

9

SECONDARY AND CUMULATIVE EFFECTS

This chapter presents the long-term secondary and cumulative effects of the No Build Alternative, the Wiehle Avenue Extension, and the full LPA. The secondary effects associated with construction of the Wiehle Avenue Extension and the full LPA would result primarily from induced development (also referred to as secondary development) at transit station areas. Potential cumulative effects would occur due to construction of the Wiehle Avenue Extension and the full LPA in addition to the past, present, and future reasonably foreseeable projects described for the No Build Alternative in Chapter 2.

The alternative formerly known as “LPA Phase 1” in the October 2003 *Supplemental Draft Environmental Impact Statement and Section 4(f) Evaluation* has been renamed the Wiehle Avenue Extension in this Final EIS and is expected to begin operations in 2011. This change reflects the federal approach to the project’s funding under the Federal Transit Administration’s New Starts program. It will assure consistency among the environmental, engineering and financial documents during the project’s development.

In the October 2003 *Supplemental Draft Environmental Impact Statement and Section 4(f) Evaluation* as well as this Final EIS, the term “full LPA” represents the Wiehle Avenue Extension and the second phase of the Dulles Corridor Rapid Transit Project. This second phase would extend west from Wiehle Avenue to Washington Dulles International Airport and Route 772 and is expected to begin operations in 2015.

The term “LPA”, “proposed action”, or “selected LPA” refers to both the Wiehle Avenue Extension and the full LPA collectively.

This section of this chapter discusses the following topics:

Section 9.1 describes the general methodology used to conduct the secondary and cumulative effects analysis.

Section 9.2 identifies the resources that could be sensitive to secondary or cumulative impacts.

Section 9.3 contains the analysis of potential secondary effects.

Section 9.4 contains the analysis of potential cumulative effects.

Section 9.5 includes a discussion of mitigation.

As described in the Draft Environmental Impact Statement (EIS), several resources were evaluated for secondary effects, including neighborhoods, community services and cohesion; displacements; visual and aesthetic conditions; cultural resources; parks and recreational resources; geologic resources; water resources; aquatic biota and habitat; terrestrial biota and habitat; rare, threatened, and endangered species; and traffic and associated air quality impacts. Most of these resources were also assessed for

cumulative effects. However, if the proposed project does not result in an impact to a certain resource, then it would be considered as not contributing to cumulative impacts to that resource.

9.1 GENERAL METHODOLOGY

The process used to evaluate secondary and cumulative effects is based on the guidance provided in the Federal Highway Administration Technical Advisory, “Guidance for Preparing and Processing Environmental and Section 4(f) Documents” (October 30, 1987). It involves the identifying sensitive resources and area of effect, sources of potential secondary and cumulative effects on resources, and potential effects.

Each of these steps is described briefly in the following sections.

9.1.1 IDENTIFY SENSITIVE RESOURCES AND AREA OF EFFECT

The first step in the process is the identification of sensitive resources to be analyzed for effects. These resources would include: those that are directly affected by the Wiehle Avenue Extension or the full LPA, those affected by the secondary development that is associated with the stations under consideration, and those resources that are particularly susceptible to cumulative effects (e.g., wetlands can experience multiple individual impacts from many projects over time, that when summed result in cumulative effects). Not all impacts tend to “accumulate”—that is, similar impacts from more than one project do not always add together and create a greater impact. However, some resources may experience project impacts that result in minimal change, but when impacts from several actions are summed cumulatively, they may experience greater effects over time.

Sensitive resources were identified using the environmental information prepared for the various sections of this Final EIS, as well as public and agency scoping comments received. In addition, the agencies shown in Table 9.1-1 were contacted to request information regarding sensitive resources and other major actions that should be considered in determining cumulative effects. After the sensitive resources were identified, a composite map of the resources was prepared to determine an overall geographic boundary for the analysis. This methodology to determine a unified geographic boundary is consistent with secondary and cumulative effects analyses being conducted in other states.

