U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION &
VIRGINIA DEPARTMENT OF TRANSPORTATION

DULLES AIR CARGO, PASSENGER & METRO ACCESS HIGHWAY

DRAFT ENVIRONMENTAL ASSESSMENT

SUBMITTED PURSUANT TO 42 U.S.C. 4332(2)(C)
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ENVIRONMENTAL ASSESSMENT

Dulles Air Cargo, Passenger and Metro Access Highway
Loudoun County
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Chapter 1.0 PURPOSE AND NEED

The Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration (FHWA) as the lead federal agency and the Federal Aviation Administration (FAA) as a cooperating agency, is evaluating options to address transportation needs west of the Washington Dulles International Airport (IAD) in Loudoun County, Virginia. Pursuant to the National Environmental Policy Act (NEPA) of 1969 and in accordance with FHWA regulations[1], this Environmental Assessment (EA) has been prepared to analyze the potential social, economic, and environmental effects associated with the proposed alternative solutions.

1.1 BACKGROUND

1.1.1 Washington Dulles International Airport Expansion

In April 2012, the Metropolitan Washington Airports Authority (MWAA) announced its initiative to solidify IAD as a major east coast transportation hub. To advance this initiative, MWAA plans to expand airport facilities west of Runway 1L-19R on three areas identified as the Western Land Area (WLA), Airport Support Zone (ASZ), and General Aviation (GA) site, which together are comprised of approximately 1,000 acres of currently undeveloped land, herein referenced as the "Western Development Area". Within the Western Development Area, the WLA would consist of mixed general aviation support, cargo freight, commercial, and industrial development, while the ASZ would be limited to cargo facilities and infrastructure and the GA would provide services for local aircraft and unscheduled flights. As part of the planned expansion, IAD would increase its freight capacity and nearly double the existing 540,000 square footage of operational cargo space (Board of Supervisors, 2012c). Freight forecasts indicate an anticipated growth in total freight activity at IAD by approximately 105 percent between 2010 and 2030, with international freight predicted to increase by more than 700 million pounds (Ricondo & Associates, 2010, p. 27). The western development area would provide the additional cargo space necessary to accommodate this predicted freight growth. Emphasizing the increasing importance of this cargo expansion, MWAA has been soliciting interest for a major cargo distribution facility with operators such as FedEx and UPS as well as coordinating with Loudoun County to develop plans for a major aircraft manufacturing facility (MWAA, 2013).

In order to facilitate direct access to the expanded air cargo activities and western development area, as well as provide general circulation within airport boundaries, several transportation portals were identified along VA Route 606 in the *Washington Dulles International Airport Access and Parking Study* (MWAA, 2004, p. 16-17). MWAA's 2011 Airport Land Use Plan (ALUP) includes reserved space for an interchange with VA Route 606 and internal road elements linking to the main passenger terminal area (MWAA, 2011). Planning for this internal public roadway network has occurred concurrently with the conceptual development of the western airport expansion. MWAA's current concepts for the western development area and connecting roadway facilities are illustrated in **Figure 1–1.** MWAA has indicated that this supporting roadway network is anticipated to be constructed as a two-lane facility by 2025, with plans for a four-lane expansion by 2040 (MWAA, 2013).

[1] The National Environmental Policy Act (NEPA) and the US Department of Transportation, Federal Highway Administration's regulations for Environmental Impact and Related Procedures are codified in 42 USC § 4332(c), as amended, and 23 CFR § 771, respectively.

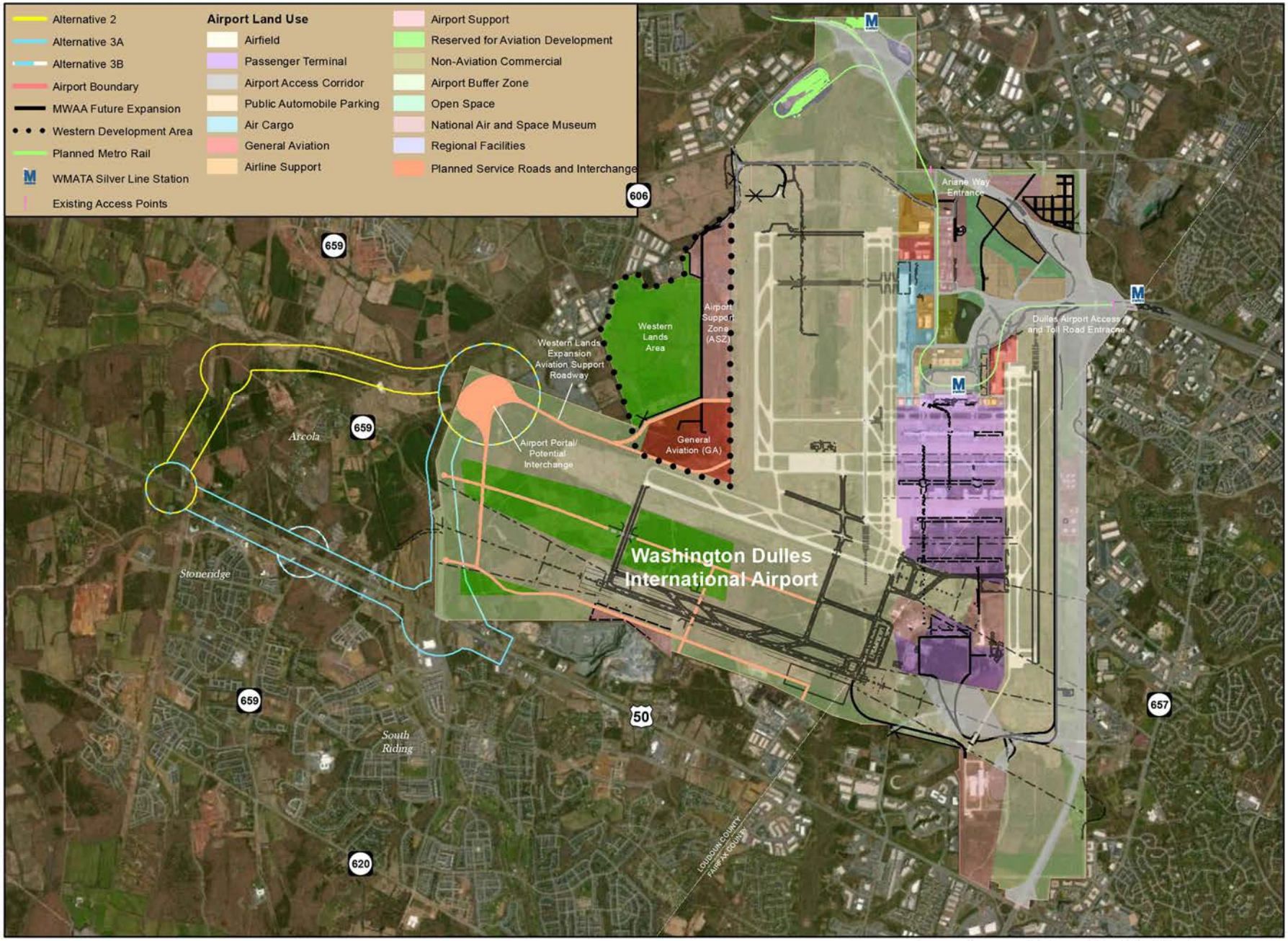

Figure 1-1: Planned MWAA Development

Source: Metropolitan Washington Airports Authority

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Local economic development officials identify the lack of roadway access to the western side of the airport as a major impediment to economic development activities in and around airport property. Acknowledging MWAA's expansion initiative and the need for transportation infrastructure improvements to airport access, the Loudoun County Board of Supervisors passed a resolution, "Air Cargo Support for North-South Corridor", on November 7, 2012 supporting VDOT's efforts to construct the North-South Corridor from Dulles Airport to I-66 (Board of Supervisors, 2012b, p.16).

1.1.2 Metrorail Silver Line

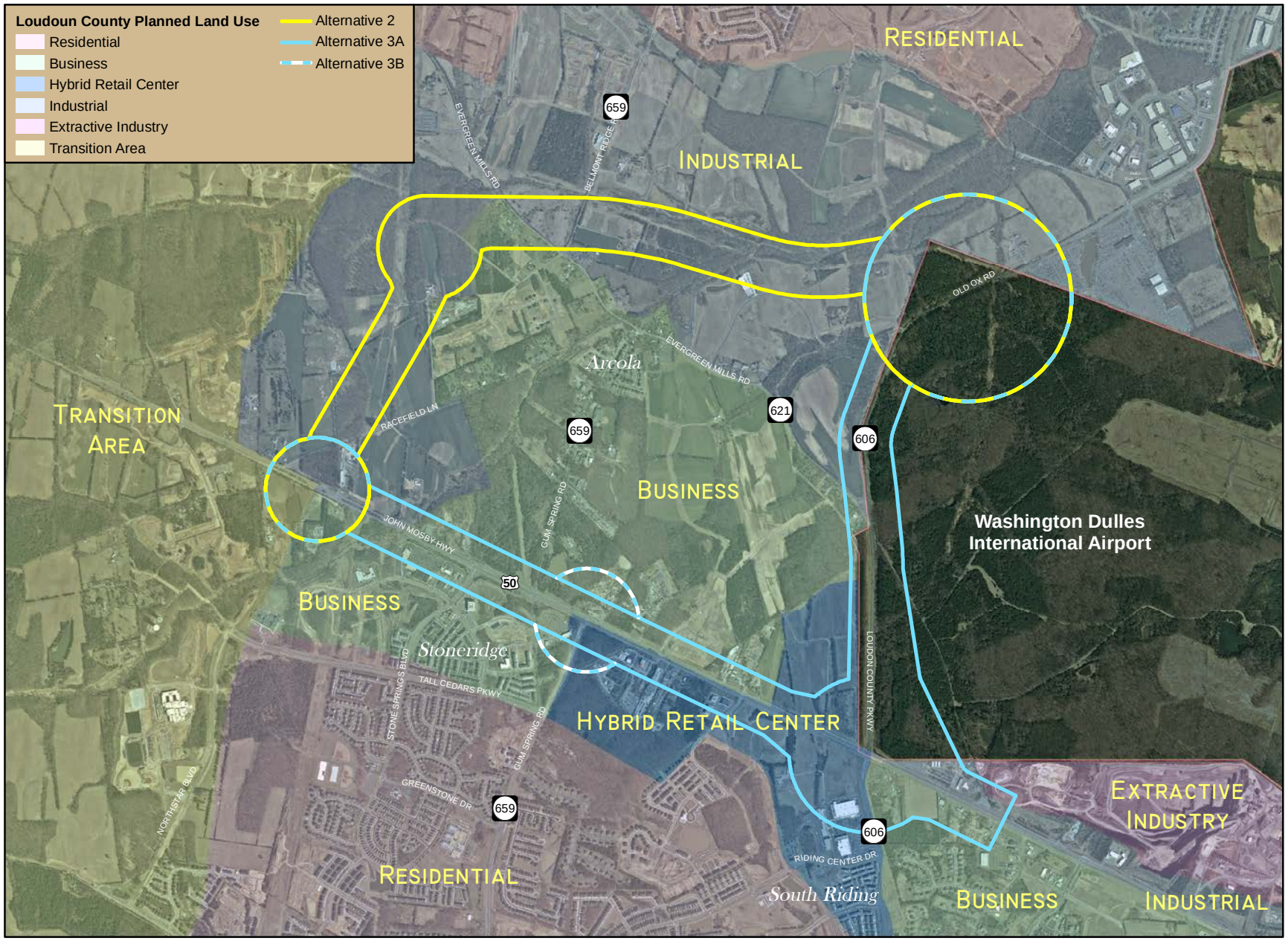
MWAA is currently constructing a 23-mile extension of the existing Metrorail system, to be operated by the Washington Metropolitan Transit Authority (WMATA). MWAA included the Metrorail Silver Line in its long range planning for the airport[2] to provide a viable alternative connection and reduce travel times between downtown Washington, DC and the Dulles Corridor. The Metrorail Silver Line extension is planned to link the existing East Falls Church Metrorail Station with IAD, VA Route 606 at the Dulles Greenway, where a park and ride for express bus service is currently located, and Route 772 by 2018. Transit boardings are expected to be substantially higher than the existing corridor express buses due to the Metrorail's ability to run multiple train cars simultaneously (FTA, 2004). Furthermore, construction of the Metrorail stations would increase parking at the existing VA Route 606 Park and Ride from 750 spaces to 2,750 spaces and would introduce 3,300 spaces at the Route 772 station. Introduction of this service will create an increased demand on local roadway traffic west of IAD.

1.1.3 Loudoun County Land Use

The introduction of the Metrorail and IAD expansion is reflective of the changes and rapid growth that have occurred in Loudoun County in recent decades, particularly in the eastern most portion of the county. Under *Loudoun County's Revised Comprehensive Plan* (**Figure 1–2**), this Suburban Policy Area, which is bounded by the Potomac River to the north, Braddock Road to the south, the Fairfax County line to the east, and Goose Creek, property lines, roadways, and power line easements to the west, has been designated as the primary location for suburban-scale residential and nonresidential development. The Suburban Policy Area serves as a transitional zone between the suburban growth surrounding metropolitan Washington, DC and the traditionally more rural areas of Loudoun County. Since the 1990s, the Suburban Policy Area experienced an increase in population by approximately 128 percent and the construction of more than 25,000 new homes (Board of Supervisors, 2011).

Much of the growth has been concentrated in the Dulles Policy Subarea, which encompasses IAD and the areas immediately west of the airport, as evidenced by the 429 and 354 percent growth in population and housing units, respectively, since 2000. This is compared to 84 percent population and 76 percent housing unit growth overall within Loudoun County (Loudoun County Department of Management, 2012). Within this high growth Policy Subarea, several mixed-use and commercial developments are currently under development, including the Arcola Center, Dulles Landing, and Glascock Field at Stoneridge. As a result, Loudoun County has recently recommended to the Metropolitan Washington Council of Governments (MWCOG) that the area surrounding the US Route 50 / VA Route 606 interchange be designated as an Activity Center to be included in future regional forecasting. Activity Centers serve as one of the guiding principles for land use plans by the localities which feed into the cooperative planning forecasts produced by MWCOG (Loudoun County Department of Planning, 2013).

[2] Planning for future rail transit station at IAD included in the 1985 *Master Plan Update*, MWAA's most recent Master Plan on file (FAA, 1985, p. 135).



VDOT

Figure 1-2: Loudoun County Revised Comprehensive Plan

Source: Loudoun County

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1.2 DESCRIPTION OF THE PROJECT STUDY AREA

The project study area for this evaluation encompasses an approximate 3.5-mile diameter circle centered on Evergreen Mills Road (VA Route 621) between Gum Spring Road (VA Route 659) and Trade West Drive. As illustrated in **Figure 1–3**, the proposed project study area is generally bounded by Creighton Road to the north, Providence Ridge Drive to the south, IAD property to the east, and Lenah Run to west, focusing on the Dulles South area located in the southern region of Loudoun County.

1.3 NEEDS FOR THE PROJECT

Based on the background information previously introduced above, three distinct transportation needs have been identified and are described in detail below.

1.3.1 Enhance Access to the Planned Western Development Area at Washington Dulles International Airport

Existing Conditions

Primary access to IAD is presently oriented towards the east of the airport, via the Dulles Airport Access and Toll Road (VA Route 267), where population and economic growth have historically been concentrated. In addition, Ariane Way located to the northeast of IAD provides a secondary access point to the existing cargo area, located on the north side of the airport within the main campus.

The existing cargo infrastructure at IAD was constructed for low volume cargo distribution and cannot accommodate current space demands (Ricondo & Associates, 2010). These existing facilities no longer meet the requirements of current cargo carriers for large, high volume cargo operations at IAD. As a result, MWAA has evaluated numerous relocation and configuration options for long-term cargo development and has targeted the WLA expansion to address long-term cargo growth at IAD. According to the *Dulles Loop Implementation Plan*, 80 percent of traffic using VA Route 606, VA Route 28 and US Route 50 is not associated with travel to and from the airport meaning baseline traffic congestion on airport access roadways is impacting access to and from IAD (Michael Baker Jr., Inc., 2009).

Locally, passengers and freight traffic must follow a circuitous route along VA Route 606 from US Route 50, or Sully Road (VA Route 28), to Ariane Way or the Dulles Airport Access and Toll Road (VA Route 267). Furthermore, traffic generated by the existing residential and mixed-use development within the project study area described in this EA, is confined to use the same routes. Regionally, passenger and freight traffic traveling to and from the airport must combine with substantial on-airport traffic traveling to and from Washington, DC and surrounding metropolitan areas, thus intensifying travel demand on the existing roadway facilities in and around IAD[3]. As a result, Loudoun County recognizes the need to facilitate a more convenient access to and around IAD and has identified in their 2010 *Revised Countywide Transportation Plan* (CTP) (**Figure 1–4**) a limited and/or controlled access facility surrounding the perimeter of the Dulles Airport (Board of Supervisors, 2012a, p 2-20).

[3] Local traffic accounted for approximately 78 percent of traffic in the immediate vicinity of IAD in 2005, according to Washington Airports Task Force's *Dulles Airport Access Study* (2005).

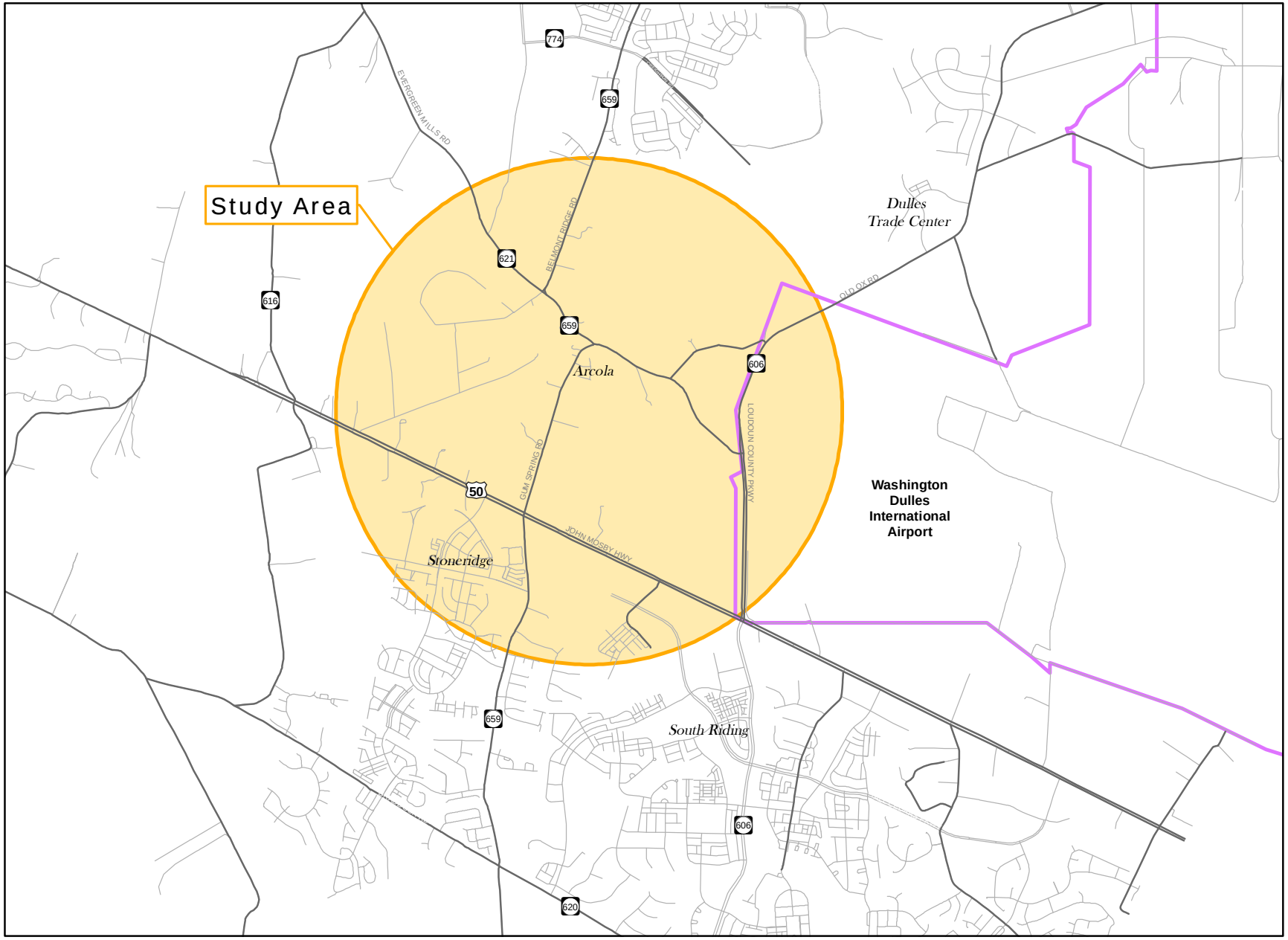

Figure 1-3: Proposed Project Study Area

Source: Loudoun County

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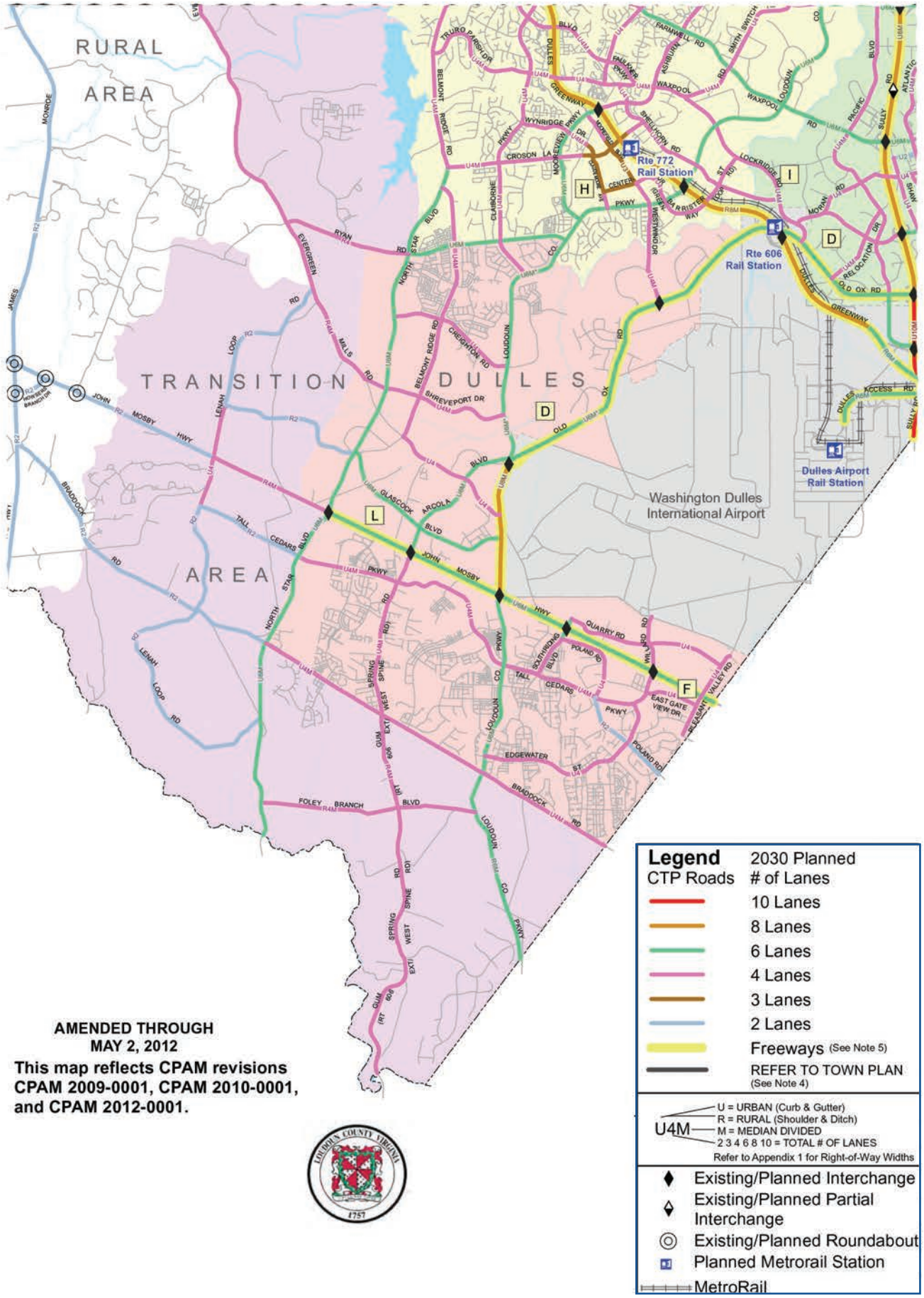

Figure 1-4: Revised Loudoun County: Countywide Transportation Plan (Dulles South)

Source: 2010 Revised Countywide Transportation Plan - Loudoun Co.

