IV. Affected Environment

The environmental resources that are likely to be affected by the Proposed Action and past, present, and reasonably foreseeable future actions are described in this section. Past, present, and reasonably foreseeable future actions are identified in Section 5.18, which discusses the cumulative impacts of these actions and the Proposed Action.

4.1 Description and Identification of the Study Area

The general study area includes the immediate environs of the Airport. Resource-specific study areas vary depending on the resource category being considered.

The LOPD for resource categories that would be directly affected by implementing the Proposed Action (e.g., the area where soil may be disturbed) is illustrated on **Exhibit IV-1.** Other resource categories within the immediate environs of the Airport may also be affected, not involving physical disturbance, within the area potentially affected by aircraft noise or within the Metropolitan Washington region (the area potentially affected by air pollutant emissions and includes Washington, D.C., and areas of southern Maryland and northern Virginia). **Exhibit IV-2** illustrates the Airport environs for reference in this section. The specific areas that would be affected are discussed by resource category in the following sections.

4.2 Resources Not Present in the Study Area

Resources that are not present and that would, therefore, not be affected by implementation of the Proposed Action include:

- **Farmlands:** Land within the LOPD is considered Airport developed area, within the airside of the Airport. This land does not support agricultural uses nor is it undeveloped. Offshore areas within the LOPD would not be considered important farmland. Therefore, no prime, unique, or state significant farmlands are present within the LOPD.
- **Wild and Scenic Rivers:** The three rivers in the vicinity of the Airport, the Potomac River, Four Mile Run, and the Anacostia River, are not designated under the National Wild and Scenic River System as having remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural values.[1] Furthermore, the segments of these rivers located in the Airport vicinity are not listed in the National Rivers Inventory as having "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance.[2]

4.3 Human Environment

The existing human environmental conditions and activities that may be affected by the Proposed Action are discussed below.

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1 The National Wild and Scenic Rivers System, *River Mileage Classifications for Components of the National Wild and Scenic Rivers System*, http://www.rivers.gov/publications/rivers-table.pdf (accessed August 11, 2008).

2 The National Park Service Rivers, Trails & Conservation Program, *Nationwide Rivers Inventory, Virginia Segments*, http://www.nps.gov/ncrc/programs/rtca/nri (accessed August 11, 2008).

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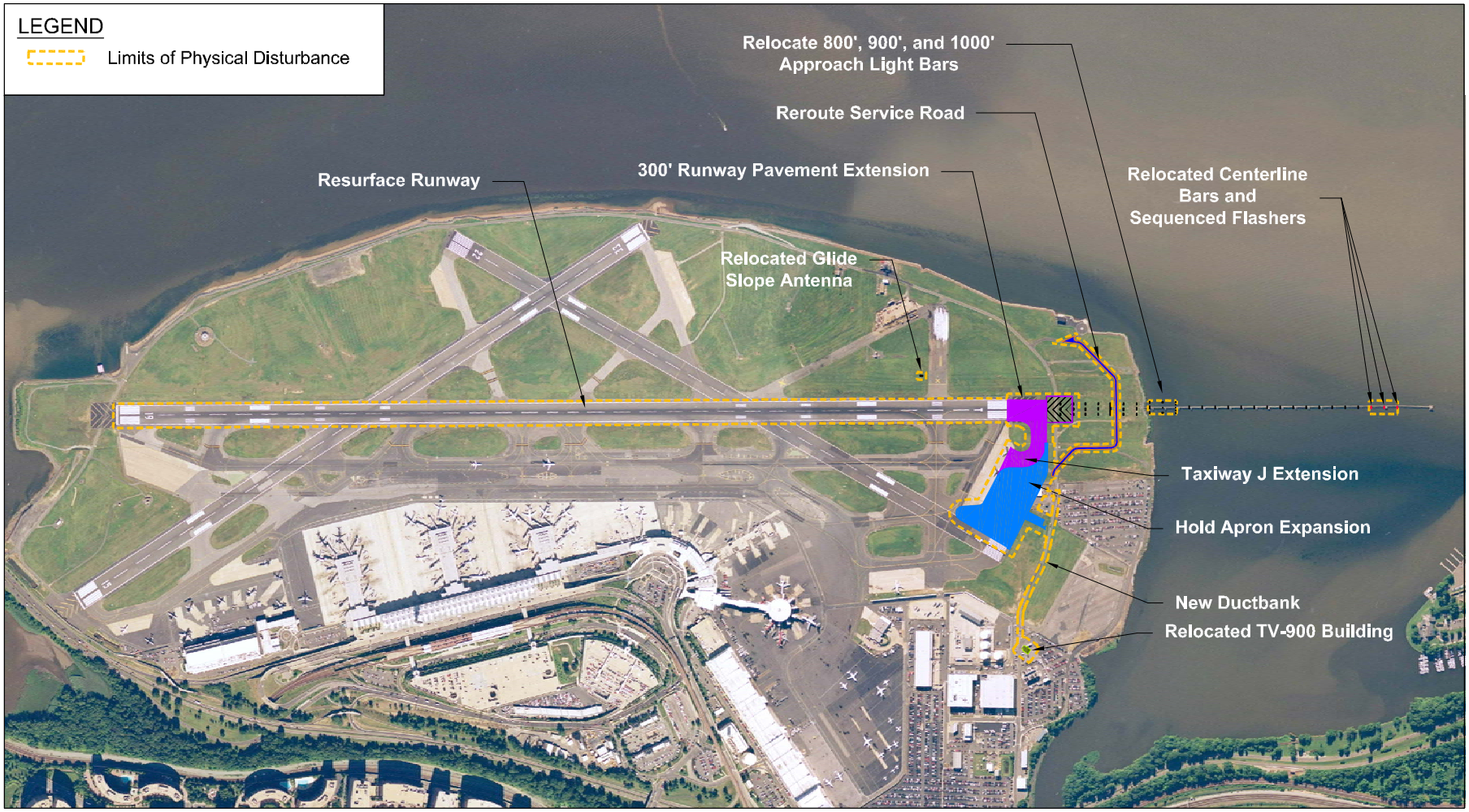

Source: Ricondo & Associates, Inc., July 2008.
Prepared by: Ricondo & Associates, Inc., July 2008.