Table 9.1-1: Agencies Contacted for Secondary and Cumulative Effects Analysis

Federal Agencies	State Agencies
Federal Aviation Administration, Office of Airports Planning & Programming	Virginia Department of Historic Resources, Northern Regional Preservation Office
Federal Aviation Administration, Washington Airports District Office	Virginia Department of Game and Inland Fisheries
National Marine Fisheries Service, Northeast Region Public Affairs Office	Virginia Department of Historic Resources, State Historic Preservation Office
National Park Service, National Capital Region	Virginia Department of Transportation
National Park Service, Wolf Trap Farm Park	Virginia Marine Resources Commission
Smithsonian’s National Air and Space Museum	Virginia Outdoors Foundation
U.S. Army Corps of Engineers, Norfolk District	County Agencies
U.S. Army Corps of Engineers, Northern Virginia Field Office	Fairfax County Executive
U.S. Army Corps of Engineers, Northern Virginia Reg. Section	Fairfax County Department of Transportation
U.S. Department of Agriculture, National Resource Conservation Service	Fairfax County Economic Development Authority Fairfax County Community & Recreation Services

Federal Agencies	County Agencies
U.S. Department of Agriculture, Virginia Conservationist U.S. Environmental Protection Agency U.S. Fish & Wildlife Service, Virginia Field Office	Fairfax County Park Authority Fairfax County Planning and Zoning Fairfax County Public Works and Environmental Services Fairfax County Water Authority
Regional Agencies	Loudoun County Building and Development
National Capital Planning Commission Northern Virginia Regional Commission Metropolitan Washington Airports Authority, Planning Metropolitan Washington Airports Authority, President Metropolitan Washington Council of Governments Northern Virginia Regional Park Authority Northern Virginia Soil and Water Conservation District	Loudoun County Administrator Loudoun County Parks, Recreation and Community Services Loudoun County Transportation Planning Program Loudoun County Planning
State Agencies	Local Agencies
Virginia Department of Aviation Virginia Department of Environmental Quality Virginia Department of Forestry	City of Falls Church, Planning Department City of Falls Church, City Manager Dulles Greenway, Director of Operations Town of Herndon, Community Development

The study area for the cumulative effects analysis was based on a combination of factors. Within Fairfax County, the corridor boundary, which was largely based on the travel shed, was used. Fairfax County is currently highly developed and the corridor boundary was drawn to include the greatest number of trips that would be drawn to the new transit improvements. In Loudoun County, this area was modified to follow the various watershed boundaries of the streams that traverse the Dulles Corridor. These boundaries were used because Loudoun County is more rural in character and cumulative effects would be more likely to involve natural resources. Therefore, the watershed boundaries were used to define the study area. Figure 9.1-1 presents the study area for the secondary and cumulative effects. The horizon year for the analysis is 2025.

9.1.2 IDENTIFY POTENTIAL SOURCES OF EFFECTS

By definition, the sources of secondary and cumulative effects are the Dulles Corridor Rapid Transit Project and the other actions planned within the project’s area of influence. These other actions, which are included as part of the No Build Alternative, are listed in Table 9.1-2.

For the Dulles Corridor Rapid Transit Project, the primary source of potential secondary effects is the increased development allowed at the station areas for the Wiehle Avenue Extension and the full LPA. Though the addition of transit does not directly cause development to occur, county comprehensive plans have been modified to ensure that new development is located in the vicinity of stations if a new transit line is built. This induced increase in development has the potential to have effects on social, environmental, and transportation conditions beyond those directly associated with the proposed project.

During the public scoping process for the project, the potential for secondary effects due to increases in the allowable density of development were of primary concern to local citizens. Commenters consistently requested an analysis of the effects that increased density would have on traffic congestion and their quality of life. Fairfax County officials also requested an analysis of the effects of increases in allowable densities.

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LEGEND

	Cumulative Effects Study Boundary		Existing Metrorail Orange Line and Stations
	County Boundary		Proposed Station
	Rail Yard		PROPOSED METRORAIL ALIGNMENT
			At-grade/Retained Fill
			Aerial
			Underground
			Aerial Yard Lead

DIAAH/DTR is the Dulles International Airport Access Highway/Dulles Toll Road

Figure 9.1-1

Secondary and Cumulative Effects Study Area

0 1 2 3 MILES

FIS 9.1-1 - Cumulative Effects July 2004

There are a variety of other potential transportation projects within the study area for secondary and cumulative effects that are in the initial planning phase. These projects include major transportation projects such as the I-66 widening and Metrorail Orange Line extension project, the Tri-County Parkway Location Study and other initiatives. In addition, there are local improvements listed in the comprehensive plans of Fairfax and Loudoun counties. However, projects such as the Edmund Haley Drive underpass and the Rock Hill Road overpass are in the initial stages of planning and no definitive information is available as to their likely construction, preferred location, funding and impacts. Consequently, these projects are not considered to have reasonably foreseeable effects on this project and are not included in this analysis.