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Future Conditions

MWAA's proposed improvements for the Western Development Area calls for construction of a public roadway alignment along the northwest portion of the airport property to connect with undeveloped land dedicated for air cargo development, as well as other sites planned for general aviation and support services. Access to this future roadway network is confined to the north (Ariane Way) or to the east (Dulles Airport Access and Toll Road), as described above. Travel demand generated by the planned Western Development Area will increase the need for improved access west of IAD. The lack of sufficient access into the airport would impede the airport's foreseeable capacity to serve the Western Development Area in the future. As evidenced by FHWA's *Freight Facts and Figures 2012*, the demand for freight transportation is corollary with population and economic growth (Federal Highway Administration [FWHA], 2012b). In order to capitalize on the potential economic benefits offered by IAD, there is a need for improved movement of goods to and from the airport facilities.

Landside access is a key consideration in determining how IAD can grow to accommodate additional cargo volume and how effectively it competes for discretionary cargo with other major freight airports (Cambridge Systematics, Inc., 2013). MWAA's future investment in the western lands expansion will require adequate access to the airport west of IAD to facilitate the intermodal connections between truck and air cargo freight, while maintaining the existing transportation infrastructure conditions in the project study area.

In addition to supporting the region's sustained economic growth, IAD is also a gateway to national and international markets. IAD is especially attractive for international shipping companies, as it is located within an overnight road delivery trip to 56 percent of the United States population (MWAA, 2012b). There is a need for enhanced movement in and out of IAD, so that cargo freight services can easily transport goods and services globally and domestically.

1.3.2 Relieve Congestion

Existing Conditions

The project study area encompasses one of the fastest growing regions in the entire Washington, DC metropolitan area. In addition to the economic growth offered by IAD, increases in population and employment, unrelated to the airport facilities, have resulted in a great deal of economic development within the project study area. **Table 1-1** illustrates the population and employment growth that is forecasted to occur within the project study area, Loudoun County, and the surrounding Washington Metropolitan Region. This population and employment growth is anticipated to add to traffic congestion during both peak and off-peak periods.

Table 1-1: Population and Employment Surrounding Dulles[1]

Location	2010		2040		Percent Change	
	Population	Employment	Population	Employment	Population	Employment
Project study area	18,507	19,941	58,440	51,891	216%	160%
Loudoun County	312,331	142,738	480,525	285,449	54%	100%
Metropolitan Region	6,625,384	3,992,382	8,660,708	5,617,587	31%	41%

[1]According to an *Economic Impact Study* conducted by MWAA, the number of full- and part-time employees at IAD totaled 17,948 and overall, IAD was responsible for the creation of over 96,980 jobs with an associated $10.123 billion of economic activity in Virginia in 2009 (Louis Berger Group, 2010).
Source: Metropolitan Washington Council of Governments (2012, July). *Round 8.1 Cooperative Forecasts*. Retrieved from http://www.mwcog.org/publications

The growing populations west of IAD frequent US Route 50 and Old Ox Road (VA Route 606) / Loudoun County Parkway as part of their daily commutes or to access points of interest in and around the Washington Metropolitan Region.

Table 1-2 defines the various LOS and their relationship to roadway segment congestion and **Table 1-3** defines LOS as it relates to intersection operations.

Table 1-2: Roadway Segment LOS Descriptions

LOS	Description	Congestion Level
A	Free traffic flow with low volumes and high speeds. Speeds controlled by driver desires, speed limits, and physical roadway conditions. Vehicles almost completely unimpeded in their ability to maneuver within the traffic stream.	Low
B	Stable traffic flow, with operating speeds remaining near free flow. Drivers still have reasonable freedom to maneuver with only slight restrictions within the traffic stream.	Low
C	Stable flow, but with higher volumes, more closely controlled speed and maneuverability that is noticeably restricted.	Moderate
D	Approaching unstable flow with tolerable operating speeds maintained, but considerably effected by changes in operating conditions. Freedom to maneuver within the traffic stream is more noticeably limited.	Moderate
E	Unstable flow with low speed and momentary stoppages. Operations are at capacity with no usable gaps within the traffic stream.	Severe
F	Forced flow with low speed. Traffic volumes exceed capacity and stoppages for long periods are possible.	Severe

Source: Highway Capacity Manual, Transportation Research Board, 2010.

Table 1-3: Roadway Intersection LOS Descriptions

LOS	Description	Congestion Level
A	Progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.	Low
B	Good progression with short cycle lengths. Some vehicle stoppage may occur, causing slightly higher levels of delay.	Low
C	Higher delays resulting from fair progression, longer cycle lengths, or both. Individual cycle failure may begin to occur at this level, resulting in some overflow. The number of vehicles stopping is significant at this level, but many still pass through the intersection without stopping.	Moderate
D	Longer delays may result from some combination of unfavorable progression, long cycle lengths, and lane flow rates conflicting with signal timing. Individual cycle failures are noticeable at this level[1].	Moderate

LOS	Description	Congestion Level
E	High delay level indicative of poor progression, long cycle lengths, and high ratios of conflicts between lane flow rates and signal timing. Individual cycle failures are frequent[1].	Severe
F	Arrival flow rates exceed the capacity of lane groups and conflicting signal timing. Evidenced by poor progression and long cycle lengths with many individual cycle failures[1]. Considered to be unacceptable by most motorists.	Severe

[1]Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur.
Source: Highway Capacity Manual, Transportation Research Board, 2000, pp. 10-15–17.

Average Daily Traffic (ADT) is defined as the total volume of traffic passing a point or segment of a highway facility in both travel directions. Similarly, Level of Service (LOS) is a qualitative measure of operational conditions within a traffic stream, based on criteria such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience (TRB, 2000). **Table 1-4** indicates that US Route 50 is congested at a majority of the intersections in the project study area, especially during the peak travel hours. Likewise, traffic volumes on Old Ox Road (VA Route 606) have grown to exceed the capacity of the roadway, especially along the two-lane facility between Arcola Road and the Dulles Greenway. As presented in **Table 1-5,** an analysis of the existing ADT and LOS along roadway segments within the project study area reveals high levels of traffic and inhibited travel, indicative of severe congestion.

Table 1-4: Existing and Future Level of Service[1] at Intersections within the Project study area

Intersection	Level of Service			
	Existing (2012)		No Build (2040)	
	AM	PM	AM	PM
Route 50 at Stone Springs Boulevard	C or Better	C or Better	C or Better	E
Route 50 at Gum Spring Road	F	F	E[1]	F[1]
Route 50 at Hutchinson Farm Drive	E	C or Better	E	F
Route 50 at Pinebrook Road	D	C or Better	E	F
Route 50 at Loudoun County Parkway	D	D	--[2]	--[2]
Route 50 at South Riding Boulevard	C or Better	C or Better	C or Better	D
Route 50 at Poland Road/Tanner Lane	C or Better	C or Better	D	F
Route 50 at Tall Cedars Parkway	E	C or Better	E	D
Loudoun County Parkway at Evergreen Mills Road	D	C or Better	F	F
Loudoun County Parkway at Tall Cedars Parkway	C or Better	C or Better	F	F
Loudoun County Parkway at Old Ox Road (Route 606)	--	--	F	F
Evergreen Mills Road at Belmont Ridge Road/Briarfield Lane	F	F	F	F
Evergreen Mills Road at Gum Spring Road	F	D	F	F

[1]LOS is shown for the worst peak hour and peak direction
[2]This assumes future improvements at this intersection that are included in the CLRP. This includes widening Route 50 and installing additional turn lanes on Route 50 and Gum Spring Road. The existing Route 50 at Loudoun County Parkway intersection is an interchange in the future, per the CLRP.

Table 1-5: Existing and Future Traffic Volumes and Level of Service[1] for Roadway Segments within the Project study area

Roadway	Segment	Existing (2012)		No Build (2040)	
		ADT	LOS	ADT	LOS
US Route 50	Fleetwood to Gum Spring Road (1.43 mi)	16,500	C or Better	24,800	C or Better
	Northstar Boulevard/Bi-County Parkway to Gum Spring Road (0.9 mi)	--	--	38,000	D
	Gum Spring Road to Loudoun County Parkway (1.35 mi)	31,000	C or Better	59,000	F
	Loudoun County Parkway to South Riding Boulevard (0.87 mi)	36,000	C or Better	54,900	C or Better
Loudoun County Parkway	Tall Cedars Parkway to US Route 50 (0.38 mi)	13,500	C or Better	18,100	C or Better
	US Route 50 to Evergreen Mills Road (0.60 mi)	30,500	C or Better	61,500	F
	Evergreen Mills Road to Arcola Road (0.62 mi)	21,500	D	51,000	F
Gum Spring Road	Braddock Road to US Route 50 (2.01 mi)	17,000	C or Better	27,300	D
	US Route 50 to Evergreen Mills Road (1.06 mi)	9,000	C or Better	19,000	F
Evergreen Mills Road	Evergreen Mills Road from Belmont Ridge Road to Gum Spring Road (0.41 mi)	20,500	F	23,800	F
	Evergreen Mills Road from Gum Spring Road to Loudoun County Parkway (1.08 mi)	13,000	C or Better	15,600	F
Tall Cedars Parkway	Tall Cedars Parkway (east of Loudoun County Parkway)	9,000	C or Better	23,300	C or Better

[1]LOS is shown for the worst peak hour and peak direction

Note: Northstar Boulevard/Bi-County Parkway is included in the regional CLRP and is anticipated to be completed by 2035. It is not included in the calculations for existing traffic conditions.

Future Conditions

Located in a region that is projected to substantially increase in population and employment in the future, the project study area is anticipated to see an increasing demand for travel. Consequently, as presented in **Table 1-4** and **Table 1-5**, overall congestion and traffic volume for roadway segments and intersection delays in the project study area are expected to substantially worsen by the design year of 2040. Increased congestion would be experienced for local and regional traffic traveling to IAD along roadway segments in the project study area, and would hinder the anticipated freight truck traffic associated with IAD's planned cargo expansion. In addition to improving access for purposes of freight shipping, personal travel, and employment associated with IAD, roadway improvements are also needed to accommodate existing and forecasted local travel demands in the Dulles South area located in the Southern Region of Loudoun County.

1.3.3 Facilitate Intermodal Relationships

Existing Conditions

Currently, few project study area residents and employees (3.5%) use public transportation to travel to work (American Community Survey, 2011). Existing public transportation[4] in the project study area consists of Loudoun County's Commuter Bus Service, which presently provides ten morning and 14 afternoon peak-period express bus service routes to and from destinations that include West Falls Church

[4] Considered Commuter Bus Service routes in Dulles South and Brambleton areas.

Metro, Rosslyn, the Pentagon, and other locations in downtown Washington, DC, for an average of 933 weekday riders (Loudoun County, 2013b). Because the existing transit system operates on the congested roadways described above, as well as others with similar conditions, it offers a limited alternative to automobile travel. The Metrorail Silver Line extension is intended to increase transit ridership and improve transportation service. The first phase of construction is nearly complete, with construction anticipated for completion by August 2013 and passenger service beginning in December 2013.

Future Conditions

The addition of the Silver Line extension would link individuals to employment and activity centers closer to Washington, DC with a more efficient, high-capacity transit option. The entire Metrorail Silver Line expansion is expected to reach full project completion and begin service to the Route 772 Station in Dulles by December 2018 (MWAA, 2012c). By 2025, anticipated ridership on the Silver Line is expected to attract approximately 4,485 and 6,961 boardings at the Route 606 and Route 772 stations, respectively (Federal Transit Administration [FTA], 2004). In order to provide connectivity to these Metrorail Silver Line stations locations and the mobility benefits that the system would offer, an enhanced transportation network is necessary. Increasing congestion exceeding roadway capacity would inhibit access, as traffic to and from the Metrorail Silver Line stations would be combined with local traffic, further worsening issues of volumes, congestion, and delays in the project study area. The future planned completion of the Loudoun County Parkway (VA Route 607) from Old Ox Road (VA Route 606) / Arcola Road (VA Route 842) to Ryan Road (VA Route 772) would enhance connections to the future Silver Line station at Ryan Road (VA Route 772). However, Old Ox Road (VA Route 606) / Loudoun County Parkway, from US Route 50 to Arcola Road (VA Route 842), are projected to be overcapacity (LOS F) in 2040 for those traveling from the Dulles South area.

1.4 SUMMARY

The purpose of the proposed Dulles Air Cargo, Passenger, and Metro Access Highway (DACPMAH), presently under study, is to improve capacity on the existing roadway network in the project study area, based on three distinct transportation needs:

- Enhance access to the planned western development area at the Washington Dulles International Airport;
- Relieve congestion; and
- Facilitate intermodal relationships.

Chapter 2.0 ALTERNATIVES

Four alternatives, which include the No Build Alternative and three Build Alternatives, have been developed for study in this EA and are described in the sections that follow. Alternatives development was based on initial project scoping and screening efforts, which included public and agency involvement, consideration of environmental concerns, preliminary engineering issues, and their ability to meet Purpose and Need. The proposed DACPMAH would extend from the interchange of the planned Northstar Boulevard/Bi-County Parkway (VA Route 411) and US Route 50 to the existing intersection of Old Ox Road (VA Route 606) and Arcola Road (VA Route 842), where future Washington Dulles International Airport (IAD) access roads and an extension of the Loudoun County Parkway are planned to converge.

2.1 ALTERNATIVES CARRIED FORWARD

2.1.1 No Build Alternative (Alternative 1)

The No Build Alternative serves as a benchmark for comparison to the proposed project alternatives. The No Build Alternative would include all planned and programmed transportation improvements in the project study area that have been approved and adopted for implementation by 2040, as identified in the most recent *National Capital Region's Financially Constrained Long-Range Plan* (CLRP). Prepared by the National Capital Region Transportation Planning Board (TPB), which is the designated Metropolitan Planning Organization (MPO) for the Washington, DC region under the MWCOG, the CLRP includes projected transit and traffic, demographics, and air quality conditions through the 2040 horizon year. The roadway projects listed in the CLRP that would affect the project study are illustrated on **Figure 2–1** and include the following:

- Construction of the Loudoun County Parkway (VA Route 607) to four lanes from Old Ox Road (VA Route 606) / Arcola Road (VA 842) to Ryan Road (VA Route 772);
- Widening of US Route 50 from four to six lanes from Gum Spring Road (VA Route 659) to Sully Road (VA Route 28);
- Completion of the new Bi-County Parkway (VA Route 411), a four lane limited access facility from VA Route 234 in Prince William County at I-66 to US Route 50, west of Dulles Airport along the Northstar Boulevard alignment in Loudoun County;
- Widening of Gum Spring Road (VA Route 659) from two lanes to a four lane divided facility from Braddock Road (VA Route 620) to US Route 50;
- Reconstruction and widening of Old Ox Road (VA Route 606) from two to four lanes from Moran Road (VA Route 634) to Evergreen Mills Road (VA Route 621);
- Construction of an interchange at US Route 50 and Old Ox Road (VA Route 606) / Loudoun County Parkway; and
- Construction of Tall Cedars Parkway to a four lane divided facility from Gum Spring Road (VA Route 659) to Pinebrook Road.

Transit projects, as illustrated in **Figure 2–2** that are listed in the CLRP and included for consideration under the No Build Alternative include the following:

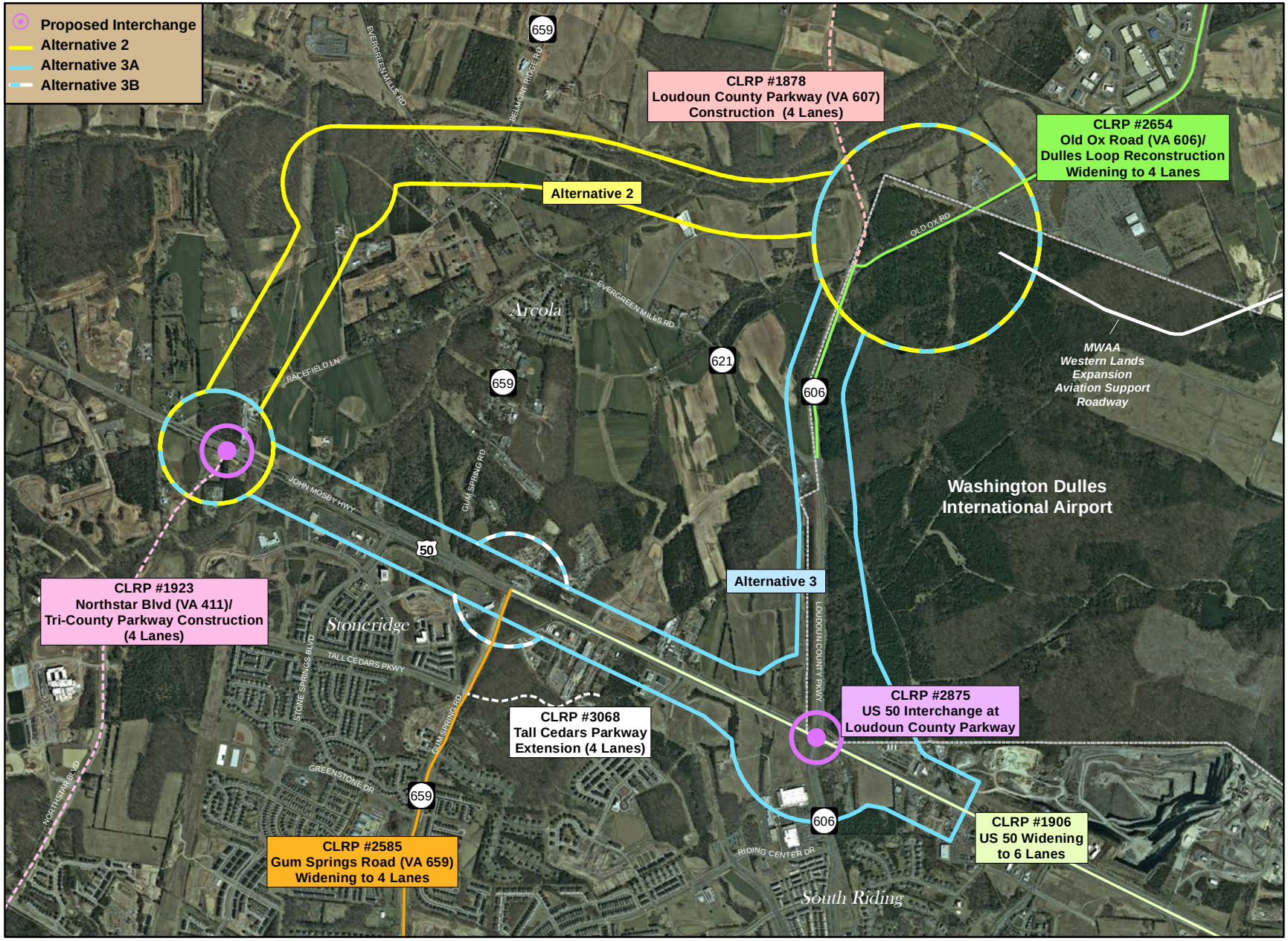


Figure 2-1: CLRP Planned Roadway Improvements and Location Study Corridors

Source: Loudoun County

Miles
0 0.25 0.5 0.75 1

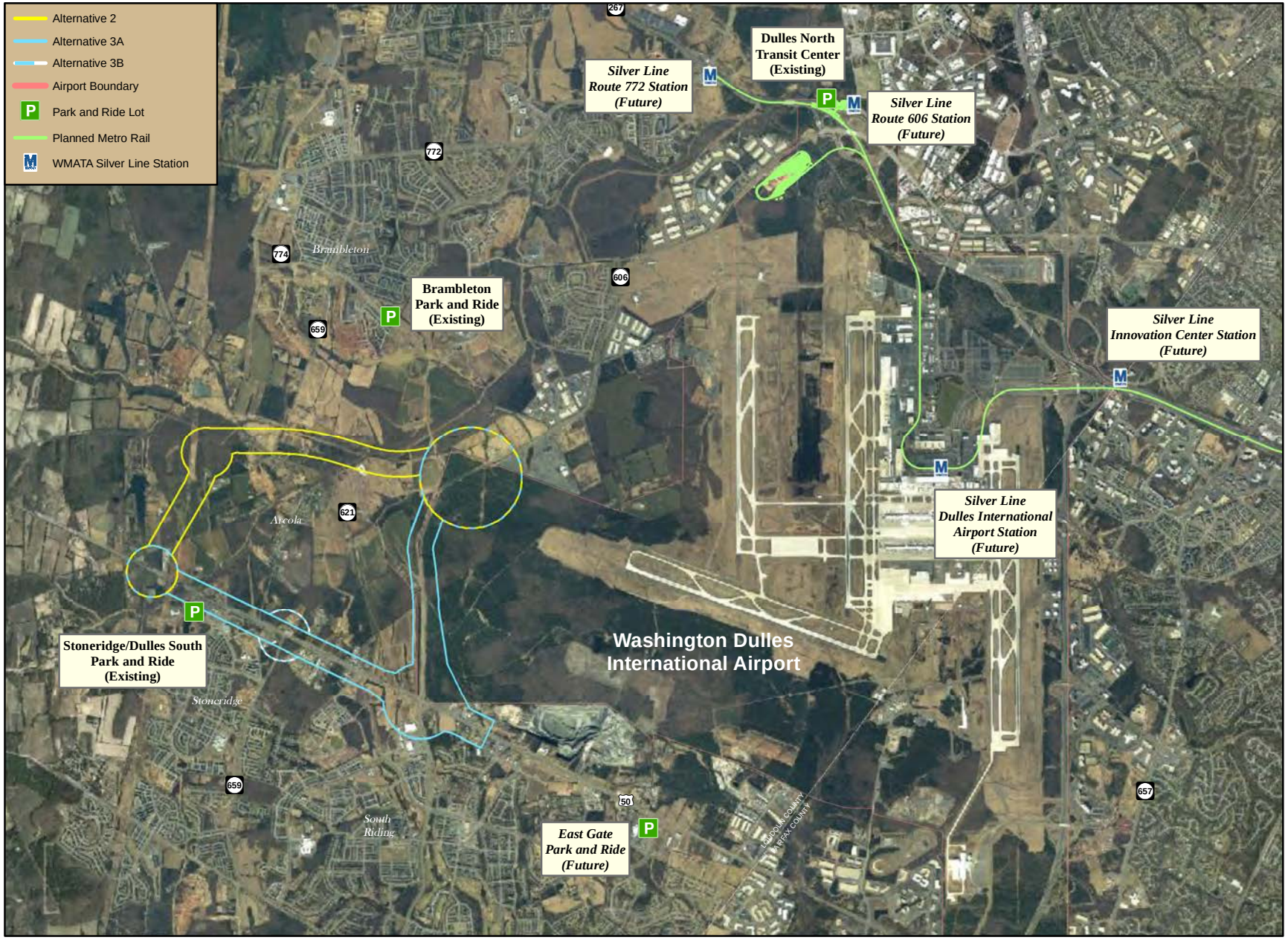


Figure 2-2: CLRP Planned Transit Improvements

Source: Loudoun County

Miles 0 0.5 1 1.5 2

- Park and Ride Lot: US Route 50 at Stone Ridge – 150 spaces
- Park and Ride Lot: US Route 50 Dulles at East Gate – 200 spaces
- Park and Ride Lot: Brambleton at Creighton Road (VA Route 774) – 100 space expansion
- Dulles Corridor Metrorail (Silver Line): East Falls Church Metrorail Station to Wiehle Avenue
- Dulles Corridor Metrorail (Silver Line): Wiehle Avenue to Route 772

Under the No-Build Alternative, no additional roadway infrastructure, beyond those projects funded in the CLRP, are assumed to be in place to the west of the airport by 2040. The No-Build Alternative would not satisfy the identified needs of the project. It would not enhance the planned western access to IAD, relieve congestion, nor would it facilitate intermodal relationships.

