotive history
BP-225	National Auto Radiator and Fender Company Inc.	9 East Lanvale Street	Automotive history

Hazards associated with the low priority sites include: Petroleum, automotive, dry-cleaning, railway contamination, and "hazardous waste" as well as industrial history and coal use, Brownfields, and a VCP site. More than half of the sites have current or historical petroleum use and/or release.

Table 53: Alternative 3B Medium Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-013	L & J Processing Facility	222 North Calverton Road	Hazardous waste history
BP-017	Can-Do Fuel Oil Company, Inc.	2527 Baker Street	Petroleum contamination
BP-018	Maryland Lumber Co.	2601 West Franklin Street	Petroleum release
BP-020	Emanuel Tire, LLC	1300 Moreland Avenue	Hazardous waste history, Petroleum use
BP-022	Baltimore Car & Truck Rental, Inc.	200 North Warwick Avenue	Petroleum release
BP-023	G&M Oil Company, Inc.	1549 Warwick Avenue	Petroleum release
BP-024	Trans Realty, Inc.	2501 West Lexington Street	Petroleum use
BP-025	Franklin Fuel Express	2417 W Franklin Street	Petroleum use
BP-028	Blue Ridge Fuel Co.	1400 Moreland Avenue	Petroleum use
BP-030	Tedco Industries	2335 W Franklin Street	Petroleum use
BP-031	Kaufman Products	1330 North Bentalou Street	Petroleum use, Industrial history
BP-035	Jung, Youngok Ann	501 North Bentalou Street	Automotive history
BP-036	Exxon Station	2200 Edmondson Avenue	Petroleum use
BP-038	Alpha One, Inc.	2140 Edmondson Avenue	Petroleum release
BP-040	Emanuel Tire	2120 West Lafayette Avenue	Brownfields
BP-042	Carver Vocational Technical Senior High School	2201 Presstman Street	Petroleum use
BP-045	The Old Time Way Church of Deliverance	2104 West Lanvale Street	Coal history
BP-059	Stop Shop Save	1410 North Monroe Street	Automotive history
BP-062	Exxon Company	1542 North Monroe Street	Petroleum use
BP-063	E. S. Brady & Co., Inc.	1310 North Monroe Street	Railway history
BP-064	Jolly's Food and Convenience Mart	1500 North Monroe Street	Automotive history
BP-066	Former Coliseum Building	2201 North Monroe Street	VCP action, Petroleum use
BP-067	BP Service Station	900 North Monroe Street	Petroleum release
BP-077	JJ Adams Fuel Oil Company	1810 Winchester Street	Petroleum use
BP-080	Watkins residence	2037 North Fulton Avenue	Petroleum release
BP-086	American Oil Co., Penn Square II	1655 Old Lane	Petroleum release
BP-099	George G. Ruppersberger & Sons, Inc.	2639 Pennsylvania Avenue	Petroleum release
BP-108	Part Terminal Station	2331 North Fulton Avenue	Petroleum release
BP-119	MTA Terminal	2471 Woodbrook Avenue	Petroleum use
BP-133	Greenwood Towing Inc./Auto Title Service Corp.	1370 West North Avenue	Petroleum use, Automotive history
BP-203	MTA Light Rail Maintenance Facility	344 West North Avenue	Petroleum use, railway history

Site ID #	Property Description	Address	Hazard Type
BP-206	Baltimore City DPW Highway Maintenance Garage	560 West North Avenue	Petroleum use
BP-214	Amtrak/Jones Falls Substation	151 West Oliver Street	Petroleum release
BP-217	Baltimore Postal Service Vehicle Maintenance	60 West Oliver Street	Petroleum release
BP-219	Maryland Community Resource Center/Sterling Auto Radiator Works	1731 Maryland Avenue	Petroleum release
BP-221	Metro Laundry & Cleaners/La La Auto Repair Inc./Atlantic Auto Service	1700 North Charles Street	Dry-cleaning history, Petroleum use
BP-223	Vincent Gulf Service Station/Hess	1801 North Charles Street	Petroleum release

Hazards associated with the medium priority sites include: Petroleum, automotive, dry-cleaning, railway contamination, and "hazardous waste" as well as industrial history and coal use, Brownfields, and a VCP site. The majority of sites have current or historical petroleum use and/or release.

Table 54: Alternative 3B High Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-037	ABEX Baltimore – ABC Rail Products Corp.	2200 Winchester Street	CERCLIS, Industrial history
BP-041	American Ice Company	2100 West Franklin Street	Brownfields assessment, Hazardous waste history
BP-050	Matrix Metals	2045 Winchester Street	VCP action, Petroleum use
BP-056	The Baltimore Asphalt Paving Co. (P. Flanigan & Sons, Inc., Pen Mar Company, Inc.)	1320 North Monroe Street	Petroleum use, Industrial history
BP-095	Penn Square Property	2632 Pennsylvania Avenue	VCP action, Petroleum release
BP-224	Amtrak Pennsylvania Station	1500 North Charles Street	Petroleum release, Railway history
BP-226	Norfolk Railway Yard	340 West North Avenue	Petroleum release, Railway history

Hazards associated with the high priority sites include: Petroleum, railway contamination, and "hazardous waste" as well as Brownfields, industrial history, and VCP sites. The majority of sites have current or historical petroleum use and/or release.

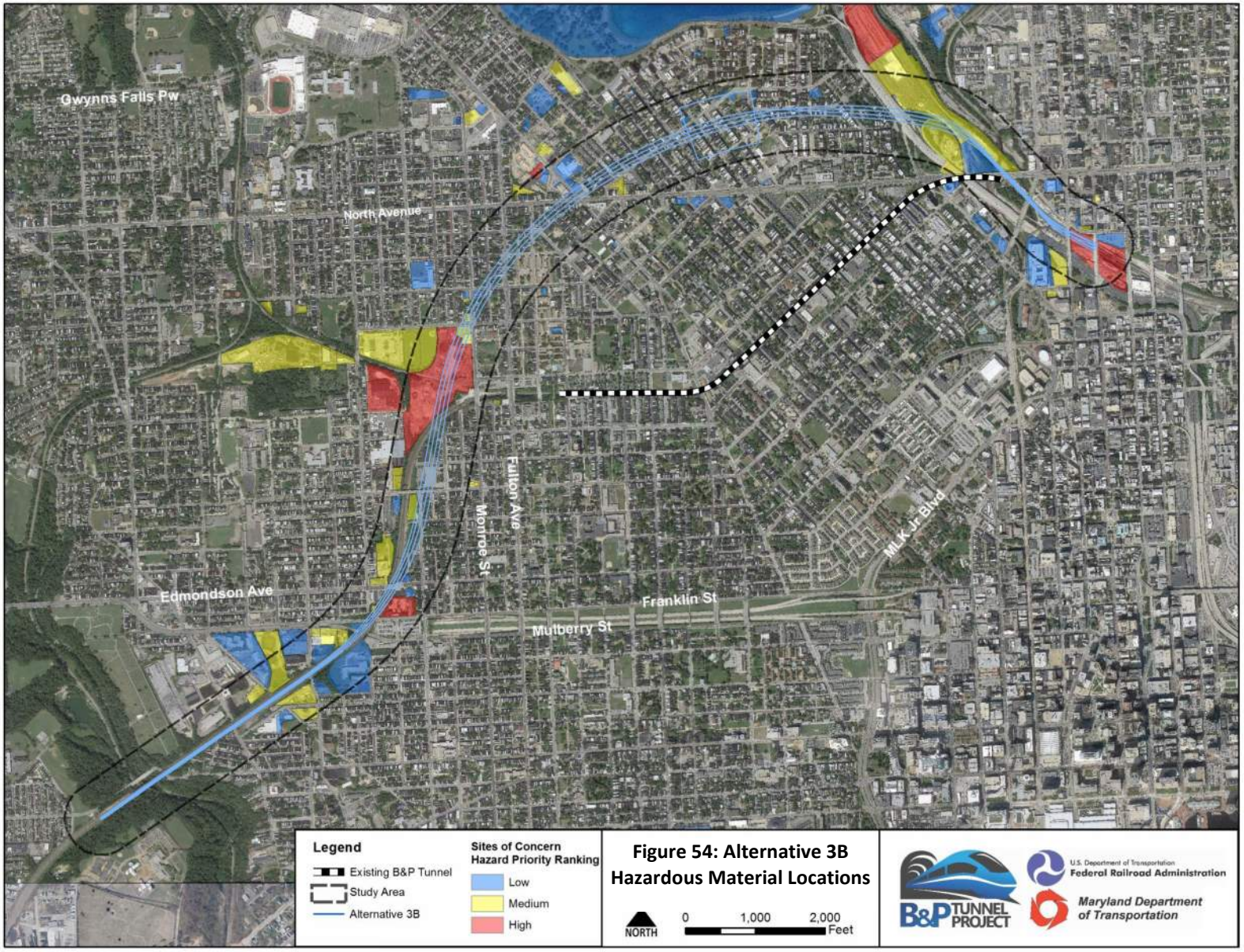

Figure 54: Alternative 3B Hazardous Material Locations

4. Alternative 3C

There are 153 hazardous material sites, including residences, dry cleaners/laundromats, schools, automotive maintenance facilities, gas stations, fire stations, community resource centers, industrial properties, and railway yards within the Study Area. Of the 153 sites, 92 sites are low priority, 52 sites medium priority, and nine sites high priority. Twenty of the potential sites of concern were identified within the ventilation plant construction areas. **Table 55**, **Table 56**, and **Table 57** summarize the low, medium, and high priority sites, respectively for Alternative 3 Option C. The sites are shown on **Figure 55**.

Table 55: Alternative 3C Low Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-002	Southwestern Senior High School	200 Font Hill Avenue	Petroleum use
BP-003	Mount Nebo Church	240 North Franklintown Road	Petroleum release
BP-004	Franklintown Road Assoc./The Service Composition Company Inc.	232 North Franklintown Road	Petroleum use
BP-007	Supervisor of Elections	301 North Franklintown Road	**Petroleum use**
BP-008	Baltimore City Water Meter Shop	200 North Franklintown Road	**Petroleum use**
BP-009	Maryland Food Bank	241 North Franklintown Road	**Petroleum use**
BP-011	Baltimore Pre-Release Unit	301 North Calverton Road	Petroleum use
BP-012	Baltimore Substation	239 North Calverton Road	Petroleum release
BP-014	Zimmer Development Company	2600 West Franklin Street	**Petroleum use**
BP-015	City of Baltimore Franklin Street Yard	231 North Calverton Road	Petroleum release
BP-016	Lexington Auto Service/Motor Pool West	2560 West Lexington Street	Automotive and Hazardous waste history
BP-019	Baltimore Uniform Rental, Inc.	2555 West Lexington Street	Petroleum use, Dry-cleaning history
BP-021	Former Acme Pad Factory	330 North Warwick Avenue	Petroleum release
BP-026	Unknown site	311 North Warwick Avenue	Petroleum release
BP-027	Cosmechem	215 North Warwick Avenue	Hazardous waste history
BP-032	Bentalou Elementary School	220 North Bentalou Street	Petroleum release
BP-034	Victor Graphics	200 North Bentalou Street	Petroleum release
BP-043	LA Auto Service	2124 Edmondson Avenue	Automotive history
BP-044	McDowell's Auto Service	2135 Edmondson Avenue	Automotive history
BP-046	C & P Telephone	2010 Windsor Avenue	**Petroleum use**
BP-047	Matthew A. Henson Elementary School	1600 North Payson Street	Petroleum use
BP-048	Keen Leasing, Inc.	1900 Elgin Avenue	Petroleum release
BP-051	How-Nor Partnership/Baltimore Design Center	2000 West North Avenue	**Petroleum release**
BP-060	Fingles Metalworks Inc.	2256 Reisterstown Road	**Hazardous waste history**

Site ID #	Property Description	Address	Hazard Type
BP-061	One & One Carry Out	1550 North Monroe Street	Automotive history
BP-062	Exxon Company	1542 North Monroe Street	Petroleum use
BP-065	Dulany-Varney Inc.	2250 Reisterstown Road	**Hazardous waste history**
BP-068	Kim property	1655 North Monroe Street	Petroleum release
BP-069	Sunoco Service Station	1829 Baker Street	Automotive history
BP-071	Papa Auto Parts	2218 Reisterstown Road	Petroleum release
BP-081	People's Valet Service, Inc.	1827 North Fulton Avenue	Dry-cleaning history
BP-082	Orange Cleaners	1740 West North Avenue	Dry-cleaning history
BP-083	Druid Hill Park Conservatory	3100 Swann Drive	**Petroleum release**
BP-084	Eurco One Hour Cleaners	2214 North Fulton Avenue	Dry-cleaning and Hazardous waste history
BP-087	Eagle Dyeing & Dry Cleaning Company	2658 Pennsylvania Avenue	Dry-cleaning history
BP-088	Parham & Spriggs Laundry	1704 West North Avenue	Dry-cleaning history
BP-092	Christy Motor Company	2634 Pennsylvania Avenue	Automotive history
BP-093	Druid Hill Park	2600 Madison Avenue	Petroleum use
BP-096	Hop, Lee	2249 North Fulton Avenue	Dry-cleaning history
BP-097	Mel and Logan Auto	2608 Pennsylvania Avenue	Automotive history
BP-100	National Auto Repair	2600 Pennsylvania Avenue	Automotive history
BP-101	Whiteley, George S	2550 Woodbrook Avenue	Automotive history
BP-104	Colonial Launderers	2542 Pennsylvania Avenue	Dry-cleaning history
BP-110	Fish Rental Services	2565 Pennsylvania Avenue	Petroleum use, Dry-cleaning history
BP-111	Baltimore City	2565 Francis Street	**Petroleum use**
BP-112	Wareheim's Garage	2480 Woodbrook Avenue	Automotive history
BP-113	Baltimore Transit Co. – Retreat Street Repair Shop	1511 Retreat Street	Automotive history, Railway history
BP-115	Former auto service facility (Theo Messersmith)	2468 Woodbrook Avenue	Automotive history
BP-116	CVS Pharmacy	2523 Pennsylvania Avenue	Hazardous waste history
BP-121	L & J Cleaners	2501 Francis Street	Dry-cleaning history
BP-122	H&B Manufacturing Co., Inc.	1415 Retreat Street	Automotive history
BP-126	Sisa Enterprises	2580 McCulloh Street	**industrial history**
BP-127	Druid Park Motors Inc.	2509 Druid Hill Avenue	Automotive history
BP-131	H M Auto Service/Daw's Body & Fender Repair Shop	2493 Druid Hill Avenue	Automotive history
BP-133	Greenwood Towing Inc./Auto Title Service Corp.	1370 West North Avenue	Petroleum use, Automotive history
BP-135	Temple Gardens Apartments	2601 Madison Avenue	**Petroleum use**
BP-137	Emersonian Apartments	2502 Eutaw Place	**Petroleum use**
BP-141	Esplanade Apartments	2525 Eutaw Place	**Petroleum use**
BP-142	Feeser-Murphy property	2511 Eutaw Place	**Petroleum use**