Table 9.1-2: Other Projects or Actions Included in the Cumulative Effects Analysis

Project	Description
Transit Projects (Included in No Build Alternative)	
New Bus Access Slip Ramps on DIAAH and Dulles Toll Road	Construction of new bus-only, at-grade slip ramps to allow for bus access between the DIAAH and Dulles Toll Road and to improve safety and schedule reliability. Three of the ramps have been constructed and are in use.
Expansion of Reston East Park-and-Ride	Fairfax County has studied alternatives designed to expand the Reston East Park-and-Ride to include a multi-level garage with 2,300 spaces by 2010.
Highway Projects (Included in No Build Alternative)	
Route 123	Route 123 within Tysons Corner from Route 7 to I-495 is planned for expansion from six to eight lanes by 2010.
Route 7	Route 7 within Tysons Corner is planned for expansion from six to eight lanes by 2010. Route 7 is also planned for expansion from four to six lanes between Reston Parkway and the Dulles Toll Road, and Rolling Holly Drive and Reston Parkway.
DIAAH Widening	The Access Highway from Dulles Airport to Route 123 is planned for expansion from four to six lanes by 2010.
I-495	A section of the Capital Beltway, I-495, from the I-9/I-395/I-495 interchange and the American Legion Bridge is planned for capacity improvements, including HOV lanes and ramps providing direct HOV access to Tysons Corner at Route 123. Implementation of these improvements is anticipated by 2010.
Route 7100	Route 7100 is planned for expansion from four to six lanes between I-66 and Sunrise Valley Drive by 2010.
Route 50	A segment of Route 50 between Old Lee Road and the Fairfax/Loudoun County line is planned for expansion from four to six lanes by 2020.
Route 28 Improvements	This is a design/build project to widen Route 28 from six to eight/ten lanes from I-66 to Route 7 and to add interchanges (to be completed in 2005); the project is included in the 2003 update of the CLRP and 2002-2007 TIP; the project accommodates a possible, future light rail guideway.
Loudoun County Parkway	This is a two- to four-lane, north-south roadway, which will link the Dulles Greenway and Route 7 and be widened to a four- to six-lane facility by 2010.
Other Projects (Other Actions not Transit Related)	
Wolf Trap Master Plan Improvements	Expanded and improved parking and circulation improvements at the park.
Dulles Airport Layout Plan Improvements	MWAA is implementing or planning the following improvements: the newly opened Smithsonian Air and Space Museum, Tier 2 concourse improvements, airside automatic people mover (APM), on-airport roadway improvements, runway reconstruction, new control tower, and two new runways with associated projects. The two new runways are a new parallel north-south runway, approximately 9,473 feet long by 150 feet wide and a new parallel east-west runway, approximately 10,500 feet long by 150 wide. Associated with the runways project are taxiways and navigational aids (NAVAIDS) for runways, property acquisition, Tier 3 Concourse development, relocation of National Oceanographic and Atmospheric Administration (NOAA)/National Weather Service (NWS) Sterling facilities and extension of the APM.

9.1.3 IDENTIFY POTENTIAL EFFECTS

The final steps in the secondary and cumulative effects analysis process involve the determination of effects the potential sources have on the identified resources.

For the assessment of cumulative effects, the projects identified in Table 9.1-2 were evaluated relative to the same social, environmental, economic, and transportation criteria presented in the Final EIS, though at a lower level of detail. The mitigated condition for the evaluated projects was assumed for the analysis. The anticipated effects of these projects were combined with identified impacts of the Dulles Corridor Rapid Transit Project to determine the potential for cumulative effects.

The results of these effects analyses are presented in Sections 9.3 and 9.4.

9.2 RESOURCE IDENTIFICATION

The following resources were identified as sensitive to secondary and cumulative effects:

- § Neighborhoods, Community Services and Cohesion;
- § Acquisitions and Displacements;
- § Visual and Aesthetic Conditions;
- § Cultural Resources;
- § Parks and Recreation Resources;
- § Geologic Resources;
- § Water Resources;
- § Aquatic Biota and Habitat;
- § Terrestrial Biota and Habitat;
- § Rare, Threatened and Endangered Species; and
- § Traffic and Air Quality Impacts.