Exhibit IV-1

0 1,200 ft.

north

Limits of Physical Disturbance

Drawing: Z:\MWAA\DCA\RSA EAs\Task 1-RW 1-19\1.2 PDEA Number 1\AutoCAD Files\Exhibit IV-1 Limits of Physical Disturbance.dwg_Layout: 8.5 x 11L_Jun 10, 2009, 1:51pm

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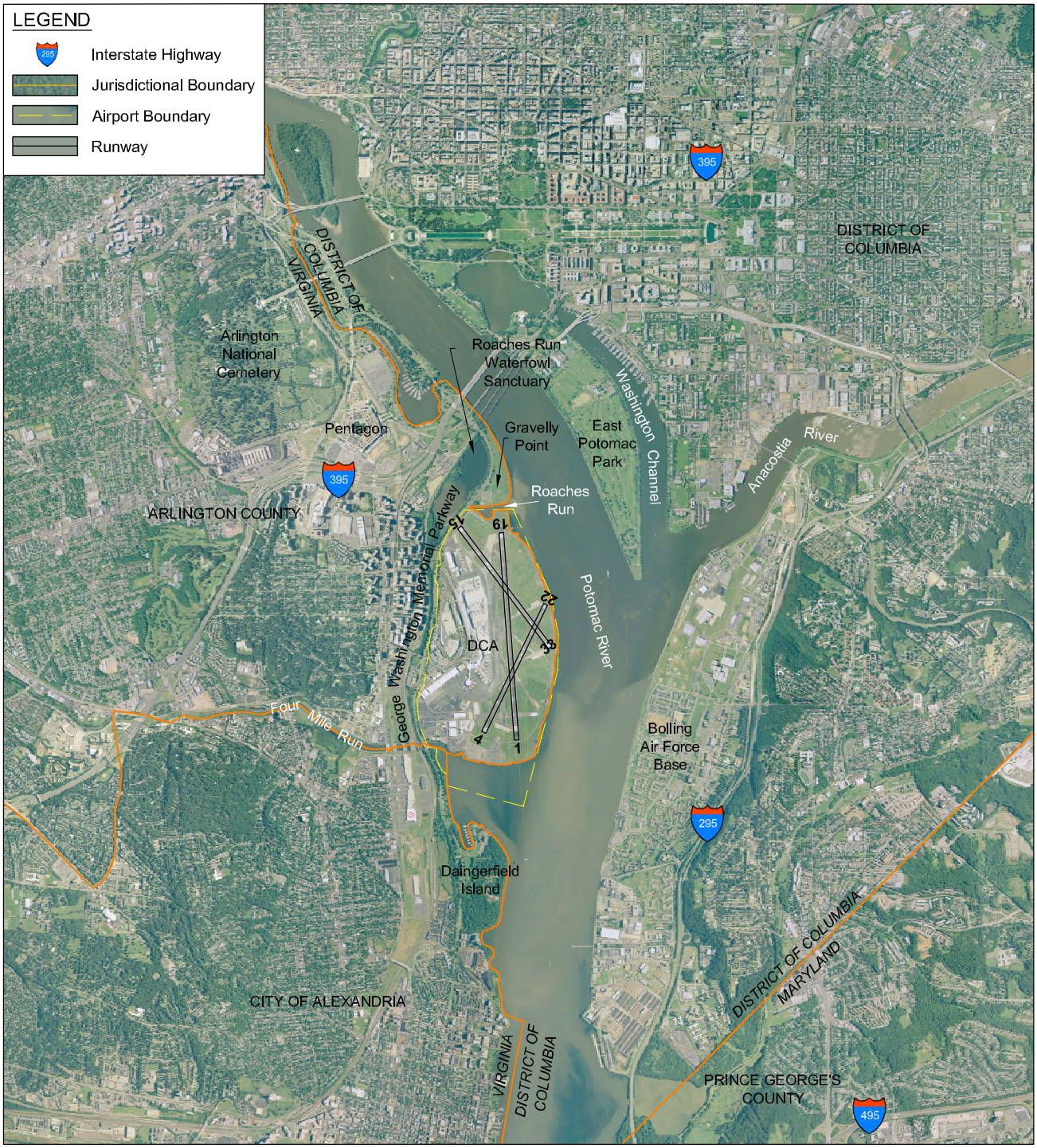

Sources: AirPhotoUSA, 2001 (Aerial); Ricondo & Associates, Inc., September 2008.
Prepared by: Ricondo & Associates, Inc., October 2008.