Site ID #	Property Description	Address	Hazard Type
BP-147	Former auto service facility (Jason Litchfield)	1006 Whitelock Street	Automotive history
BP-153	Penrose property	901 Druid Park Lake Drive	Petroleum use
BP-155	Penrose property	2520 Linden Avenue	Petroleum release
BP-158	Adolohla Garage	2415 Linden Avenue	Automotive history
BP-160	unknown	2411 Linden Avenue	**Petroleum release**
BP-161	Baltimore City	2423 Linden Avenue	Automotive history
BP-163	Wonder Cleaners & Tailors	954 Whitelock Street	Dry-cleaning history
BP-165	Lee, Sun F	925 Whitelock Street	Dry-cleaning history
BP-167	Housing & Urban Development	827 Druid Park Lake Drive	Petroleum release
BP-169	Former Cove One Hour Cleaners	919 Whitelock Street	Dry-cleaning history
BP-170	Snow White Self Service Laundry	915 Whitelock Street	Dry-cleaning history
BP-172	Fish Dry Cleaning & Laundry Co.	2270 Brookfield Avenue	Dry-cleaning history
BP-175	Lakeview Tower Extension	737 Druid Park Lake Drive	**Petroleum use**
BP-180	Housing and Urban Development	735 Druid Park Lake Drive	**Petroleum use**
BP-189	Lakeview Tower	717 Druid Park Lake Drive	**Petroleum use**
BP-192	Beres, Michael	705 Whitelock Street	Dry-cleaning history
BP-193	White Park Apartments	2220 Park Avenue	**Petroleum use**
BP-205	Sisson Realty Company/Sun Cab	2600 Sisson Street	Petroleum release
BP-208	Baltimore Fire Department, Aerial Tower 111	401 West North Avenue	Petroleum use
BP-209	Southern Fuel Company	401 West 26th Street	Petroleum release
BP-210	Lincoln Motor	410 West North Avenue	Automotive history
BP-211	AAA Mid-Atlantic Inc.	1401 West Mount Royal Avenue	Petroleum use
BP-212	Maryland Institute College of Art - Fox Building	1341 Dickson Street	Petroleum use
BP-213	Bolton Yard	80 West Oliver Street	VCP action
BP-215	Maryland Institute College of Art	113 West North Avenue	Petroleum release
BP-216	Maryland Community Resource Center	1734 Maryland Avenue	Petroleum release
BP-218	Penn Esso Station	1716 Maryland Avenue	Automotive history
BP-220	Atlantic Automobile Repairs	6 West Lanvale Street	Automotive history
BP-222	Binswanger, Sylvan W	2 East Lanvale Street	Automotive history
BP-225	National Auto Radiator and Fender Company Inc.	9 East Lanvale Street	Automotive history

Hazards associated with the low priority sites include: Petroleum, automotive, dry-cleaning, railway contamination, and “hazardous waste” as well as industrial history and a VCP site. Half of the sites have current or historical petroleum use and/or release.

Table 56: Alternative 3C Medium Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-005	H & S Bakery Company/A & P Bakery	230 North Franklintown Road	Petroleum use
BP-006	Harowitz property	222 North Franklintown Road	Petroleum release
BP-010	Jesus Collision Center/Cooks Tank Line	110 North Franklintown Road	Petroleum release
BP-013	L & J Processing Facility	222 North Calverton Road	Hazardous waste history
BP-017	Can-Do Fuel Oil Company, Inc.	2527 Baker Street	Petroleum contamination
BP-018	Maryland Lumber Co.	2601 West Franklin Street	Petroleum release
BP-020	Emanuel Tire, LLC	1300 Moreland Avenue	Hazardous waste history
BP-022	Baltimore Car & Truck Rental, Inc.	200 North Warwick Avenue	Petroleum release
BP-023	G&M Oil Company, Inc.	1549 North Warwick Avenue	Petroleum release
BP-024	Trans Realty, Inc.	2501 West Lexington Street	Petroleum use
BP-025	Franklin Fuel Express	2417 W Franklin Street	Petroleum use
BP-028	Blue Ridge Fuel Co.	1400 Moreland Avenue	Petroleum use
BP-029	Marco Shoe Company/Nelco Shoes	2415 West Franklin Street	Petroleum use
BP-030	Tedco Industries	2335 West Franklin Street	Petroleum use
BP-031	Kaufman Products	1330 North Bentalou Street	Petroleum use, industrial history
BP-033	Baltimore City	2305 West Franklin Street	Automotive history
BP-035	Jung, Youngok Ann	501 North Bentalou Street	Automotive history
BP-036	Exxon Station	2200 Edmondson Avenue	Petroleum use, Automotive history, Dry-cleaning history
BP-038	Alpha One, Inc.	2140 Edmondson Avenue	Petroleum release
BP-039	Apex Oil, Co.	2109 West Lafayette Avenue	Petroleum release
BP-040	Emanuel Tire	2120 West Lafayette Avenue	Brownfields assessment
BP-041	American Ice Company	2100 W Franklin Street	Petroleum use
BP-042	Carver Vocational Technical Senior High School	2201 Presstman Street	Petroleum use
BP-045	National Railroad	2104 West Lanvale Street	Coal-use history
BP-058	Cloverland Dairy	2200 North Monroe Street	Petroleum contamination
BP-059	Stop Shop Save	1410 North Monroe Street	Automotive history
BP-063	E. S. Brady & Co., Inc.	1310 North Monroe Street	Railway history
BP-064	Jolly's Food and Convenience Mart	1500 North Monroe Street	Automotive history
BP-066	Former Coliseum Building	2201 North Monroe Street	VCP action, Petroleum use

Site ID #	Property Description	Address	Hazard Type
BP-067	BP Service Station	900 North Monroe Street	Petroleum release
BP-070	Green, Jeffrey E	1814 McKean Avenue	**Automotive, Industrial history**
BP-077	JJ Adams Fuel Oil Company	1810 Winchester Street	Petroleum use
BP-079	Steve Auto	2115 North Fulton Avenue	Petroleum release
BP-085	Penn North Partners LLLP	2632 Pennsylvania Avenue	Dry-cleaning history
BP-086	American Oil Co., Penn Square II	1655 Old Lane	Petroleum release
BP-089	F. A. Taylor	1568 Clifton Avenue	Petroleum release
BP-099	George G. Ruppersberger & Sons, Inc.	2639 Pennsylvania Avenue	Petroleum release
BP-102	Westside Elementary School	2335 North Fulton Avenue	Petroleum release
BP-107	Whitelock Towing	2634 Flora Street	Petroleum release
BP-119	MTA Terminal	2471 Woodbrook Avenue	Petroleum use
BP-125	Baltimore City	2513 Druid Hill Avenue	**Automotive, painting history**
BP-129	Dix residence	2562 McCulloh Street	Petroleum release
BP-134	Accent Displays, Inc.	2560 Madison Avenue	Petroleum release
BP-174	VI Contracting Site	841 Whitelock Street	Petroleum release
BP-194	Tune Up City, Inc.	701 Whitelock Street	Automotive history
BP-203	MTA Light Rail Maintenance Facility	344 West North Avenue	Petroleum use, railway history
BP-206	Baltimore City DPW Highway Maintenance Garage	560 West North Avenue	Petroleum use
BP-214	Amtrak/Jones Falls Substation	151 West Oliver Street	Petroleum release
BP-217	Baltimore Postal Service Vehicle Maintenance	60 West Oliver Street	Petroleum release
BP-219	Maryland Community Resource Center/Sterling Auto Radiator Works	1731 Maryland Avenue	Petroleum release
BP-221	Metro Laundry & Cleaners/La La Auto Repair Inc./Atlantic Auto Service	1700 North Charles Street	Dry-cleaning history, Petroleum use
BP-223	Vincent Gulf Service Station/Hess	1801 North Charles Street	Petroleum release

Hazards associated with the medium priority sites include: Petroleum, automotive, dry-cleaning, railway contamination, and “hazardous waste” as well as industrial history and coal use, Brownfields, and VCP sites. Half of the sites have current or historical petroleum use and/or release.

Table 57: Alternative 3C High Priority Hazardous Material Sites

Site ID #	Property Description	Address	Hazard Type
BP-001	Potts and Callahan Quarry	2902 West Baltimore Street	**VCP action**
BP-037	ABEX Baltimore – ABC Rail Products Corp.	2200 Winchester Street	CERCLIS screening, industrial history
BP-050	Matrix Metals	2045 Winchester Street	VCP action, Petroleum use

Site ID #	Property Description	Address	Hazard Type
BP-056	The Baltimore Asphalt Paving Co. (P. Flanigan & Sons, Inc., Pen Mar Company, Inc.)	1320 North Monroe Street	Petroleum use, industrial history
BP-080	Watkins residence	2037 North Fulton Avenue	Petroleum release
BP-095	Penn Square Property	2632 Pennsylvania Avenue	VCP action, Petroleum release
BP-108	Part Terminal Station	2331 North Fulton Avenue	Petroleum release
BP-224	Amtrak Pennsylvania Station	1500 North Charles Street	Petroleum release, railway history
BP-226	Norfolk Railway Yard	340 West North Avenue	Petroleum release, railway history

Hazards associated with the high priority sites include: Petroleum and railway contamination as well as industrial history, CERCLIS, and VCP sites. The majority of the sites have current or historical petroleum use and/or release.

All environmental hazardous materials and contaminants encountered or mobilized during construction of the project will be investigated, handled and mitigated in accordance with applicable Federal, state and local laws and regulations. Although the PSA focused on historical environmental releases in the vicinity of each proposed alternative alignment, other sources of contamination or hazardous materials mobilized during construction of the project have the potential to impact the surrounding community or local environment. Tunnel construction activities are potential sources of hazardous materials include work in and around:

- Gas lines and other subsurface utility systems;
- Construction equipment fuel tanks;
- Compressed gas canisters for welding;
- Building demolition material including asbestos or lead-based paint; and
- Chemicals present in tunneling muck.

Although the previous list is not exhaustive, in each instance, the hazardous material or contaminant material will be handled, stored, transported and disposed of in accordance with applicable Federal, state and local regulations and requirements. Exposure of the local population to groundwater pollutants is mitigated since the City of Baltimore conversion from water supply wells to a municipal supply system in the 1800s.

5. Mitigation

Mitigation measures will be needed in areas where construction encounters contaminated soil and/or groundwater. Excavated soil will be sampled, treated, and/or disposed of in accordance with Federal, state, and local regulations. If other contaminants, such as metals, are detected above MDE screening levels, soil and/or groundwater will be handled in accordance with applicable laws and regulations and disposed of at an MDE-approved treatment and/or disposal facility. Measures will need to be taken to contain excavated soil onsite and avoid offsite migration.

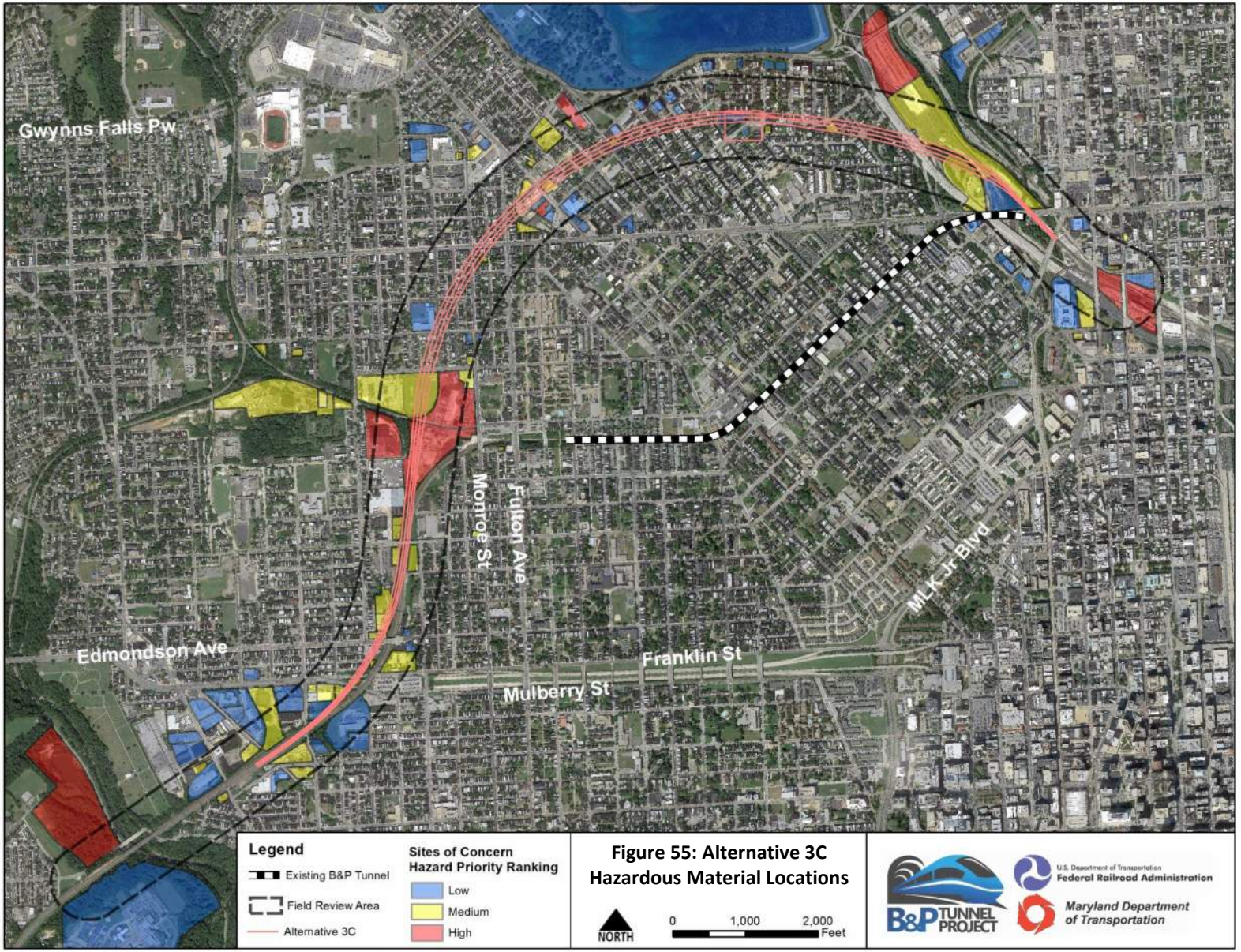

Figure 55: Alternative 3C Hazardous Material Locations

Each of the proposed alternative alignments will have a varying potential for the mobilization of hazardous materials or contaminants of concern during construction. Localized areas of contaminated soil or groundwater from historical spills or leaks maybe encountered during tunnel excavation. When a preferred alternative is selected, targeted investigation of sites identified in the PSA will further evaluate and delineate the extent of hazardous material and contaminant impacts within the construction limits of disturbance.