If a proposed project does not result in an impact to a certain resource, it would not contribute cumulative impacts to that resource.

9.3 SECONDARY DEVELOPMENT EFFECTS

This section addresses long-term secondary effects of the No Build Alternative, the Wiehle Avenue Extension and the full LPA. Secondary development effects are impacts related to the increased density of development that would occur. The characteristics of the secondary development generated at station areas under the No Build Alternative, the Wiehle Avenue Extension and the full LPA are described further in Chapter 5 of this document. As noted earlier, the provision of transit within the corridor does not, in and of itself, cause secondary development to occur. However, because local jurisdictions have plans in place that allow for greater density to occur in some areas if transit is provided, it is considered induced or secondary development for the purposes of this analysis. In order to address all potential for secondary effects, density bonuses at station areas are included; however, it is important to note that the allowed density bonuses may or may not occur. Discussion of the related effects is presented to disclose, to the extent possible, all potential effects.

Future land development would be greatly influenced by factors outside of the control of the project sponsor. Such factors as the economy, changes in land use plans by the local jurisdictions, and technological trends can all affect how, when, and to what degree land is developed. The growth projections can be considered to be predictive based on current information and similar land use development patterns in the corridor. Actual growth may be more or less than that projected as part of this analysis.

After estimating the potential growth, the impacts of this growth were analyzed in much the same way that the direct impacts of the project were analyzed. Study areas were defined around each proposed station location for the Wiehle Avenue Extension and the full LPA. The size of these study areas varied depending upon where density bonuses were allowed by the local jurisdictions: 1,600 feet radius for the Tysons Corner area, one-half mile radius for Fairfax County (but not within the Town of Herndon where there are no density bonuses at this time), and one-half mile radius for Loudoun County. No assessment of secondary development impacts was undertaken for the Dulles Airport station area because no density bonuses are allowed in this area. Outside of station areas and along regional transportation facilities, the expected effects of secondary development were assessed qualitatively.

The effects on other sensitive resources were evaluated qualitatively, because only general information is known regarding the location, scale, and appearance of the projected development. For example, it is difficult to conduct an in-depth analysis of visual effects associated with new development when specific designs and plans are not available. However, knowing the anticipated density and scale of development, and the relatively confined area in which it is allowed, a general assessment of its visual effects could be conducted. The same methodology applies to other resources as well.

9.3.1 LONG-TERM EFFECTS

This section describes the long-term secondary development effects of the No Build Alternative, the Wiehle Avenue Extension, and the full LPA. The primary source of potential secondary effects would be the increased development allowed at the station areas under the Wiehle Avenue Extension and the full LPA. Although transit does not directly cause development to occur, it does help direct development where infrastructure can better support it. County comprehensive plans have been modified to ensure that new development would be located in the vicinity of stations if a new transit line were built.

A comparison of the alternatives in terms of station area population, employment and development, is shown in Table 9.3-1. The No Build Alternative shows the predicted development characteristics if the LPA was not implemented. It should be noted that the predicted character of development is highly speculative. It represents how development would occur under circumstances similar to today—policies that are applicable today, growth rates based on what is known today, and market influences that are in force today—although it is very unlikely that all of these conditions would continue unchanged until 2025. Therefore, the predicted growth presented in this analysis is useful mostly for comparative purposes and should not be considered as the actual future population, employment, and land use that would occur in 2025.

9.3.1.1 No Build Alternative

Under the No Build Alternative, the density bonuses at the station areas would not be triggered and current development patterns would continue. Development would be driven by market conditions

throughout the corridor and would not be focused in certain areas as it would under the Wiehle Avenue Extension or the full LPA. Undeveloped lands, including natural lands and farmlands in the corridor, would continue to be developed based on market demands. Under the No Build Alternative, traffic congestion on local roads and regional highways would continue to worsen.