2.1.2 Build Alternatives Carried Forward

Also shown previously in **Figure 2–1**, two Location Study Corridors (Alternative 2 and Alternative 3) incorporating three potential Build Alternatives (Alternative 2, 3A, and 3B) have been identified for study in this EA as potential alignments for the proposed Dulles Air Cargo, Passenger, and Metro Access Highway. The sections that follow provide detailed descriptions of the build alternatives that remain under consideration for the proposed project.

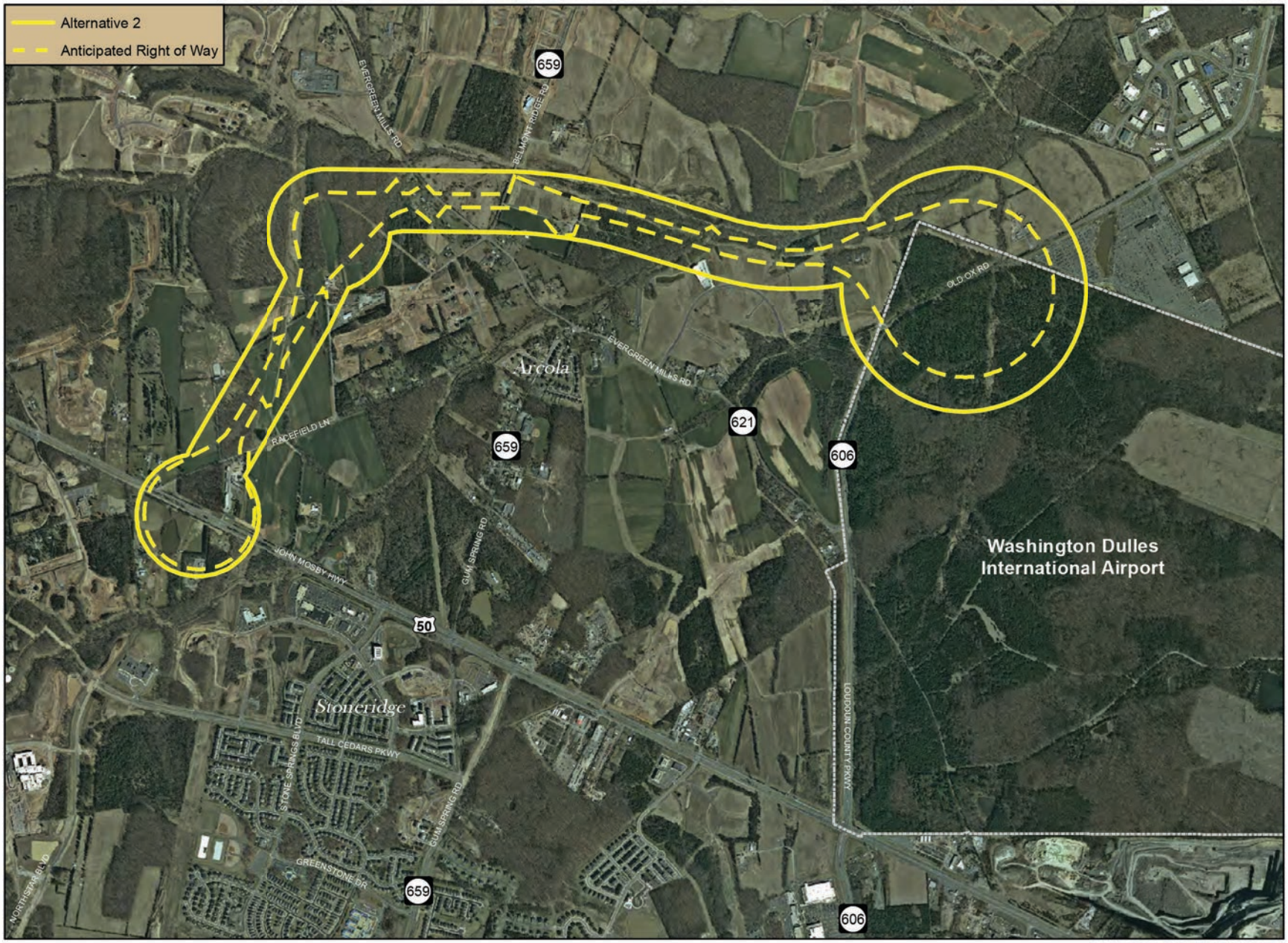
The Location Study Corridors for each Build Alternative have been developed to identify the project "footprint" and are generally 1,000 feet wide along the mainlines, with circular project study areas where interchange connections would be made. The Location Study Corridors are described in greater detail in **Chapter 3.0** as they are used as boundaries for the inventory of environmental resources to allow for a relative comparison of each Build Alternative.

Alternative 2: Proposed New Location

Alternative 2 (**Figure 2–3**) would originate at US Route 50, approximately 2.2 miles west of its existing intersection with the Loudoun County Parkway (Route 607), in the location where the Bi-County Parkway (VA Route 411) interchange is planned. Alternative 2 would connect to the proposed interchange allowing for all movements to and from US Route 50 and the proposed Bi-County Parkway (VA Route 411)[5]. From US Route 50, the proposed alternative would follow a new alignment located within the same corridor as Loudoun County's proposed Northstar Boulevard, extending approximately one-mile northeast before turning due east approximately 0.25 mile south of Evergreen Mills Road (VA Route 621). The alignment would continue east for approximately 1.7 miles, with an overpass at Belmont Ridge Road (VA Route 659) and Evergreen Mills Road (VA Route 621) until intersecting with existing Old Ox Road (VA Route 606) / Loudoun County Parkway. This connection would consist of a full-access interchange with Old Ox Road (VA Route 606), the planned Loudoun County Parkway (VA Route 607) extension, and planned airport connector roads. Alternative 2 would be a limited access highway, specifically, with no direct access to adjoining properties. Instead, connections with arterial roadways would be provided via US Route 50, Bi-County Parkway, Old Ox Road (VA Route 606), planned extension of Loudoun County Parkway (VA Route 607) and the planned airport connector roads.

As shown in the typical section (See **Figure 2–4**) for Alternative 2, the proposed alignment would consist of a four-lane divided principal arterial with a design speed of 60 miles per hour.

[5] If for any reason the Bi-County Parkway is not constructed, US Route 50 would remain a logical termini and the interchange between US Route 50 and the proposed DACPMAH would be designed accordingly.



VDOT

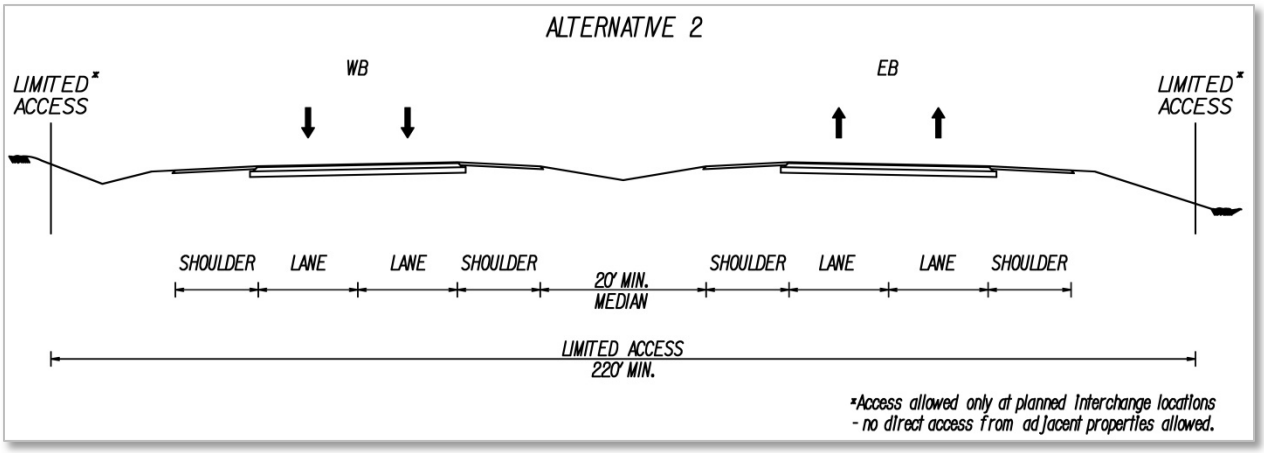
Figure 2-3: Alternative 2 Location Study Corridor and Anticipated Right-of-Way

Source: Loudoun County

N W E S

0 0.25 0.5 0.75 1 Miles

Figure 2–4: Alternative 2 Typical Roadway Section



Alternative 3

Alternative 3 would consist of improvements along existing US Route 50 and Old Ox Road (VA Route 606) from the location of the planned US Route 50 interchange at Bi-County Parkway[5] to a proposed full-access interchange with Old Ox Road (VA Route 606), the planned Loudoun County Parkway (VA Route 607) extension, and planned IAD connector roads as shown previously on **Figure 1–1**. Along the Alternative 3 alignment, two potential improvement options, described below, were evaluated independently for environmental resources and potential project impacts. The "footprint" of the Location Study Corridors for Alternative 3 remains nearly identical, with only a slight variation at the intersection of Gum Spring Road and US Route 50.

Alternative 3A – US Route 50 Elevated

Alternative 3A (**Figure 2–5**) would be a 4-lane divided limited access principal arterial, on an aerial structure within the median of US Route 50. In order to construct the aerial structure, the existing US Route 50 median would need to be widened, resulting in the at-grade lanes for US Route 50 being shifted outward from the widened median. Upon returning to grade parallel to Loudoun County Parkway, Alternative 3A would run parallel to Loudoun County Parkway as a separated 4-lane divided principal arterial but at-grade instead of elevated. The proposed typical sections for Alternative 3A are shown on **Figures 2–6** and **2–7**.

Figure 2–6: Alternative 3A Typical Roadway Section (US Route 50)

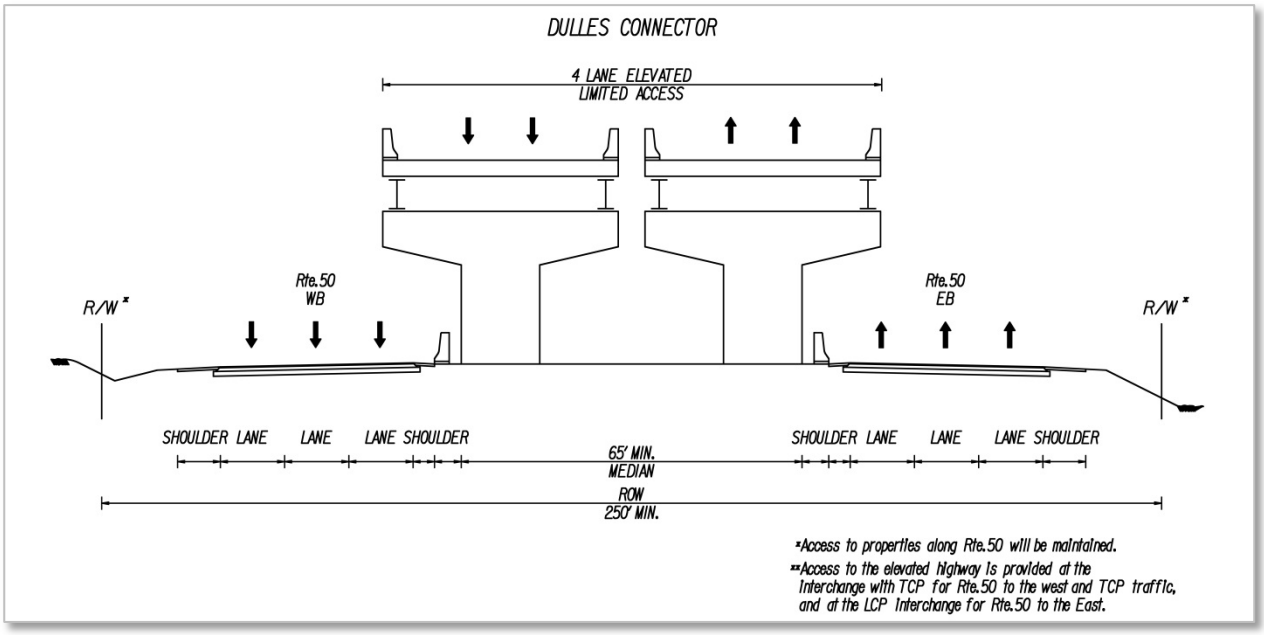
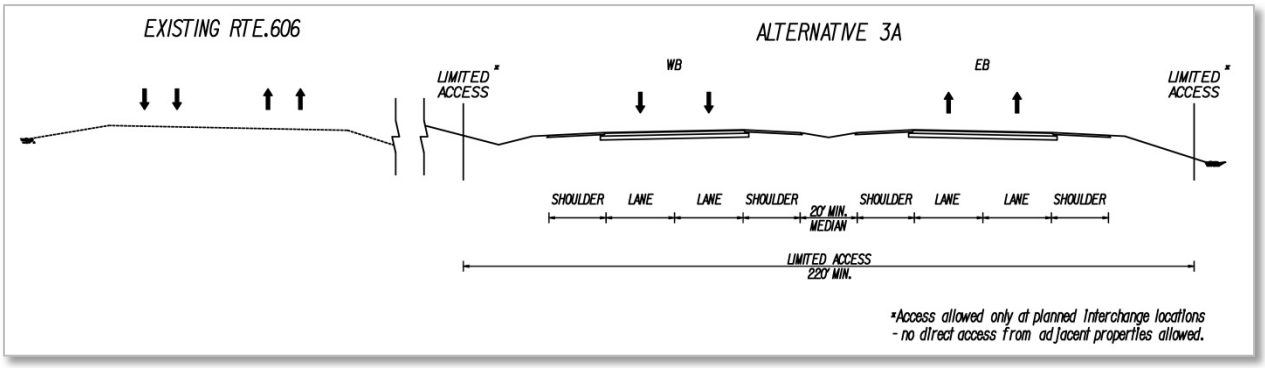


Figure 2–7: Alternative 3A Typical Roadway Section (VA Route 606)



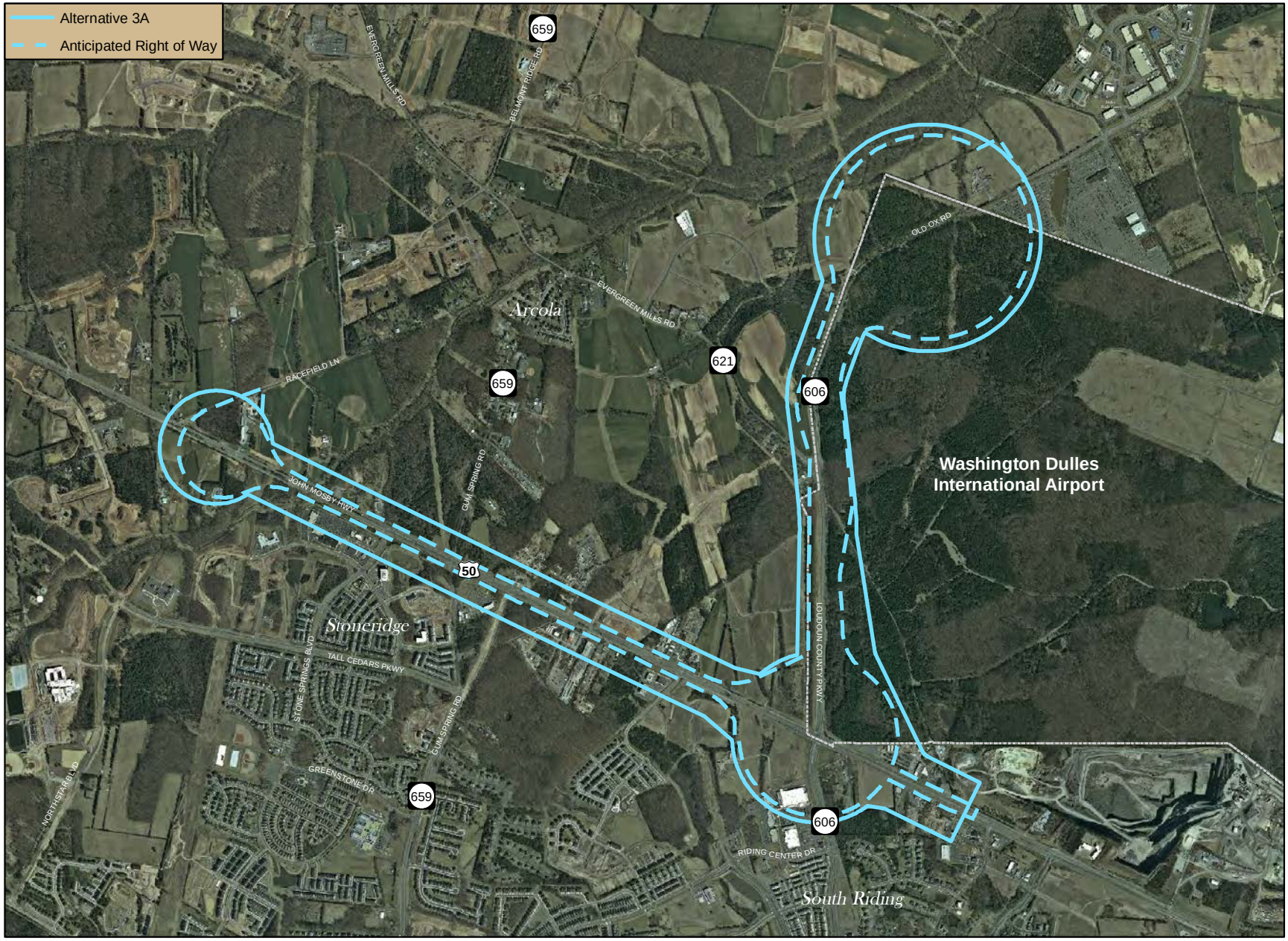


Figure 2-5: Alternative 3A Location Study Corridor and Anticipated Right-of-Way

Source: Loudoun County

N W E S

0 0.25 0.5 0.75 1 Miles

Alternative 3A would originate at US Route 50 and the planned Bi-County Parkway interchange and provide full connections to the planned Bi-County Parkway (VA Route 411)[5]. Alternative 3A would provide access to the elevated highway at the interchange with the Bi-County Parkway for US Route 50 westbound and Bi-County Parkway traffic and at the Loudoun County Parkway interchange for US Route 50 eastbound. From the interchange at Bi-County Parkway (VA Route 411), Alternative 3A would follow along the US Route 50 alignment in an elevated section, within the roadway median. At the planned interchange with Loudoun County Parkway, the roadway would travel north over the Loudoun County Parkway and return to grade on the east side of Old Ox Road (VA 606) / Loudoun County Parkway, on Dulles Airport property. Alternative 3A would provide a connection to US Route 50 eastbound and from US Route 50 westbound at this future interchange. From there the facility would extend parallel to Old Ox Road (VA Route 606) / Loudoun County Parkway approximately 1.7 miles to the planned airport connector roads. Flyover ramps would be provided along this portion of Alternative 3A to provide a connection from northbound Alternative 3A to northbound Loudoun County Parkway and from southbound Loudoun County Parkway to southbound Alternative 3A. A full-access interchange with Old Ox Road (VA Route 606), the planned Loudoun County Parkway (VA Route 607) extension, and planned airport connector roads is proposed.

Alternative 3B – Loudoun County: Countywide Transportation Plan

Alternative 3B (**Figure 2–8**) would originate at the planned full-access interchange of US Route 50 and the Bi-County Parkway (VA Route 411)[5]. To meet Loudoun County's CTP (Loudoun County, 2012a), which identifies US Route 50 as a six (6) lane freeway at this location, US Route 50 would be widened from four (4) lanes to six (6) lanes from the planned interchange of US Route 50 and Bi-County Parkway (VA Route 411) to Gum Spring Road (VA Route 659). At-grade access to all properties would be closed along US Route 50 from Bi-County Parkway to Loudoun County Parkway in order to provide limited access along this roadway. Access to properties to the south would be provided from Tall Cedars Parkway. Access to properties to the north would be provided from a parallel frontage road accessed from Gum Spring Road (VA Route 659). The Loudoun County CTP identifies proposed Glascock Boulevard as a parallel facility to the north of US Route 50, but this facility is not currently included in the CLRP and therefore not assumed to be in place as part of this study. Should Glascock Boulevard be constructed prior to the construction of Alternative 3B, Glascock Boulevard could possibly function in place of the proposed frontage road. However, Alternative 3B presumes a separate frontage road would be provided within the proposed corridor along US Route 50. A full access interchange at Gum Spring Road (VA Route 659) and US Route 50 would also be provided, in order to conform to Loudoun County's adopted CTP.