Any contaminated soil, groundwater or air will be handled in accordance with Federal, state, and local laws and regulations for handling, transportation, treatment and disposal. USEPA environmental protection, OSHA worker protection and USDOT transportation requirements will be implemented to ensure the minimization or elimination of worker, public or environmental exposure to hazardous materials or contaminants mobilized by the proposed action. Project-specific documentation will provide guidance for the safe handling, transport and disposal of hazardous materials and contamination encountered during construction or on an emergency response basis.

G. Solid Waste

1. Alternative 1: No-Build

Alternative 1: No-Build would not generate additional solid waste.

2. Alternatives 3A, 3B, and 3C

Alternatives 3A, 3B, and 3C have the potential to generate large quantities of material. One source is chunks of concrete and pavement rubble from street and sidewalk destruction. An alternative source would be building demolition materials from displaced residential and commercial properties. Another source would be soil and rock excavation, which may be suitable for reuse as backfill (which would comply with the directives of the *Zero Waste Plan for Maryland* (Executive Order 01.01.2015.01).

Alternatives 3A, 3B, and 3C, all include the construction of a new tunnel with a new alignment. Because Alternatives 3A, 3B, and, 3C involve boring a new underground tunnel, and because each alternative has a slightly different alignment, each alternative would result in a different amount of generated solid waste, specifically excavated earthen material. At the current level of engineering, it is not yet known how much material would be excavated. The major source of solid waste during the construction phase of any selected alternative would be from excavation. Specifically, the greatest amount of total solid waste generated would result from shaft and tunnel boring activities, while the site preparation phases may also involve the removal of additional amounts of excavated material. Building material resulting from demolition of buildings would also be generated.

During construction, the project would generate a small volume of waste such as product packaging, broken equipment, and site litter. Lingering construction waste would also amass once main construction activity commences; this includes building materials such as metal, wood, and concrete. A minimal amount of solid waste would also be generated by general construction worker activities and would include food or paper trash, cardboard, aluminum, plastic, etc.

Independent of the alternative chosen, some of the excavated earth material will be suitable for backfill for the newly created tunnel. Additionally, the existing B&P Tunnel may be filled in (depending on the future determination of the existing tunnel disposition), meaning some excavated material from one of the new Alternatives could be reused for backfill operations at the existing tunnel site as well. Minor hydraulic fluid, motor oil, and fuel spills could require the disposal of contaminated soil, spill clean-up kits would be kept on-site at all times. Contaminated solid waste will be collected and disposed of appropriately in accordance with Maryland and Baltimore City regulations.

3. Mitigation

All excavated materials requiring off-site disposal would be handled and disposed of in accordance with applicable regulations. Alternatives 3A, 3B, and 3C are very similar in tunnel length, but would generate a different amount of excavated material. The re-use of some earthen material as fill and the status of land fill capacity being at an acceptable level to handle the increase mean disposal of generated solid waste by the B&P Tunnel Project should be manageable. Thus, no substantial harmful impacts on the solid waste system would occur as a result of the solid waste created by any of the Build Alternatives.

H. Air Quality

Generalized potential air quality effects due to operations are presented here for all alternatives. The tunnel operations data for existing year 2014, No-Build year 2050 and Build year 2040 are summarized in **Table 58** and **Table 59**, respectively. Although the number of Amtrak operations increases with the Build Year, the Acela, Northeast Regional, and Metropolitan trains are powered by electric locomotives which do not directly generate significant air emissions. The regional MARC commuter train service plans to replace all existing electric locomotives with diesel-powered locomotives by 2019 (MTA, 2013), as well as doubling operations in 2040 with the operation of the proposed tunnel.

Table 58: Tunnel Operating Characteristics in the No-Build Year (2040)

Train Service	Locomotive Type	Total Bi-directional Frequencies		Consist Data		Speed N/S* (mph)
		Daily	Peak Hour	# of Locos	# of Cars	
MARC (Regional)	Diesel	82	7	1	8	30/30
Acela (Intercity Express)	Electric	58	4	N/A	14	30/30
NE Regional (Intercity Corridor)	Electric	52	3	1	8	30/30
Metropolitan	Electric	0	0	N/A	N/A	30/30
Freight	Diesel	2	0	1	30	30/30
Total	**All**	**194**	**14**			

*Note: Average train speed entering and exiting the North Portal (N) and South Portal (S).
Source: Federal Railroad Administration NEC FUTURE Project, Tier I EIS Alternatives (Alternative 1).

Table 59: Tunnel Operating Characteristics in the Build Year (2040)

Train Service	Locomotive Type	Total Bi-directional Frequencies		Consist Data		Speed N/S* (mph)
		Daily	Peak Hour	# of Locos	# of Cars	
MARC (Regional)	Diesel	164	15	1	8	30/70
Acela (Intercity Express)	Electric	82	8	N/A	14	30/70
NE Regional (Intercity Corridor)	Electric	48	4	1	8	30/70
Metropolitan	Electric	92	8	N/A	14	30/70
Freight	Diesel	2	0	1	30	30/70
Total	**All**	**388**	**35**			

*Note: Average train speed entering and exiting the North Portal (N) and South Portal (S).
Source: NEC FUTURE Project (USDOT, Accessed September 8, 2014).

Table 60 summarizes the analysis of MARC diesel locomotive emissions.

Table 60: MARC Diesel Locomotive Emissions

Scenario	CO	NO_x	VOC	$PM_{2.5}$
2040 No Build	8.6	6.7	0.3	0.1
2040 Build*	19.4	15.2	0.6	0.2
Net Increase	**10.9**	**8.5**	**0.3**	**0.1**
De Minimis Threshold	N/A	100	50	100
Below *De-Minimis*?	**N/A**	**Yes**	**Yes**	**Yes**

*Note: Emission estimates are for Build Alternative 3C (the longest tunnel out of the six alternatives). It has the highest potential to affect air quality due to the greatest tunnel length.

Values of "Net Increase" subject to rounding. All values rounded to the nearest 0.1 tons.

The B&P Tunnel ventilation system serves multiple purposes including: furnishing outside "fresh" air into the underground spaces, removing air emissions and heat from inside the tunnel, and providing a means for evacuating smoke and other by-products in the event of a fire or other emergency. Under normal operating conditions, the removal/dilution of air emissions is aimed primarily at the combustion products from the burning of diesel fuel. The pollutants of concern include NOx, CO, VOC, and PM.

The results of the B&P Tunnel emissions inventory are presented below in **Table 61** in tons per year of pollutants by project alternative under future-year conditions. For ease of comparison, the *de minimis* and PSD thresholds are also shown. No impacts to air quality would occur under Alternative 1: No-Build.

Table 61: B&P Tunnel Emissions Estimates (tons per year)

Pollutant	2040 No-Build	2040 Build	Net Change	De-Minimis Threshold	PSD Threshold
CO	8.6	19.4	10.9	N/A	N/A
NO_x	6.7	15.2	8.5	100	40
VOC	0.3	0.6	0.3	50	N/A
PM	0.1	0.2	0.1	100	N/A

Notes:
- All values rounded to the nearest 0.1 tons. Values of "Net Change" represent Build minus No-Build and are subject to rounding.
- Emission estimates are for Build Alternative 3 Option C (the longest tunnel out of the six alternatives). It has the highest potential to affect air quality due to the greatest tunnel length.
- De-Minimis thresholds are established by the U.S. EPA for emissions associated with mobile sources (e.g., motor vehicles, trains, etc.). PSD thresholds are Prevention of Significant Deterioration thresholds established by the U.S. EPA for stationary sources of emissions.

As shown in **Table 61**, the Build Alternatives (3A, 3B, and 3C) would have no effects on operational emissions, due to no projected increase in diesel freight train operations, and no significant air emissions generated by electric locomotive trains (e.g., Amtrak). The No Build and Build Alternatives diesel emissions were estimated based upon emissions factors provided by the EPA (EPA, 2009). As shown in **Table 60**, the MARC equipment and operational changes would have no significant effects on air quality, as the net change in emissions of NO_x, VOC, and $PM_{2.5}$ between the 2040 No Build and the 2040 Build scenarios would be below the *de minimis* levels. Emission estimates were developed for Alternative 3C (i.e., the longest tunnel out of the alternatives), since this alternative has the highest potential to affect air quality due to having the greatest tunnel length.

The principal air quality considerations given to ventilation of train tunnels are the interior conditions, and the exhaust air from the tunnel portals and the ventilation plants. Ventilation plants maintain safe air quality by automatically turning on fans when sensors indicate air is nearing air quality standards for NOx. For the exhaust air, the aim is directed towards the quality of the air emitted to the outside environment during normal operations. Compared to the applicable General Conformity thresholds, the expected increases in emissions with the project are well within the prescribed values. With a focus on NOx, the pollutant of most concern, the net change in emissions is also well within the applicable stationary source Prevention of Significant Deterioration (PSD) threshold. Based upon these results, it is unlikely that emissions associated with the ventilation plants for the project will cause, nor substantially contribute to, a violation of the NAAQS. Increases in pollutant levels could occur near the three proposed ventilation plants. Further analysis will be conducted to determine potential localized air quality impacts at a later stage once a preferred alternative has been identified. Further analysis will also take into account the proposed ventilation plant location for the preferred alternative. Additional information is available in the *Noise and Air Quality Technical Memorandum for Ventilation Plants*.

Construction emissions stem from dust generated from earth moving activities and gaseous emissions generated from diesel-powered equipment at the project site. Alternative 3C represents the longest tunnel out of the Build Alternatives, and therefore has the highest potential to affect air quality. This alternative would entail the largest amount of volume to be excavated (e.g., underground, in addition to cut and cut-and-cover at each portal), thus requiring more material handling as well as haul truck trips to and from staging areas. Alternative 3A is similar in length to 3B, however, the length of the tunnel, and cut and cut-and-cover areas, is slightly less than 3B. Of note, emissions produced during construction activities will be temporary in nature and will not result in a long-term impacts to local air quality.

It is possible that additional GHG emissions could be generated due to the increased use of electricity from rail traffic using electrically-driven locomotives. The extent of such an increase is not currently known, and cannot be estimated at this time based on readily available data.

Mitigation

In order to mitigate potential impacts to air quality from construction, construction activities will be performed in accordance with Maryland's *Standard Specifications for Construction and Materials* which outlines the procedures to be followed by contractors involved in site work. In addition, the Maryland Air and Radiation Management Administration has determined that the specifications are consistent with the requirements of the "Regulations Governing the Control of Air Pollution in Maryland". Therefore, during the construction period, all appropriate measures cited in the Code of Maryland Regulations (COMAR) 26.11.06.03D would be employed to minimize the impact of the proposed project on the air quality of the area (such as, but not limited to the installation and use of hoods, fans, and dust collectors to enclose and ventilation the handling of materials). Application of these measures would ensure that construction impacts of the proposed project are not significant.

I. Noise

1. Impact Assessment Methodology

Because FRA has not established noise and vibration regulations, FRA defers to regulations published by the FTA. The operational noise effects were evaluated using the guidelines set forth by the FTA *Transit Noise and Vibration Impact Assessment* (FTA, 2006). The temporary construction effects were also evaluated using both the FTA guidelines and COMAR 26.02.03—Control of Noise Pollution.

In accordance with the FTA Transit Noise and Vibration Impact Assessment guidelines, a screening assessment was conducted to identify locations where the project may cause noise impact. The FTA screening distances for operations are based on typical commuter rail systems. A screening distance of 750 feet was computed and used to determine if noise-sensitive land uses are present within a defined area of project noise influence. This distance represents the unobstructed distance from a commuter rail line to where the project noise reaches an L_{dn} of 50 dBA, or roughly the noise produced by an indoor air conditioner at a distance of three feet. L_{dn} is the 24-hour day-night average sound level, an average sound level which includes a 10-decibel penalty added between 10:00 pm and 7:00 am.

The screening distance was applied from the centerlines of Alternatives 3A, 3B, and 3C to determine the Area of Potential Noise Effect. Since noise-sensitive land uses were within the screening distance, further analysis was needed. Therefore, a General Assessment was conducted for the project.

Noise exposure due to the ventilation of the proposed B&P Tunnel Project was assessed in terms of the construction and operation of the ventilation plant facilities. The applicable noise ordinances and guidelines were assessed relative to the land uses surrounding each portal and the intermediate mid-tunnel location. The ventilation plant facilities would be designed in order to meet the Baltimore Health Code noise regulations. This would ensure that, during operation of the ventilation plants, the resulting noise levels in the adjacent communities would meet the applicable standards.

2. Evaluation Criteria

a. Operational

The FTA's guidance manual, *Transit Noise and Vibration Impact Assessment* (FTA, 2006), presents the basic concepts, methods and procedures for evaluating the extent and severity of noise impacts from transit projects. Transit noise impacts are assessed based on land use categories and sensitivity to noise from transit sources under the FTA guidelines.

The reference noise levels for each of the proposed noise sources and related operating characteristics are summarized in **Table 62**. These data are based on default FTA data.

Table 62: Summary of Noise Source Reference Data

Source Type	Specific Source	Reference Conditions	Reference SEL (dBA)
Fixed Guideway	Locomotive	Diesel-electric, 3000 hp, throttle 5	92
	Rail Cars	Ballast, welded rail	82

Note: SEL noise levels are reported in decibels at a reference distance of 50 feet and a reference speed of 50 mph. SEL is the sound exposure level that converts the cumulative noise energy of an event into one second.
Source: Transit Noise and Vibration Impact Assessment (FTA, 2006).

The tunnel operations data are summarized in **Table 63** for Alternative 3A, 3B, and 3C. Train operating speeds are projected to be an estimated 30 mph at the north portals and a maximum of approximately 70 mph at the south portal based on the NEC FUTURE Project (FRA, 2015).

Table 63: Tunnel Operating Characteristics in the Build Year (2040)

Train Service	Total Bi-directional Frequencies		Consist Data		Speed N/S* (mph)
	Daily	Peak Hour	# of Locos	# of Cars	
MARC (Regional)	164	15	1	8	30/70
Acela (Intercity Express)	82	8	n/a	14	30/70
NE Regional (Intercity Corridor)	48	4	1	8	30/70
Freight	2	0	1	30	30/70
Metropolitan	92	8	n/a	14	30/70

*Note: Average train speed entering and exiting the North Portal (N) and South Portal (S).
Source: NEC FUTURE Project (FRA, 2015).

The FTA noise criteria are delineated into two categories: moderate and severe impact. The level of impact at any specific site is established by comparing the predicted future Project noise level at the site to the existing noise level at the site. Potential impacts to residential noise receptors are depicted below for Alternative 3A (**Figure 56**), Alternative 3B (**Figure 57**), and Alternative 3C (**Figure 58**).