Table 9.3-1: Secondary Development Effects

Projections	No Build Alternative (2025)	Locally Preferred Alternative ¹		
		Wiehle Avenue Extension (2011)	Wiehle Avenue Extension (2025)	Full LPA (2025)
Station Area Population Projections	15,500	Not Applicable	90% Increase (Station Areas Only)	233% Increase (Station Areas Only)
Station Area Employment Projections	130,500	Not Applicable	17% Increase (Station Areas Only)	48% Increase (Station Areas Only)
Station Area Residential Development (square feet)	8.7 million	Not Applicable	80% Increase (Station Areas Only)	201% Increase (Station Areas Only)
Station Area Commercial Development (square feet)	42.8 million	Not Applicable	17% Increase (Station Areas Only)	35% Increase (Station Areas Only)

1. Projections are based on information for 2025 only. Opening year forecasts were not prepared due to the longer period of time required for development to take effect following the opening of the LPA.

Commercial includes office, retail, hotel, industrial, and institutional.

Station Area totals include 1,600 foot radii from each station in Tysons and half-mile in remainder of corridor.

9.3.1.2 Wiehle Avenue Extension

For the Wiehle Avenue Extension, the primary source of potential secondary effects is the increased commercial and residential development generated by density bonuses that would occur near planned Metrorail stations. This would result in secondary effects on population, employment, community facilities and services, land development patterns, water resources and traffic. To a lesser extent, the visual character of the area would be affected.

Secondary development would result in a potential increase in population and employment near station areas. This increase in population and employment would in turn create an additional strain on community facilities and services within the study area for the Wiehle Avenue Extension. However, under the No Build Alternative, population and employment is projected to increase within the area and would also cause a strain on these facilities and services.

The allowable transit-related growth would result in an increase in development in the immediate vicinity of stations throughout the corridor, but does not represent a dramatic increase in the overall level of growth allowed in Fairfax and Loudoun counties, as defined in their land use regulations. Rather, the comprehensive plans refocus the previously anticipated levels of growth into patterns that will increase the number of viable travel options available to corridor residents and employees, including transit, walking, and bicycling. As an additional benefit, compact development reduces the cost of providing utilities, facilities, and services to new residential and commercial developments. Comparatively, the No Build Alternative would likely lead to a dispersed pattern of development and would be highly auto-oriented, leaving people with few travel choices and resulting in widespread congestion.

The increase in development near station areas would likely result in greater areas of impervious surfaces. However, due to the existing level of development within the area and the lack of undeveloped, pervious surfaces, the increase would likely be minimal compared to the No Build Alternative.

Analysis of travel effects related to secondary development is primarily focused on station area travel patterns in relation to ridership, transit mode share, pedestrian and bicycle trips, total person and vehicle trips, vehicle miles traveled, and traffic volumes at selected intersections. Travel effects related to secondary development would include increases in peak-period traffic levels, transit mode shares, and pedestrian and bike trips to stations and also support of the reverse commute market through the increase of employment densities near stations. While it is expected that increased density would result in localized traffic congestion in station areas, the new, transit-oriented urban form related to the Wiehle Avenue Extension would help to increase overall mobility in the corridor, the counties, and the region.

Under the Wiehle Avenue Extension, changes in visual character due to denser, transit-oriented development would occur in Tysons Corner and at the Wiehle Avenue Station area. Changes in visual character due to denser development would not be significant in the western part of Fairfax County and Loudoun County, as current development patterns and trends would continue.

9.3.1.3 Full LPA

Secondary effects of the full LPA would be similar to those described for the Wiehle Avenue Extension, albeit to a greater extent due to the less developed character of the western portions of Fairfax County and Loudoun County within the study area.

As with the Wiehle Avenue Extension, the increases in population and employment would result in additional strain on the existing infrastructure, community facilities and services. However, the benefit of compact development reduces the cost of providing utilities, facilities and services to new residential and commercial developments.

The total increase in development projected under the full LPA would be less than the total build-out permitted by the Fairfax and Loudoun county comprehensive plans in the absence of transit. In the Reston and Herndon area, the full LPA could support an increase in development of about 49 million square feet of development by 2025, while total allowable build-out for transit-related growth in this area is approximately 70 million square feet. The compact, high-density form of development would promote mobility much more effectively than sprawled development.

Secondary development would contribute to increased areas of impervious surface and reductions in potential terrestrial and to a lesser extent, aquatic habitat. Unlike the Wiehle Avenue Extension where the majority of the study area is primarily urbanized, the western portion of the study area is more suburban and rural in nature. However, the increase in impervious surfaces and minor loss of undeveloped, rural land would not be substantially greater than that which would occur as projected under the No Build Alternative.