Exhibit IV-2

0 5,280 ft.

north

Airport Environs

Drawing: Z:\MWAA\DCA\RSA EAs\Task 1-RW 1-19\1.2 PDEA Number 1\AutoCAD Files\Exhibit IV-2 Airport Environs.dwg_Layout: 8.5x11-P_Jun 10, 2009, 1:59pm

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4.3.1 Local Jurisdictions

The Airport occupies approximately 763 acres of land and 127 acres of water situated along the western shore of the Potomac River in the Commonwealth of Virginia. The Airport is located in Arlington County, Virginia, immediately north of the City of Alexandria, Virginia, and across the Potomac River from Washington, D.C.

Several properties administered by the U. S. Department of the Interior, NPS, are located within a one-mile radius of the Airport. These are identified in Section 4.3.4, U.S. DOT Section 4(f) and 6(f) Resources. Additionally, the waters of the Potomac River up to the mean high water line are under the jurisdiction of the District of Columbia as the west bank of the river serves as the District's border with Virginia. No local agency in the District manages public lands; however, the NPS provides management assistance for land in the public domain. Therefore, the Potomac River bottom is managed by the NPS.

4.3.2 Existing Land Use

The generalized existing land use pattern in the Airport environs is depicted on **Exhibit IV-3**. The existing land use plan drawing was developed using geographic information system (GIS) data obtained from the following government agencies and their web sites: City of Alexandria Department of Planning and Zoning, Arlington County Department of Environmental Services, the District of Columbia Office of Planning, and the Maryland Department of Planning. Land parcels on the generalized land use map are coded by general land use category, such as residential, commercial, institutional/government, and the like, and individual facility locations, such as schools and day care sites that are relevant to evaluating children's health and safety risks, are identified.

Land use in the Airport environs is a mix of commercial, industrial, governmental, parks and recreation, and residential. The Pentagon and Arlington National Cemetery are located northwest of the Airport. Areas directly north of the Airport are parks/recreation and open space land uses, and consist of the lands associated with the George Washington Memorial Parkway on the west bank of the Potomac River and the Nation's Monumental Core on the east bank of the river. Land on the east bank of the Potomac River in Washington, D.C., supports several institutional and government facilities such as: Anacostia Naval Station, Bolling Air Force Base, and the Naval Research Laboratory. Arlington County and the City of Alexandria are located to the west and south of the Airport and are dominated by residential land uses interspersed with mixed uses and parks/recreation uses. The mixed-use corridor directly west of the Airport is Crystal City, and the parks/recreation uses to the west and south are on lands that are part of the George Washington Memorial Parkway, including the Mount Vernon Trail and Daingerfield Island.

4.3.3 Demographics and Socioeconomic Profile

Demographic and socioeconomic data for Arlington County and the City of Alexandria in Virginia, Prince George's County in Maryland, and Washington, D.C., are presented in **Table IV-1**. All jurisdictions experienced a population increase between 2000 and 2006.

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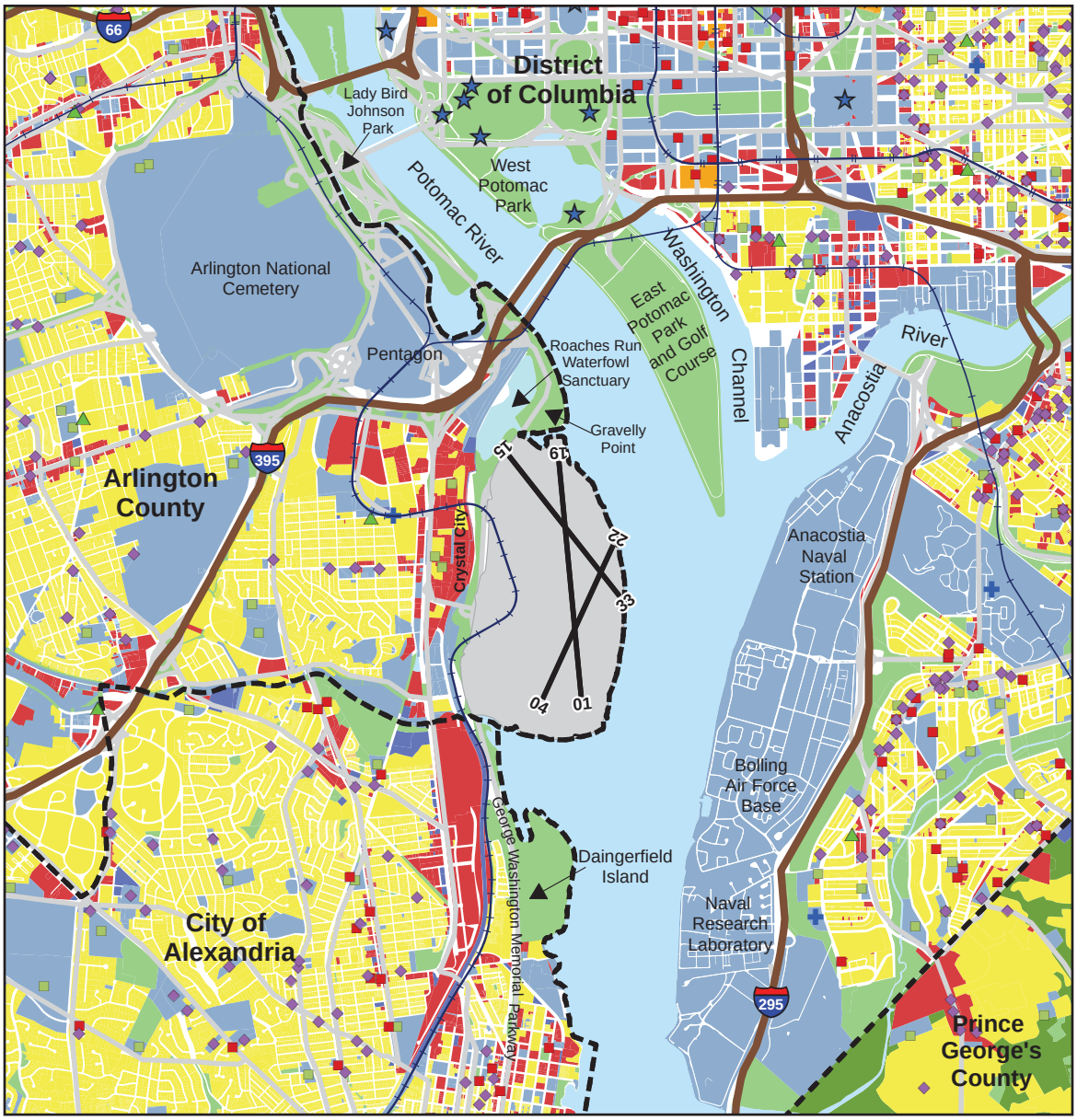