Noise levels in the immediate vicinity of the ventilation plant buildings would be due to the continual operation of the ventilation fans within each facility. The horizontal fans would operate periodically and would generate sound that would propagate through the louvers on the side and top of the ventilation plant buildings. As discussed in **Section III.B.6**, fans would operate periodically when NO_2 levels in the tunnel exceed a set threshold

or in emergencies when smoke is present in the tunnel. NO_2 levels are likely to be highest when the level of diesel locomotive operations are highest, or when congestion causes trains to operate slowly or at idle in the tunnel. However, there is not enough information currently available to determine the duration or specific hours per day the fans would run.

The Alternative 3A, 3B, and 3C tunnel designs include three ventilation plants: one at each portal and an intermediate facility located above the tunnel. The three ventilation plant facilities would be subject to the noise level standards included in the Noise Regulation of the Health Code of Baltimore City.

The ventilation plants would be designed to meet the L_{max} 50 dBA noise limit for the worst-case location, which is the intermediate facility adjacent to residential properties located in Reservoir Hill. The design standard for the ventilation plants would limit the outdoor noise level, when the fans are in operation, to L_{max} 50 dBA at the facility property lines.

To achieve the required reduction in noise level, cylindrical or rectangular sound attenuators would be mounted directly to each fan or to the ductwork within the system. In addition, the building itself would partially shield noise from the interior of the ventilation plant, which would further reduce noise levels outside of the building (with the exception of the louvers on one side of the building and the top of the building). The final design of the building will also take into account building orientation and the location of the louvers in order to reduce noise levels in the communities near each ventilation plant. Based on Amtrak's preliminary engineering, the ventilation plant facilities, with attenuators installed, will emit noise at 45 dBA. This would meet the design standard of L_{max} 50 dBA at the facility property lines (therefore, the noise level generated would be less than the design standard).

b. Construction

During the Draft EIS and development phase of a project, construction details are not yet determined. Therefore, the FTA noise assessment guidelines (FTA, 2006) suggest evaluating prototypical construction scenarios. The FTA design guidelines, for example, are evaluated against noise levels from the two loudest pieces of equipment that, under worst case conditions, are assumed to operate continuously for one hour during both the daytime (7:00 am to 10:00 pm) and nighttime (10:00 pm to 7:00 am) periods.

Since the local noise ordinance does not provide quantitative noise limits on construction activities, COMAR 26.02.03—Control of Noise Pollution was reviewed to assess temporary construction activities. The MDE has established the following noise guidelines for construction activities:

- 90 dBA—daytime (7 am to 10 pm)—residences;
- 55 dBA—night time (10 pm to 7 am)—residences;
- Blasting during construction is exempt from the MDE noise ordinance during the daytime (7 am to 10 pm);
- Pile driving during construction is exempt from the MDE noise ordinance from 8 am to 5 pm; and
- Construction activities on public property are exempt (COMAR 26.02.03.02.C.2.l—Environmental Noise Standards Exemptions).

These sound levels are described as "maximum allowable sound pressure levels" and are therefore assumed to be Lmax levels. See the *Noise Technical Report* and the *Noise and Air Quality Technical Memorandum for Ventilation Plants* for additional information.

Figure 56: Alternative 3A Residential Noise Receptors

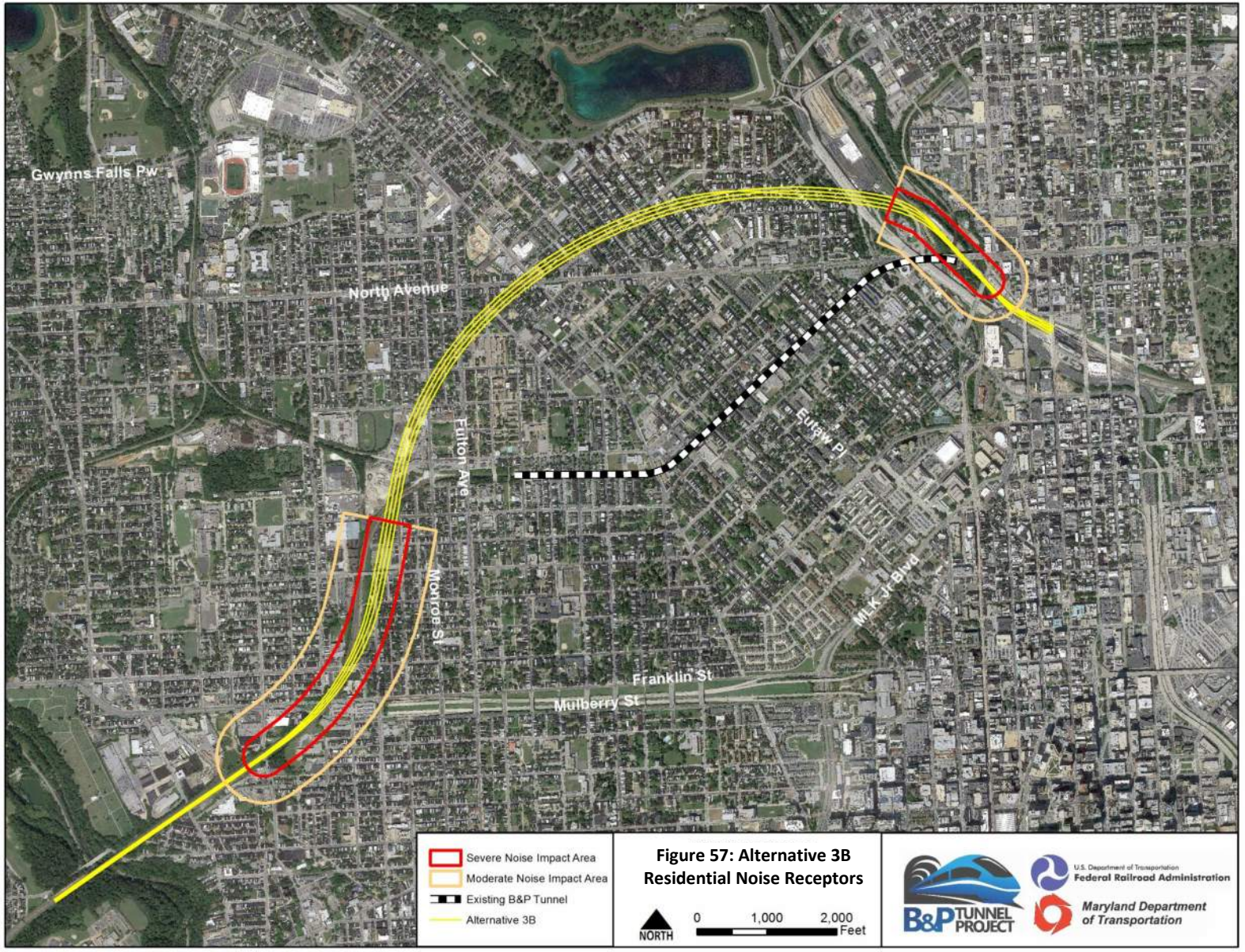

Figure 57: Alternative 3B Residential Noise Receptors

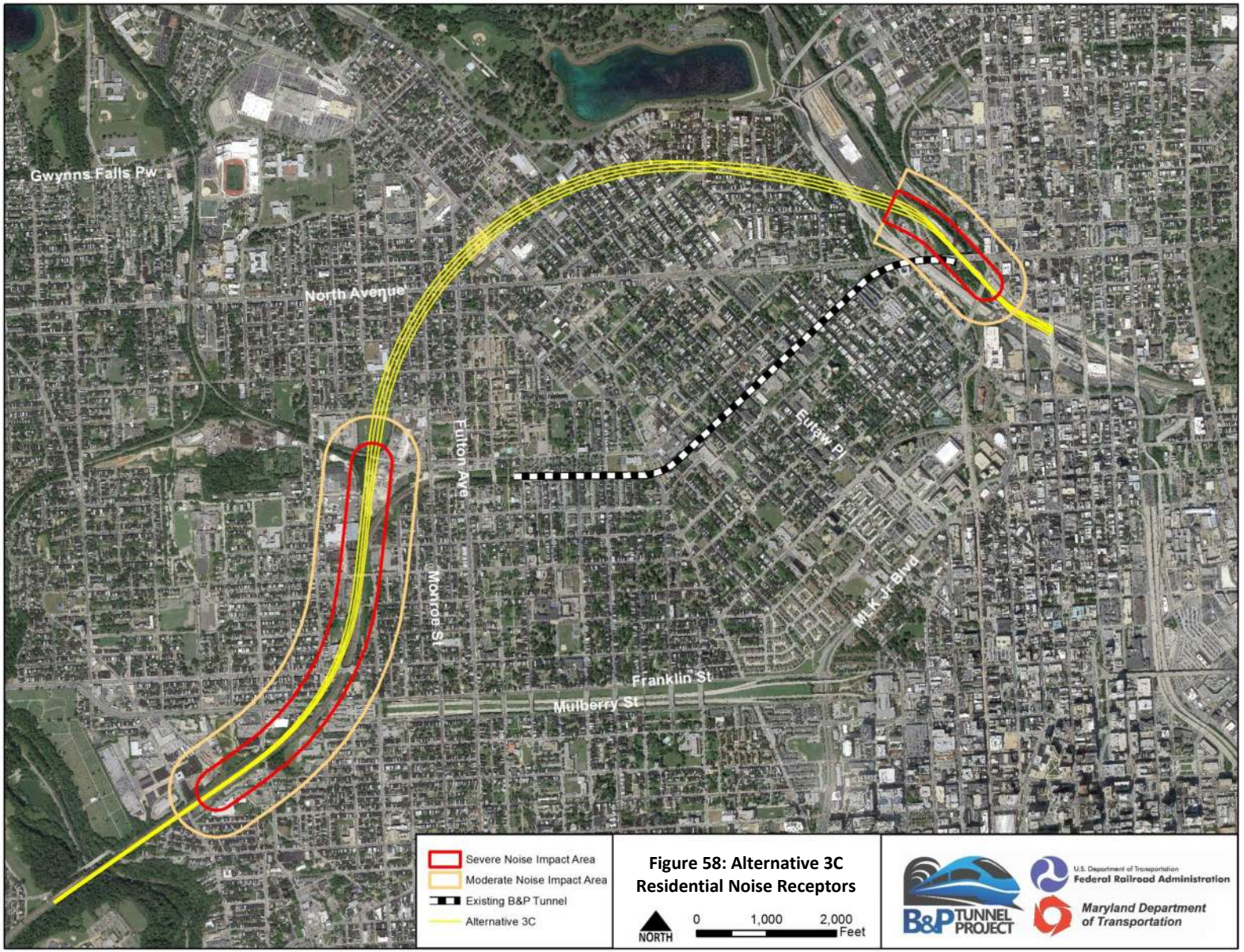

Figure 58: Alternative 3C Residential Noise Receptors

3. Alternative 1: No-Build

Future ambient noise levels under Alternative 1: No-Build are anticipated to be similar to those under existing conditions. The Study Area is characterized by urban communities that include major highways (such as I-83) and arterials (such as North Fulton Avenue and West North Avenue). Regardless of other projects in the Long-Range Transportation Plan, ambient noise under the Alternative 1: No-Build is anticipated to be similar to that of the existing conditions without implementation of the proposed Build Alternatives.

4. Alternatives 3A, 3B, and 3C

To determine the number of potentially affected receptors associated with Alternatives 3A, 3B, and 3C, the predicted *moderate* and *severe* impact contour distances were computed using the FTA General Noise Assessment guidelines (shown in **Figure 56**, **Figure 57**, and **Figure 58**). Based on these contour distances, the number of potential *moderate* and *severe* noise impacts along each Build Alternative (3A, 3B, and 3C) were estimated using noise contour maps and land use information. The anticipated noise impacts due to each Build Alternative are summarized in **Table 64**.

Table 64: Number of Buildings Potentially Affected by Noise

Alternative	Number of Affected Residential Buildings		Number of Affected Institutional Buildings	
	Moderate	Severe	Moderate	Severe
3A	254	0	0	0
3B	1,077	175	1	0
3C	975	111	4	0

5. Mitigation

FTA's guidance states that noise mitigation should be considered for areas of *severe* impact, unless the project's location or alignment can be modified to eliminate the impact. Noise impacts designated as *moderate* also require consideration for mitigation, but additional project factors should first be considered when assessing mitigation (such as: the increase in noise as a result of the project; the cost of the mitigation relative to the amount of noise reduction; and, the number of affected receptors).

Since noise impacts are predicted for all of the proposed Build alternatives (3A, 3B, and 3C), a range of mitigation measures were investigated for addressing *moderate* and *severe* noise impacts from tunnel operations. Specific mitigation measures will be examined once a Preferred Alternative is selected.

Once a preferred alternative is identified, mitigation measures such as operational restrictions, control measures to eliminate rail gaps at crossovers, noise barriers, buffer zones, and building noise insulation will be evaluated.

a. Construction

To reduce temporary construction noise impacts that may occur to sensitive receptors along the Build Alternatives, the following noise control measures would be considered during the construction process:

- Temporary noise barriers between noisy activities and noise- sensitive receptors.
- Locate construction equipment and material staging areas away from sensitive receptors.
- Route construction traffic and haul routes along roads in non-noise-sensitive areas where possible.
- Conduct all construction activities during the daytime and during weekdays in accordance with the MDE noise policy, to the extent practicable.

- Use best available control technologies to limit excessive noise and vibration when working near residences.
- Notify the public of construction operations and schedules.
- Consideration of early construction of any planned permanent noise barriers.

Mitigation measures would be confirmed as further engineering details are available.

J. Vibration

1. Impact Assessment Methodology

Vibration impacts were evaluated using prediction modeling according to the FTA's "General Assessment" guidelines to reflect the type of input data available. To determine the appropriate FTA evaluation criteria, rail operations along the NEC were evaluated using bi-directional train frequencies, number of locomotives, number of coaches, and speed for MARC, Acela, NE Regional, and freight services. The vibration levels from a diesel locomotive are assumed to be the same regardless whether it is pulling a passenger train or a freight train. In addition, temporary construction vibration levels were also evaluated using both the FTA guidelines as well as standard industry practices for evaluating vibration due to tunnel boring and other tunnel excavation activities. The modeling assumptions and input data used to predict existing and future vibration levels from rail service in the B&P Tunnel are summarized as follows:

- A screening assessment identified 6,858 land-uses within the FTA screening distance of 300 feet, including:
  - 6,287 Residential and Mixed-Use parcels;
  - 101 Institutional properties;
  - 2 Parks (Maple Leaf Park and Arnold Sumpter Park);
  - 179 Commercial parcels;
  - 9 Industrial parcels; and
  - 280 Unknown or undeveloped parcels.
- The FTA vibration thresholds selected for the evaluation criteria are based on the total number of daily trains traveling through the community. Based on the average daily operations for each alternative and as described in the *Vibration Technical Report,* the FTA "frequent" criteria were selected to evaluate the potential impacts.
- Train speeds were applied using the same assumptions as the noise assessment, which include 30 miles per hour (mph) under Alternative 1 and a range of speeds from 30 mph at the east or north portal to 70 mph at the west or south portal for Alternatives 3A, 3B, and 3C.
- Adjustments for continuously-welded track were applied using the FTA guidelines for Alternatives 3A, 3B and 3C.
- To account for improvements to the existing corridor as well as the proposed tunnels, an adjustment of 5 VdB was applied to Alternative 1 to reflect adverse track and tunnel conditions similar to jointed-rail track.
- The FTA default ground-surface vibration curves for diesel-electric locomotives (which are heavier than the railcars) were utilized to reflect typical ground propagation characteristics.
- Adjustments for ground-borne noise reflect typical ground conditions with peak frequencies between 30-60 Hz.

a. Operational Vibration Criteria

The FTA vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance, and are based on root mean square (RMS) velocity levels expressed in VdB. FTA's experience with community response to ground-borne vibration indicates that when there are only a few train events per day, it would take higher vibration levels to evoke the annoyance level that would be expected from more frequent events. This experience is taken into account in the FTA criteria by distinguishing between projects with frequent, occasional, or infrequent events. The frequent events category is defined as more than 70 events per day; to be conservative, the FTA frequent criteria were used to assess ground-borne vibration impacts in the Study Area.