Analysis of travel effects related to secondary development primarily focused on station area travel patterns in relation to ridership, transit mode share, pedestrian and bicycle trips, total person and vehicle trips, vehicle miles traveled, and traffic volumes at selected intersections. While it is expected that increased density will result in localized traffic congestion in station areas, the new, transit-oriented urban form related to the full LPA would help to increase overall mobility in the corridor, the counties, and the region to a greater extent than the Wiehle Avenue Extension.

Changes in visual character would be noticeable in the western portion of the study area due to the existing rural and suburban characteristics. However, current development patterns and trends in this area that are altering the visual setting will continue with or without transit investment.

9.4 CUMULATIVE EFFECTS

Determining the cumulative environmental consequences of an action requires delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. The analysis of cumulative impacts addresses the “mitigated condition” for both the Dulles Corridor Rapid Transit Project and the other projects included in the analysis.

In determining the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern, the projects listed in Table 9.1-2 were reviewed in conjunction with the social, environmental, economic, and transportation effects detailed in the Final EIS. If the proposed project and the other projects added together would result in an impact that would be considered substantial as a direct impact, then a substantial cumulative impact would occur. At this point, the proposed project level of contribution to the cumulative impact must be considered and mitigation, if available, must be identified appropriate to that contribution.

9.4.1 LONG-TERM EFFECTS

This section describes the cumulative effects of the No Build Alternative, Proposed Action and relevant, reasonably foreseeable actions that could contribute to cumulative effects on four resources: water resources, air quality, historic resources and Section 4(f) resources.

One reasonably foreseeable action within the Dulles Corridor study limits with the potential to influence the analysis of cumulative effects is the program of improvements of Washington Dulles International Airport. The FAA, in association with MWAA, is exploring ways that Dulles Airport can meet the projected demands for air transportation. In order to enable the airport to safely and efficiently meet the forecasted levels of aviation activity, MWAA is proposing to implement airside and landside improvements to Dulles Airport that are part of the 2003 Airport Layout Plan. MWAA is implementing or planning the following improvements: Tier 2 concourse improvements, airside automatic people mover (APM), on-airport roadway improvements, runway reconstruction, new control tower, and two new runways with associated projects. The runways project features a new parallel north-south runway, approximately 9,473 feet long by 150 feet wide and a new parallel east-west runway, approximately 10,500 feet long by 150 feet wide. Associated with the runways project are taxiways and navigational aids (NAVAIDS) for the runways, property acquisition, Tier 3 Concourse development, relocation of National Oceanographic and Atmospheric Administration (NOAA)/National Weather Service (NWS) Sterling Facilities and extension of the APM. With the exception of the Dulles Runways and Associated Projects, which is still under environmental review, the following projects have received Findings of No Significant Impacts (FONSI): Dulles Concourse and Related Projects Environmental Assessment, completed August 2002; Dulles Air Traffic Control Tower Environmental Assessment; completed May 2003; and the Dulles Construction Service Road – Environmental Assessment – Finding of No Significant Impact, completed August 2003. These three projects are considered as part of the No Build and are not evaluated as part of the cumulative effects analysis presented for the Dulles Corridor Rapid Transit Project.

Coordination with FAA on the runways project has resulted in the identification of four potential resource areas where cumulative effects may be of concern. These resource areas of concern are: water resources, air quality, historic resources and resources protected under Section 4(f). The following is a summary of approximate effects related to the Dulles Airport Runways Project on the four identified resource areas. This summary of potential impacts associated with the Dulles Airport Runways Project is provided as a context for the evaluation of potential cumulative effects associated with the Dulles Corridor Rapid Transit Project.

Water Resources

The Dulles Airport Runways Project would have approximately 170 to 180 acres of wetland impacts, primarily to palustrine emergent and forested wetland types. Between 60,000 and 63,500 linear feet of streams would be impacted. Direct impacts to wetlands and streams would result from activities such as clearing vegetation, altering hydrology, filling wetlands and grading for construction activities. Indirect impacts would potentially result from alterations in hydrology. New development would occur within the 100-year floodplain, resulting in lost floodplain storage volume. Approximately 35 to 40 acres of floodplain would be affected.