LEGEND

- Hospital
- School
- Day Care
- Library
- Religious Facility
- Landmark
- Interstate Highway
- Jurisdictional Boundary
- Major Road
- Railroad
- Runways
- Residential
- Commercial
- Mixed Use
- Institutional/ Government
- Parks/Recreation
- Open Space
- Industrial
- Vacant Space
- Water
- Other Roads/Unknown
- Ronald Reagan Washingon National Airport

Note: Day care and library data for Prince George's County unavailable.

Sources: Arlington County Department of Environmental Services (land use); City of Alexandria Department of Planning & Zoning, 2008 (land use); Maryland Department of Planning (land use), 2002; District of Columbia Office of Planning (land use), 2002; Virginia Economic Developement Partnership GIS (point data), 2007.

Prepared by: Ricondo & Associates, Inc., 2008.

Exhibit IV-3

0 4,500ft.

north

Generalized Existing Land Use in Airport Environs

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Table IV-1

Demographic and Socioeconomic Data by Jurisdiction

	Arlington County	City of Alexandria	Prince George's County	District of Columbia
Demographic Data [a/]				
Total Residents (2006 estimate)	199,776	136,974	841,315	581,530
Percent Change (2000-2006)	+5.5%	+6.8%	+5.1%	+1.7%
Percent by Ethnicity Group, 2006[b/]				
Caucasian	80.2%	71.0%	27.9%	38.4%
African-American	8.7%	21.7%	66.0%	56.5%
Asian/Pacific Islander/Native Hawaiian	8.9%	5.4%	4.0%	3.3%
American Indian/Alaska Native	0.5%	0.4%	0.4%	0.4%
Reporting Two or More Races	1.6%	1.5%	1.7%	1.4%
Socioeconomic Data [a/]				
Median Household Income, 2004	$66,626	$60,715	$55,129	$46,211
Persons below Poverty Level, 2004	7.1%	8.3%	9.3%	18.3%

Note:
a/ The U.S. Department of Commerce, Bureau of the Census updates demographic and socioeconomic characteristics periodically for states and counties.
b/ Columns may not add to 100 percent because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census: *State and County Quickfacts*. Last revised July 25, 2008, http://quickfacts.census.gov/qfd (website accessed November 17, 2008).
Prepared by: Ricondo & Associates, Inc., November 2008.

4.3.4 U.S. DOT Section 4(f) and 6(f) Resources

Public land resources include parks and recreation areas, wildlife and waterfowl refuges and sanctuaries, national forests, wilderness areas, and wild and scenic rivers that are generally available for public use. Public lands in the vicinity of the Airport are shown on Exhibit IV-3.

4.3.4.1 Regulatory Background

Section 4(f) of the DOT Act of 1966[3] is the applicable law regarding the protection of public land resources. This law prohibits the use of publicly owned parks or recreation areas, wildlife or waterfowl refuges, or significant historic sites for transportation purposes unless there is no feasible and prudent alternative to the use of such land and the action includes all possible planning to minimize harm resulting from such use.

4.3.4.2 Methodology

To determine the existence and extent of public lands within and adjacent to the LOPD, the study team that prepared this EA (see Appendix A) collected and reviewed readily available maps and performed a field reconnaissance. The information gathered was evaluated for applicability to the law identified above and for relevance to the Proposed Action and associated LOPD.

[3] Section 4(f) of the DOT Act of 1966 (49 United States Code 303(c)).

4.3.4.3 Affected Environment

The study team identified that the Airport is bordered to the north and west by publicly owned parks; recreation areas; wildlife or waterfowl refuges; and land from historic sites of national, state, or local significance. The locations of these public lands are illustrated on Exhibit IV-3.

The NPS owns, maintains, and operates the GWMP,[4] which comprises a north-south roadway and landscaped right-of-way immediately west of the Airport that links a series of historic sites and parks that preserve the natural scenery along the Potomac River from Mount Vernon to the Great Falls of the Potomac.[5] In the immediate vicinity of the Airport, the GWMP includes Gravelly Point and Roaches Run Waterfowl Sanctuary to the north; the GWMP and Mount Vernon Trail to the west, forming the western boundary of the Airport; and Daingerfield Island, including the Washington Sailing Marina, to the south. These components of the GWMP are discussed below.