The vibration criteria levels shown in **Table 65** are defined in terms of human annoyance for different land use categories such as high sensitivity (Category 1), residential (Category 2), and institutional (Category 3). In general, the vibration threshold of human perceptibility is approximately 65 VdB.

Table 65: Ground-Borne RMS Vibration Impact Criteria for Annoyance during Operations and Construction

Receptor Land Use		Ground-borne Vibration Levels (VdB)			Ground-borne Noise Levels (dBA)		
Category	Description	Frequent Events	Occasional Events	Infrequent Events	Frequent Events	Occasional Events	Infrequent Events
1	Buildings where low vibration is essential for interior operations	65	65	65	N/A	N/A	N/A
2	Residences and buildings where people normally sleep	72	75	80	35	38	43
3	Daytime institutional and office use	75	78	83	40	43	48
Specific Buildings	TV/Recording Studios/Concert Halls	65	65	65	25	25	25
	Auditoriums	72	80	80	30	38	38
	Theaters	72	80	80	35	43	43

Source: Transit Noise and Vibration Impact Assessment (FTA, 2006).

b. Construction Vibration Criteria

The same vibration criteria used to evaluate operational impacts may also be used to evaluate vibration impacts during temporary construction activities. Other criteria used to evaluate the potential for structural damage are also available. However, during the preliminary stage of the project when details of the actual construction scenarios and equipment are not yet known, a qualitative evaluation is typically utilized to identify potential problem areas. As a result, a quantitative assessment of impact during construction is recommended during the Final Design phase when more details of the proposed construction equipment and construction scenarios are determined.

2. Vibration Impact Assessment

To assess impacts along an existing, heavily-used rail corridor, Alternatives 3A, 3B, and 3C were modeled and compared to the FTA impact criteria to evaluate the change in ground-borne vibration as a result of the project. Along the existing tunnel alignment, future predicted vibration levels under Alternative 1: No-Build were compared against the levels predicted for the Existing Condition to determine the relative change in impact. Along Alternatives 3A, 3B, and 3C, future predicted vibration levels were compared against the FTA absolute criteria threshold limits to determine the onset and magnitude of impact. Predicted impacts from ground-borne vibration and ground-borne noise are shown in **Table 66** and **Table 67**.

Table 66: Inventory of Ground-Borne Vibration Impacts Predicted During Operation

Alternative	Number of Impacts (Ground-Borne Vibration)			
ID	Total	Residential (Cat. 2)	Parks (Cat. 3)	Institutional (Cat. 3)
1	24	23	0	1
3A	69	69	0	0
3B	138	138	0	0
3C	92	92	0	0

NB: 6858 receptor set used for alternative analyses
Source: Vibration Technical Report.

Table 67: Inventory of Ground-Borne Noise Impacts Predicted During Operation

Alternative	Number of Impacts (Ground-Borne Noise)			
ID	Total	Residential (Cat. 2)	Parks (Cat. 3)	Institutional (Cat. 3)
1	127	126	0	1
3A	215	215	0	0
3B	303	303	0	0
3C	265	265	0	0

NB: 6858 receptor set used for alternative analyses
Source: Vibration Technical Report.

a. Alternative 1: No-Build

Impacts under Alternative 1: No-Build due to ground-borne vibration from train passbys are predicted to exceed the FTA *frequent* impact criterion of 72 VdB at 23 residences and other FTA Category 2 land-uses, **Table 66**. Similarly, exceedances of the FTA impact criterion of 75 VdB are predicted at one FTA Category 3 receptor (Eutaw-Marshburn Elementary School). No exceedances of the FTA ground-borne vibration impact criteria are predicted at any Category 1 land-uses (highly sensitive equipment) under Alternative 1: No-Build.

Vibration from train passbys in tunnels could contribute to ground-borne noise inside residences due to vibrating surfaces. Impacts under Alternative 1: No-Build due to ground-borne noise from train passbys are predicted to exceed the FTA frequent impact criterion of 35 dBA at 126 residences and other FTA Category 2 land-uses, **Table 67**. Additionally, exceedances of the FTA impact criterion of 40 dBA are predicted at one FTA Category 3 receptor (Eutaw-Marshburn Elementary School). FTA Category 1 land-uses (highly sensitive equipment) are generally not sensitive to ground-borne noise.

Alternative 1: No-Build would result in vibration impacts equivalent to existing conditions. Future vibration levels under Alternative 1: No-Build are expected to be similar to those currently experienced, because existing vibration is dominated by existing rail traffic along the NEC. Since no project components or design elements are

proposed under Alternative 1: No-Build, the alternative would not cause any new vibration impacts, and existing impacts would remain unchanged.

b. Alternative 3A

Levels under Alternative 3A due to ground-borne vibration from train passbys are predicted to exceed the FTA *frequent* impact criterion of 72 VdB at 69 residences and other FTA Category 2 land-uses (**Figure 59, Table 66**). No exceedances of the FTA ground-borne vibration impact criteria are predicted at any Category 1 or 3 land-uses (institutions) under Alternative 3A.
Similarly, levels under Alternative 3A due to ground-borne noise from train passbys are predicted to exceed the FTA frequent impact criterion of 35dBA at 215 residences and other FTA Category 2 land-uses (**Table 67**). No exceedances of the FTA ground-borne noise impact criteria are predicted at any Category 3 land-uses (institutions) under Alternative 3A.

c. Alternative 3B

Levels under Alternative 3B due to ground-borne vibration from train passbys are predicted to exceed the FTA *frequent* impact criteria at 138 residences and other FTA Category 2 land uses (**Figure 60, Table 66**). No exceedances of the FTA ground-borne vibration impact criteria are predicted at any Category 1 or 3 land-uses (institutions) under Alternative 3B.

Levels under Alternative 3B due to ground-borne noise from train passbys are predicted to exceed the FTA *frequent* impact criteria at 303 residences and other FTA Category 2 land-uses (**Table 67**). No exceedances of the FTA ground-borne noise impact criteria are predicted at any Category 3 land-uses (institutions) under Alternative 3B.

d. Alternative 3C

Levels under Alternative 3C due to ground-borne vibration from train passbys are predicted to exceed the FTA frequent impact criteria at 92 residences and other FTA Category 2 land-uses (**Figure 61, Table 63**). No exceedances of the FTA ground-borne vibration impact criteria are predicted at any Category 1 or 3 land-uses (institutions) under Alternative 3C.

Similarly, levels under Alternative 3C due to ground-borne noise from train passbys are predicted to exceed the FTA frequent impact criteria at 265 residences and other FTA Category 2 land uses (**Table 64**). No exceedances of the FTA ground-borne noise impact criteria are predicted at any Category 3 land uses (institutions) under Alternative 3C.

K. Energy

1. Alternative 1: No-Build

Alternative 1 would continue operation of the B&P Tunnel at current service levels with no major changes. Therefore, energy consumption from the use of fuel and electricity by trains and/or for the operation of the B&P Tunnel would not change under this alternative. Also, no new construction would occur that would potentially consume more energy.

Figure 59: Alternative 3A Vibration Impacts

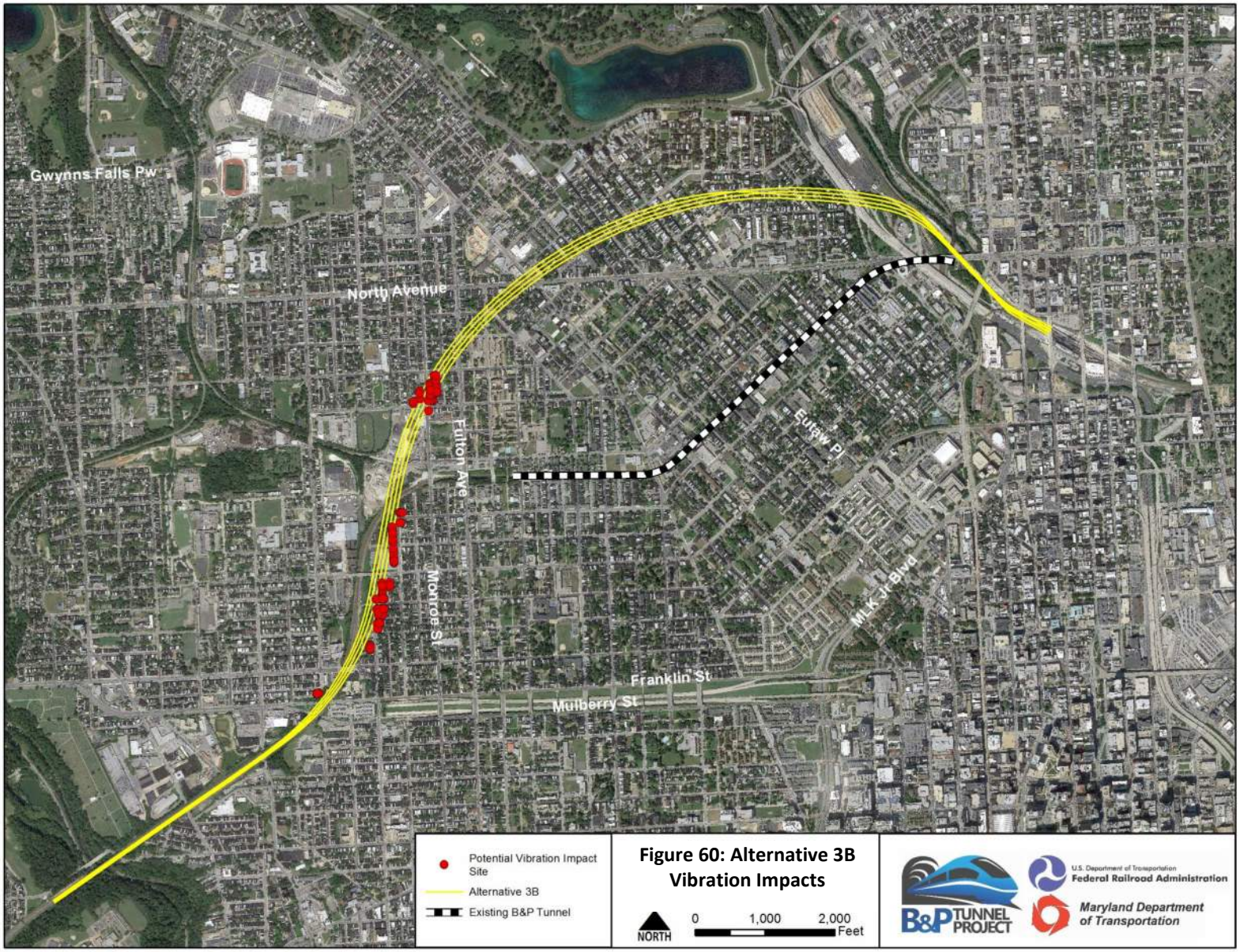

Figure 60: Alternative 3B Vibration Impacts

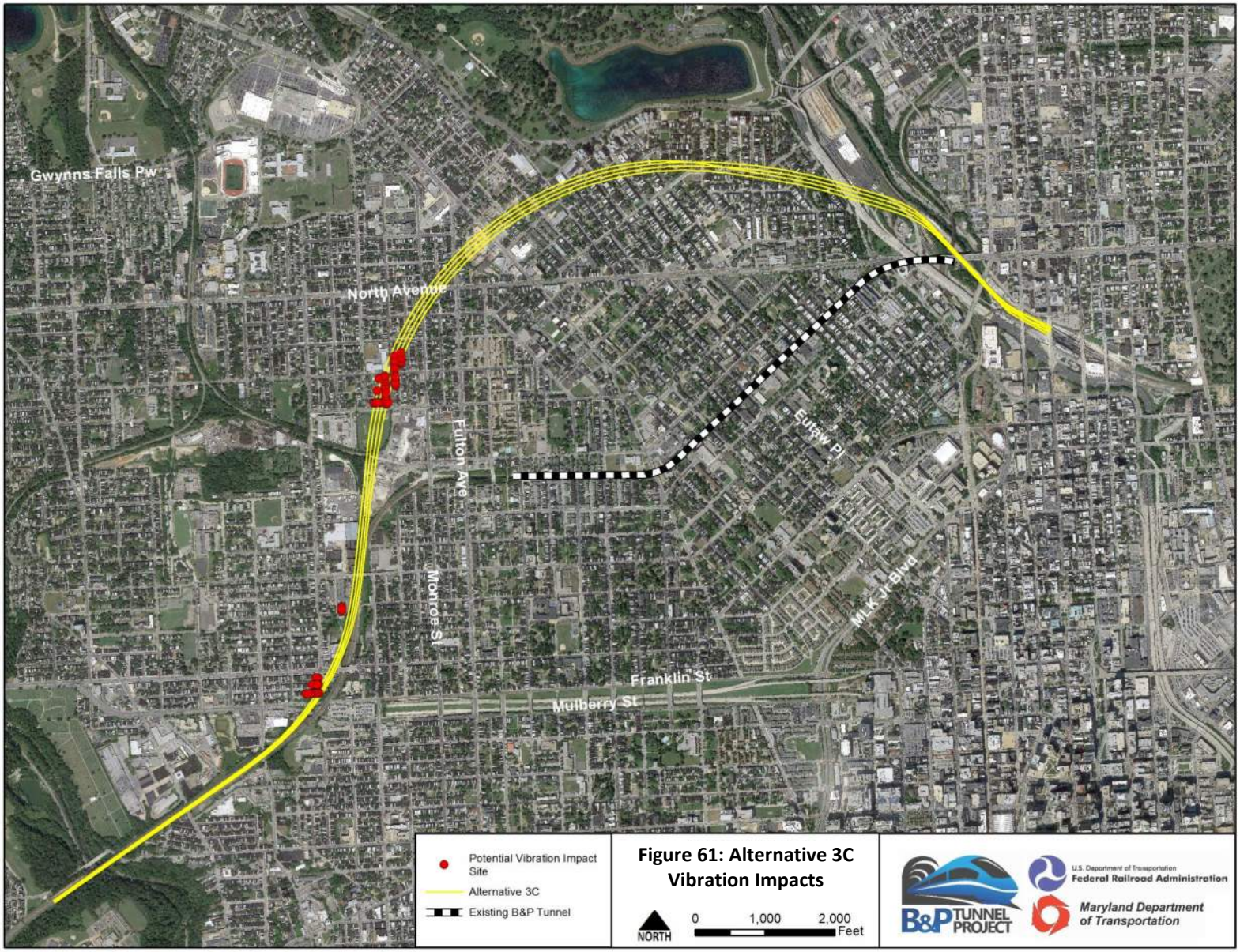

Figure 61: Alternative 3C Vibration Impacts

2. Alternatives 3A, 3B, and 3C

As discussed in the *Alternatives Report*, Alternatives 3A, 3B, and 3C would meet NEC operational needs forecasted to 2040. The travel distance between the Gwynns Falls Bridge and Baltimore Penn Station through the new B&P Tunnel as proposed per individual Build Alternative varies by as much as 0.5 miles, and all Build Alternatives propose four tracks.