Air Quality

Total Operation Emissions for the Dulles Airport Runways Project are below minimum levels and conform to the SIP. Construction-related emissions exceed minimum levels. However, they are accounted for in the SIP.

Historic Resources

The Dulles Airport Runways Project is not expected to result in impacts to historic architectural resources. Fourteen archaeological sites within the APE for the runways project have the potential to be impacted. Further studies and coordination are ongoing to determine potential adverse effects to these resources.

Section 4(f) Resources

The Dulles Airport Runways Project would not result in any use of Section 4(f) resources.

9.4.1.1 No Build Alternative

The No Build Alternative would not result in any project-related cumulative impacts. However, there are projects included in the No Build Alternative that will have direct and indirect effects within the limits of the study area. These projects and potential changes are unrelated to the LPA and would occur with or without the transit investment.

9.4.1.2 Wiehle Avenue Extension

Water Resources

The Wiehle Avenue Extension would not result in major long-term effects to wetlands, streams, floodplains or critical areas as defined in Section 4.2 and therefore would not contribute cumulatively to effects on these resources. For construction related effects and minor long-term effects, mitigation is proposed.

There would be no loss of wetlands as a result of the Wiehle Avenue Extension. The alignment crosses five streams, none of which would experience long-term effects.

The construction of bridge piers within floodplains would not result in an increase in surface elevations of more than one-foot within the 100-year floodplains identified. There would be no increased risk of on or off-site flooding associated with the project; therefore, the Wiehle Avenue Extension would not contribute cumulatively to effects on 100-year floodplains.

The Wiehle Avenue Extension would not result in the degradation of critical areas associated with water resources; therefore, it would not contribute cumulatively to effects on these areas.

Air Quality

The Dulles Corridor Rapid Transit Project is included in the Constrained Long-Range Plan (CLRP) prepared by the MWCOG Transportation Planning Board. EPA, FHWA, and FTA have concurred with the conformity determination for the CLRP. Therefore, the project conforms to the Virginia SIP. Fairfax and Loudoun counties, including the Dulles Corridor, are in attainment for CO, NO₂, PM10, Pb, and SO₂. The Dulles Corridor is located in an ozone non-attainment area. None of the one-and eight-hour CO concentrations are predicted to exceed the NAAQS at any of the intersections modeled; therefore, no mitigation is proposed. The Wiehle Avenue Extension would not contribute cumulatively to effects on the region's air quality.

Historic Resources

The Wiehle Avenue Extension would have no adverse effects on known archaeological resources or historic architectural resources. The Wiehle Avenue Extension would result in minor impacts related to slight increase in noise (that would not exceed FTA impact criteria) and minor visual impacts to three historic architectural resources. However, construction of the Wiehle Avenue Extension would not affect the characteristics that contribute to these resources' eligibility for the NRHP. The Wiehle Avenue Extension would not contribute cumulatively to effects on historic resources within the study area.

Section 4(f)

Seven Section 4(f) resources were identified within the limits of the Wiehle Avenue Extension. Based on the existing conditions, the Wiehle Avenue Extension operations would not substantially impair the protected activities, features, or attributes to six of these resources. Therefore, no use of these Section 4(f) resources would occur.

However, a potential physical use to one of these resources could result. The Wiehle Avenue Extension has the potential to constitute an additional Section 4(f) use of the Proposed Hunter Mill Historic District. However, the formal boundaries of this potential district have not been determined. Depending on the determination of the boundaries, the Wiehle Avenue Extension could potentially result in a physical use of this resource.

9.4.1.3 Full LPA

The cumulative effects analysis for the full LPA described below takes into consideration the potential effects identified for the Dulles Airport Runways Project. Even with these potential effects, the full LPA is not expected to result in cumulative effects, given the relatively small scale of the potential effects associated with the full LPA.

Water Resources

The full LPA would result in minor construction related and long-term effects to water resources. However, all impacts would be mitigated. A total of 5.2 acres of wetland impact, of which most occurs

with the Route 28 Station and S&I Yard Site 15. Of the 5.2 acres, 3.6 acres is associated with aerial bridge structures that would permanently change the vegetative class from forested wetland to emergent, but would not be a permanent impact per se because the wetlands would remain but rather, reestablish as an emergent wetland. Given the complexity and length of the project, the wetland impacts are relatively minor. Therefore, it is unlikely these wetland impacts would substantially contribute to the loss of wetlands.