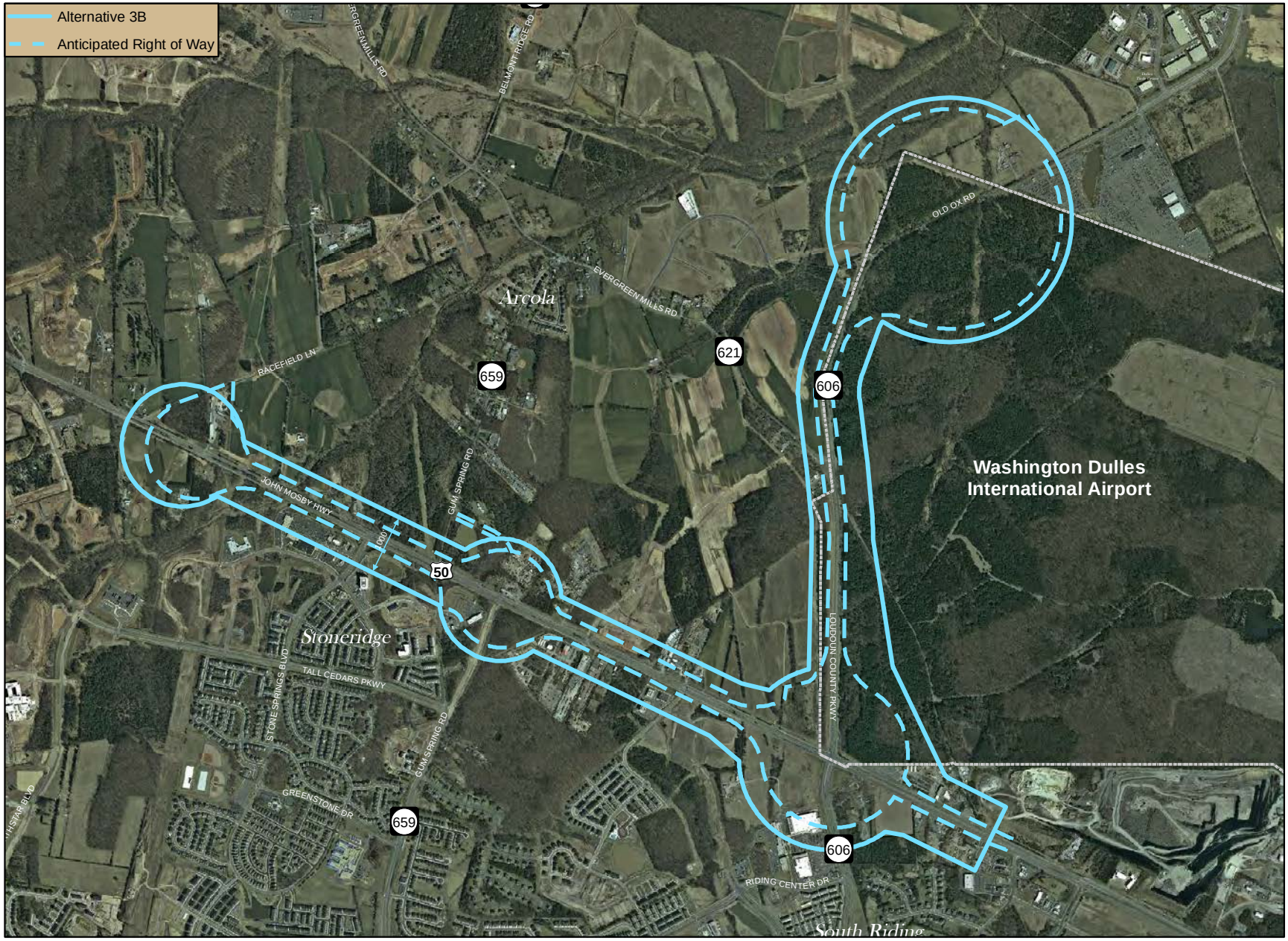


Figure 2-8: Alternative 3B Location Study Corridor and Anticipated Right-of-Way

Source: Loudoun County

Miles
0 0.25 0.5 0.75 1

A full access interchange would be provided at Old Ox Road (VA 606) / Loudoun County Parkway and US Route 50 where Alternative 3B would follow Old Ox Road (VA Route 606) / Loudoun County Parkway to the north. Under Alternative 3B, Old Ox Road (VA Route 606) / Loudoun County Parkway would be upgraded to an eight (8) lane limited access facility to match the Loudoun County CTP designation of the facility as a freeway. The Loudoun County CTP shows at-grade intersections at proposed Glascock Boulevard, Evergreen Mills Rd (VA Route 621) and Arcola Boulevard (VA Route 842). However, at grade intersections are generally not allowed within a limited access freeway. Therefore, Alternative 3B assumes a frontage road will be provided within the proposed corridor along Old Ox Road (VA Route 606) / Loudoun County Parkway in the southbound direction to provide limited access to and from Evergreen Mills Road (VA Route 621). The frontage road is anticipated to be for the southbound direction only. Alternative 3B would terminate as full-access interchange with Old Ox Road (VA Route 606), the planned Loudoun County Parkway (VA Route 607) extension, and planned airport connector roads. This proposed alternative would be a six(6) lane limited access facility along US Route 50 and an eight (8) lane limited access highway along Old Ox Road (VA Route 606) / Loudoun County Parkway, as shown in Figure 2-4, with design speeds of 60 miles per hour. The proposed typical sections for Alternative 3B are shown on **Figures 2–9** and **2–10**.

Figures 2–9: Alternative 3B Typical Roadway Section (US Route 50)

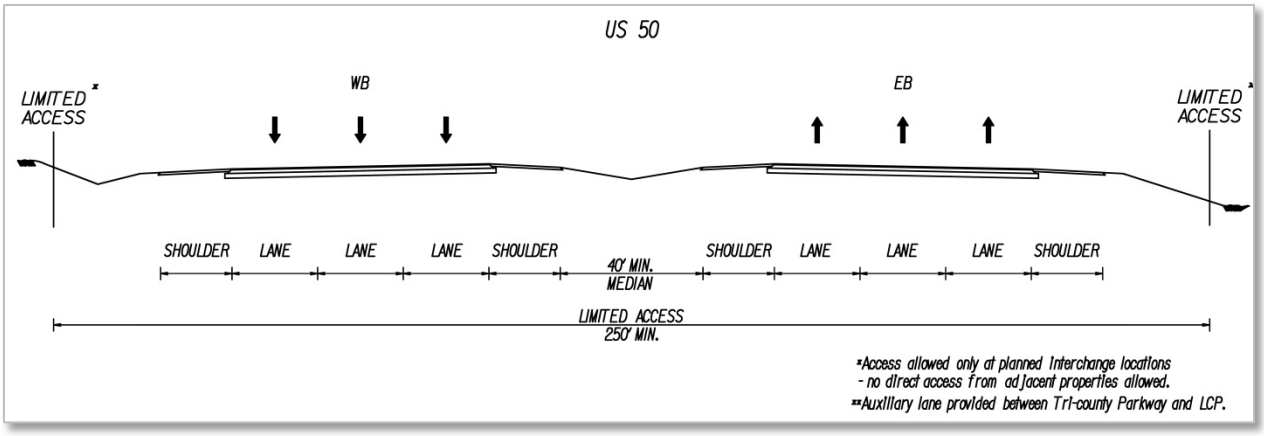
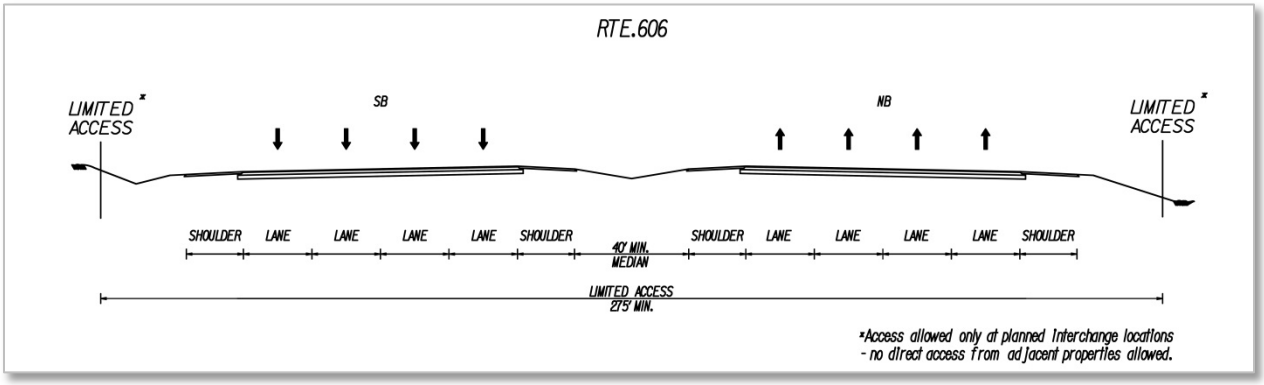


Figure 2–10: Alternative 3B Typical Roadway Section (VA Route 606)



2.2 BENEFITS OF ALTERNATIVES AND ABILITY TO MEET NEEDS

The Build Alternatives described in the preceding sections have been retained for evaluation in this EA based on their ability to meet the identified transportation needs in the project study area.

2.2.1 Enhance Planned Western Access to Washington Dulles International Airport

All three of the proposed build alternatives would meet the need for improved access to IAD. The implementation of a limited access highway extending from the planned interchange of the Northstar Boulevard/Bi-County Parkway (VA Route 411) and US Route 50 to the intersection of VA Route 606 and Arcola Road would provide better access into and around the IAD by circumventing the circuitous route that is currently required for traffic traveling to and from the south and west to enter into the airport. These alternatives would serve the western lands expansion and facilitate airport access for freight traffic to development facilities within IAD that include the midfield area, airport support zone, and western area lands, all which are planned for the integration of cargo facilities.

As evidenced by FHWA's *Freight Facts and Figures 2012*, the demand for freight transportation is corollary with population and economic growth (FHWA, 2012b). Specifically, between 2010 and 2030, the demand for freight (goods) coming in and out of IAD is projected to grow at an annual rate of four percent and growth of freight activity in the region, driven by IAD and supporting infrastructure can be expected to lead to proportional gains in direct and indirect employment (Ricondo & Associates, 2010). Assuming that the current relationship between the projected air cargo tonnage and employment holds true to 2030, the additional 567,000 tons of cargo would lead to an additional 2,070 jobs and $155 million in annual wages in the year 2030. Landside access will remain a key consideration in determining how the airport grows to accommodate additional cargo volume and how effectively it competes for discretionary cargo with other major freight airports (Cambridge Systematics, Inc., 2013).

All three build alternatives provide enhanced access to IAD, which will improve movement of goods to and from the airport facilities. This enhanced movement in and out of IAD, will allow cargo freight carriers to more easily transport goods and services globally and domestically. Furthermore, the overall anticipated increase in passenger trips and airport employment traveling from the west, would be directed to this new access point to the west of the airport.

2.2.2 Relieve Congestion

The proposed alternatives are intended to relieve congestion on the existing roadway network in the project study area by providing additional highway capacity for travel routes west of IAD. Although the continued residential and employment growth expected in the Dulles Policy Subarea combined with the planned addition of a western access to IAD would presumably create additional traffic demand in the project study area, the increased roadway capacity offered by each alternative would provide greater overall LOS under Alternatives 2 and 3B and sustained levels of services under Alternative 3A, compared to the No Build Alternative (***Appendix A: Transportation and Traffic Technical Report***). **Table 2-1** lists the anticipated LOS for roadway segments within the project study area.

Table 2-1: Comparison of Future Roadway Levels of Service for No Build and Build Alternatives

Route	Segment	No Build (2040)	Alternative 2 Proposed New Location (2040)	Alternative 3A US Route 50 Elevated (2040)	Alternative 3B Loudoun County: CTP (2040)
John Mosby Highway (US Route 50)	West of Northstar Boulevard/Bi-County Parkway to Northstar Boulevard/Bi-County Parkway	C Or Better	C Or Better	C Or Better	C Or Better
	Northstar Boulevard/Bi-County Parkway to Gum Spring Road	D	C Or Better	C Or Better	C Or Better
	Gum Spring Road to Loudoun County Parkway	F	C Or Better	D	C Or Better
	Loudoun County Parkway to South Riding Boulevard	C Or Better	C Or Better	C Or Better	C Or Better
New Alignment (Alt. 2)	US Route 50 to Loudoun County Parkway / Old Ox Road/ future Dulles Airport connector interchange	--	C Or Better	--	--
Elevated US Route 50 (Alt. 3A)	Northstar Boulevard/Bi-County Parkway to Gum Spring Road	--	--	C Or Better	--
	Gum Spring Road to Loudoun County Parkway	--	--	C Or Better	--
Loudoun County Parkway	Tall Cedars Parkway to US Route 50	C Or Better	C Or Better	C Or Better	C Or Better
	US Route 50 to Evergreen Mills Road	F	F	C Or Better	C Or Better
	Evergreen Mills Road to Loudoun County Parkway / Old Ox Road / future Dulles Airport connector interchange	F	E	F	C Or Better
	Loudoun County Parkway / Old Ox Road / future Dulles Airport connector interchange to Creighton Road (north of Location Study Corridors)	C Or Better	C Or Better	F	F
Dulles Connector (Parallel to Loudoun County Pkwy)	US Route 50 to Evergreen Mills Road	--	--	C Or Better	--
Old Ox Road (VA Route 606)	Loudoun County Parkway / Old Ox Road / future Dulles Airport connector interchange to Carters School Road	F	F	F	F

Route	Segment	No Build (2040)	Alternative 2 Proposed New Location (2040)	Alternative 3A US Route 50 Elevated (2040)	Alternative 3B Loudoun County: CTP (2040)
Northstar Boulevard/Bi-County Parkway	Tall Cedars Parkway to US Route 50	C Or Better	C Or Better	C Or Better	C Or Better
Gum Spring Road	Tall Cedars Parkway to US Route 50	D	D	D	F
	US Route 50 to Evergreen Mills Road	F	F	E	F
Evergreen Mills Road	Belmont Ridge Road to Gum Spring Road	F	F	F	F
	Gum Spring Road to Loudoun County Parkway	F	F	F	F
Tall Cedars Parkway	Loudoun County Parkway to East of Loudoun County Parkway	F	C Or Better	F	F
	Gum Spring Road to Loudoun County Parkway	C Or Better	C Or Better	C Or Better	C Or Better
	Northstar Boulevard / Bi-County Parkway to Gum Spring Road	--	C Or Better	C Or Better	C Or Better

Note: Blanks within table occur where routes and segments would not exist under proposed alternatives.

2.2.3 Facilitate Intermodal Relationships

The future Metrorail Silver Line operates as a passenger intermodal connector, and will benefit from the implementation of all three build alternatives. As discussed in **Section 2.2.2** above, relieving congestion by providing additional roadway capacity for travel routes west of IAD is essential for facilitating multiple modes of transportation.

Currently, two Loudoun County Commuter Bus Service routes[6] originate in the project study area and require travel north along Old Ox Road (VA Route 606) to the Dulles North Transit Center[7], which is slated as the future Route 606 Metrorail Silver Line station. As presented in **Table 2-1** above, future traffic conditions north of the proposed full-access interchange with Old Ox Road (VA Route 606), the planned Loudoun County Parkway (VA Route 607) extension, and future Dulles Airport connector road that is an element of all three build alternatives, is projected to be overcapacity (LOS F) in 2040 under all build scenarios, including no-build. However, Alternative 2, along with the No Build Alternative, are projected to improve congestion to a moderate (C or better) level of service along the planned Loudoun County Parkway (VA Route 607) extension, north of the proposed full-access interchange with Old Ox Road (VA Route 606), the planned Loudoun County Parkway (VA Route 607) extension, and future Dulles Airport connector road, thus providing improved access to the Silver Line station at VA Route 772. Implementing any of the build alternatives would provide an improved or sustained level of service along the transportation network accessing the extension of the Silver Line and the continued commuter bus operations.

[6] Dulles South: Stoneridge (Millstream Road at Village Center Place) and Brambleton: Creighton Road
[7] Moran Road at Lockridge Road

2.2.4 Consistency with Long Range Transportation Plan

The region's metropolitan planning organization (MPO), the Transportation Planning Board (TPB) under the MWCOG, has recently agreed to include the DACPMAH build and no-build alternatives in the draft update of the CLRP, for regional air quality conformity testing. In July 2013, VDOT will formally request the TPB to select one of the alternatives for inclusion in the 2013 CLRP.

Chapter 3.0 ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION AND OVERVIEW OF ENVIRONMENTAL ISSUES

Transportation projects have the potential to affect social, economic, historic and natural resources; therefore, it is essential that the existing environmental conditions and potential project related impacts are identified and understood. The purpose of the following section is to inventory and consider the potential environmental consequences resulting from the DACPMAH. The environmental conditions within the Location Study Corridors and their relevance to the project are summarized in **Table 3-1**.

Table 3-1: Summary of Environmental Issues

Environmental Resource	Resource Summary
Demographics	The proposed DACPMAH is located in a designated growth region in Loudoun County that has witnessed dramatic population and housing increases in recent years, and is expected continue this development into the future. Implementation of the proposed project would help accommodate the sustained growth of these diverse neighborhoods and support the goals and direction of *Loudoun County's Revised Comprehensive Plan* (see **Section 3.2.1**).
Community Facilities	Community facilities including public healthcare facilities, churches, libraries, and a government institution have all been identified within the Location Study Corridors. With the exception of the No Build Alternative, each alternative would result in the relocation of one government facility. Minimal impacts are anticipated under Alternative 3A and 3B (see **Section 3.2.3**)
Environmental Justice	This project has been evaluated in accordance with Title VI of the Civil Rights Act of 1964, as amended, and Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Minority populations have been identified within the Location Study Corridors for each alternative but are not expected to experience disproportionately high and adverse effects as a result of the proposed project (see **Section 3.3**).
Land Use	Much of the land within the Location Study Corridors is highly transitional and the location of many current and planned commercial and residential developments. The proposed DACPMAH would provide a more direct westerly connection to IAD, supporting both current and anticipated land use and growth within the Dulles Community , which is guided by *Loudoun County's Revised Comprehensive Plan* (see **Section 3.4**)
Displacements and Relocations	Property acquisitions and displacements were determined based on professional engineering judgment and the right of way requirements identified in the typical sections in **Chapter 2.0**, estimated property acquisitions and displacements have been determined. Total property acquisitions would be generally consistent among each Alternative (2, 3A, and 3B) with some additional property acquisitions required for roadway frontage or interchange configurations along US Route 50 (see **Section 3.5**).
Farmland and Soils	Farmland, as defined by the Farmland Protection Policy Act (FPPA) of 1981 (7 USC § 4201, et seq.), has been identified within the Location Study Corridors. The potential conversion of farmland as a result of the project is anticipated to account for less than 0.129% of total farmland acres in Loudoun County and less than 0.161% of those that meet the definition of farmland under the FPPA in the county (see **Section 3.6**).
Section 4(f)	Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended (49 USC 303(c), 23 CFR 774), protects publicly owned parks, recreation areas, wildlife or waterfowl refuges, and public or private historic sites listed on or eligible for the National Register of Historic Places (NRHP). There are no publicly-owned parks, recreation areas or wildlife or waterfowl refuges within the Location Study Corridors. There would be no use of Section 4(f) properties anticipated from this project. As described in **Section 3.7**, the project would have no effect on historic architectural or

Environmental Resource	Resource Summary
	archaeological sites.
Section 6(f)	Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965, as amended (16 U.S.C. 4601, 36 CFR 59.3) protects lands purchased with LWCF funds. No impacts to Section 6(f) properties are anticipated under any alternative. No lands purchased with LWCF funds are located within the project study area.
Historic Properties	No historic properties would be affected by the DACPMAH. VDOT is engaged in ongoing coordination with Virginia's State Historic Preservation Office (SHPO), the Virginia Department of Historic Resources (VDHR), to confirm these determinations for the absence of historically significant architecture and archeology sites (see **Section 3.7**).
Air Quality	In accordance with VDOT and FHWA guidance, as well as requirements established by the US Environmental Protection Agency (EPA), changes in existing carbon monoxide (CO), particulate matter (PM) and mobile source air toxics (MSATs) have been analyzed, in addition to potential construction emissions. As a result of these analyses, no adverse impacts to ambient air quality or human health and welfare are anticipated. In addition the Study Alternatives are not expected to cause or contribute to any violations of National Ambient Air Quality Standards (NAAQS) (see **Section 3.8**).
Noise	The noise analysis indicates that there are noise sensitive receptors (predominantly residential) for each Study Alternative under consideration. Noise abatement measures would be determined upon the selection of a Preferred Alternative and development of project design (see **Section 3.9** and the *Noise Analysis Technical Report*).
Wetlands and Streams	The combined Location Study Corridors for the DACPMAH cross Broad Run's North and South Forks, a small portion of Elklick Run, and several other small unnamed streams and intermittent tributaries. Palustrine forested, palustrine emergent, and palustrine scrub-shrub wetlands are associated with these streams. Avoidance and minimization of impacts to these resources would be incorporated during the permitting process, as project design advances (see **Section 3.10.1**).
Water Quality	In accordance with the Clean Water Act Section 303(d) (40 CFR §130.7(b), the Virginia Department of Environmental Quality (DEQ) identifies a length of Broad Run within the Location Study Corridors as impaired or requiring a Total Maximum Daily Load (TMDL) (Virginia Department of Environmental Quality [DEQ], 2012). The degradation of water quality resulting from increased pollutant runoff associated with the proposed DACPMAH is not anticipated to inhibit the attainment of water quality goals for Broad Run and would be minimized by the implementation of temporary and permanent stormwater management measures identified in VDOT's *Road and Bridge Specifications* (2007) (see **Section 3.10.2**).
Floodplains	Floodplain mapping produced by the Federal Emergency Management Agency (FEMA) indicate the presence of 100-year floodplains in each of the Location Study Corridors. As the project design advances, detailed avoidance and minimization measures would be developed to ensure that no substantial changes to these floodplains occur and potential flooding hazards diminished (see **Section 3.10.3**).
Wildlife and Habitat	The clearing of land associated with the development of each alternative would impact wildlife and include the displacement of habitat. With the incorporation of best management practices, potential impacts to wildlife and habitat within the Location Study Corridors would be avoided to the greatest extent practicable (see **Section 3.11.1**).
Threatened and Endangered Species	A review of the U.S. Fish and Wildlife Service's (USFWS) Online Information, Planning, and Conservation (IPaC) system indicate that no federally-protected species, wildlife refuges, or critical habitat exist within the project vicinity. A small number of state-listed threatened or endangered species have been identified within close proximity to the project study area. VDOT cooperates with State authorities in an effort to identify and conserve state listed species whenever feasible. With the incorporation of best management practices, impacts to rare, state-listed threatened and

Environmental Resource	Resource Summary
	endangered species will be avoided to the greatest extent practicable (see **Section 3.11.2**).
Hazardous Materials	A search of Federal and State agency databases did not identify any recognized environmental concerns (REC) along the Alternative 2 corridor. The search identified one property along the Alternative 3A and 3B alignment with an open pollution control case due to a leaking tank. This result indicates that the pollution may not yet be controlled and the property is considered an REC for the purpose of this study (see **Section 3.12**).

This assessment of environmental resources focuses on two Location Study Corridors, encompassing the three Build Alternative alignments (Alternative 2, 3A, and 3B), which have been developed to determine the "footprint" of the proposed project. As previously described in **Section 2.1.2**, these Location Study Corridors are substantially larger than the proposed roadway facilities for each Build Alternative, thus the inventory of environmental effects, within each Location Study Corridor, includes a larger magnitude of resources than would potentially be impacted by a Build Alternative, should one be selected. Specifically, the Location Study Corridors used for this environmental analysis are generally 1,000 feet wide along the mainlines, with circular project study areas where interchange connections would be made. Due to the complexity of the interchange at Old Ox Road (VA Route 606) / Loudoun County Parkway (VA Route 607) / Future roadway into IAD, the radius interchange project study area is 2,000 feet, while the remaining interchange project study areas have a radius of 1,500 feet or less. **Table 3-2** quantifies the full extent of environmental resources located with the entire Location Study Corridors associated with each of the proposed project Alternatives.

Table 3-2: Summary of Environmental Resources Inventoried within Location Study Corridors

Category of Resources	Alternatives		
	Alt. 2	**Alt. 3A**	**Alt. 3B**
Total Area (acres)	687.8	936	964.2
Vacant Land tax parcels (no.)	44	50	50
Residential tax parcels (no.)	22	27	27
Business tax parcels (no.)	5	34	36
Institution tax parcels (no.)	1	1	1
Community Facilities (no.)	1	6	6
Minority Population (%)	46.5	46.7	46.7
Median Household Income (dollars)	143,203	151,363	151,363
Population Below Poverty Level (%)	1.7	2.2	2.2
Farmland or Farmland Soils (acres)[1]	168.3	384.0	327.8
Section 4(f) Properties (acres)	0	0	0
Historic Properties (no.)	0	0	0
Waters of the U.S. (linear feet)	29,725	25,768	25,828
Wetlands (acres)	32.1	32.2	33.1
Floodplains (acres)	112.5	58.2	58.2
Forest and Vegetation (acres)	346.1	427.7	434.5
Threatened or endangered species impacted (no.)	0	0	0
Hazardous Material Sites (no.)	0	1	1

Since the Location Study Corridors are much larger than the proposed roadway facility the typical sections presented in **Chapter 2.0** were used to determine a more refined right-of-way requirement, which was then applied along the entire length of each Location Study Corridor to obtain a conservative estimate for the overall right-of-way requirements. These planning-level design assumptions were based

on standard design principles and guidelines provided in the *VDOT Road Design Manual* (VDOT, 2005). This method provides a more realistic estimate for impacts that may occur as opposed to assuming all of the environmental resources inventoried within the Location Study Corridors would be affected. However, these assumptions are not based on detailed design and the anticipated impacts to environmental resources would be subject to change during project design. **Table 3-3** illustrates a more realistic summary of potential project related impacts associated with each proposed Alternative.