Table 68 provides the estimated future daily energy consumption of Amtrak and MARC trains per Build Alternative based on statistics provided by Amtrak, the U.S. Department of Energy (DOE), and number of daily passenger trips forecasted by the NEC FUTURE Program to 2040. This estimate uses current Btu-per-passenger-mile data in the calculations; future gains in efficiencies would be speculative. As shown in the table, daily energy consumption by Amtrak and MARC trains in terms of Btu-per-passenger-mile would substantially increase from existing levels due to the increased capacity the Build Alternatives would support and/or the longer travel distance under the various alternatives. Alternative 3C would consume the most energy among Alternatives 3A, 3B, and 3C.

Although energy consumption would increase under the these alternatives, the forecasted increase in daily passenger trips includes passengers diverted from other, less energy efficient modes of travel, such as single-occupant automobiles. However, these potential diversions from less energy efficient modes of travel are speculative, and are not expected to offset the increase in energy consumption due to the expanded capacity under Alternatives 3A, 3B, and 3C.

The number of forecasted daily freight trains traveling through the B&P Tunnel is not expected to increase under any of the Build Alternatives; therefore, no change in energy consumption by freight in the Study Area would occur.

Construction of any of the Build Alternatives would require additional energy use beyond what would be used for normal operations. This additional energy would be consumed on a short-term basis as required for construction of the new tunnel, associated trackwork, and intersecting roadways modifications. In the long-term, energy consumption to operate the new tunnel under any of the Build Alternatives may increase as well. Overall, once a Build Alternative becomes operational, long-term energy savings are expected from more efficient operations.

Table 68: Maximum Estimated 2040 Amtrak and MARC Service Energy Consumption in the Study Area

Alternative	Type of Service	Daily Passenger Trips[2]	Length of Travel (Miles)	Daily Passenger Miles	Average Btu Per Passenger-Mile[3]	Daily Estimated Energy Consumption (Btu)	Percent Difference from Existing Daily Energy Consumption
3A and 3B	Amtrak	55,800	3.7	206,460	2,214[4]	457,102,440	247%
	MARC	11,800	3.7	43,660	2,838[5]	123,907,080	228%
3C	Amtrak	55,800	3.8	212,040	2,214[4]	469,456,560	256%
	MARC	11,800	3.8	44,840	2,838[5]	127,255,920	237%

Source: Baltimore Penn Station Master Plan (Amtrak, 2015)*, NEC FUTURE Program* (USDOT, Accessed September 8, 2014)*, and Transportation Energy Data Book* (USDOE, 2014).

[1]Maximum estimate is based on NEC FUTURE Program B (medium level of service) because higher service level alternatives propose a new high speed route through Baltimore, resulting in lower traffic through the B&P Tunnel

[2]NEC FUTURE Program 2040 forecast data

[3] Average Btu per passenger-miles are the most current available data estimates, not forecasted to 2040

[4]2014 Amtrak data

[5]2012 commuter rail data

L. Construction Impacts

This section is intended as a general overview of temporary project-related construction impacts and potential mitigation measures that could be considered. Specific impacts of construction, and associated mitigation measures, will be addressed in the Final EIS for a preferred alternative. Temporary impacts from the construction process to the individual resources described in this DEIS are included under each resource in **Section VI** for Alternative 3A, 3B, and 3C.

Alternative 1: No-Build would not implement major improvements to the existing B&P Tunnel. Construction activities associated with ongoing maintenance of the tunnel would have localized effects such as noise, dust and vibration from construction equipment and potential temporary interruptions to vehicular and pedestrian traffic. It is expected that, as the existing tunnel continues to age, maintenance activities would become more frequent and/or intensive.

Construction of the tunnels for Alternative 3A, 3B, or 3C would primarily involve horizontal mining with a tunnel boring machine. The outside approaches and portal areas would be built with a combination of trench cutting and cut-and-cover construction techniques. Cut-and-cover construction requires removal of everything on the surface, above the planned tunnel, and excavating a deep and wide trench; in which the tunnel structure is constructed and then covered, restoring the ground cover. After excavation, the trench would be covered with fill material.

Horizontal excavation by mining involves boring at a portal where the alignment would transition from surface to underground and excavating horizontally; surface disturbance would only occur at the approaches to the portals on either end of the tunnel and for ancillary structures like emergency exits. Ancillary structures, such as ventilation shafts or emergency egress, could be mined in a combination of mechanical excavation and controlled blasting.

Construction impacts associated with construction of Alternative 3A, 3B, or 3C would include localized impacts at the mucking shaft and portal cut-and-cover locations, emissions and dust from construction vehicles, blasting noise and vibration near tunnel portal and ventilation shaft locations, temporary interruptions to vehicular and pedestrian traffic, and temporary loss of on-street parking, and major utility relocations. Demolition of buildings, clearing land, and other construction activities could displace and increase activity from urban rodents, including rats. Contractors will implement appropriate measures, such as rodent control programs, as needed to minimize and control potential infestation generated by the construction of the project.

Tunnels are typically constructed from one portal location, known as the “mucking shaft” through to the far portal. The mucking shaft is the scene of the most visible tunnel activity, as it is the passageway through which the excavated material (muck) is removed and the tunnel lining segments and construction materials enter. The mucking shaft will require a laydown and staging area. It is not yet known how large of a staging area is required, but several acres or more could be required.

Construction activities would result in temporary interruptions to both vehicular and pedestrian traffic patterns, including temporary closure of roads and sidewalks. During various stages of construction, additional traffic would be generated by hauling of construction debris, excavation spoils and building materials. Increased traffic and vehicular emissions along waste hauling routes would likely occur as the muck material is trucked to appropriate waste facilities (as described in **Section VI.G**). Specific trucking routes, frequency of trips, or waste destinations are not yet known at this phase of the project.

Measures that can be used to lessen construction noise fall into two general categories: design considerations and construction staging and/or sequencing of operations. Design considerations could potentially include erection of temporary walls or earth berms between the noise source and the sensitive receptor, the identification of haul routes that avoid sensitive receptors to the maximum extent possible, and location of

stationary noise generating equipment at a distance from sensitive receptors. Construction activities can be planned to avoid prolonged noise generating activities and to minimize construction activities during the most sensitive time of day or night.

Air polluting emissions from construction equipment can be minimized by proper engine maintenance and code enforcement. Dust control measures may include application of water and calcium chloride to haul roads, provision of truck wheel wash stands, minimization of exposed, erosion prone areas to the greatest extent possible; stabilization of exposed earth with grass, geotextile fabric, ground cover, paving, or other finished surface as easily as possible; and covering or shielding stockpiled materials from wind.

Construction activities can result in varying degrees of ground vibration that diminish in strength with distance. Construction activities that typically generate the most severe vibrations are impact pile driving and blasting. Smaller, less perceptible vibrations will also occur in tunneling. Mitigation measures may include restricted activities near vibration sensitive receptors. Construction staging considerations could include limited hours of loading and hauling operations, and stockpiling excavated materials in the station excavation during non-haul hours.

Construction of tunnels can produce changes in soil and ground water that have potential to cause settlement at the ground surface or at overlying structures. Prior to final design, a more detailed subsurface investigation will be implemented and mitigation plans will be developed to prevent damage to overlying structures, particularly historic structures, during tunnel boring activities. The following mitigation measures could potentially be considered to prevent or reduce settlement: extensive monitoring, use of tunneling equipment and methods that reduce loss of ground, ground freezing, grouting between tunnel and foundations, slurry walls, chemical grouting, or underpinning. These methods have been successfully utilized in numerous tunneling projects located in urban areas, including construction of the Baltimore Metro Subway.

FRA will work with communities to minimize potential community effects during construction. Appropriate signing, the project website, and other means will be used to notify motorists of road closures and detours and pedestrians of sidewalk closures and detours. Particular attention will be given to maintaining public safety during the construction period; public access to construction areas will be limited to the greatest extent possible. This can be accomplished with temporary fencing, warning signs, and other safety precautions.

Maintenance of traffic and construction staging would be planned and scheduled to minimize traffic delays and interruptions to the extent possible. Coordination with and approval by the involved jurisdictions would be required. Access to residences and businesses would be maintained to the maximum extent possible, and access for fire and emergency vehicles would be maintained at all times.

M. Indirect and Cumulative Impacts

1. Regulatory Requirements

The CEQ regulations set forth in 40 CFR § 1500 et. Seq., require federal agencies to also consider the potential for indirect and cumulative effects (ICE) from a proposed project. The terms “effects” and “impacts” are considered synonymous, as used in the CEQ regulations. The CEQ regulations define the impacts and effects that must be addressed and considered to meet NEPA requirements, as follows:

- Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.8(a))
- Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR § 1508.8(b)).

- Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

2. Methodology

The indirect and cumulative effects (ICE) analysis was completed using available information on past, present and foreseeable future development, as well as readily available data from published plans and studies. Information was obtained from the Baltimore City Planning Department and the Baltimore Development Corporation.

A combination of analysis methodologies were employed to assess indirect and cumulative effects. The analyses were based on readily available information and data including:

- Trend Analysis: historic data were collected to understand past events and patterns, as well as the rates at which effects occurred, and projected data consulted to assess anticipated development or other trends and changes that could have future effects on the resources assessed
- Transportation and Community Planning: existing planning documents of transportation agencies and communities within the analysis area were consulted to identify future planned projects, community visions for their future, and potential impacts to planned actions
- Map Overlays: mapping layers were compiled to identify a reasonable and foreseeable future land use scenario

The ICE analysis includes the identification of resources of interest and establishment of the geographic boundary and temporal boundary (time frame) for the analysis. Analysis includes determination of past, present and reasonably foreseeable future actions and analysis of indirect and cumulative effects to resources from evaluated alternatives within the defined temporal and geographic boundaries.

3. Resources to Be Evaluated

All resources included in the 1999 FRA *Procedures for Considering Environmental Impacts* have been considered as part of this ICE analysis. Those resources impacted directly by the B&P Tunnel Project alternatives, as described in **Section VI**, form the basis for the analysis. Although considered, biodiversity areas, Special Protected Areas, protected species, wetlands, sole source aquifers, groundwater, wild and scenic rivers, and agriculture are not included in the analysis because there are no direct effects to these resources, these resources are not present in the analysis area.

4. Geographic Boundary

The indirect and cumulative effects analysis geographic boundary was developed using the boundaries of environmental resources and socioeconomic units that would be directly and indirectly impacted by the B&P Tunnel Project (**Figure 62**). The ICE analysis Study Area is identical to the Study Area used for Socio-Economic and Environmental Justice assessments, as described in **Section V** and **Section VI**, and extends from the Gwynns Falls Bridge to the west, the Barclay-Midway-Old Goucher neighborhoods to the east, Druid Lake to the north, and West Baltimore Street and U.S. 40 to the south.

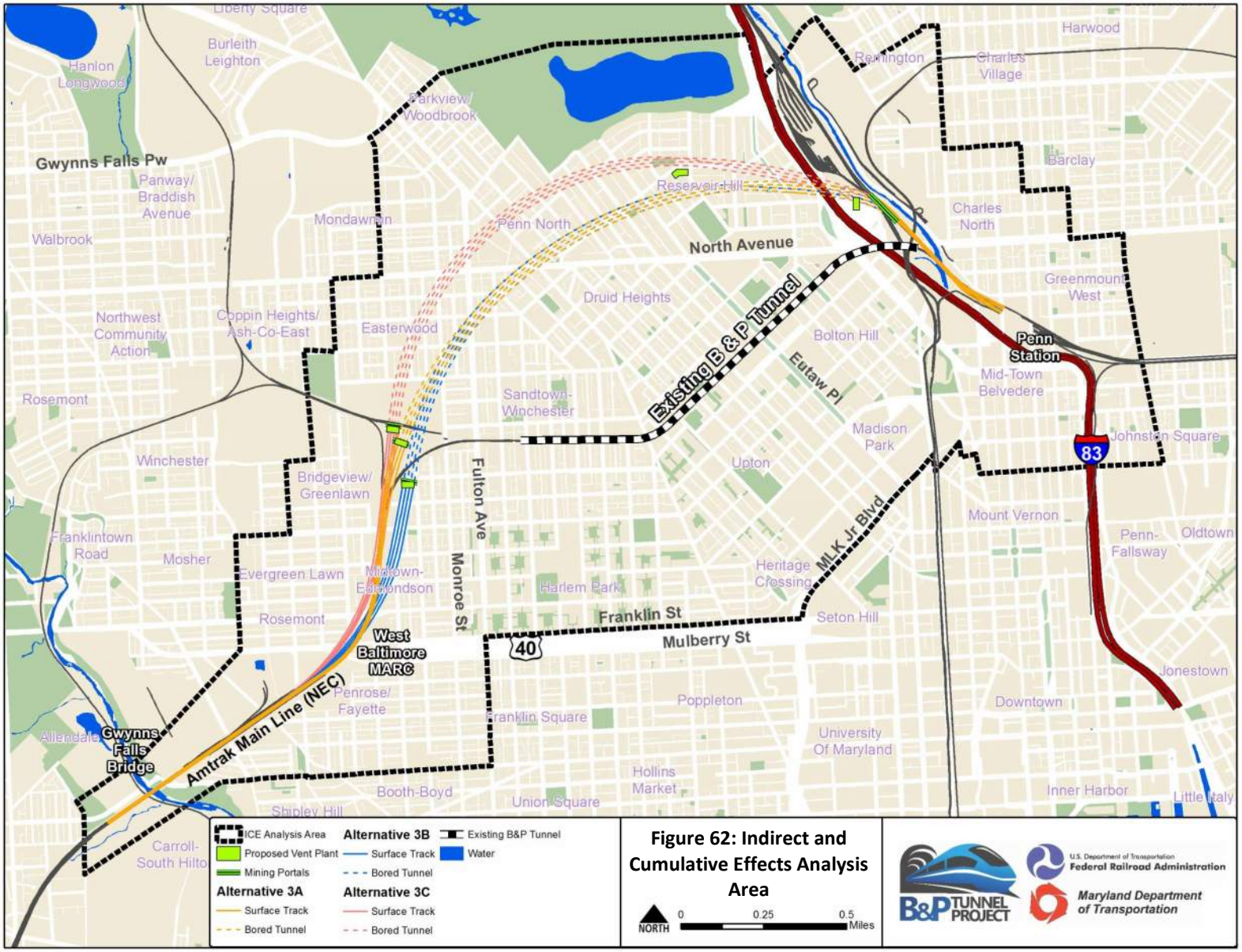

Figure 62: Indirect and Cumulative Effects Analysis Area

5. Temporal Boundary

The temporal boundaries for the ICE analysis generally extend from approximately 1970 to 2040. The past time frame was selected based on available census and land use data, development trends, and population trends. Population in the city historically peaked post-war in the 1950's (MDP, 2010). The city's population decreased 33 percent between 1970 and 2010, then increased approximately 4.2 percent by 2013 to 622,104. Population is projected to increase 5.0 percent from 2010 to 2040 (MDP, 2010; US Census Bureau, Accessed 2014).