In all, the corridor crosses ten streams. The Route 772 Station would result in piping underground 220 linear feet of a tributary to Broad Run and 25 linear feet of another intermittent tributary to Broad Run, for a total of 245 feet. Appropriate mitigation for these impacts is proposed.

The construction of bridge piers within floodplains would not result in an increase in surface elevations of more than one-foot within the 100-year floodplains identified. There would be no increased risk of on or off-site flooding associated with the project; therefore, the full LPA would not contribute cumulatively to effects on 100-year floodplains.

The full LPA would not result in the degradation of critical areas associated with water resources; therefore, it would not contribute cumulatively to effects on these areas.

Air Quality

The Dulles Corridor Rapid Transit Project is included in the Constrained Long-Range Plan (CLRP) prepared by the MWCOG Transportation Planning Board. EPA, FHWA and FTA have concurred with the conformity determination for the CLRP. Therefore, the project conforms to the Virginia SIP. Fairfax and Loudoun counties, including the Dulles Corridor, are in attainment for CO, NO₂, PM₁₀, Pb, and SO₂. The Dulles Corridor is located in an ozone non-attainment area. None of the one- and eight-hour CO concentrations are predicted to exceed the NAAQS at any of the intersections modeled; therefore, no mitigation is proposed. The full LPA would not contribute cumulatively to effects on the region's air quality.

Historic Resources

Seven archaeological resources were identified within the APE for archaeology. None of these resources would be impacted by construction of the LPA. Eight historic architectural resources were identified within the APE for architecture. In all, five of these resources would experience effects from the full LPA.

Four resources that are potentially eligible for listing in the NRHP would experience minor impacts related to slight increases in noise (that would not exceed FTA impact criteria) and minor visual impacts. However, construction of the LPA would not affect the characteristics that contribute to these resources' eligibility for the NRHP.

One resource, the Dulles Airport Historic District, would be adversely affected under Section 106. The addition of a Metrorail alignment within the district has a visual effect on the "peekaboo sequence" which is a contributing element to the district. However, the impacts would be mitigated through design considerations and the implementation of various treatment measures, which include interpretive exhibits, public artwork, photo documentation and/or landscaping to help preserve the airports' unique historic characteristics. It is not likely that the full LPA would contribute cumulatively to effects on historic resources.

Section 4(f)

In addition to the visual effects on the Dulles Airport Historic District, the full LPA would also result in a Section 4(f) physical use of the historic district. The alignment transitions would also result in a section 4(f) physical use of the historic district. The alignment transitions from at-grade to underground and from underground to aerial structure, which requires an easement from the MWA.

The full LPA has the potential to constitute an additional Section 4(f) use of the Proposed Hunter Mill Historic District. However, the formal boundaries of this potential district have not been determined. Depending on the determination of boundaries, the LPA could potentially result in a physical use of this resource.

Assessment of Cumulative Effects

The Dulles Airport Runways Project and the Dulles Corridor Rapid Transit Project are not related actions; they are independent of one another. The extent of potential impacts resulting from the Dulles Airport Runways Project has the potential to far exceed those impacts identified for the Dulles Corridor Rapid Transit Project. Based on the technical analysis conducted for the Final EIS, the Proposed Action would not result in major impacts to the resources identified and therefore, would not contribute substantially to potential cumulative effects related to other relevant, foreseeable projects, such as the Dulles Airport Runways Project.

9.5 MITIGATION

Secondary and cumulative effects associated with this project are primarily attributable to projects considered part of the No Build Alternative and secondary development at transit station areas.

Direct impacts resulting from the other projects included in the No Build Alternative would be mitigated as a part of their construction. Any secondary or cumulative effects to the built and natural environment resulting from additional station area development would be mitigated through compliance with Fairfax and Loudoun Counties' land use policies and development permitting processes. County regulations allow the localities to cluster future development in locations that are best able to support that development in terms of providing transit, pedestrian, and bicycle access to residents and employees. In the future, the counties may limit development at station areas if necessary to mitigate any associated impacts to the surrounding community.

Mitigation measures specific to the four resource areas identified are described in the relevant Sections of this Final EIS. No additional mitigation measures are proposed.