- Gravelly Point is a park located north of the Airport and Roaches Run. The park provides a view of the Potomac River and the District of Columbia skyline, and serves as an observation area for aircraft landing at and taking off from the Airport. The parking area is used by bicyclists and pedestrians accessing the Mount Vernon Trail. The park also contains a public boat launch.
- Roaches Run Waterfowl Sanctuary is a tidal wetland off the Potomac River. Popular activities include bass fishing and bird watching.
- The Mount Vernon Trail[6] is an 18.5-mile trail for pedestrians and bicyclists. The trail is adjacent to and follows the western boundary of the Airport, connecting Mount Vernon, the home of George Washington, located south of the Airport, to Theodore Roosevelt Island, located north of the Airport. At its northern extent, the trail connects to the Arlington County trail system.
- Daingerfield Island is a peninsula located south of the Airport on the west bank of the Potomac River. Public facilities include the Washington Sailing Marina, an NPS concession that rents boats and bicycles.

The NPS and Arlington County Department of Parks, Recreation and Cultural Resources are cooperating on an Arlington County proposal to improve public facilities on NPS property near the Airport, as follows:

- Gravelly Point – Expand the parking lot; install gated access; and construct permanent restrooms, a larger picnic area, wayside exhibits, and playing fields.
- Roaches Run Waterfowl Sanctuary – Preserve natural resources and provide visitors the opportunity to observe and learn about the sanctuary's natural resources through wayside exhibits and ranger-led talks. Appropriate types of facilities include viewing platforms, benches, trails, waysides, observation areas, and brochure holders.

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4 National Park Service, *George Washington Memorial Parkway*, http://www.nps.gov/gwmp (accessed July 11, 2006).

5 National Park Service, *George Washington Memorial Parkway Trail Map*, http://home.nps.gov/applications/parks/gwmp/ppMaps/mvtrailmap.jpg (accessed September 27, 2006).

6 National Park Service, *Mount Vernon Trail*, http://www.nps.gov/gwmp/mvt.html, (accessed July 11, 2006).

- Mount Vernon Trail – Construct facilities such as benches, waysides, and signs.[7]

There are no national forests, wilderness areas, or wild and scenic rivers on or adjacent to Airport property.

4.3.5 Historic, Archaeological, Architectural, and Cultural Resources

Cultural resources dating to the early colonial period and historic transportation resources associated with development of the nation's capital are located within and adjacent to Airport property.

4.3.5.1 Regulatory Background

Applicable laws include:

- National Historic Preservation Act of 1966, Sections 106 and 110
- Archaeological and Historic Preservation Act of 1974, as amended
- Archaeological Resources Protection Act of 1979, as amended
- Native American Graves Protection and Repatriation Act (1990)[8]

Historic properties eligible for, or listed on, the National Register of Historic Places are protected by Section 106 of the National Historic Preservation Act (NHPA).[9] Under the NHPA, the FAA is required to consult with the State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, and other interested parties on the potential effects that any FAA-sponsored undertaking would have on historic properties listed or eligible for listing on the NRHP. The Authority consultation procedures regarding the NHPA are outlined in a 1987 *Programmatic Memorandum of Agreement* among the U.S. DOT, the Virginia State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The Archaeological and Historic Preservation Act and the Archaeological Resources Protection Act protect both known and as yet unidentified archaeological resources located on publicly owned land or resources that could be affected by federally funded actions. The Native American Graves Protection and Repatriation Act protects Native American human remains and cultural artifacts.

4.3.5.2 Methodology

To determine the existence of historic, archaeological, architectural, and cultural resources within or near the LOPD, available documentation was reviewed and the appropriate local and national historic preservation agencies were contacted. Consideration was also given to historic resources elsewhere on and adjacent to Airport property, such as the GWMP, for potential viewshed-related concerns. Information was obtained from the following sources:

- Virginia Department of Historic Resources (2006 archive research for terrestrial resources within Airport property)
- City of Alexandria archives (for terrestrial resources within Virginia)

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7 Federal Highway Administration, Eastern Federal Lands Highway Division and the National Park Service, George Washington Memorial Parkway Unit, *George Washington Memorial Parkway Roadway and Trail Safety Improvements Environmental Assessment*, 2002.

8 Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001 et seq., November 16, 1990.

9 National Historic Preservation Act of 1966, as amended, including Executive Order 11593, *Protection and Enhancement of the Cultural Environment* (36 Federal Register 8921, May 13, 1971) [16 U.S.C. 470, 470 note PL 102-575 (1992)].

- District of Columbia's Historic Preservation Office[10] (for underwater archaeological sites)
- NPS site files[11] (for underwater archaeological sites)
- Metropolitan Washington Airports Authority documents

4.3.5.3 Affected Environment

Identified resources are shown on **Exhibit IV-4**. The Airport contains a complex of buildings, six of which are considered historic and are either individually listed on the NRHP or are considered NRHP-eligible. The Washington National Airport Terminal and the South Hangar Line (VDHR File Number 000-0045) are both listed on the NRHP. These structures are significant "as milestones in aviation technology and as symbols of the broad pattern of New Deal government initiatives," and were considered by the Civil Aeronautics Administration (the predecessor of the FAA) to be the model for how airports should be designed.[12]

Historic structures that have been determined eligible for but are not listed on the NRHP include the Jet Engine Test Cell (presently the Ogden-Allied Equipment Storage and Maintenance Building) and the Department of Transportation Abingdon Research Station (presently the Authority Engineering Complex).[13] All listed and eligible structures are located within the terminal complex.