The 2040 end year for the analysis is based on projections of population, households, and employment in the analysis area endorsed by the Baltimore Metropolitan Council (Cooperative Forecasting Group, 2014) and long-range transportation plans extending to 2040. This period encompasses the anticipated construction and beginning operation of the selected alternative. Actions intended for a time beyond 2040 are not considered reasonably foreseeable.

6. Land Use and Zoning

a. Existing Land Use

Existing land use in the ICE analysis area has been evaluated using aerial mapping, readily available Baltimore City land use data, and field reconnaissance. The analysis area (approximately 2,600 acres) comprises about five percent of Baltimore City. Current land uses in the ICE analysis area are primarily residential (49%), followed in area by institutional (14%), transportation-related (11%), parks/open space (10%), commercial (8%), industrial (7%) and mixed (1%).

b. Zoning

The Baltimore City zoning code was last comprehensively updated in 1971. At that time, the focus was on automobile-oriented development, separation of uses, and preserving the city's heavy manufacturing base. Baltimore City has recently initiated the first substantial zoning changes since the last effort 44 years ago. Overall goals are to promote pedestrian-oriented, mixed-use development, allow for the creative and flexible reuse of older buildings, encourage campus master planning, and to protect open space. The new code has design standards to improve the quality of Baltimore's built environment, which would restrict building materials while allowing for modern approaches to building design, and creating specific architectural guidelines to maintain the unique character of the older areas of the city. The city is currently eliciting public comment on the new draft zoning code.

Existing zoning in the analysis area is generally consistent with current land use. Analysis area zoning is comparable to citywide zoning in most categories, except proportionately more properties are zoned community businesses, central commercial, community commercial, and as office-residences (Baltimore City, 2008). Substantially less acreage is zoned industrial in the analysis area compared to citywide. Existing right-of-way for the B&P Tunnel and approach tracks are zoned as industrial or are an approved conditional use through other zones such as residential and commercial areas.

7. Planning

a. Community Planning

Completed in 2009, Baltimore City's most recent Comprehensive Master Plan emphasizes directing compatible growth to suitable areas that promote mixed uses, nodal activity centers and access to multiple modes of transit. It provides the policies and guidance to encourage development, infill and redevelopment that is transit oriented and brings vacant areas back into productive use. The principal method to implement these changes discussed by the plan is updating the city's zoning code, currently underway.

In the ICE analysis area there are seven Area Master Plans that implement the Comprehensive Plan goals tailored to their individual communities. Common to the Area Master Plans is the desire to create vibrant, mixed use communities that encourage new growth on vacant lands but is respectful of existing land uses and the historic character of neighborhoods, and reduction of industrial uses incompatible with residential areas. The seven Area Master Plans included in this analysis are:

- Operation Reach Out Southwest (2002)
- Barclay-Midway-Old Goucher (2005)
- Upton (2005)
- Penn North (2006)
- West Baltimore MARC Station (2008)
- Greater Rosemont and Mondawmin (2012)
- Mount Vernon (2013)

The NEC FUTURE Program is FRA's comprehensive planning effort to define, evaluate, and prioritize future investments in the NEC, from Washington, DC, to Boston. Through the NEC FUTURE Program, FRA will determine a long-term vision and investment program for the NEC that addresses current and future rail passenger service needs and considers the appropriate role of passenger rail within the larger transportation system of the region. Outcomes of NEC FUTURE include the release, in 2016, of a Tier 1 EIS and Service Development Plan to support the selected vision. FRA considered the corridor-wide service requirements of NEC FUTURE alternatives for the BP tunnel project. As a preferred alternative has not yet been identified for NEC FUTURE, FRA has not included it in the cumulative impact assessment for the BP tunnel project.

b. Transportation Planning

Several comprehensive transportation plans and supportive studies evaluating the state of current infrastructure and capital needs have been completed that address needs in the ICE analysis area. **Table 69** summarizes the most relevant recent plans. A common theme of the plans is the challenge of initiating projects addressing longer term needs in light of current and projected budget constraints, and the major investments needed to achieve a state of good repair of existing infrastructure.

Table 69: Transportation Plans Encompassing the ICE Analysis Area

Plan	Agency	Description
NEC Infrastructure Master Plan 2010	Amtrak	Anticipating a 60% increase in commuter trips by 2030, the plan identifies $52 billion in investments to cover system repair, upgrades, and capacity increases.
2011 - Plan It 2035	Baltimore Regional Transportation Board	The region's long-range transportation plan for the years 2016 to 2035. Identifies $11.5 billion worth of projects to expand the region's transportation system. This includes $6.7 billion for new and improved highways, $4.3 billion for expanded transit service, and $93 million for new and improved bicycle/pedestrian facilities.
The Amtrak Vision for the Northeast Corridor 2012 Update Report	Amtrak	The plan outlines recent actions and initiatives taken by Amtrak and others since the 2010 Master Plan. It supports the FRA NEC FUTURE Passenger Rail Corridor Investment Plan EIS currently being prepared. The plan would invest $151 billion from 2012-2040 using a phased approach.
2013 Critical Infrastructure Needs of the Northeast Corridor	NEC Infrastructure Operations Advisory Commission	The report identifies priority needs along the NEC. Proposed projects in Baltimore include BWI Marshall Airport Station improvements and a 4th track, the B&P Tunnel, and improvements at Baltimore Penn Station.
MARC Growth and Investment Plan 2013	Maryland Transit Administration	This multi-phased, multi-year plan aims to triple the capacity of MARC. Goals include support of multi-modal access, improved parking along Penn Line stations, enhancing bike/pedestrian access, and a new Penn Line maintenance facility.

Plan	Agency	Description
NEC FUTURE - A Rail Investment Plan for the NEC	Federal Railroad Administration	Initiated in 2012, its goal is to develop a comprehensive long-term vision to guide investment in the NEC. A Tier 1 Programmatic Environmental Impact Statement and Service Development Plan are underway to be completed in 2016.
2035 Maryland Transportation Plan—Moving Maryland Forward (2015)	Maryland Department of Transportation	This plan outlines the transportation strategies to achieve broad transportation improvement goals by 2035. In the analysis area the strategies identified include MARC improvements, completion of the Red Line light rail service (which has since been canceled), addressing congestion on I-83, and investing in multimodal transportation capacity to support State designated TOD areas such as State Center.
AMTRAK FY 2014 Budget and Business Plan, FY2015 Budget Request Justification, FY2014-2018 Five Year Financial Plan	Amtrak	Presents the goals and strategies to implement its program from FY 2014-2018. The five year financial plan estimates approximately $6.2 billion in capital investments in the NEC.
Maximize 2040 (in development)	Baltimore Regional Transportation Board	Currently in development, this long range plan would address transportation goals in the Baltimore region until 2040. Preliminary goals center on improving safety, improve and maintain the existing infrastructure, improve accessibility, increase mobility, conserve and enhance the environment, improve security, and promote prosperity and economic opportunity, among others.

8. Past, Present and Reasonably Foreseeable Projects

a. Past Projects

The B&P Tunnel was opened in 1873, approximately 144 years after the founding of Baltimore. Baltimore Penn Station was constructed in Jones Falls Valley in 1911 to serve the Pennsylvania Railroad. The Jones Falls Expressway (I-83) was conceived in the 1940's, and after many iterations to reduce its impacts to industry in the Jones Falls Valley and connect to other proposed interstates in the city, was constructed through the analysis area in 1961-1962.

The project to extend I-70 into the city, dating back to the 1960s, was completed between Pulaski Street and Martin Luther King Jr. Boulevard along the Franklin—Mulberry corridor. Located along the southern margins of the analysis area, this highway now known as U.S. 40 still functions as a highway but was never connected as planned and did not become part of the interstate system.

By 1976 Amtrak owned most of the NEC extending between Washington, D.C. to Boston. In 1978, Amtrak began running the Chesapeake commuter train on what is the NEC alignment today, which stopped at Edmonson Avenue. MARC took over the route as far as Perryville with a stop at the West Baltimore MARC Station on Franklin Street in 1983. In 1987, the Baltimore Metro was built through Upton, Penn North, and Mondawmin in the analysis area, extending to Owings Mills northwest of the city. Light Rail from Timonium to Glen Burnie opened in 1992, extending along North Howard Street through Midtown and Bolton Hill in the analysis area. Today, Baltimore Penn Station serves Amtrak, MARC, and the light rail systems.

The West Baltimore MARC Station Parking Expansion and Enhancements Project was completed in 2014. The project expanded parking at the West Baltimore MARC Station, reconnected Payson Street to the street grid, and improved the U.S. 40 highway entrances and exits. The project was also designed to enable future development and community open space.

b. Present Projects

Planned improvements and developments within the ICE analysis area are used to qualitatively analyze potential for indirect and cumulative effects. Present projects are those currently underway or planned to occur in the next five years (2015-2020). Planned improvements evaluated include:

- Ongoing development of transit service
- Planned roadway improvements
- Planned bicycle and pedestrian improvements
- Planned development and municipal capital improvements

Thirty-nine development projects and 13 transportation projects were identified from available sources such as agency websites and published plans. Diverse projects underway include the Franklin Entrepreneurial and Apprenticeship Center located at 2118 Madison Avenue, and the $51 million Remington Row Planned Unit Development (PUD) project providing new office, retail and residential space at 2700 Remington Avenue. In general, the development projects identified include retail, office, housing, institutional, and mixed-use developments. Numerous building renovation, rehabilitation, and demolition projects are also planned in the ICE analysis area. Transportation projects identified generally include roadway resurfacing, sidewalk repair, storm drain improvements, and intersection improvements.

c. Future Projects

Reasonably foreseeable future projects within the ICE analysis boundary have been gathered from the long range planning document, *Plan It 2035*, adopted by the Baltimore Metropolitan Council in November 2011. *Plan It 2035* was developed with local, state, and federal transportation agencies, area business leaders, community advocates and other stakeholders. No specific projects are identified within the analysis boundaries, however; the plan generally indicates improvements to facilities throughout the MARC system and bicycle/pedestrian access to rail transit stations are priorities (including West Baltimore MARC). In addition, the Maryland Department of Transportation *2035 Moving Maryland Forward* plan prioritizes Red Line light rail service (which has since been canceled), addressing congestion on I-83, and investing in multimodal transportation capacity to support state-designated transit-oriented development, such as at State Center in the analysis area.

Specific future development projects by private industry and Baltimore City are not reasonably foreseeable as these entities have not produced long range plans. However, the Baltimore City Comprehensive Master Plan and Area Plans, as well as the *West Baltimore MARC Transit-Centered Community Development Strategy* outline the goals of individual communities for their growth and development, and are indicators of potential futures if supporting conditions are realized.

While there are no specific plans in place to establish a double-stack (Plate H) freight corridor through Baltimore City, either by CSX, NS, or others, it is reasonably foreseeable that future efforts could be made to establish one. A stated objective of *Baltimore's Railroad Network* study (FRA and MDOT, 2011) is "Provide tri-level auto carrier clearance (Plate H) routes through Baltimore for both NS and CSXT freight trains." It is considered highly desirable by freight rail carriers to connect the Port of Baltimore with inland markets via a double-stacked Baltimore freight line. Both NS and CSX have expressed interest in the B&P Tunnel Project; correspondence from both railroads is provided in **Appendix B**.

Double-stack cargo trains are trains that include flat-bed trailers on each of which are stacked two semi-trailer trucks, one on top of the other. These trains are approximately five feet taller than normal freight trains (20'-3" tall vehicles, 26'-9" including catenary clearance), and therefore require five feet more vertical clearance than normal rail equipment to the underside of bridges, overpasses, signal trusses, and other infrastructure that spans the rail right of way in order to use the tracks.

The Northeast Corridor does not feature sufficient vertical clearance to allow double-stack operation in most places, as most of the bridges and spanning infrastructure was built before double-stack train systems were invented, and can only accommodate railroad equipment of normal height. Therefore, before double-stack trains can operate through the B&P Tunnel, many nearby bridges, tunnels, and signal trusses north and south of the tunnel – as well as the station mezzanine and platform canopies at and the underpasses beneath the streets and Union Tunnel surrounding Baltimore Penn Station – would have to be raised at significant cost. Therefore, while the proposed B&P Tunnels themselves will be tall enough to accommodate double-stack trains, virtually none of the trackage north or south of the tunnel in the vicinity of Baltimore can accommodate the extra height, and, without additional investment in the hundreds of millions of dollars, it is unlikely that double-stack trains will operate through Baltimore on the Northeast Corridor in the near future. Any potential freight corridor improvements, if they were to move forward, would be completed wholly independently of the B&P Tunnel Project.

9. Indirect Effects

Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR § 1508.8)

Under Alternative 1: No-Build, no major improvements to the existing B&P Tunnel would occur and routine maintenance would continue. No indirect effects to any of the resources evaluated would occur from Alternative 1: No-Build.