Table 3-3: Summary of Potential Planning-Level Design Environmental Impacts

Category	Potential Impacts			
	No Build Alt. 1[1]	**Alt. 2**[2]	**Alt. 3A**[2]	**Alt. 3B**[2]
Total Right-of-Way Area (acres)	--	278.07	318.20	329.04
Right-of-Way Property Acquisition (acres)[3]	--	169.26	121.98	169.03
Residential Displacements (no.)	3	5	1	1
Businesses Displaced (no.)	5	2	3	15
Institutions Displaced (no.)	1	0	0	0
Community Facilities (no.)	1	0	3	5
Noise Receptors Impacted (no.)	63	13	80	52
Waters of the U.S. Bridged (linear feet)	2,388.7	8,700.4	11,422.6	12,065.2
Wetlands (acres)	6.8	10.3	17.2	16.1
Floodplains (acres)	0.02	26.5	31.1	29.1
Forest and Vegetation (acres)	52.4	166.6	212.4	195.5
Hazardous Material Sites (no.)	0	0	1	1

[1] No Build Alternative impacts assume 90% of the anticipated right-of-way requirements anticipated at the planned CLRP Bi-County Parkway / US Route 50 interchange, as well as the Loudoun County Parkway / US Route 50 interchange, but do not include additional planned CLRP projects in the study area as they are comprised of roadway widening. These and other additional impacts will be identified and addressed during the respective planning and design for projects under the No Build Alternative.
[2] Reflects remaining 10% of right-of-way acquisition at Bi-County Parkway / US Route 50 interchange as well as Loudoun County Parkway / US Route 50 interchange.
[3] Assumes donation of MWAA property along VA Route 606 for VDOT use.

3.2 SOCIOECONOMICS AND COMMUNITY FACILITIES

3.2.1 Demographics and Population Characteristics

The Location Study Corridors are situated in the Dulles Community of the Suburban Policy Area, which is designated under *Loudoun County's Revised Comprehensive Plan* as the primary location for suburban-scale residential and nonresidential development. The Suburban Policy Area is located in the easternmost portion of Loudoun County and is bounded by the Potomac River to the north, Braddock Road to the south, the Fairfax County line to the east, and Goose Creek, property lines, roadways, and power line easements. As the designated growth area of Loudoun County, the Suburban Policy Area has undergone rapid transformation since the 1990s, with over 25,000 building permits issued (75 percent of the total issued Countywide) and a 128 percent increase in population to more than 106,500 residents (Board of Supervisors, 2011). Since then, this growth has continued to escalate, primarily within the Dulles Community, which has seen a respective 429 and 354 percent growth in population and housing units between 2000 and 2012 (Loudoun County Department of Management, 2012 and 2013). Future demographic forecasts for population and housing units suggest that the Dulles Community will remain the fastest growing area in Loudoun County.

An inventory of housing and population data regarding current and forecasted population and housing within the Location Study Corridors, as well as the Dulles Community and other Loudoun County Planning Areas, was obtained from demographic data produced for Loudoun County's 282 Traffic Analysis Zones (TAZs), which are submitted to the Metropolitan Washington Council of Governments (COG) for use in their regional transportation planning efforts (Loudoun County Department of Management, 2012 and 2013). As shown in **Table 3-4**, the TAZs included in the Location Study Corridors are reflective of this concentrated regional growth. Specifically, population and housing growth in the Location Study Corridors is anticipated to increase by 414 and 444 percent, respectively by 2040[8].

Table 3-4: Population and Housing Units in Loudoun County by Planning Subareas

Planning Subarea	2000		2010[1]		2025		2040	
	POP	HU	POP	HU	POP	HU	POP	HU
Ashburn	33,581	12,007	94,896	33,594	125,620	42,690	136,592	53,221
Dulles	7,795	2,999	48,240	15,827	98,345	27,928	100,350	33,654
Leesburg	31,840	11,958	57,470	20,023	66,613	21,621	103,731	24,498
Northwest	6,499	2,430	9,979	3,675	11,108	4,230	15,322	6,773
Potomac	39,115	13,718	45,483	15,913	47,231	16,116	52,888	16,529
Route 15N	2,506	947	5,031	1,720	5,989	2,355	10,100	3,593
Route 15S	2,403	937	3,734	1,402	4,169	1,761	5,802	2,757
Route 7W	12,354	4,468	22,315	7,577	25,870	8,681	40,308	11,114
Southwest	6,056	2,706	7,053	3,181	7,327	3,476	8,214	4,458
Sterling	27,450	9,990	34,330	11,990	36,304	12,895	42,934	16,317
Location Study Corridors[2]	N/A	N/A	6,847	2,291	33,716	11,643	35,189	12,455
County Total	169,599	62,160	328,533	114,902	328,533	141,753	426,242	172,914

[1]TAZ numbers only provided in five year increments; therefore 2010 values are provided to represent existing conditions.
[2]Sub-County forecasts unavailable prior to 2010.
Source: COG Round 8.1 and 8.2 Cooperative Forecasts, 2012 and 2013.

Furthering this population and housing growth within the Dulles Community, several large-scale neighborhoods have been developed within or proximate to the Location Study Corridors. These communities include Brambleton, Stone Ridge, South Riding, and Arcola. The northernmost portion of the Location Study Corridor for Alternative 2 encompasses undeveloped land owned by the Brambleton community and Alternative 3 follows the northern boundaries of Stone Ridge and South Riding, along US Route 50. Arcola is central to both Location Study Corridors, as it is essentially bounded by each alternative. **Table** 3-5 provides a brief profile of the demographic characteristics of each place and also shows the overall demographic composition of the county as well as the Location Study Corridors.

[8] Projected growth generated from *Loudoun County COG Round 8.2 TAZ Forecasts*, updated February 20, 2013. TAZs within the Location Study Corridors were included in these population and housing unit counts.

Table 3-5: Demographic Profile for Neighborhoods within or Proximate to Location Study Corridors

Characteristics		Loudoun County	Location Study Corridor	Arcola[1]	Brambleton[1]	Stone Ridge[1]	S. Riding[1]
Total Population		312,311	36,517	233	9,845	24,256	7,214
Gender	Male	154,078 (49%)	18,033 (49%)	113 (49%)	4,898 (50%)	11,894 (49%)	3,555 (49%)
	Female	158,233 (51%)	18,484 (51%)	120 (51%)	4,947 (50%)	12,362 (50%)	3,659 (51%)
Age	Under 18	95,434 (31%)	12,566 (34%)	65 (28%)	3,529 (36%)	8,657 (36%)	2,331 (32%)
	18-24	18,328 (6%)	1,446 (4%)	10 (4%)	319 (3%)	983 (4%)	318 (4%)
	25-29	18,817 (6%)	2,501 (7%)	8 (3%)	726 (7%)	1,307 (5%)	659 (9%)
	30-39	54,056 (17%)	8,946 (24%)	75 (32%)	2,722 (28%)	5,311 (22%)	1,935 (27%)
	40-49	57,304 (18%)	6,149 (17%)	35 (15%)	1,634 (17%)	4,523 (19%)	1,136 (16%)
	50-59	36,278 (12%)	2,825 (8%)	18 (8%)	529 (5%)	2,028 (8%)	537 (7%)
	60 and Over	32,094 (10%)	2,084 (6%)	22 (9%)	386 (4%)	1,447 (6%)	298 (4%)
Race	White	214,471 (69%)	19,699 (54%)	108 (46%)	5,966 (61%)	14,120 (58%)	3,968 (55%)
	Black/ African American	22,710 (7%)	2,644 (7%)	13 (6%)	665 (7%)	1,564 (6%)	728 (10%)
	American Indian/ Alaska Native	914 (0.3%)	101 (0.3%)	--	20 (0.2%)	52 (0.2%)	20 (0.3%)
	Asian	46,033 (15%)	11,612 (32%)	72 (31%)	2,547 (26%)	7,019 (29%)	1,998 (28%)
	Native Hawaiian/ Pacific Islander	184 (0.1 %)	19 (0.1%)	--	7 (0.1%)	14 (0.1%)	2 (0%)
	Other Race	15,424 (5%)	761 (2%)	28 (12%)	158 (2%)	507 (2%)	116 (2%)
	Two/More Races	12,575 (4%)	1,681 (5%)	12 (5%)	482 (5%)	980 (4%)	382 (5%)
	Hispanic/Latino[2]	38,576 (12%)	2,622 (7%)	40 (17%)	578 (6%)	1,806 (7%)	597 (8%)

[1]Neighborhood delineated as Census Designated Place (CDP) from decennial census.
[2]The US Census Bureau defines Hispanic or Latino as a person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race. Because Hispanics may be any race, data for Hispanics overlap data for other racial groups.
Source: US Census Bureau, 2010.

As illustrated, the Location Study Corridors are comprised of a number of diverse neighborhoods and communities that are developing at a dramatic rate. Under the No Build condition, the existing transportation network and planned infrastructure improvements would be unable to accommodate the increasing travel demand resulting from development in the Dulles Community. The implementation of the proposed project would help support the sustained growth of the diverse neighborhoods in and around the Location Study Corridors. The DACPMAH would facilitate improved traffic movements and

promoting the overall goals for the Dulles Community, as identified in *Loudoun County's Revised Comprehensive Plan* (see **Figure 1–2,** Page 4), which is comprised of the *General Plan* and the CTP (refer to **Figure 1–4**, Page 8) and provides development and transportation policy direction for Loudoun County.

3.2.2 Economics

The Location Study Corridors and Loudoun County, in general, support a broad range of commercial activity. According to Census data retrieved from the 2007-2011 American Community Survey, the top industries in the County are:

- Professional, scientific, and management, and administrative and waste management services;
- Educational services, health care and social assistance;
- Retail trade; and
- Public administration.

These industries account for approximately 60% of total County employment. As the leading industry in the entire county, professional, scientific, and management, and administrative and waste management services alone comprise almost 25% of employment within the County.

According to the Virginia Employment Commission (2012), those entities within Loudoun County employing the largest number of people include:

- Loudoun County Public Schools (10,000+);
- County of Loudoun (2,500-4,999);
- Orbital Sciences Corporation (1,000-4,999); and
- United Airlines (1,000-4,999).

Specifically within the Dulles Community, the largest employers, each with anywhere from 1,000-4,999 employees, include:

- Orbital Sciences Corporation;
- M C Dean Inc.;
- AOL Inc; and
- Raytheon Company (Loudoun County Department of Economic Development, 2013).

As the home of IAD, Loudoun provides easy access to the global community with 11 domestic legacy and low fare carriers and 22 international carriers which provide air service throughout the world. Consequently, Loudoun has been one of the fastest growing job markets in the United States. Every one dollar spent at a Virginia airport contributes an additional $3.48 in economic activity for the state. Additionally, visitors that arrive in Virginia by air transportation spend an average of $747 per person during their stay (Virginia Department of Aviation, 2011). Generating approximately $10,123,254 million in economic activity each year, IAD is the most profitable airport in Virginia, accounting for approximately half of commercial service economic impacts statewide. Operations of IAD facilities supported a total of 26,012 jobs and $1.403 billion of labor income in Virginia; 270 jobs and $23 million of labor income in the District of Columbia; and 1,039 jobs and $52 million of labor income in Maryland. Air cargo shipments through IAD and the producers that depend on these services are a substantial

generator of jobs and economic activity in the region. These expenditures support vendors and their employees while also supporting additional jobs throughout the region as these funds are re-circulated back into the economy by airport vendors, their suppliers, and employees.[9]

Implementation of the proposed project would improve access to IAD and intermodal connections to and from the Metrorail Silver Line, the project study area, and the businesses and residences located in the project study area. This improved access and mobility would accommodate continued economic growth and planned development in the project study area, including economic activity at IAD. The proposed project would not result in any substantial negative economic impacts.

3.2.3 Community Facilities

Community facilities include schools, emergency services (police, fire, and life), governmental facilities, post offices, libraries, places of worship, hospitals, and other facilities such as museums performing art centers, and sports centers. **Table 3-6** lists the community facilities that have been identified within the Location Study Corridors for the proposed project. The majority of the community facilities that have been identified are located along US Route 50, within the Location Study Corridor for Alternative 3A and 3B.

Table 3-6: Community Facilities within Location Study Corridors

Facility Name	Facility Address	Facility Type/Description
Alternative 2		
Virginia Department of Transportation	41880 John Mosby Highway Aldie	Maintenance area headquarters
Alternatives 3A and 3B		
Virginia Department of Transportation	41880 John Mosby Highway Aldie	Storage area headquarters
Lion's Club Ball Park	42034 John Mosby Highway Aldie	Baseball/recreational facility
Gum Spring Library	24600 Millstream Drive Stone Ridge	Loudoun County Public Library
StoneSpring Medical Center and Emergency Care Center	24597 / 24570 Gum Spring Road Aldie	Future healthcare service hospital and freestanding emergency center (to be opened Fall 2013)
Innova Medical Center	24801 Pinebrook Road Chantilly	Urgent care and physical therapy
Church of Latter Day Saints Brambleton Ward	42350 Tall Cedars Parkway Aldie	Future religious institution site

Potential impacts to community facilities are expected to be limited to small portions of property acquisition fronting US Route 50, without causing any effects to buildings or parking lots. However, because Alternative 3 is a limited access facility community facilities located along US Route 50, which currently have full access to Route 50, would no longer have direct access. Access to properties to the south of US Route 50 would be provided from Tall Cedars Parkway. Access to properties to the north would be provided from a parallel frontage road accessed from Gum Spring Road (VA Route 659). Based on estimated right of way requirements, partial property acquisitions are anticipated for three community facilities under Alternative 3A and five community facilities under Alternative 3B (see **Section 3.5**).

[9] Figures generated from MWAA's *Technical Report: Economic Impact Study- 2009*, The Lewis Berger Group, Inc.

Upon completion, the DACPMAH travelers would benefit overall from improved movement to and around IAD as well as reduced congestion, therefore resulting in improved access to community facilities. Fire, police, and rescue responders would be able to better serve community needs with improved transportation infrastructure in the project study area.

3.3 ENVIRONMENTAL JUSTICE

This project has been evaluated in accordance with Title VI of the Civil Rights Act of 1964, as amended, and Executive Order (EO) 12898. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to identify and address disproportionately high and adverse human health or environmental effects that their programs, policies and activities may have on minority and low-income populations. The goal of this order is to avoid the disproportionate placement of adverse environmental economic, social, or health impacts from Federal actions and policies on minority and low-income populations that might be affected by the implementation of a Proposed Action.

According to FHWA Order 6640.23A, *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, minority populations are defined as any person who is Black, Hispanic or Latino, Asian American, American Indian, Alaskan Native, Native Hawaiian, or other Pacific Islander. Minority and/or low-income populations included within the project study area are "any readily identifiable groups of minority and/or low-income persons who live in geographic proximity". Low income persons include any person whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines (FHWA, 2012a). **Table 3-7** identifies the 2013 poverty guidelines for Virginia:

Table 3-7: 2013 Poverty Guidelines for the 48 Contiguous States and the District of Columbia

Persons in family/household	Poverty Guideline
1	$11,490
2	$15,510
3	$19,530
4	$23,550
5	$27,570
6	$31,590
7	$35,610
8	$39,630

Source: U.S. Department of Health and Human Services 2013 Poverty Guidelines

A disproportionately high and adverse effect on minority and low-income populations includes those that "is predominately 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 nonminority population and/or non-low-income population" (FHWA, 2012a). Environmental justice assures that the services and benefits of the

proposed project allow for meaningful participation among these populations and are fairly distributed to avoid discrimination.

To perform an environmental justice analysis, data were collected on minority and low-income populations for US Census Tracts within and adjoining the Location Study Corridors. These data consist of statistics regarding race and income. To serve as a measure for comparison, census data were also extracted for Loudoun County and the state of Virginia.

There are six Census Tracts within the Location Study Corridors that are applicable to an Environmental Justice analysis (**Table 3-8**). A seventh Census Tract (9801.00) is located in the project study area, but is entirely comprised of IAD property and contains no households or applicable census information; therefore, this tract was omitted from the environmental justice study.

Table 3-8: Environmental Justice Census Tract Data

Location	Minority Population	Median Household Income	Percentage Below Poverty Level
Virginia	30.0%	$63,302	10.7%
Loudoun County	28.9%	$120,096	3.4%
Alternative 2			
Census Tract 6110.25	40.2%	$105,417	3.3%
Census Tract 6118.01	45.3%	$120,461	4.2%
Census Tract 6118.06	44.1%	$158,184	0.6%
Census Tract 6119.00	61.2%	$188,750	0.0%
Alternative 3A and 3B			
Census Tract 6118.01	45.3%	$120,461	4.2%
Census Tract 6118.02	46.9%	$130,083	1.6%
Census Tract 6118.04	32.1%	$159,339	6.0%
Census Tract 6118.06	44.1%	$158,184	0.6%
Census Tract 6119.00	61.2%	$188,750	0.0%

Source: 2007-2011 American Community Survey 5-Year Estimates

All six of the census tracts in the project study area have a minority population slightly greater than those of Loudoun County and Virginia, and are considered minority populations for the purpose of this EA. None of the census tracts have low-income populations as compared with the HHS 2013 Poverty Guidelines for households. Thus, none of the census tracts within the project study area qualify as low-income populations for the purposes of this study.

Current and future planned land use in the project study area is zoned for a mixture of commercial, industrial, and residential development. Land acquisitions expected as a result of each Alternative are comparable and do not very greatly. Full acquisition of approximately 11 properties are anticipated for Alternative 2, 14 full acquisitions are anticipated for Alternative 3A, and 13 are anticipated for Alternative 3B (see **Section 3.5**). The minority population surrounding each alternative's alignment is comparable in size; thus full property acquisitions under any alternative will not have a profoundly more adverse effect on minority populations than another.

The displacement of nine residences or businesses are anticipated under Alternative 2; four are anticipated under Alternative 3A; and 14 are likely to occur with the selection of Alternative 3B; thus it is likely that Alternative 3B would displace slightly more minority residences and businesses than the other alternatives. The community effects of the project, including improved mobility and transit access, would be borne by all residents of the project study area, including minority populations within each census tract. The proposed project is not anticipated to cause disproportionately high and adverse effects on minority populations because the project study area's social and demographic characteristics as identified in the census track data are representative of the surrounding area. VDOT will ensure meaningful opportunities to participate by conducting all required public outreach to give minority or low-income populations the opportunity to comment on the project.

3.4 LAND USE AND PLANNED DEVELOPMENT

Land use in the Location Study Corridors is guided by the principles set forth in the *Loudoun County Revised Comprehensive Plan*, which primarily concentrates development in the Suburban Policy Planning Area and Dulles Community (Board of Supervisors, 2011). **Figure 1–2** (See Page 4) depicts land use and planned development within the Location Study Corridors. The primary planned land uses in the Location Study Corridors include industrial, retail, and business infrastructure. Both south and west of the project study area, land uses primarily include transitional business and residential uses. Industrial and residential uses exist just north of the project study area, with IAD to the immediate east (Board of Supervisors, 2011). Presently, the project Location Study Corridors traverse land with a variety of designations including industrial complexes, commercial developments and office spaces, planned mixed-use and housing developments, forested land, and open space. Located in a region that has experienced rapid population and employment growth in recent years and is expected to see increasingly more, this area is highly transitional and serves as the location for a number of future planned commercial and residential developments.

The Alternative 2 Location Study Corridor is currently zoned to allow for residential and industrial development. It is largely undeveloped land, partially forested while otherwise cleared, with the exception of a few small developed lots scattered throughout. These include a cluster of single-family detached homes in the Briarfield Estates development, a commercial structure within the Dulles Trade Center West development, and a group of industrial structures on a transportation facility in the southwest corner of the project study area, adjacently north of US Route 50.

The Alternative 3A and 3B Location Study Corridors are currently zoned for a mixture of commercial, industrial, and residential development. While the portion of the alignment running north-south along VA Route 606 is largely undeveloped, the east to west segment along US Route 50 is heavily travelled and lined with existing commercial and industrial businesses and facilities as a result. According to the *Loudoun County Revised Comprehensive Plan*, future zoning along the entirety of this alignment will primarily accommodate hybrid retail and business development. Notable developments along the Alternative 3 alignment include Gum Spring Village Center, South Riding Market Square, Dulles Landing Shopping Center, and the Arcola Center.

The proposed project would generally support planned land use as recommended in the *Loudoun County Revised Comprehensive Plan*, and more specifically the *Revised General Plan*. The proposed project is consistent with and is not expected to affect zoning classifications within the project study area. The

majority of the project study area is designated for "Industrial" or "Business" uses. Areas planned for industrial uses are intended to accommodate labor-intensive uses that have outdoor storage requirements, high noise levels, or emissions, and areas designated for business are intended to accommodate office and light industrial uses. The proposed project is not expected to generate substantial additional traffic through residential areas; rather, the DACPMAH would provide a more direct westerly connection to IAD, supporting both current and anticipated land use within the Dulles Community.

3.5 DISPLACEMENTS AND RELOCATIONS

Potential displacements and relocations were determined by comparing the anticipated right of way requirements with existing tax parcel mapping obtained from Loudoun County. As part of this inventory, the following types of impacts were estimated:

- *Full Acquisition*—this is the full purchase of a property. Full acquisitions would result in a displacement of the current land use on the property.
- *Partial Acquisition*—this is the purchase of a portion of a property. Partial acquisitions would not affect the ability of the parcel to support existing or planned future land uses. (Where there is a need for a portion of the property that was determined to affect the ability of the parcel to support existing or planned future land uses, a full acquisition would be made of that property).
- *Displacement*—Displacement results from full acquisitions and the conversion of the existing land use to a transportation use. Displacements are measured by housing unit or business, not tax parcel. For example, the acquisition of an apartment building on a single tax parcel with six units would result in six residential displacements.

Table 3-9 estimates the potential property acquisitions and displacements associated with the right-of-way requirements for each Build Alternative. However, these impacts are anticipated to change upon the development of detailed project design. As the project design advances and the right of way impacts are better understood, VDOT would develop a detailed relocation plan for all displaced residents, businesses, farms, and non-profit organizations. The acquisition of property and any necessary relocations would be conducted in accordance with all applicable Federal laws, regulations and requirements, including but not limited to 23 CFR §710, the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (49 CFR §49, as amended). All persons displaced on Federally-assisted projects will be treated fairly, consistently, and equitably so that they do not experience disproportionate effects as a result of projects that are designed for the benefit of the public as a whole. VDOT would provide relocation resources to all residential and business potentially impacted by the proposed improvement without discrimination.

Table 3-9: Property Impacts and Displacements

Alternative	Right of Way Total (Acres)*	Full Acquisitions*	Partial Acquisitions*	Displacements *
Alternative 1 (No Build)	0	0	0	0
Alternative 2	169.26	8	22	7
Alternative 3A	121.98	2	35	4
Alternative 3B	169.03	4	43	16

*Based on professional engineering judgment and predicted right of way requirements. Assumes 10% of right-of-way acquisitions at Bi-County Parkway / US Route 50 interchange as well as Loudoun County Parkway / US Route 50 interchange and excludes MWAA owned property along VA Route 606. Subject to change upon development of project design.

3.6 FARMLAND AND SOILS

The Farmland Protection Policy Act (FPPA) of 1981 (7 USC § 4201, et seq.), requires that federal actions identify and consider adverse effects on protected farmland. Under the FPPA, the US Department of Agriculture (USDA) defines "farmland" as:

- *Prime farmland* – land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.
- *Unique farmland* – land other than prime farmland that is used for production of specific high-value food and fiber crops.
- Farmland other than prime or unique farmland that is of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops.

This land may be in cultivation, forest, pasture, or other uses except for urban or built-up land or water uses (7 USC § 4201(c)).

According to the Natural Resource Conservation Service (NRCS) of the USDA, there are approximately 307,182 acres of farmable land in Loudoun County, of which an estimated 245,097 acres (73 percent) meet the definition of farmland under the FPPA. Pursuant to the requirements of FPPA, Form AD-1006, *Farmland Conversion Impact Rating*, was submitted to the NRCS to assess the potential impacts of the project on this farmland incorporated within the Location Study Corridors and determine the Farmland Conversion Impact Rating for the project. Correspondence with NRCS' District Conservationist confirmed that farmland, as defined by the FPPA, lies within the limits of each Alternative. Within the Location Study Corridor for Alternative 2, which encompasses 687 acres, approximately 186 acres is farmland that would be directly converted to highway use. Alternative 3A and 3B, comprised of approximately 936 and 964 acres respectively, would result in the conversion of an estimated 384 and 328 acres of farmland to highway use. This would amount to less than 0.129% (percent based on total acres verse directly converted) of farmland in Loudoun County and less than 0.161% of acres that meet the definition of farmland under the FPPA in the county.