The Airport shares a boundary with the GWMP, which is a listed resource on the NRHP (also known as the Mount Vernon Memorial Highway, VDHR File Number 029-0218). The GWMP is significant as the first parkway constructed and maintained by the U.S. Government and as the first such road with a commemorative function explicit in its name and alignment. The GWMP is generally separated from the airfield by the terminal complex; however, at the northwest and southwest edges of the airfield, the GWMP right-of-way abuts the airfield.

One archaeological site, a portion of the Abingdon Plantation (VDHR File No. 44AR0018), has been identified on Airport property. Another portion of the Abingdon Plantation is identified as an architectural site, VDHR File No. 000-0041. The site is located within the terminal complex and is eligible for listing in the NRHP.[14] Some portions of the site have been excavated and others, including the plantation house foundation, have been preserved.

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[10] Nancy Kassner, Archaeologist, District of Columbia Historic Preservation Office, Personal communication with Sarah Michailof, Straughan Environmental Services, Inc., June 30, 2006.

[11] Stephen Potter, Regional Archaeologist, National Park Service, National Capital Region, Personal communication with Sarah Michailof, Straughan Environmental Services, Inc,. July 25, 2006.

[12] United States Department of the Interior, National Register of Historic Places Registration Form, Washington National Airport Terminal and South Hangar Line, VDHR File No. 000-0045, April 11, 1994.

[13] Metropolitan Washington Airports Authority, *Archeology/Historic Preservation Considerations: Ronald Reagan Washington National Airport*, undated.

[14] Nancy Kassner, Archaeologist, District of Columbia Historic Preservation Office, Personal communication with Sarah Michailof, Straughan Environmental Services, Inc., June 30, 2006.

Sources: US Department of Agriculture, 2005 (Aerial photo); File, 2006,
Virginia Department of Historic Resources Archive (archaeological and architectural resources).
Prepared by: Straughan Environmental Services, Inc., November 2008.

Exhibit IV-4

0 2,000 ft.

north

Archaeological and Architectural Resources

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Most of the Airport is located on fill, including the entire airfield, and, therefore, has low potential to contain additional intact archaeological resources. There is, however, the potential for archaeological sites to be located in portions of the Airport that were not filled or otherwise disturbed by previous Airport construction. These limited areas are generally located to the west of the Runway 15 end, in the terminal complex, and at the former Jet Engine Test Cell, and are between 1,000 feet and 2,000 feet from the LOPD. No underwater archaeological sites were identified during the archival search. The dredging operation associated with construction of the airfield was a massive, year-long project that included some of the world's largest dredges, clearing 11 feet of sediment from the future airfield and then removing an additional 11 million cubic yards of bottom sediments from the surrounding Potomac River bottom in order to raise the runways 20 feet above the river. This operation would likely have destroyed any sites that once existed in these borrow areas on the river bottom.

4.3.6 Aircraft Noise

An overview of aircraft noise analysis requirements and existing aircraft noise exposure in the Airport environs is provided in this section. Appendix D, "Aircraft Noise Modeling Assumptions," provides detailed information related to aircraft operations and associated runway use and routing assumptions. Appendix D also provides a brief overview of the basics of sound and metric definitions, including use of the day-night average sound level (DNL, expressed in A-weighted decibels) 65 noise exposure contour to evaluate aircraft noise exposure.

The DNL 65 noise exposure contour was used to establish the relevant study area for evaluating potential aircraft noise impacts in the Airport environs.

4.3.6.1 Regulatory Background

The applicable laws and regulations related to aircraft noise exposure include:

- Aviation Safety and Noise Abatement Act of 1979, as amended (49 USC 47501-47507)
- Federal Aviation Act of 1958 (49 USC 40101 et seq., as amended by PL 103-305) (August 23, 1994)
- Control and Abatement of Aircraft Noise and Sonic Boom Act of 1968
- Airport and Airway Improvement Act (49 USC 47101 et seq., as amended by PL 103-305 (August 23, 1994)
- Airport Noise and Capacity Act of 1990 (49 USC 2101 et seq.)
- Noise Control Act of 1972 (49 USC 44715)
- Airport Noise Compatibility Planning (14 CFR Part 150)
- FAA Advisory Circular 150/5020-1, *Noise Control and Compatibility Planning for Airports*

4.3.6.2 Methodology

The Integrated Noise Model (INM) is an FAA computer model used to develop aircraft noise exposure maps. Version 7.0a of the INM was used for the noise analysis. A discussion of the INM and specifics of the noise analysis process are provided in Appendix D. The most critical data required to develop noise exposure maps using FAA INM Version 7.0a are:

- Existing number of aircraft operations by time of day, aircraft type, and stage length (non-stop departure distance from the Airport).
- Operational information, including runway use, flight track (the path that pilots fly to arrive at and depart from the Airport) locations and use, departure profiles, existing noise abatement procedures, and other similar data.

In accordance with current FAA guidelines, aircraft noise exposure was analyzed for 2007 (i.e., existing conditions). Estimates of total noise exposure resulting from aircraft operations, as expressed in DNL, were used to determine probable effects on land uses. Three ranges of aircraft noise exposure were used: (a) DNL 65 to 70, (b) DNL 70 to 75, and (c) DNL 75 and higher. The guidelines for evaluating land use compatibility in aircraft noise exposure areas were originally developed by the FAA and are shown in **Table IV-2**. The guidelines reflect the statistical variability of the responses of large groups of people to noise. Therefore, any particular noise level might not accurately reflect an individual's perception of or reaction to an actual noise environment. Compatible or incompatible land use is determined by comparing the predicted or measured DNL at a site and the type of land use with the information provided in the table.