Alternatives 3A, 3B, and 3C, could potentially result in indirect effects. These effects are individually discussed below by resource.

a. Land Use

Alternatives, 3A, 3B, and 3C, could indirectly result in changes in land use, population density, or growth rate in the city but any effects would likely be relatively minor. No new transit facilities would be created in an area where none currently exist; any of these alternatives would only replace a segment of the existing alignment in the general vicinity of the existing tracks. Thus, any indirect effects on land use or population would be the result of improved MARC and Amtrak passenger service to West Baltimore MARC, Baltimore Penn Station, and other passenger stops along the NEC. Alternatives 3A, 3B, and 3C, would provide greater improvements in Penn Line and Amtrak passenger service, thus resulting in a greater potential for indirect land use impacts. Given the City's plans for redevelopment at West Baltimore MARC and Baltimore Penn Station, any growth-inducing effects of this improved service would be beneficial in working towards Baltimore City's goals of fostering transit-oriented development and regaining population lost in previous decades. In particular, improved speed and reliability of MARC Penn Line service could provide greater incentive for workers in D.C. to live in Baltimore City.

b. Socioeconomics and Environmental Justice

Alternatives 3A, 3B and 3C would impact approximately 2-10 businesses in the Study Area, The project alternatives could potentially result in impacts which are further removed in time or distance than direct effects, such as a lack of availability or higher cost of goods and services, and loss of employment which could degrade the community economic conditions. The potential for indirect economic effects would be greatest for Alternatives 3B and 3C, given the larger number of direct business impacts for those alternatives. Direct impacts to the P. Flanigan & Sons asphalt manufacturing facility under Alternatives 3A and 3C could result in indirect effects to regional asphalt production and storage given that there are few nearby facilities with these capabilities.

Permanent indirect impacts to communities would not be expected to result from Alternative 3A. The south portal location is in an industrial corridor adjacent to the existing NEC rail line, so no change to nearby communities would be expected.

Construction of a ventilation plant building in the Reservoir Hill neighborhood under Alternative 3A, 3B or 3C would permanently preclude future development at the proposed site by the City of Baltimore and local community. Efforts to redevelop and enhance the neighborhood in this vicinity are ongoing so potential future development is reasonably foreseeable. Under Alternative 3A, 3B, or 3C, future development projects in Reservoir Hill would need to locate elsewhere resulting in potential indirect effects. Furthermore, direct visual impacts from the proposed ventilation plant building could indirectly affect future development by influencing the general character and cohesion of the surrounding blocks in Reservoir Hill.

Alternative 3A would have minimal indirect community effects given that it would not result in any residential displacements. Alternative 3B and 3C could have indirect community impacts resulting from conversion of residential areas in the Midtown Edmondson and Bridgeview-Greenlawn neighborhoods to transportation use. Direct noise, vibration, and visual impacts from new infrastructure and rail traffic through this neighborhood could result in less community cohesion near the new alignment. This could further contribute to issues of vacancy and housing deterioration already prevalent in the area.

Indirect effects to minority and low-income populations were assessed in relation to environmental justice guidelines as described in **Section VI**. All of the potential indirect impacts described above would occur in low-income and/or minority population areas. There would potentially be disproportionately high and adverse effects to low-income and minority populations resulting from indirect effects, as most of the effects would be borne by these populations.

c. Cultural Resources

Alternatives 3A, 3B and 3C, would have community impacts that would potentially result in indirect impacts to historic architecture. Because each of these would introduce major new transportation infrastructure into the residential portions of neighborhoods including Midtown-Edmondson, Rosemont, and Bridgeview-Greenlawn; impacts from the new transportation infrastructure could lead to less community cohesion in the Study Area. Such an effect could then contribute indirectly to the ongoing deterioration of the numerous historic buildings contributing to the Midtown-Edmondson, Monroe-Riggs, Edmondson Avenue, and/or Greater Rosemont historic districts. The greatest potential for indirect effects would likely be for Alternative 3B and 3C due to their greater direct impacts to historic properties.

d. Natural Resources

Due to the highly-developed, urban nature of the Study Area no indirect effects to natural resources would be anticipated from any of the alternatives. The relatively minor direct impacts to floodplains, forested land and street trees, with appropriate mitigation measures, would not be expected to result in indirect impacts to natural resources.

e. Air Quality, Noise and Vibration

If greater volumes of freight traffic are allowed through the Northeast Corridor in the Study Area in the future, due to increased throughput capacity and operational flexibility, increased air quality impacts from diesel freight trains would need to be assessed in accordance with Clean Air Act requirements. Any increase in future air emissions would be in compliance with applicable air quality regulations.

Similarly, greater volumes of freight traffic could result in increased severity of noise and vibration impacts relative to those described in **Section VI.I.** and **Section VI.J.** due to diesel freight trains traveling through the corridor more frequently. Although not determined and not currently planned as part of the B&P Tunnel Project,

increased capacity for freight traffic through the Study Area could result in additional indirect noise and vibration impacts. Any potential noise and vibration impacts would likely occur near portals and at open sections.

f. Transportation

Alternatives 3A, 3B and 3C would result in a beneficial indirect effect to transportation. Each would result in downstream improvements to the efficiency of passenger rail service along sections of the NEC north and south of Baltimore as a result of the removed barrier. Indirect effects could also include changing travel behavior from automobile, air travel and bus to passenger rail.

Alternative 3A would not include any improvements to the West Baltimore MARC Station. Therefore, an indirect effect of this alternative would be that the MTA would need to relocate the station in order to construct platforms that accommodate high-level boarding. Alternatives 3B and 3C would not require relocation of the West Baltimore MARC Station.

Alternatives 3B and 3C could have indirect effects to transportation as a result of modifications to the roadway network in West Baltimore. This would result in changes to community access across the NEC, thereby resulting in long-term changes to travel patterns.

Each of the Build Alternatives could increase throughput capacity for freight traffic through the Study Area. CSX freight lines do not currently connect with the NEC in a manner that would allow CSX trains to travel through the proposed tunnels, or the existing B&P Tunnel, without construction of additional connections as part of a separate project from the B&P Tunnel Project. While no specific increases in freight traffic are planned or proposed with the B&P Tunnel Project, increased capacity and operational flexibility on the NEC could allow an option for Amtrak to route more freight trains through the Study Area without impeding their passenger operations. Each of the Build Alternatives could also include repurposing of the existing B&P Tunnel into a single-track, double-stack dedicated freight tunnel. The demand for, and feasibility of, freight traffic along Amtrak's NEC through the Study Area will ultimately be determined by market conditions. Any increases would need to be determined via agreement with Amtrak. The new tunnels will feature relatively steep grades that may not be desirable for freight carriers. Impacts from any future increases in freight volume resulting solely from B&P Tunnel Project improvements are considered potential indirect impacts and are qualitatively assessed in this section.

g. Other

There would be no indirect effects to water quality, utilities, visual quality, hazardous materials, or safety and security from any of the Build Alternatives.

10. Cumulative impacts

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

Under Alternative 1: No-Build, no major improvements to the existing B&P Tunnel would occur and routine maintenance would continue. No cumulative impacts to the resources included in this analysis would therefore occur.

The resources evaluated for cumulative effects include those socioeconomic, cultural, and natural resources potentially affected, either directly or indirectly, by the project.

a. Land Use

A review of master plans and planned development projects in the area does not indicate any projects or plans that would result in impacts or land use changes similar in nature to those resulting from the proposed Build Alternatives such as residential displacements, community facility and business displacements, historic building impacts, or conversion of land to transportation use. Therefore no cumulative land-use impacts are anticipated from Alternatives 3A, 3B, and 3C.

b. Socioeconomics and Environmental Justice

Alternative 3A would not have any reasonably foreseeable cumulative socioeconomic or environmental justice impacts. Alternatives 3B and 3C would have community impacts similar in nature to the US 40 highway project (formerly I-70) along the Franklin – Mulberry corridor. Community impacts such as displacements, noise, visual impacts, and loss of street connectivity resulting from Alternatives 3B and 3C, would be similar in nature to those resulting from construction and operation of the US 40 highway. Creating a wide new trenched transportation corridor in close proximity to affected portions of the Midtown-Edmondson neighborhood would cumulatively add to the past, present, and future impacts occurring as a result of the highway project. These cumulative impacts would occur in areas identified as low-income and/or minority population areas.

c. Cultural Resources

A review of master plans and planned development projects in the area does not indicate any reasonably foreseeable projects or plans that would result in demolition of historic architecture near the Build Alternative impacts. Therefore no cumulative impacts to historic architecture are expected under any of the Build Alternatives.

d. Natural Resources

The only natural resource impacts identified for any of the Build Alternatives are to floodplains, street trees and forested areas. A review of master plans, transportation plans, and planned development projects in the area does not indicate any reasonably foreseeable projects or plans that would require loss of street trees or forested areas near the Build Alternative impacts. Therefore no cumulative impacts to natural resources are expected under any of the Build Alternatives.

e. Air Quality, Noise and Vibration

No impacts to air quality, in exceedance of the NAAQS, are anticipated under any of the Build Alternatives. However, increased air quality impacts could result if additional rail projects, none of which are currently planned or are part of the B&P Tunnel Project, establish additional freight connections to allow CSX to route double-stack freight trains through the proposed tunnels or a repurposed B&P Tunnel. Any additional air quality impacts would still be subject to NAAQS air quality regulations.

A review of master plans, transportation plans, and planned development projects in the analysis area does not indicate any reasonably foreseeable projects or plans that would result in increased noise or vibration near the Build Alternative impacts. Therefore no cumulative noise and vibration impacts are currently anticipated. However, increased noise and vibration impacts could potentially occur if additional projects, none of which are currently planned, establish additional freight rail connections to allow CSX to route double-stack freight trains through the proposed tunnels or a repurposed B&P Tunnel. Any noise impacts from other projects would be subject to local noise regulations, as well as federal noise requirements if completed as part of a USDOT action.

f. Transportation

Any reasonably foreseeable cumulative effects of the Build Alternatives along with planned projects along Amtrak's NEC would be beneficial improvements to regional and high-speed rail service. Alternatives 3A, 3B and

3C, would improve travel times, improve reliability and safety, increase capacity, and allow for more high-speed travel.

Any of the Build Alternatives along with the reasonably foreseeable past, present, and future actions along the MARC Penn Line would likely result in beneficial cumulative effects. Support of increased ridership, improved operational flexibility and reliability, and support of Amtrak's high-speed rail expansion are among the reasonably foreseeable cumulative impacts. Alternatives 3A, 3B and 3C would contribute to this cumulative improvement of the MARC Penn Line.

Potential increases in freight traffic occurring as a result of other, independent projects not directly associated with the B&P Tunnel project are recognized as reasonably foreseeable. Although no such projects are currently planned, efforts to establish a double-stack freight corridor through Baltimore City could potentially result in greater volumes of freight traffic through the Study Area.

All of the Build Alternatives would be designed to accommodate double-stack (Plate H) freight clearance in the new proposed tunnels, but restrictions would still exist to the north and south along the NEC. Each could also include repurposing the existing B&P Tunnel into a dedicated double-stack, single-track freight tunnel (as described in **Section IV.G**). While no projects are currently planned or underway that would allow freight carriers such as CSX and NS to establish double-stack corridors through Baltimore, it is reasonably foreseeable that future efforts, independent of the B&P Tunnel Project, could lead to a double-stack corridor. The additional capacity and clearance would potentially make the proposed corridor a desirable route for freight operators, allowing a double-stack connection between the port of Baltimore and inland markets. Other projects would require evaluation through separate environmental analyses.

g. Other

There would be no cumulative effects to energy, water quality, utilities, visual quality, hazardous materials, or safety and security from any of the Build Alternatives.

N. Irreversible or Irretrievable Commitments of Resources

The National Environmental Policy Act (NEPA) requires that environmental analyses include identification of "any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." An irreversible or irretrievable commitment of resources results in the permanent loss of a resource for future uses (or alternative purposes) as they cannot be replaced or recovered. Irreversible commitments involve the use or destruction of a specific resource (for example, natural resources such as water, minerals, or timber) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (for example, extinction of a threatened or endangered species or disturbance of a cultural site). Irreversible and irretrievable impacts were reviewed in accordance with NEPA (42 USC 4332(C)(v)); guidelines published by CEQ on implementing NEPA (40 CFR 1502.16); and FRA's Environmental Procedures Section 14(n)(10), (11) and (22).

Alternative 1: No-Build would not require an increase in irreversible and irretrievable commitment of resources above the current conditions and continued maintenance of the tunnel. Under the No Build, new commitments of resources would not occur beyond those that could occur related to other projects in the region.

The construction of Alternative 3A, 3B, or 3C would require the commitment of natural, human, and monetary resources. Generally, these resources would be committed irreversibly and irretrievably.

Construction materials such as wood, steel, fossil fuels, cement, aggregate, and bituminous material would be irretrievably expended during grading, tunneling, and track construction. Whereas these materials would be largely irretrievable when used, these resources are not in short supply and many of the materials could be recycled for other projects when they no longer meet the design needs for passenger rail service.

Construction of a Build Alternative would require a one-time investment of federal funds, and potentially state and local funds, which are irretrievable because these funds would not be available for other projects.

The commitment of these resources is based on the recognition that residents in the area, state and region would benefit from the improved quality of the transportation system. These benefits would consist of improved accessibility and mobility, savings in time and greater availability of quality services that are anticipated to outweigh the commitment of these resources.

O. The Relationship Between Local Short-Term Uses and the Maintenance and Enhancement of Long-Term Productivity

Short-term impacts to and use of resources in relation to long-term productivity were evaluated in accordance with NEPA (42 USC 4332(C)(iv)); guidelines published by CEQ on implementing NEPA (40 CFR 1502.16); and FRA's Environmental Procedures Section (14)(n)(22). This analysis qualitatively discusses the relationship between short-term impacts to and use of resources, and the long-term benefits and productivity of the environment. For this document, short-term refers to the estimated five to seven-year period of construction—the time when the largest number of temporary environmental effects is most likely to occur. Long-term refers to the more than 100-year life span estimated for the proposed tunnel following the completion of construction activities.

Alternative 1: No-Build would not involve any project-related construction; therefore, short- and long-term project-related effects from Alternative 1: No-Build are not anticipated.

Construction activities associated with Alternative 3A, 3B, or 3C could have short-term and construction effects related to the following items, which are also described in **Section VI.L**:

- Hazardous materials and waste disposal
- Water quality (erosion and sedimentation, and/or potential fuel and lubricant spills)
- Air quality (equipment emissions and fugitive dust)
- Noise and vibration (construction equipment)
- Property acquisition
- Traffic and pedestrian delays and detours

In addition, short-term employment, use of materials to construct the project, and purchases of goods and services generated by construction could create a short-term improvement in the local economy that would diminish once the construction is completed. For more information on potential economic effects, see **Section VI.A**.

Any inconveniences to residents, motorists, and rail patrons would be offset by the improved rail network once construction is completed. Any short-term uses of human, physical, socioeconomic, cultural, and natural resources would contribute to the long-term benefits of improved travel times, operations and reliability along the NEC corridor. Since the Northeast Corridor Improvement Program (NECIP) era 1976 – 1980, Amtrak has been making incremental improvements to increase speed and reduce travel time for train passengers for nearly 40 years. They have cumulatively delivered significant changes in the inter-city rail experience, amounting since 1980 to between a one-hour and a one-and-one-half hour reduction (Regional vs. Acela) of the travel time between NYC and Washington, D.C.

A rail program of continuous, small improvements can cumulatively produce a significant transformation in the quality of inter-city rail services. Individual investments to straighten curves and eliminate other impediments to high-speed travel are – over time – producing a steady migration of travelers from air and automobiles to trains, conserving energy, land, and air quality.