Furthermore, the Farmland Conversion Impact Rating, which is based on an assessment of the quality of prime farmlands soils in the area of the project and an assessment of the suitability of the land in the corridor for protection of farmland, would be well below the 160 point threshold for each alternative. Based on this assessment, no further consideration is required for farmland protection measures or other alternatives that may reduce farmland conversion impacts.

3.7 HISTORIC PROPERTIES

3.7.1 Architectural Resources

In accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, (16 USC §470) and the Advisory Council on Historic Preservation's regulations for compliance with Section 106 (36 CFR §800), architectural resources within the project's Area of Potential Effects (APE)[10] that are on, eligible for, or potentially eligible for listing on the National Register of Historic Places (NRHP) have been identified. Within the APE, 47 previously recorded resources and 24 newly recorded resources were documented for above-above ground historic architectural resources as part of the current study. Of the previously recorded resources, 15 are no longer extant, which is largely reflective of developmental pressures in the project vicinity (see **Sections 3.2.1 and** Error! Reference source not found.). None of the extant previously recorded have been determined to retain sufficient integrity or possess the architectural significance or associative value necessary for NHRP eligibility. Likewise, none of the newly recorded resources located in the APE, which include twentieth-century dwellings, office buildings, outbuildings, and a workshop, are recommended eligible for listing in the NRHP based on current survey (***Appendix B: Cultural Resource Survey Report***). VDOT is currently coordinating with the Virginia Department of Historic Resources (VDHR) to receive concurrence with these findings.

3.7.2 Archaeological Resources

Pursuant the regulations implementing Section 106, archaeological surveys were also conducted. These surveys resulted in the identification of 21 previously recorded sites within or abutting the APE for archaeological resources[11]. These sites range from Archaic lithic scatters to twentieth-century trash scatters. Primarily due to loss of integrity, but also because many of the sites represent low density scatters or common site types, none of the previously recorded site areas contain information of historical significance that would contribute to NHRP eligibility. Of the four new archaeological sites that were recorded within the APE as a result of the current evaluation, none were recommended as eligible for NRHP (***Appendix B: Cultural Resource Survey Report***). VDOT will seek concurrence for this determination from VDHR.

3.8 AIR QUALITY

Air quality is dependent on a combination of many factors, including the type and amount of pollutants emitted, the size and topography of the air basin, and prevailing meteorological conditions. The significance of the pollutant concentration is determined by comparing a certain area's conditions with federal and state air quality standards. Pursuant to the Federal Clean Air Act of 1970 (CAA), the U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for major pollutants known as "criteria pollutants." Currently, the EPA regulates six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter, and lead (Pb). Particulate matter (PM) is organized in two particle size categories: particles with a diameter less than 10 micrometers (PM_{10}) and those with a diameter of less than 2.5 micrometers ($PM_{2.5}$).

[10] The APE for above-ground architectural resources is based upon the two Location Study Corridors with circular interchange study areas, as described in Section 3.1.

[11] The archaeological APE generally followed the Location Study Corridors, but only included 350 foot sections along the mainlines, as this was determined to be the most cost-effective survey width accommodating a four-lane divided roadway with turning lanes as well as the potential widening along existing routes.

Table 3-10 shows the primary and secondary NAAQS for the criteria pollutants. The NAAQS are two-tiered. The first tier (primary) is intended to protect public health; the second tier (secondary) is intended to prevent further degradation of the environment. Section 176(c) of the CAA requires Federal agencies to assure that all of their actions conform to applicable implementation plans for achieving and maintaining the NAAQS. Federal actions must not cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation, or delay timely attainment of any standard.

Table 3-10: National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standards [1,2]	Secondary Standards [1,3]
CO	8- hour	9 ppm (10 mg/m^3)	None
	1- hour	35 ppm (40 mg/m^3)	None
Lead [4]	Rolling 3-Month Average[5]	0.15 µg/m^3	Same as Primary
NO_2	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Same as Primary
	1-hour	0.100 ppm[6]	None
PM_{10}	Annual Arithmetic Mean	None	None
	24-hour	150 µg/m^3	Same as Primary
$PM_{2.5}$	Annual Arithmetic Mean	12 µg/m^3[9]	15 µg/m^3
	24-hour	35 µg/m^3	Same as Primary
O_3	8-hour (2008 standard)	0.075 ppm	Same as Primary
	8-hour (1997 standard)	0.08 ppm	Same as Primary
	1-hour	0.12 ppm[7]	Same as Primary
SO_2	1-hour	75 ppb[8]	None
	3-hour	None	0.5 ppm

Notes:

1. National standards (other than ozone, particulate matter, and those based on annual averages) are not to be exceeded more than once per year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or is less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 ug/m^3 is equal to or is less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over three years, are equal to or are less than the standard.
2. Primary Standards: Levels necessary to protect public health with an adequate margin of safety.
3. Secondary Standards: Levels necessary to protect the public from any known or anticipated adverse effects.
4. Lead is categorized as a "toxic air contaminant" with no threshold exposure level for adverse health effects determined.
5. National lead standard, rolling three-month average: final rule signed October 15, 2008.
6. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
7. EPA revoked the 1-hour ozone standard in all areas; however, some areas have continuing obligations under that standard.
8. Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
9. EPA updated the NAAQS for PM2.5 to strengthen the primary annual standard to 12 *u*g/m^3.

The standards in **Table 3-10** apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area is equal to or is better than the national standard, it is called an "attainment area". Areas where air quality does not meet the national standard are called "non-attainment areas". Once the air quality in a non-attainment area improves to the point where it meets the standards and the additional redesignation requirements in the CAA [Section 107(d) (3)(E)], the EPA redesignates the area as a "maintenance area".

The Clean Air Act Amendments (CAAA) of 1990 requires states to designate the status of all areas within their borders as being in or out of compliance with the NAAQS. The CAAA further defines non-attainment areas for ozone based on the severity of the violation as marginal, moderate, severe, and extreme. In an effort to further improve the nation's air quality, the EPA has classified additional areas as attainment/non-attainment for a new 2008 eight-hour ozone standard. The new 2008 eight-hour ozone standard is listed in **Table 3-10**.

Each state is required to draft a state implementation plan (SIP) to further improve the air quality in non-attainment areas and maintain the air quality in attainment or maintenance areas. The plan outlines the measures the state will take in order to improve air quality.

The air quality attainment status was identified for the project study area along with representative monitoring data from the DEQ to estimate the existing air quality in the project study area. The following section describes the attainment status of the project study area.

3.8.1 Attainment Classifications

The proposed project would be located in Loudoun County which is part of the National Capital Interstate Air Quality Control region. Loudoun County is located in an U.S. EPA designated non-attainment area for the eight-hour ozone standard (1997 and 2008 standards) and 1997 annual fine particulate matter standard (PM2.5). The area is designated as attainment for all other National Ambient Air Quality Standards (NAAQS). Air monitoring conducted by the DEQ shows that the air quality has improved significantly in the northern Virginia region over the past 20 years.

3.8.2 Summary of Representative Monitoring Data

The existing air quality of the project area was estimated using monitoring data reported by the DEQ Office of Air Quality Monitoring for the most recent three year period available (2009 to 2011). The analysis focused on regulated air pollutants contained in the NAAQS; including sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and particulate matter (PM_{10} and $PM_{2.5}$).

The closest and most representative DEQ monitoring stations to the project study area are the nearby Loudoun, Alexandria, Arlington, and Warren County monitoring locations. A summary of the measured air quality concentrations are presented in **Table 3-11** along with the NAAQS. The NAAQS have been established by EPA to protect the public's health and welfare with a margin of safety.

The measured levels from the DEQ monitoring stations are all below the NAAQS except for ozone which exceeded the 2008 eight-hour ozone standard for three days in 2011 at the Loudoun County monitor. It should be noted that ozone is a seasonable pollutant and is not emitted directly, but is a "secondary pollutant" formed by chemical reactions between volatile organic compounds (VOCs) and oxides of nitrogen in the presence of sunlight. A review of the DEQ ten year monitoring data shows that most

criteria pollutants concentrations have been decreasing since 2001. The decrease in NO_2, VOCs, and CO emissions is predominantly due to motor vehicle controls and reductions in evaporative emissions from gasoline stations and consumer products.

Table 3-11: Observed Ambient Air Quality Concentrations

Pollutant	Averaging Period	2009	2010	2011	Background Level	NAAQS
NO_2 (ppm)[1]	1-Hour Annual	40 ppb 7 ppb	44 ppb 8 ppb	38 ppb 8 ppb	41 ppb 8 ppb	100 ppb 53 ppb
SO_2 (ppm)[2]	1-Hour 3-Hour	36 ppb 55 ppb	17ppb 17 ppb	14 ppb 36 ppb	22 ppb 55 ppb	75 ppb 500 ppb
CO (ppm)[3]	1-Hour 8-Hour	1.7 ppm 1.3 ppm	2.2 ppm 1.7 ppm	1.9 ppm 1.4 ppm	2.2 ppm 1.7 ppm	35 ppm 9 ppm
Ozone (ppm)[4]	8-Hour	0.068 ppm	0.078 ppm	0.075 ppm	0.073 ppm[7]	0.075 ppm
PM_{10} ($\mu g/m^3$)[5]	24-Hour	24	28	31	31 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$ ($\mu g/m^3$)[6]	24-Hour Annual	20.0 9.2	19.6 10.3	20.5 9.2	20.0 $\mu g/m^3$ 9.5 $\mu g/m^3$	35 $\mu g/m^3$ 12 $\mu g/m^3$

Notes:

1. Represents the DEQ Loudoun Co. Monitoring Station (38-I).
2. Represents the DEQ Alexandria (L126-C) Monitoring Station.
3. Represents the DEQ Arlington Co. (47-T) Monitoring Station.
4. Represents the DEQ Loudoun Co. Monitoring Station (38-I).
5. Represents the DEQ Warren Co. Monitoring Station (30-E).
6. Represents the DEQ Loudoun Co. Monitoring Station (38-I).
7. Consistent with the NAAQS, the background level is based on a three year average of the fourth highest daily maximums.

3.8.3 Potential Impacts

This section summarizes the air quality project level analysis that was conducted for carbon monoxide (CO), particulate matter (PM), and Mobile Source Air Toxics (MSATs) for the proposed Alternatives. Details of the methodologies and analysis for each pollutant are presented in ***Appendix C: Air Quality Analysis Technical Report***. The methodologies and assumptions for addressing the type of analysis for each pollutant is consistent with the Environmental Protection Agency (EPA) and Federal Highway Administration (FHWA) guidance along with the latest version of the VDOT Consultant Guide, Air Quality Project-Level Analysis, Revision 18 (May 2009). Concentrations of air pollutants potentially resulting from implementation of any of the Study Alternatives are assessed against the National Ambient Air Quality Standard (NAAQS) criteria, which set a limit on how much of a given "criteria" pollutant can be present without creating public health impacts.

A review of the LOS, peak traffic volumes and delay time for each Alternative and analysis year determined that the four worst-case intersections and interchanges for inclusion in the CO Hot-Spot analysis were:

- US 50 at Gum Spring Road;
- Evergreen Mills Road at Belmont Ridge Road at Briarfield Lane;
- Loudoun County Parkway at Evergreen Mills Road; and
- US 50 at Loudoun County Parkway.

It is assumed that if these intersections/interchanges show ground-level concentrations below the CO NAAQS, then all other intersections included in the traffic study should also be below the NAAQS.

Emissions of CO were estimated using the EPA MOVES (MOVES2010b) emissions generating model. Ambient concentrations at sensitive receptor locations were estimated using the FHWA CAL3Interface which incorporates the latest version of the U.S. EPA CAL3QHC (04244) dispersion model which were added to appropriate background concentrations for comparison to the CO NAAQS.

For the modeling analysis, receptor locations were placed in the vicinity of the four intersections/interchanges at public access locations such as sidewalks, property lines, and parking lots. Each of the receptor locations was subject to one-hour and eight-hour CO concentrations analysis for comparison to the NAAQS.

The CO assessment was conducted consistent with the procedures identified in the VDOT Consultant Guide and the EPA modeling guidelines[12].

Table 3-12 shows the predicted concentrations are well below the one-hour NAAQS standard of 35 ppm for the existing, build, and no-build conditions. The one-hour concentrations were then scaled to generate eight-hour values for comparison to the NAAQS. These concentrations are also well below the eight-hour NAAQS standard of 9 ppm. The receptor locations referenced in **Table 3-12** along with a detailed discussion of the roadway CO assessment can be found in the ***Appendix C: Air Quality Analysis Technical Report***.

[12] "Guidelines for Modeling Carbon Monoxide from Roadway Intersections", EPA-454/R-92-005, US EPA, 1992.

Table 3-12: CAL3QHC Modeling Results for Each Intersection/Interchange

Intersection/Interchange	Averaging Period	Base Year 2012[1,2]		Interim Year 2025[1,2]				Design Year 2040[1,2]				NAAQS (PPM)
				No-Build		Build[3]		No-Build		Build[3]		
		Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	
Evergreen Mills Road at Belmont Ridge Road and Briarfield Lane	1-hour	3.4 (20)	3.3 (9)	3.2 (8)	3.2 (12)	3.2 (20)	3.1 (6)	3.2 (8)	3.2 (8)	3.2 (8)	3.5 (26)	35
	8-hour	2.7 (20)	2.6 (9)	2.5 (8)	2.5 (12)	2.5 (20)	2.4 (6)	2.5 (8)	2.5 (8)	2.5 (8)	2.7 (26)	9
US 50 at Gum Spring Road	1-hour	3.7 (12)	3.6 (13)	3.3 (1)	3.5 (19)	3.7 (16)	3.9 (19)	3.4 (20)	3.5 (19)	3.7 (2)	4.1 (19)	35
	8-hour	2.9 (12)	2.8 (13)	2.6 (1)	2.7 (19)	2.9 (16)	3.0 (19)	2.7 (20)	2.8 (19)	2.9 (2)	3.1 (19)	9
Loudoun County Parkway at Evergreen Mills Road	1-hour	3.4 (6)	3.7 (4)	3.4 (3)	3.4 (1)	3.4 (1)	3.5 (8)	3.4 (1)	3.4 (2)	3.4 (1)	3.5 (8)	35
	8-hour	2.7 (6)	2.9 (4)	2.7 (3)	2.7 (1)	2.7 (1)	2.7 (8)	2.7 (1)	2.7 (2)	2.7 (1)	2.7 (8)	9
US 50 at Loudoun County Parkway	1-hour	3.9 (50)	3.8 (50)	3.4 (27)	3.5 (47)	3.4 (41)	3.7 (58)	3.5 (27)	3.6 (47)	3.5 (2)	3.7 (47)	35
	8-hour	3.0 (50)	2.9 (50)	2.7 (27)	2.7 (47)	2.7 (41)	3.0 (58)	2.9 (27)	2.8 (47)	2.7 (2)	2.9 (47)	9

Notes:

[1] Total concentration is the sum of the modeled concentration plus background concentrations.

[2] Number in parenthesis represents the modeled receptor number of maximum modeled concentration. Please refer to Figures 6 through 11 of the *Air Quality Analysis Technical Report.*

[3] The Build condition assumes the worst case of the three Build Alternatives. For both 2025 and 2040, Alternative 3A was determined to have the highest traffic volumes and LOS at each intersection/interchange and was used to determine the worst case Build CO impacts at the four intersections/interchanges studied in the CO hot-spot analysis.

Particulate Matter

Loudoun County is designated by EPA as a non-attainment area for $PM_{2.5}$; therefore, an analysis is required to determine if the project is considered a "project of air quality concern". The EPA has established a list of criteria (40 CFR 93.123(b) (1)) in determining whether a project is of "air quality concern" for $PM_{2.5}$. Based on an evaluation of projected ADT and diesel truck traffic, the Alternatives are not considered to be ones of "air quality concern" for $PM_{2.5}$. Therefore, the CAA and 40 CFR 93.116 requirements for $PM_{2.5}$ were met without a hot-spot analysis, since such projects have been found to not be of air quality concern under 40 CFR 3.123(b)(1). A detailed discussion on $PM_{2.5}$ is included in the ***Appendix C: Air Quality Analysis Technical Report***.

Mobile Source Air Toxics

In December of 2012, FHWA issued an interim guidance update regarding Mobile Source Air Toxic (MSAT) impacts in NEPA documents. The update reflects the recent implementation of the EPA MOVES emission model for estimating MSAT emissions from mobiles sources along with updates of scientific research in the MSAT arena. Since the Build Alternatives will not add significant capacity to any of the existing and proposed roadway networks where design year traffic is projected to be 140,000 to 150,000 AADT or greater, the Alternatives are best characterized as a project with "Low Potential MSAT Effects". A qualitative analysis was conducted, consistent with the FHWA guidance, demonstrating that for all three Build Alternatives in the design year, there could be slightly higher MSAT emissions in the Project study area relative to the No Build Alternative due to increased vehicle miles travelled (VMT), and there could also be increases in MSAT levels in a few localized areas where VMT is projected to increase. However, in all areas of the project corridor, EPA's vehicle and fuel regulations will bring about significantly lower MSAT levels in the future than exist today. A detailed discussion on MSATs is included in the ***Appendix C: Air Quality Analysis Technical Report***.

Conformity

In accordance with EPA's transportation conformity rule, ozone is addressed on a regional scale by Metropolitan Planning Organizations (MPO's) and at the statewide level in the State Implementation Plan (SIP). Federal agencies may not approve any transportation project, program, or plan in a nonattainment area (where the concentration of a criteria pollutant exceeds the NAAQS) or maintenance area (formerly designated as nonattainment that now meets air quality standards) that does not conform to the approved SIP for air quality. For regions designated nonattainment or maintenance for ozone and PM, MPOs conduct conformity analyses of their transportation plans and programs to ensure that they conform to the SIP for attainment and maintenance of the NAAQS for ozone.

Loudoun County is located in an U.S. EPA designated non-attainment area for the eight-hour ozone standard (1997 and 2008 standards) and fine particulate matter ($PM_{2.5}$). The area is designated as attainment for all other National Ambient Air Quality Standards (NAAQS). On February 20, 2013 the National Capital Region Transportation Planning Board (TPB) agreed to include the Dulles Air Cargo, Passenger, and Metro Access Highway Build and No Build Alternatives for regional air quality conformity testing. In July 2013, VDOT will formally request the TPB to select one of the alternatives for inclusion in the 2013 National Capital Region's Financially Constrained Long-Range Plan (CLRP) which includes projected transit and traffic, demographics, and air quality conditions through the 2040 horizon year.

Construction Emissions

The temporary air quality impacts from construction activities would not be expected to be significant. Construction activities would be performed in accordance with VDOT's current *Road and Bridge Specifications*. The specifications conform to the State Implementation Plan (SIP) and require compliance with all applicable local, state, and federal regulations.

The study is located in an EPA designated non-attainment area for ozone. The following DEQ air pollution regulations would be adhered to during the construction: 9 VAC 5-130 et seq., Open Burning restrictions; 9 VAC 5-45, Article 7 et seq., Cutback Asphalt restrictions; and 9 VAC 5-50-60 et seq., Fugitive Dust precautions.

Conclusion

The study has been assessed for potential air quality impacts and conformity will all applicable air quality regulations and requirements and indicates that the Study Alternatives meet all applicable conformity requirements. Additionally, the Alternatives are not expected to cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation, or delay timely attainment of any standard.

3.9 NOISE

3.9.1 Noise Impacts

The noise impacts of the proposed Alternatives and the No Build Alternative were evaluated in accordance with FHWA's Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) and VDOT's Highway Traffic Noise Impact Analysis Guidance Manual (revised 2013). All traffic noise modeling for this study was conducted using the latest version of the FHWA Traffic Noise Model (TNM). The FHWA TNM incorporates state-of-the-art sound emissions and sound propagation algorithms, based on well-established theory or on accepted international standards.

To determine the degree of impact noise will have on human activity, the FHWA established Noise Abatement Criteria (NAC) for different categories of land use. If noise levels are predicted to approach or exceed the absolute FHWA/VDOT NAC for the design year build scenario at any receptor, than an impact is said to occur and a noise abatement evaluation is warranted. VDOT defines the word "approach" in "approach or exceed" as within 1 decibel. The NAC are measured in decibels and denoted as dBA. The project study area was determined to include the following five NAC categories:

- *Category B* – exterior residential. For uses included within Category B, noise impact would occur wherever project noise levels are expected to approach within one decibel or exceed 67 dBA;
- *Category C* – exterior recreational or institutional, including areas such as campgrounds, libraries, parks, active sport areas, places of worship, and medical facilities. For uses included within Category C, noise impact would occur wherever project noise levels are expected to approach within one decibel or exceed 67 dBA day;
- *Category D* – interior institutional uses which may be noise sensitive, such as auditoriums, day care centers, institutional structures and public meeting rooms. For Category D uses, noise impact would occur where predicted project-related interior noise levels approach or exceed 52; and

- *Category E* – exterior commercial areas, including hotels, restaurants and bars, offices, and similar developed lands, properties or activities. For Category E (commercial) land use, noise impact is assumed to occur where predicted exterior noise levels approach or exceed 72 dBA.
- *Category F* – exterior industrial areas, including manufacturing, bus yards, retail facilities, warehousing, maintenance facilities, and similar developed lands, properties or activities. Category F (industrial) land use is not considered noise-sensitive and impact due to highway noise is not assessed at these locations.

For purposes of this analysis, areas along the Location Study Corridors were divided into 23 Common Noise Environments (CNE). CNEs are groupings of receptor sites that, by location, form distinct communities within or adjacent to the project area and contain receptors with similar exposures to noise. These areas are used to evaluate traffic noise impacts and potential noise abatement options for communities as a whole, and to assess the feasibility and reasonableness of possible noise abatement measures for those areas. Areas without noise-sensitive land uses are not identified within CNE boundaries.

Additionally, noise impacts would occur wherever project-related noise levels cause a substantial increase over existing noise levels for all noise-sensitive exterior activity categories. VDOT considers an increase of 10 dBA or more to be "substantial". Aircraft from IAD frequently dominate the background noise levels in the entire project study area; therefore a background of 57 dBA has been identified as typical and present throughout the project study area. To account for this constant aircraft noise, a 57 dBA was added to the TNM predictions to compute a total dBA for each receptor location. Worst-hour noise levels were predicted for the Existing 2012 scenario, as a measure of comparison, and for the following alternatives in the 2040 Design Year: the No Build Alternative, Alternative 2, Alternative 3A and Alternative 3B (***Appendix D: Noise Analysis Technical Report***). **Table 3-13** presents a summary of the projected noise impact for the 2012 Existing and 2040 No Build and Build alternatives. The impacts are summarized for the entire project study area and separated by NAC activity categories and type of impact. For each NAC, noise impact is first given as residential or recreational units that approach or exceed the NAC. This is the only type of impact that occurs for the Existing and No Build alternatives. For the Build alternatives, NAC impact is listed first, followed by both NAC and substantial increase impact, followed by the total noise impact count.

Table 3-13 Projected Noise Impact

Alternative	Impact Type	Land Use and NAC Activity Category				
		Residential B	Recreational C	Interior D	Commercial E	Total
Existing	NAC/Total	19	3	0	0	22
No Build Alternative	NAC/Total	53	9	0	1	63
Alternative 2	NAC Only	10	1	0	0	11
	Both*	0	2	0	0	2
	Total	10	3	0	0	13
Alternative 3A	NAC Only	68	10	0	2	80
	Both*	0	0	0	0	0
	Total	68	10	0	2	80
Alternative 3B	NAC Only	40	11	0	0	51
	Both*	0	0	0	1	1
	Total	40	11	0	1	52

*Both indicates all receptors where both NAC and Substantial Increase impact is predicted
No impacts due to only substantial increases were predicted for alternative.