The population and numbers of dwelling units, and other noise-sensitive facilities including religious facilities, convalescent homes, libraries, day care centers, schools, parks, and hospitals exposed to the various ranges of aircraft noise were estimated for existing conditions. Because the population and dwelling units within the noise exposure areas are not uniformly distributed, the population per dwelling unit is not expected to be constant in each noise exposure range.

Each generalized land use listed in Table IV-2 includes a wide range of human activities resulting in various sensitivities to noise intrusions. DNL values in the table should be interpreted only as indications of potential aircraft noise effects on people living and working in areas surrounding an airport. Although specific DNL values are obtained from a noise analysis, they do not dictate specific reactions that individuals exposed to those noise levels may have, nor do they require specific mitigation. The information is intended only as a guide for land use development. Designations used in this table do not constitute a federal determination that any use of land is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise exposure rests with local authorities.

4.3.6.3 Affected Environment

As discussed in Appendix D, 279,488 aircraft operations were accommodated at the Airport in 2007, or approximately 766 average daily aircraft operations (arrivals and departures). The types of aircraft (the fleet mix) and the average daily number of operations by time of day at the Airport in 2007 are presented in Appendix D, Table D-6. Operational information regarding flight track use, operational profiles, and runway use and flight track exhibits are also included in Appendix D. Noise exposure contours associated with aircraft operations on an average day in 2007 are shown on **Exhibit IV-5**.

Table IV-2

Suggested Land Use Compatibility Guidelines in Aircraft Noise Exposure Areas

Land use	DNL 65 to 70	DNL 70 to 75	DNL 75+
Residential			
Residential other than mobile homes and transient lodgings	NLR required *(a)*	NLR required *(a)*	Incompatible
Mobile homes	Incompatible	Incompatible	Incompatible
Transient lodgings	NLR required *(a)*	NLR required *(a)*	Incompatible
Public use			
Schools, hospitals, and nursing homes	NLR required *(a)*	NLR required *(a)*	Incompatible
Churches, auditoriums, and concert halls	NLR required *(a)*	NLR required *(a)*	Incompatible
Governmental services	Compatible	NLR required	NLR required
Transportation	Compatible	Compatible *(b)*	Compatible *(b)*
Parking	Compatible	Compatible *(b)*	Compatible *(b)*
Commercial use			
Offices – business and professional	NLR required	NLR required	NLR required *(b)*
Wholesale and retail – building materials, hardware, and farm equipment	Compatible	Compatible *(b)*	Compatible *(b)*
Retail trade – general	NLR required	NLR required	NLR required
Utilities	Compatible	Compatible *(b)*	Compatible *(b)*
Communication	NLR required	NLR required	NLR required
Manufacturing and production			
Manufacturing – general	Compatible	Compatible *(b)*	Compatible *(b)*
Photographic and optical	Compatible	NLR required	NLR required
Agriculture (except livestock) and forestry	Compatible	Compatible	Compatible
Livestock farming and breeding	Compatible	Compatible	Incompatible
Mining and fishing resources production and extraction	Compatible	Compatible	Compatible
Recreational			
Outdoor sports arenas and spectator sports	Compatible *(c)*	Compatible *(c)*	Incompatible
Outdoor music shells, amphitheaters	Incompatible	Incompatible	Incompatible
Nature exhibits and zoos	Compatible	Incompatible	Incompatible
Amusements, parks, resorts, and camps	Compatible	Compatible	Incompatible
Golf courses, riding stables, and water recreation	Compatible	Compatible	Incompatible

DNL = Day-night average sound level, in A-weighted decibels.

Compatible = Generally, no special noise-attenuating materials are required to achieve an interior noise level of DNL 45 in habitable spaces, or the activity (whether indoors or outdoors) would not be subject to a significant adverse effect by the outdoor noise level.

Incompatible = Generally, the land use, whether in a structure or an outdoor activity, is considered to be incompatible with the outdoor noise level even if special attenuating materials were to be used in the construction of the building.

NLR = Noise Level Reduction. NLR is used to denote the total amount of noise transmission loss in decibels required to reduce an exterior noise level in habitable interior spaces to DNL 45. In most places, typical building construction automatically provides an NLR of 20 decibels. Therefore, if a structure is located in an area exposed to aircraft noise of DNL 65, the interior noise level would be about DNL 45. If the structure is located in an area exposed to aircraft noise of DNL 70, the interior noise level would be about DNL 50, so an additional NLR of 5 decibels would be required if not afforded by the normal construction. This NLR can be achieved through the use of noise-attenuating materials in the construction of the structure.

(a) The land use is generally incompatible with aircraft noise and should only be permitted in areas of infill in existing neighborhoods or where the community determines that the use must be allowed.

(b) NLR required in offices or other areas with noise-sensitive activities.

(c) Provided that special sound reinforcement systems are installed.

Source: Ricondo & Associates, Inc., January 2000, as derived from the U.S. DOT, FAA, Federal Aviation Regulations Part 150, *Airport Noise Compatibility Planning*, Code of Federal Regulations, Title 14, Chapter I, Subchapter I, Part 150, Table 1, January 18, 1985, as amended.
Prepared by: Ricondo & Associates, Inc., December 2006.