The impact counts for the Existing and No-Build scenarios encompass the entire project study area including both the Alternative 2 and 3 Location Study Corridors. The number of impacted units shown in each future Build alternative includes only those receptors adjacent to the proposed improvements within that corridor.

Overall, residential and recreational impacts are predicted to occur under all alternatives. No Category D impacts are predicted under any alternative. Total noise impact under the Existing Alternative is 22 receptor units, 19 of which are residential, whereas under the 2040 No Build Alternative, 53 residential units and a total of 63 receptor units would be impacted. The Alternative 2 scenario would create a total of 13 impacted units, 10 of which are residential, and three of which are recreational. Of those recreational areas, sound levels would approach or exceed the NAC at all three receptors, and two would be exposed to substantial increases in existing noise levels. The Alternative 3A scenario would likely produce a total of 80 impacted units, 68 of which are residential, seven are recreational, and two are commercial outdoor areas. The Alternative 3B scenario would likely impact a total of 52 units, 40 of which are residential, 11 are recreational, and one is a commercial outdoor area.

Table 3-14: Category C Recreational Noise Impacts

Land Use Description	Recreational Receptors Impacted by Noise				
	Existing	No Build Alt. 1	Alternative 2	Alternative 3A	Alternative 3B
Affinity Farm equine facility	0	0	0	0	0
Shockey Farm equine facility	0	0	3	N/A	N/A
Discovery Station day care facility playground	0	2	N/A	1	2
Inova Medical Center picnic table	0	0	N/A	0	1
Arcola Center picnic tables and playground	0	1	N/A	2	3
Lion's baseball fields	3	6	N/A	7	5
Totals	**3**	**9**	**3**	**10**	**11**

The removal of buildings acting as sound barriers during project construction will likely increase noise levels predicted in the Build alternatives; however, some of these impacts would be offset by the greater distances between the remaining noise-sensitive receptors and project roadways; thus resulting in little change in predicted impact between the No Build and Build alternatives. In other areas, such reduced shielding results in a noticeable increase in projected impacts.

3.9.2 Noise Abatement

FHWA has identified certain noise abatement measures that may be incorporated into projects to reduce traffic noise impact. In general, mitigation measures can include alternative measures (traffic management, the alteration of horizontal and vertical alignment, and low-noise pavement), in addition to the construction of noise barriers. Additionally, the Noise Policy Code of Virginia (HB 2577, as amended by HB 2025) states, "*Whenever the Commonwealth Transportation Board or the Department plan for or undertake any highway construction or improvement project and such project includes or may include the requirement for the mitigation of traffic noise impacts, first consideration should be given to the use of noise reducing design and low noise pavement materials and techniques in lieu of construction of noise walls or sound barriers. Vegetative screening, such as the planting of appropriate conifers, in such a design would be utilized to act as a visual screen if visual screening is required*."

Traffic management measures typically considered for noise abatement include reduced speeds and truck restrictions. Reduced speeds would not be an effective noise mitigation measure since a substantial decrease in speed is necessary to provide a significant noise reduction. A 10 mph reduction in speed would result in only a two decibel decrease in noise level. Restricting truck usage for any of the proposed DACPMAH Build Alternatives is not practical as truck traffic is a primary function of this roadway, and diversion of truck traffic to other roadways would increase noise levels in those areas. The alteration of the horizontal or vertical alignment of any of the project roadways for the sole purpose of noise abatement could be considered for Alternative 2 since it is a new alignment, but would not be practical for Alternatives 3A and 3B because the existing roadway alignments would have to be shifted substantially to make the measure effective. Furthermore, any shifts to the alignment studied herein would require right-of-way acquisitions and would likely create new noise impacts. Furthermore, VDOT is not authorized by FHWA to use "quiet pavement" at this time as a form of noise mitigation. Upon completion of the quiet pavement pilot program and approval from FHWA, the use of "quiet pavement" will be given additional consideration.

The feasibility and reasonability of noise barriers as an abatement measure were evaluated in locations where noise impact is predicted to occur under the Build conditions. To be considered "feasible", a noise barrier must be:

- Effective, reducing noise levels at impacted noise sensitive locations by at least 5 decibels, thereby "benefiting" at least 50% of the impacted receptors in the area; and
- Constructible, accounting for safety, barrier height, topography, drainage, utilities, maintenance of the barrier, and access to adjacent properties.

In order to be considered "reasonable", a noise barrier must be:

- Cost-effective, requiring less than 1600 square feet per benefited receptor;

- Able to meet VDOT's noise reduction design goal of 7 decibels for at least one of the impacted receptors; and
- Agreeable to the majority of benefited receptors. Community views are surveyed in the final design phase of the project.

Noise barrier analyses conducted for Alternative 2 found approximately 940 feet of warranted barrier length that would be potentially feasible, but not reasonable. The single warranted barrier would benefit a total of up to three impacted receptors, with an estimated total cost of $628,896.

Approximately 1.3 miles of warranted barrier length was found to be potentially feasible and reasonable for Alternative 3A, which would benefit up to 68 impacted receptors, and 83 receptors in total. Total barrier construction costs for these barriers are estimated to be approximately $3,822,840. Another 1.1 miles of potentially feasible but not reasonable barriers would benefit ten more impacted receptors at an estimated cost of $5,291,185.

Alternative 3B will likely require approximately 2,251 feet of warranted barrier length, found to be potentially feasible and reasonable, and predicted to benefit up to 37 impacted receptors and 61 receptors total. Total construction costs for these barriers are estimated to be $1,728,192. In addition, another 2,949 feet of potentially feasible but not reasonable barriers would benefit ten more receptors and cost approximately $3,018,960. The number of benefited receptors is less in Alternative 3B than in Alternative 3A because several more potential acquisitions within the project study area result from the addition of proposed frontage roads in the roadway design. The substantial differences in total length, square footage, and cost between Alternatives 3A and 3B are due to the additional barrier required on the proposed elevated structure roadway in Alternative 3A.

This noise evaluation is preliminary; a more detailed review will be completed during the final design stage. As such, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis. Similarly, noise barriers that were not considered feasible and reasonable may be found to meet established criteria and be recommended for construction. If a noise barrier is determined to be feasible and reasonable in final design, the affected public will be given an opportunity to decide whether they are in favor of construction of the noise barrier. Additional details on the noise analysis can be found in the Noise Analysis Technical Report, which is available for public review on VDOT's project website.

3.9.3 Construction Noise Consideration

Construction activity may cause intermittent short-term fluctuations in noise levels in the vicinity of the project area. During the construction phase of the project, all reasonable measures will be taken to minimize noise impact from these activities. Additionally, Section 107.16(b) 3 of VDOT's Road and Bridge Specifications prescribes contractor requirements for noise control during construction. These include, but are not limited to:

- Limiting exterior noise levels during noise-sensitive activities to no more than 80 decibels, and taking corrective action should construction activities surpass this level;
- Restricting certain portions of work that produce objectionable noise between 10 P.M. and 6 A.M. and following any additional noise restrictions established by local ordinances; and

- Establishing alternative haul routes that direct vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.

3.10 AQUATIC RESOURCES

3.10.1 Wetlands and Streams

Water resources are regulated by the Environmental Protection Agency (EPA) and the DEQ in accordance with the Water Pollution Control Act (Clean Water Act) of 1972, which provides protection for waters of the United States (WOUS) (33 USC §1251et seq.). Surface waters in the project vicinity flow into either Broad Run or Elklick Run, both of which ultimately drain to the Potomac River and into the Chesapeake Bay. The United States Geological Survey (USGS) recognizes the project study area as part of both the Potomac River-Broad Run watershed, hydrological unit code (HUC) 0207000809, and the Bull Run, watershed, hydrological unit code HUC 0207001007.

A review of the United States Fish and Wildlife (USFWS) National Wetland Inventory (NWI) database, along with topographic maps produced by the United States Geological Survey (USGS) and available aerial photography were to initially identify potential wetlands and surface within the project's Location Study Corridors. Field verifications to confirm the identification of wetlands and desktop reviews were conducted in February and March 2013. A variety of aquatic species, including bivalves, small fish, reptiles, amphibians, and aquatic birds are likely to reside in the surface water habitats identified within the project study area; however, no aquatic species were spotted during field visits.

The evaluation of acres and length of streams was calculated for all WOUS using the corridor footprint. As noted previously, this results in a more conservative impact estimate. Detailed assessments of streams, wetlands, and other aquatic resources will be required to determine precise impacts and mitigation requirements once the project advances into design.

Wetlands

Under the provisions of Executive Order 11990, *Protection of Wetlands*, each Federal agency must take action to minimize the destruction, loss, or degradation of wetlands and to preserve or enhance their natural values. Wetlands are defined as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (40 CFR §230.41(a)(1)). Wetlands are generally found in valleys, adjacent stream beds, and topographic depressions, but can also be located in higher elevation areas where seeps and springs occur. Their functions include groundwater discharge, nutrient removal, sediment and toxin retention, and wildlife habitat.

Potential impacts to wetlands, as a result of the No Build Alternative, are expected to be minimal. However, some of the planned projects included under the No Build Alternative would potentially impact identified wetland areas and would require coordination with the US Army Corps of Engineers (USACE) in order to obtain necessary wetland permitting. Any potential wetland impacts and required regulatory permits associated with Alternative 1 would be addressed separately during the respective design and construction of each programmed transportation and infrastructure improvement included in the CLRP.

Approximately 32 total acres of wetlands were located within the Location Study Corridors for Alternatives 2 and 3A, while 33 acres were calculated within the Location Study Corridor for 3B. **Table 3-15** provides the breakdown of various wetland classifications within the Location Study Corridors. Wetlands have been classified in accordance with the USFWS system developed in *Classification of Wetland and Deepwater Habitats* (Cowardin et al., 1979).

Table 3-15: Wetlands Identified within Location Study Corridors

Wetland Class	Description	Wetland Area (Acres)		
		Alt. 2	Alt. 3A	Alt. 3B
PEM	Palustrine Freshwater Emergent Wetland	11.6	5.5	5.7
PEM/PFO	Palustrine Freshwater Emergent Forested	1.7	0.0	0.0
PFO	Palustrine Freshwater Forested	18.2	25.5	25.9
PSS	Palustrine Freshwater Scrub-Shrub	0.5	1.2	1.5
Total Wetlands		32.1	32.2	33.1
Anticipated Impact to Wetlands*		10.3	17.2	16.1

*Based on professional engineering judgment and predicted right of way requirements. Assumes 10% of right-of-way acquisition at Bi-County Parkway / US Route 50 interchange as well as Loudoun County Parkway / US Route 50 interchange and excludes MWAA owned property along VA Route 606. Subject to change upon development of project design.

Within the anticipated right-of-way area for each Build Alternative, the potential impacts to wetlands are drastically reduced from the overall wetland areas identified in each Location Study Corridor. Approximately 10.3 total acres of wetlands were located within the right-of-way for Alternative 2; 17.2 acres were identified within the right-of-way for 3A; and 16.1 acres are included in the right-of-way requirements for Alternative 3B. As project design advances, formal wetland delineations will be performed, based on more defined project limits of disturbance, and a more detailed understanding of the potential for impacts will be established. All available measures will be taken to avoid wetland impacts and to minimize effects wherever practical. These measures would include design modifications such as: minor alignment shifts to avoid or minimize impacts to wetlands, temporary and permanent stormwater management measures.

Compensation will be provided for any unavoidable wetland impacts as a result of the proposed project and in accordance with Section 404 of the Clean Water Act (CWA) of 1972, where required (33 USC §1344 et seq.). The exact form and amount of compensation will be developed with the appropriate Federal and State water quality permitting agencies as the project design and development enters into the permitting process. VDOT will negotiate with USACE, DEQ, and Virginia Marine Resources Commission (VMRC) as necessary to obtain any required permits.

Streams

Surface water drainage takes place through numerous creeks and streams in the project vicinity. The named surface waters that cross the Location Study Corridors include Broad Run's North Fork, which flows west to east; Broad Run's South Fork, which flows southwest to northeast; and a small portion of Cabin Branch, which flows south to north, as well as Elklick Run, which flows northwest to southeast. All of these are perennial streams fed by several intermittent tributaries and are considered to be protected by the EPA and the USACE under the CWA and Section 10 of the Rivers and Harbors Act of 1899 (33 USC §401).

Under the No Build Alternative, the Northstar Boulevard/Bi-County Parkway would cross South Fork Broad Run near its intersection with US Route 50 and construction of the Loudoun County Parkway from Old Ox Road (VA Route 606) would transverse the Broad Run mainstem. Several other intermittent streams and tributaries may be included in the project areas associated with the planned transportation improvements included in Alternative 1; however, these impacts would be assessed during the respective design of each project.

Figure 3–1 depicts the surface waters within the Location Study Corridors. The current Location Study Corridor for Alternative 2 contains approximately 29,725 linear feet of streams, which include the Northern and Southern Forks of Broad Run as well as a small portion of Cabin Branch near the northeastern project terminus. Alternative 3A and 3B Location Study Corridors contain approximately 25,768 and 25,828 linear feet, respectively, of streams, as they intersect sections of South Fork Broad Run, portions of Cabin Branch, Elklick Run and some small tributaries. However, this inventory of stream lengths is based on the full extent of the Location Study Corridors and any potential impacts will likely be substantially less, as the length of streams are reduced within the anticipated right-of-way area for each Alternative. Approximately 8,700 linear feet of streams are within the right-of-way for Alternative 2; 11,423 linear feet of streams are within the right-of-way for 3A; and 12,065 linear feet are included in the right-of-way requirements for Alternative 3B.

All practicable measures would be taken to avoid and minimize impacts to these streams and other water bodies within the Location Study Corridors. Minimization measures could include modifications during engineering and design such as minor alignment shifts to avoid or minimize impacts, the use of bridges instead of culverts, the use of retaining walls, temporary and permanent stormwater management measures. For unavoidable stream impacts, minimization and mitigation methods will be negotiated with the USACE, DEQ, and Virginia Marine Resources Commission (VMRC) as necessary to obtain any required permits.

3.10.2 Water Quality

Of the water bodies within the DACPMAH Location Study Corridors, Broad Run is listed in DEQ's *Draft 2012 305(b)/303(d) Water Quality Assessment Integrated Report* as not supporting aquatic life and recreation as a result of impaired benthic-macroinvertebrates bioassessments as well as the presence of Escherichia coli bacteria found during monitoring events in 2005, 2007, and 2009 (DEQ, 2012).

Water quality impacts are not likely to occur as a result of the proposed DACPMAH alternatives due to minor increases in pollutants washed from the road surface into receiving streams. Therefore, the DACPMAH would not inhibit the attainment of TMDL goals for Broad Run. Pollutants may include grease, oil, metals, nutrients, nitrogen, deicing salts, roadside vegetation management chemicals, and suspended solids. Temporary and permanent stormwater management measures, including detention basins, vegetative controls, and other measures, would be implemented to minimize potential degradation of water quality. These measures would reduce or detain discharge volumes and remove many pollutants. The requirements and special conditions of any permits for work in and around surface waters would be incorporated into the construction contract documents. The construction contractor would be required to comply with those conditions and with pollution control measures specified in VDOT's *Road and Bridge Specifications* (2007).

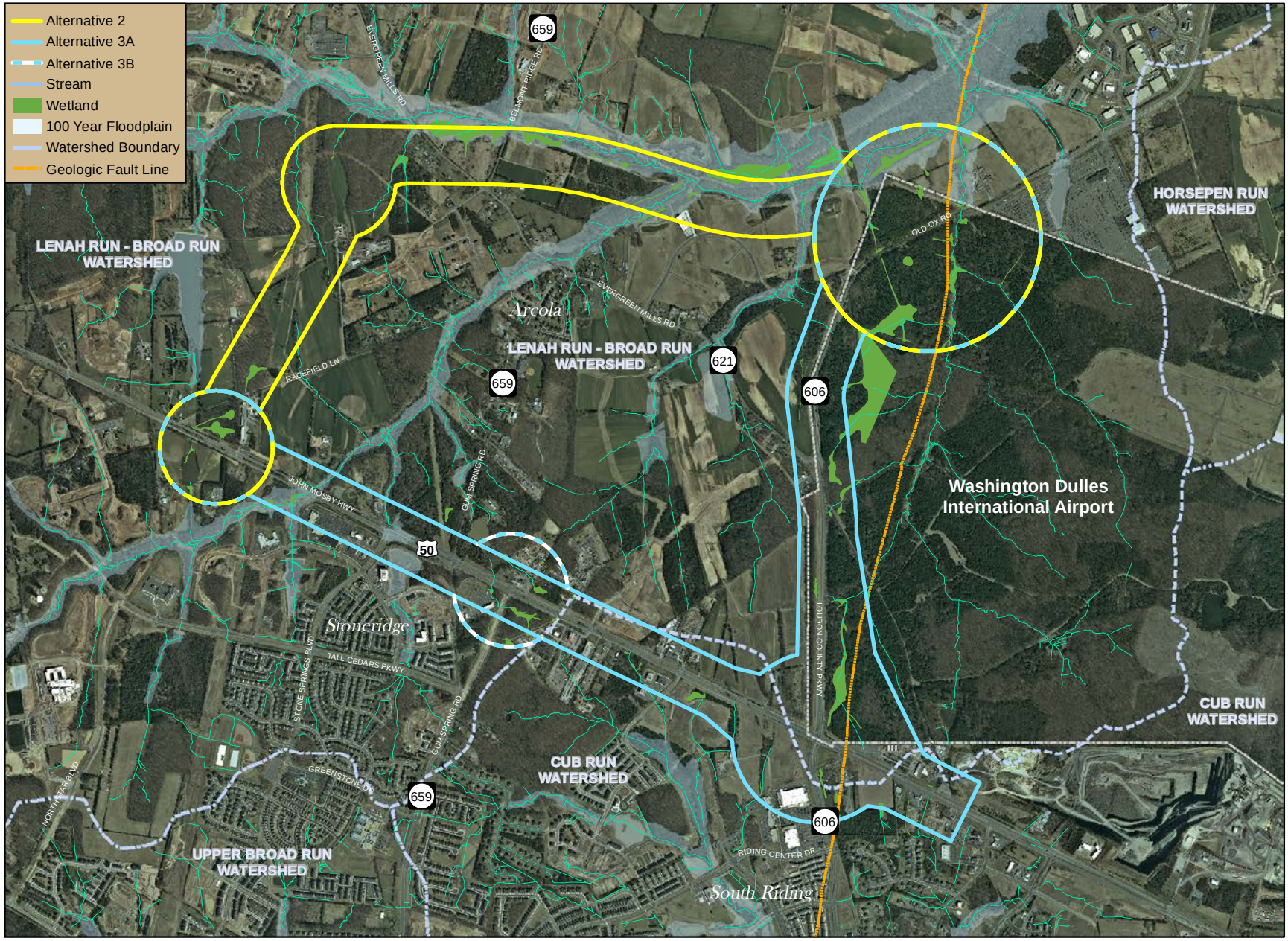


Figure 3-1: Surface Waters within the Location Study Corridors

Source: Loudoun County

Miles 0 0.25 0.5 0.75 1

3.10.3 Floodplains

In order to reduce the risk of flood loss and to minimize the impact of floods on human safety, while preserving the natural beneficial values of floodplains, Executive Order 11988, *Floodplain Management*, requires that Federally-aided projects provide an assessment of hazards for any action occurring within a floodplain. A floodplain is the lowland area adjacent to a river, lake, or stream that may become inundated during a rare flooding occurrence.

Information on floodplains within the project vicinity was obtained from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), which indicate the presence of 100-year floodplains in each of the alternative Location Study Corridors. As illustrated in **Figure 3–1**, the Alternative 2 Location Study Corridor includes three streams with 100-year floodplains (approximately 112.5 acres). The north edge of the Alternative 2 Location Study Corridor longitudinally encroaches upon the floodplain for Broad Run's North Fork and transverses the floodplain for Broad Run's South Fork and an unnamed tributary of Broad Run. Comparatively, the Alternative 3 Location Study Corridor encompasses a portion of the 100-year floodplain (approximately 58.2 acres) for South Fork Broad Run and one of its small unnamed tributaries.

Of these floodplains, only 26.5, 31.1, and 29.1 acres are expected to be impacted by the anticipated right-of-way requirements associated with Alternative 2, 3A and 3B, respectively. Every effort would be made to avoid or minimize any potential impacts to floodplains in the Location Study Corridors as the project moves forward in design. For example, minimization measures for Alternative 2 may include shifting the alignment within the corridor to avoid encroachment on the North Fork Broad Run floodplain For both Alternatives 2 and 3, crossings of South Fork Broad Run would be designed to minimize floodplain encroachments and possible adverse impacts on natural and beneficial floodplain values, pursuant to 23 CFR §650. Compliance applicable sections of VDOT Road and Bridge Specification along with any other applicable state or federal stormwater management requirements will be determined and implemented during project design to address concerns for stormwater runoff and increased downstream flooding. As the project design advances, a detailed hydraulic survey and study would be performed to determine the specific effects of stormwater discharges to ensure that no substantial increases to flooding would occur. Overall, significant floodplain encroachment, as defined by the FHWA (23 CFR §650.105(e)), is not expected to occur as a result of any proposed Build Alternatives.

3.11 NATURAL RESOURCES

3.11.1 Wildlife and Habitat

The project study area encompasses both aquatic and terrestrial habitats and much of their associated fauna.

Extensive development characterizes the majority of the terrestrial area surrounding the proposed project. Forested land and open space provide habitat for various wildlife species such as rabbits, eastern grey squirrels (*Sciurus carolinensis*), red fox (*Vulpes vulpes*), and a number of common bird species. Field work was conducted on-site in February and March of 2013. At that time, white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), Red-tailed Hawks (*Buteo jamaicensis*), Red-shouldered Hawks (*Buteo lineatus*), Eastern Bluebirds (*Sialia sialis*), Black Vulture (*Coragyps atratus*), Turkey Vulture (*Cathartes aura*), Blue Jay (*Cyanocitta cristata*),Canada Goose (*Branta canadensis*), Bufflehead

(*Bucephala albeola*), and Mallard (*Anas platyrhynchos*) were seen in the project vicinity. Evidence of beaver (*Castor canadensis*) activity was also apparent, by means of gnawed trees along the stream bank.

In its response to VDOT's scoping letter, the Virginia Department of Conservation and Recreation Natural Heritage Program did not find any State Natural Area Preserves under its jurisdiction in the project vicinity. DCR-DNH did, however, locate the Ticonderoga Farms Conservation Site within the vicinity of the project area. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. The Ticonderoga Farms Conservation Site has been ranked a "B5" site, indicating that it is "of general significance". The natural heritage resources associated with the site include the Purple Milkweed (*Asclepias purpurascens*) and Blue-heart (*Buchnera americana*).

The Location Study Corridor for Alternative 2 consists of undeveloped land, partially forested areas, and cleared parcels associated with residential dwellings or farmland cover. While the portion of the Location Study Corridors for Alternatives 3A and 3B running north-south along VA Route 606 is largely undeveloped, the east to west segment, along Route 50, is heavily traveled and lined with constructed commercial and industrial businesses and facilities.

Under each of the proposed Build Alternatives for the DACPMAH (Alternatives 2, 3A, and 3B), minor impacts to wildlife and habitat would be anticipated due to potential right of way and construction requirements. Based on professional engineering judgment and predicted right-of-way requirements for the proposed DACPMAH, approximately 166.6, 212.4, and 195.5 acres are anticipated to potentially be cleared in association with each alternative, respectively. Plant species impacted within the Location Study Corridors would be gradually repopulated from other nearby individuals, and animal species which leave the impacted area during construction would likely return when construction is complete. With the incorporation of best management practices, impacts to wildlife and habitat in the vicinity of the Location Study Corridors would be avoided to the greatest extent practicable.

3.11.2 Threatened and Endangered Species

According to a March 2013 review of the U.S. Fish and Wildlife Service's (USFWS) Online Information, Planning, and Conservation (IPaC) system, no federally-protected species were found in the project vicinity. There are also no wildlife refuges or critical habitat identified in the project vicinity.

A March 2013 search of the Virginia Department of Game and Inland Fisheries' online database (VaFWIS) indicated that the project is not located within a Bald Eagle Concentration Area or Roost. The database did not identify anadromous fish waters, bald eagle nests, and trout streams within a two-mile radius of the project study area. While there are no confirmed records of federally-listed threatened or endangered species within the vicinity of the project study area, VaFWIS identified six (6) species designated Federal Species of Concern (FS), one (1) specie designed State Endangered (SE), seven (7) species with a State Threatened (ST) designation, and two (2) species with a Collection Concern (CC) designation known or likely to be found within or adjacent to the project study area. **Table 3-16** depicts the federal and state lists of threatened or endangered fauna that can be found within a 2-mile radius of the project study area.

Table 3-16: Federal and State Listed Species within a Two-Mile Radius of the Location Study Corridor

Common Name	Scientific Name	Status	Tier
Appalachian Grizzled Skipper	Pyrgus wyandot	FS,ST	1-Critical Conservation Need
Brook Floater	Alasmidonta varicosa	SE	2-Very High Conservation Need
Bald Eagle	Haliaeetus leucocephalus	FS	2-Very High Conservation Need
Dotted Skipper	Hesperia attalus slossonae	FS	2-Very High Conservation Need
Green Floater	Lasmigona subviridis	ST	2-Very High Conservation Need
Henslow's Sparrow	Ammodramus henslowii	ST	1-Critical Conservation Need
Loggerhead Shrike	Lanius ludovicianus	ST	1-Critical Conservation Need
Migrant Loggerhead Shrike	Lanius ludovicianus migrans	ST	N / A
Persius Duskywing Butterfly	Erynnis persius persius	FS	2-Very High Conservation Need
Regal Fritillary	Speyeria idalia idalia	FS	1-Critical Conservation Need
Spotted Turtle	Clemmys guttata	CC	3-High Conservation Need
Timber Rattlesnake	Crotalus horridus	CC	4-Moderate Conservation Need
Upland Sandpiper	Bartramia longicauda	ST	1-Critical Conservation Need
Wood Turtle	Glyptemys insculpta	ST	1-Critical Conservation Need
Yellow Lance	Elliptio lanceolata	FS	3-High Conservation Need

The Virginia Department of Conservation and Recreation, Natural Heritage Program (DCR-DNH) database for Loudon County was searched in March 2013. Although no federally-listed species were reported in the County, the search indicated that four state-threatened species have been confirmed to exist within Loudon County. These include the green floater (*Lasmigona subviridis*), wood turtle (*Glyptemys insculpta*), Loggerhead Shrike (*Lanius ludovicianus*), and the Upland Sandpiper (*Bartramia longicauda*), all of which were duly identified by the VaFWIS database. In its response to VDOT's scoping letter, DCR stated the project would not affect any documented state-listed plants or insects. DCR-DNH noted that while the database does not indicate the presence of any federally-listed species in the project area, certain habitats in Northern Virginia have the potential to support undocumented occurrences of global and state rare species.

VDOT cooperates with State authorities in an effort to identify and conserve State listed species whenever feasible. With the incorporation of best management practices, impacts to rare, and state-listed threatened and endangered species that may be located in the vicinity of the project study area would be avoided to the greatest extent practicable.

3.12 HAZARDOUS MATERIALS

A search of Federal and State regulatory agency databases and site reconnaissance were performed to identify recognized environmental conditions (RECs) within a ½-mile radius from the centerline of each of the Alternatives. In addition to the No Build Alternative, Alternatives 2 and 3 were evaluated using information from Environmental Data Resources, Inc. (EDR). Site reconnaissance was performed in February 2013 to field verify information provided in the EDR report and to determine any additional information regarding recognized environmental conditions. No indications of spills, leaks, noxious odors, stained soils, lagoons, above-ground storage tanks (ASTs), underground storage tanks (USTs),

drums, groundwater monitoring wells, or stressed vegetation consistent with exposure to contaminants were observed on properties bordering the proposed project during site reconnaissance. However interviews with property owners were not conducted and portions of some of the properties were inaccessible to field surveyors due to locked gates and fences. Therefore, potential RECs were primarily identified as a result of the sites listed within the leaking UST and reported spills databases. Many of the EDR reports for these cases do not clearly state how much of a substance was released, how much was removed, whether hazardous materials were cleaned to the satisfaction of the jurisdictional agency, and whether hazardous substances are likely to remain in place.

Based on the search of Federal and State agency databases and site reconnaissance, three potential RECs were identified within ½-mile of the centerline of the Alternative 2 Location Study Corridor. Additionally, the EDR report and site reconnaissance identified a total of ten potential RECs within a ½-mile radius from the centerline of the Alternative 3 Location Study Corridor.

Although there did not appear to be any properties within the Location Study Corridors with currently observed RECs during site reconnaissance, there is one property with an open case status—the Valero gasoline station located at 42382 John Mosby Highway within the Alternative 3 Location Study Corridor. This property is listed in the Leaking Tanks database for a leak reported on 7/12/2012. For that reason, the Valero gasoline station appears to be the only site that would be considered a REC along the Alternative 3 corridor. There were no obvious RECs identified along the Alternative 2 corridor. Upon the identification of a Preferred Alternative, if one is selected, a complete Phase I Environmental Site Assessment (ESA) should be conducted to determine the full extent of potential hazardous material sites of concern.

3.13 INDIRECT AND CUMULATIVE EFFECTS

The Council on Environmental Quality (CEQ) defines indirect effects as effects that "…are caused by the [proposed] 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)). Most commonly, indirect impacts associated with transportation infrastructure projects are related to induced development, i.e., development that would not occur if the project were not constructed. Indirect effects also may occur if the proposed action would change the extent, pace and/or location of development, and if this change would affect the natural or built environment.

The Council on Environmental Quality (CEQ) defines cumulative impacts as "…impacts on the environment which result 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" (40 CFR 1508.7). Because of the "incremental impact" part of the definition, actions that have no direct or indirect impact on a resource by definition have no cumulative effect on that resource. Therefore, only those environmental resources that would be directly or indirectly affected by implementation of any of the Alternatives could incur cumulative effects from these Alternatives in combination with other actions.

3.13.1 Indirect Effects

Lands surrounding and within the ICE Analysis Area currently can be accessed from the existing road network. As set forth in the *Loudoun County Revised Comprehensive Plan* (2011), these lands are subject to the development described in the previous section. As evidenced by permits issued by the Loudoun County Department of Building and Development, this development would occur even in the absence of implementation of this project. Although construction of this project may enhance access into some of these lands, it would not result in development that would not otherwise occur. As such, it cannot be said that the project would be the indirect cause of such development; land use and zoning regulations, existing plans such as *Loudoun County's Revised Comprehensive Plan*, and other factors such as economic conditions, would ultimately dictate development decisions. Further, it is not expected that the proposed project would affect the extent, pace or location of development within the ICE Analysis Area.

Because construction of the proposed project would result in an increase in impermeable road surfaces in the ICE Analysis Area, indirect effects such as increased stormwater runoff could cause downstream effects to water quality. These effects would be addressed through implementation of stormwater management strategies designed to remove pollutants from runoff before it is discharged into receiving waters. Indirect impacts on downstream water quality over time are expected to be minimal following implementation of these strategies.

3.13.2 Cumulative Effects

Under the No-Build Alternative, the project would not be constructed and neither direct impacts nor any contribution to cumulative effects would occur. Any of the Build Alternatives would contribute to cumulative effects on natural and human environmental resources in the ICE Analysis Area. The nature of the cumulative effects is related to the incremental impact to the resource, when combined with impacts from past, present and reasonably foreseeable future actions. Any resource that would not be directly impacted by the DACPMAH project, such as historic architectural and archeological sites, air quality, and hazardous materials would not sustain a cumulative impact as a result of the project and therefore are not discussed here. The discussion below sets forth the cumulative effects of the proposed Build Alternatives on individual resources.

Development Activities

Analysis of indirect and cumulative impacts must be informed by an understanding of past, present and reasonably foreseeable future development.

A review of past, present and reasonably foreseeable future development patterns within and in the vicinity of the project study area was undertaken as a basis for analyzing the proposed project's potential indirect and cumulative effects. The boundary of the area used for the analysis of indirect and cumulative effects extends approximately one half mile in each direction from the centerline of each roadway proposed for construction or modification under the build alternatives. It incorporates parts of the census designated place (CDP) of Arcola and the CDP of Stoneridge. Development in the ICE Analysis Area for this project includes projects by private developers, by Loudoun County, by the Metropolitan Washington Airports Authority and its predecessors, and by VDOT.

<u>Past Development</u>

Development in the project study area has been limited until recent years. A review of aerial photography and historic maps from 1853 to 2012 indicates that the ICE Analysis Area was primarily agricultural /

rural until the mid-1990s. The area was dominated by moderate-sized farms and the small rural settlement of Arcola. A small degree of suburbanization began following road improvements after World War II, with the addition of a small number of single family residences. The area has undergone more rapid suburbanization since 2002, as the population of the Washington D.C. metropolitan area has expanded, although the ICE Analysis Area itself mostly has retained its rural character.

Present and Future Development

Present and planned future development within and around the ICE Analysis Area is consistent with the suburbanization that the region has seen over the past 70 years. Within the ICE Analysis Area this development is mostly residential, with supporting commercial and transportation infrastructure. The *Loudoun County Revised Comprehensive Plan*, including the Route 50/Arcola Area Corridor Land Use Plan, sets forth planning directives for years 2011-2030. According to these documents, planned land use in the ICE Analysis Area is mostly "Business," with a smaller amount of land dedicated to "Hybrid Retail Center" and "Transition" (the transition area between suburban and rural areas). The ICE Analysis Area also is situated within a Suburban Policy Area, which the *Loudoun County Revised Comprehensive Plan* designates as the primary location for suburban-scale development.

Private Projects – According to permits on file with the Loudoun County Department of Building and Development, there are fourteen projects for which elements have been approved within the ICE Analysis Area, none of which are dependent upon implementation of the DACPMAH project. These projects, if completed, will result in the establishment of:

- 414 single family homes
- 3170 residential units, including townhomes and apartments
- 2 churches
- A 9,850 square foot medical facility
- A 320,000 square foot hospital facility
- 818,000 square feet of industrial/business uses
- 3,298,400 square feet of commercial use
- 25,000 square feet of recreational area

Of note because of its size and central location entirely within the ICE Analysis Area is the Arcola Town Center project. This project, northwest of the intersection of Route 50 and Route 606 and slated to occupy 391 acres, is planned as a mixed use community comprised of townhomes, multifamily housing, commercial and open space.

In addition to community developments in Loudoun County, the planned airport expansion on MWAA property, to the west of IAD, will result in the expected establishment of approximately 430 acres of mixed use nonresidential development including commercial, office, conference, and industrial space, as well as approximately 375 acres of cargo and general aviation support facilities. The projects incorporated into the overall WLA, and their associated access roadway network, will be subject to a separate NEAP document, as these improvements advance towards construction.

Public Projects – The 2010 Loudoun County *Revised Countywide Transportation Plan* (Board of Supervisors, 2012a) sets forth several transportation projects that are planned to be undertaken within the ICE Analysis Area, as follows:

- VA Route 606 – Dulles Loop – reconstruction of existing roadway with added capacity between Evergreen Mills Road (VA Route 621) and the Dulles Greenway (VA Route 267) (VDOT Final FY 2013-2018 Six-Year Improvement Program). An Environmental Assessment is currently underway for this project. The project limits would overlap Alternatives 3A and 3B;
- VA Route 606 – Loudoun County Parkway – improve road to 8-lane limited access median divided urban arterial between Arcola Road and John Mosby Highway. The project limits would overlap Alternatives 3A and 3B;
- VA Route 606 – Loudoun County Parkway – improve road to 6-lane controlled access median divided urban arterial between John Mosby Highway and Braddock Road;
- Arcola Boulevard (VA Route 606 Extended / West Spine Road) – improve road to 6-lane controlled access median divided urban collector between VA Route 606 and Loudoun County Parkway;
- Quarry Road / Glascock Boulevard – provide long-term access to developments along US Route 50, including Dulles Landing, Arcola Center, and Glascock Fields, via 6-lane facility between Northstar Boulevard and Loudoun County Parkway (VA Route 606); and
- Tall Cedars Parkway (VA Route 2200) – complete construction of 4-lane facility between Gum Spring Road (Existing VA Route 659 / VA Route 606 Extended) east of the Stone Ridge development and Riding Center Drive in the South Riding Development (Board of Supervisors, 2012a).

None of these projects are dependent upon the implementation of the DACPMAH project.

Demographics and Population Characteristics

The implementation of the development projects listed above, it is anticipated that the area will undergo more rapid and sustained change in terms of demographics in ensuing years.

The DACPMAH project would result in beneficial impacts within the ICE Analysis Area by relieving congestion associated with approved and planned development and by accommodating continued growth by providing additional roadway capacity. The contribution of the project to cumulative impacts in terms of demographics is expected to be minor, in light of the magnitude of other present and planned infrastructure and transportation projects in the ICE Analysis Area.

Environmental Justice

Environmental Justice Populations exist within the ICE Analysis Area, as set forth in Section 3.2.2. It is expected that currently approved and planned development in the area will benefit these populations by improving mobility and access to facilities and transit.

Implementation of the DACPMAH project would result in beneficial impacts to Environmental Justice populations insofar as improved mobility and transit access would be shared by all residents of the area. Given the volume of other development projects underway and planned for the ICE Analysis Area, the contribution of the DACPMAH project to cumulative impacts in terms of Environmental Justice is expected to be minor.

Community Facilities

Because development has been limited, only a small number of community facilities exist within the ICE Analysis Area. Implementation of the DACPMAH project would result in impacts to community

facilities. Potential adverse impacts range from infringement upon a limited amount of community facility property to the removal of facilities. As illustrated in Section 3.2.3, a limited number of facilities are expected to be impacted, and therefore, in total, adverse impacts to community facilities would be minor. Beneficial impacts would include improved mobility and access to community facilities. Considering the range of other infrastructure and transportation projects currently underway or planned for the ICE Analysis Area, the contribution of the DACPMAH project to cumulative impacts on community facilities would be minor.

Economics

In terms of economics, the ICE Analysis Area has benefitted from suburbanization and the associated development of commercial infrastructure. As the region has transitioned from an agricultural economy to an economy less dependent on farming, it has become more economically vibrant. Past development of commercial and transportation infrastructure has both facilitated and benefitted from the prevailing regional economic trend.

The DACPMAH project would result in beneficial impacts in terms of economics. Because it would add roadway capacity, it would relieve congestion, increase mobility and transit access, and support continued growth within the ICE Analysis Area. Considering, however, the scope of the commercial, residential and transportation development that is independently planned for the ICE Analysis Area, the contribution of the DACPMAH project to cumulative impacts in terms of economics would be minimal.

Displacements and Relocations

The DACPMAH project would result in displacements and relocations of residences and businesses. It is anticipated that other present and reasonably foreseeable future actions also will require such displacements. Considering the relatively small number of displacements and relocations that would be required by the DACPMAH project, its contribution to cumulative impacts would be minor.

Farmland and Soils

Between 1853 and the current spate of development, the land within the ICE Analysis Area was chiefly in agricultural use, with a number of moderately sized farms in the vicinity. The pressure of suburbanization has resulted in changes in land use from agriculture to residential and commercial use, and the remaining open space is not in agricultural production.

Past, present and reasonably foreseeable future projects have and will likely continue to convert land within the ICE Analysis Area from agricultural use to residential and commercial use. Farmland has been and will likely continue to be transitioned to other uses, and soil has been and will likely continue to be impacted. As stated in Section 3.4, the DACPMAH project would result in the conversion of less than 1% of the farmland in Loudoun County to transportation use. Considering the low number of acres to be converted, along with the magnitude of other projects in the area, the contribution of the DACPMAH project to cumulative impacts to farmland and soil would be minimal.

Noise

Noise levels in the ICE Analysis Area have changed dramatically since 1853. As the pastoral nature of the area has changed, so has the nature of the ambient noise. Since the construction of IAD, aircraft has increasingly dominated background noise levels in the entire project study area.

Implementation of the DACPMAH project would have minor direct noise impacts on residential, recreational and commercial receptors in the ICE Analysis Area, representing only a small change over what would be expected under the No Build alternative. Particularly considering the contribution of the operation of IAD to the noise levels within the ICE Analysis Area, along with other past, present and reasonably foreseeable future projects, the contribution of the DACPMAH project to cumulative noise impacts would be minimal.

Water Quality

Broad Run, including the North and South Forks, flow through the ICE Analysis Area. Of these water bodies, a small segment of Broad Run between Lenah Run and the confluence of Broad Run's South Fork is designated as impaired waterways by the DEQ. Until suburbanization recently began in the area, the chief pollutants found in Broad Run were related to agriculture, i.e., sediment, hydrocarbons, pesticides and nutrients. The minimal past development in the ICE Analysis Area, including transportation infrastructure, has resulted in the flow of some stormwater-related pollutants into these streams.

Present and future projects, including the proposed project, are expected to increase the amount of pollutants flowing into the waterways in the ICE Analysis Area. Continued development also is expected to change the composition of that pollution from agriculture-based to a composition more typical of a suburban setting, e.g., less fertilizer and more road salts. All new development, however, including both the proposed project and any other present and reasonably foreseeable future development, would be required to conform to current stormwater management regulations. Implementation of erosion and sediment control plans are also required for any new construction project that disturbs more than 10,000 square feet, per the VDCR. Under the DACPMAH, impacts to water quality would be minimized through the implementation of stormwater management measures. Any contribution of the project to cumulative impacts to water quality would not be substantial.

Wetlands and Streams

Wetlands in the ICE Analysis Area chiefly are associated hydrologically with Broad Run. The continuing suburbanization of the ICE Analysis Area has impacted both forks of Broad Run and their associated wetlands. However, because development has been minimal, wetland degradation has been limited. Present and future development will result in additional impacts to wetlands, although these impacts will be subject to mitigation in accordance with Section 404 of the Clean Water Act.

Wetlands within the Location Study Corridors for each alternative range between 32 and 33 acres in size. Impacts to wetlands would be avoided where possible, and mitigated in circumstances in which avoidance is not possible. While discreet impact figures will not be developed until engineering and design advance further, it is expected that impacts including minimization and mitigation to wetlands would not be substantial.

Streams within the ICE Analysis Area include the North and South Forks of Broad Run, Cabin Branch and Elklick Run. Past development in the area has been minimal, and so impacts to these streams have been limited. Present and reasonably foreseeable future actions will impact streams in the ICE Analysis Area, subject to mitigation. Under the DACPMAH project, impacts to streams would be avoided where possible and mitigated where avoidance is not possible. Direct impacts to streams would be minimal. Therefore, the relative contribution of the proposed project toward cumulative impacts to wetlands and streams would not be substantial.

Floodplains

Both the North and South Forks of Broad Run have associated 100-year floodplains in the ICE Analysis Area. The floodplains have been subject to minimal impacts since 1853, due to the encroachment of limited development in the area. The more intensive development that is presently underway and planned for the future will likely continue to impact these floodplains. Under the DACPMAH project, all efforts would be made to avoid or minimize impacts to floodplains. Any impacts to floodplain values would be minimal. Considering the magnitude of other present and reasonably foreseeable future actions in the ICE Analysis Area, the contribution of the DCAPMAH project to cumulative impacts on floodplains would be minimal.

Wildlife and Habitat

A review of historic and current aerial photography indicates that the natural environment has only recently begun to change in a substantial way as the landscape has changed from pastoral and agricultural to suburban. The ICE Analysis Area still is currently characterized mostly by open land, comprising a patchwork of forested and unforested habitat, with scattered farmhouses and pockets of developed land in Arcola and along Route 50. Past development, while only slowly progressing, has incrementally changed the natural environment by reducing the amount of habitat, fragmenting remaining habitat, and consequently changing the number and types of wildlife that depend on that habitat. The species that currently occupy the ICE Analysis Area are those typical of suburban northern Virginia, e.g., squirrels, mice, opossums, rabbits, raccoons, deer, foxes, turtles, frogs and various bird species.

Present and future actions, including the proposed project, are expected to continue the conversion of wildlife habitat to other uses. This conversion will likely result in further fragmentation of habitat, which in turn could change the composition of wildlife species and numbers of individuals in the ICE Analysis Area. However, the species that currently inhabit the area are highly adaptable, and are expected to remain as suburbanization continues. While the DACPMAH project would entail impacting habitat, populations of wildlife species would not be substantially affected.

Threatened and Endangered Species

No federally listed endangered or threatened species are located within the general project vicinity, although state listed species exist there. It is unclear whether any populations or individuals of special status species exist within the ICE Analysis Area. All of the special status species in the project vicinity also are found in other places, and general pressures of development, as well as natural phenomena, have been responsible for the decline of these species. It is not possible to say that any given past, present, or reasonably foreseeable future action is or will be responsible for the decline of any sensitive species. Under DACPMAH, all practicable efforts to conserve special status species would be made.

Chapter 4.0 COORDINATION AND COMMENTS

4.1 AGENCY COORDINATION

Early and continuing coordination with the general public and appropriate agencies is an essential part of the environmental review process to determine the scope of environmental documentation, level of analysis, potential impacts, and mitigation measures and related environmental requirements. Agency consultation and public participation for this project have been accomplished through formal and informal methods which include project development team meetings, interagency correspondence, and citizen information meetings. The federal, state, and local agencies, and additional entities listed below, were contacted to obtain pertinent information and to identify key issues regarding the potential environmental impacts for this project.

- Brambleton Community Association
- Chesapeake Bay Local Assistance Department
- Federal Aviation Administration
- Federal Emergency Management Agency, Region III
- Loudoun County Board of Supervisors
- Loudoun County Department of Building and Development
- Loudoun County Department of Economic Development
- Loudoun County Department of Planning
- Loudoun County Department of Transportation
- Loudoun County Fire and Rescue
- Loudoun County Health Department
- Loudoun County Historic Review Committee
- Loudoun County Office of Emergency Management
- Loudoun County Planning Commission
- Loudoun County Public Schools
- Loudoun County Sheriff's Department
- Metropolitan Washington Airports Authority
- Natural Resources Conservation Service
- Northern Virginia Regional Park Authority
- Stone Ridge Association
- South Riding Proprietary
- United States Army Corps of Engineers
- United States Department of Agriculture
- United States Department of the Interior
- United States Environmental Protection Agency
- United States Fish and Wildlife Service
- United States Forest Service
- Virginia Department of Agriculture and Consumer Services
- Virginia Department of Conservation and Recreation
- Virginia Department of Environmental Quality
- Virginia Department of Forestry
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Health
- Virginia Department of Mines, Minerals and Energy
- Virginia Department of Rail and Public Transportation
- Virginia Marine Resources Commission
- Virginia Outdoors Foundation
- Virginia State Police
- Washington Metropolitan Area Transit Authority

4.2 PUBLIC INVOLVEMENT

VDOT has held two Citizen Information Meetings for this project on January 24, 2013 and April 4, 2013. VDOT will hold a location study public hearing for this project on June 13, 2013. The purpose of this location study hearing will be to present the findings of this Environmental Assessment (EA), provide a discussion forum between the public and project team, and obtain input and comments from the community. In addition, there will be a minimum of 30-day public comment period following notice of availability of the EA. Any comments received during the public hearing and public comment period will become part of the public hearing record.

Chapter 5.0 REFERENCES

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Appendix A: Transportation and Traffic Technical Report (AVAILABLE UPON REQUEST

Appendix B: Cultural Resource Survey Report (AVAILABLE UPON REQUEST

Appendix C: Air Quality Analysis Technical Report (AVAILABLE UPON REQUEST

Appendix D: Noise Analysis Technical Report (AVAILABLE UPON REQUEST