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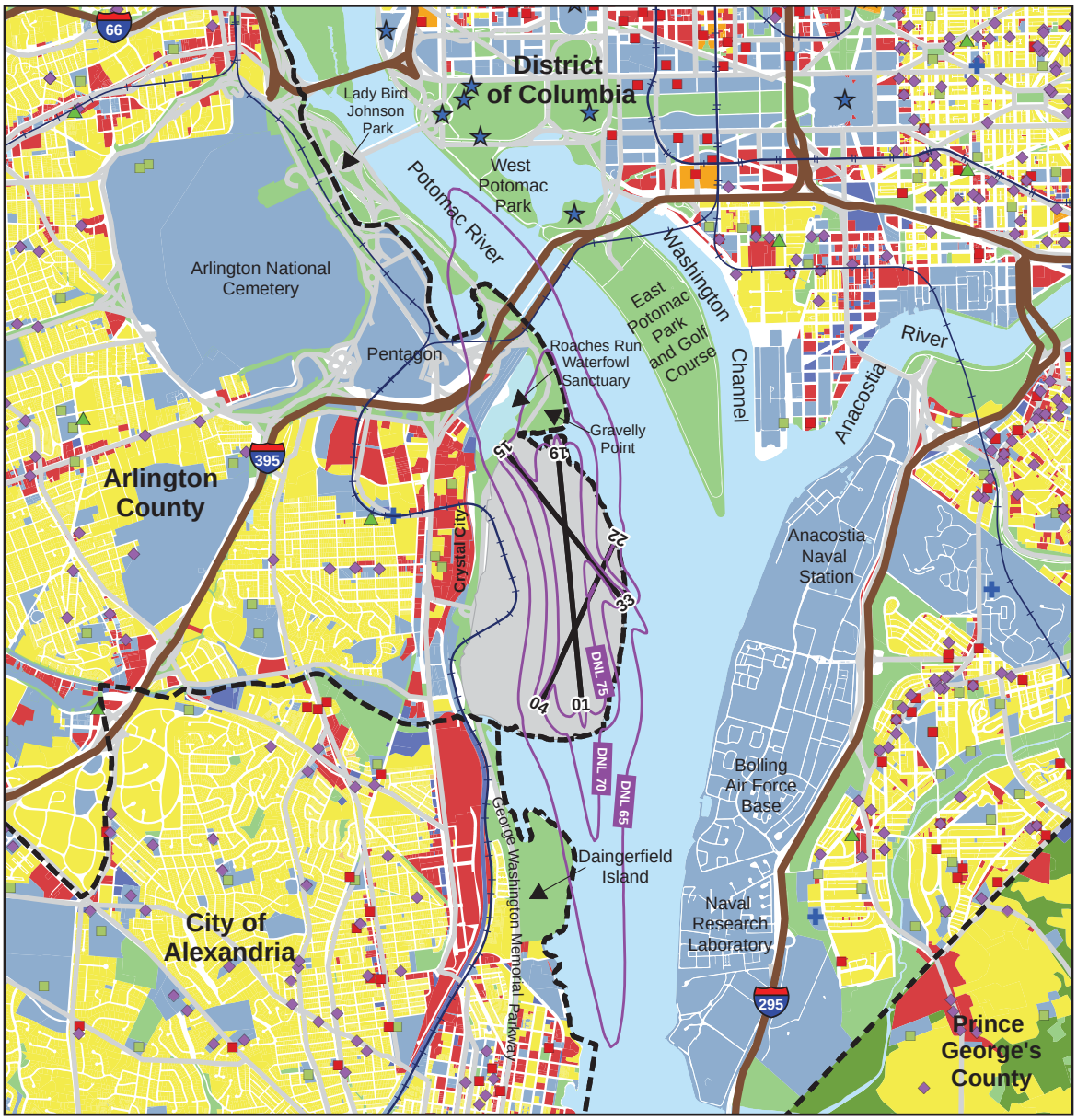

LEGEND

- Hospital
- School
- Day Care
- Library
- Religious Facility
- Landmark
- Interstate Highway
- Jurisdictional Boundary
- Major Road
- Railroad
- Runways
- 2007 Existing Noise Contours
- Residential
- Commercial
- Mixed Use
- Institutional/ Government
- Parks/Recreation
- Open Space
- Industrial
- Vacant Space
- Water
- Other Roads/Unknown
- Ronald Reagan Washingon National Airport

Sources: Arlington County Department of Environmental Services (land use); City of Alexandria Department of Planning & Zoning, 2008 (land use); Maryland Department of Planning (land use), 2002; District of Columbia Office of Planning (land use), 2002; Virginia Economic Developement Partnership GIS (point data), 2007; Ricondo & Associates, Inc., INM Version 7.0.a; INM Contour Layer: 07ext Noise-Contours, September 2008 (noise contours).

Prepared by: Ricondo & Associates, Inc., 2008.

Exhibit IV-5

0 4,500ft.

north

2007 (Existing Conditions) Aircraft Noise Exposure Map

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In 2007, approximately 1,452 acres of land in the Airport environs were exposed to aircraft noise of DNL 65 and higher, as shown in **Table IV-3**. **Table IV-4** shows the areas exposed to DNL 65 and higher in 2007 by land use. Just over 80 percent of the DNL 65 and higher noise exposure area is over water and Airport property. The next highest predominant land uses exposed to aircraft noise levels of DNL 65 and higher are parks (Daingerfield Island, Lady Bird Johnson Park, and Gravelly Point), government, and commercial land uses.

Table IV-3

Area Exposed to Each Range of Noise Exposure – 2007

DNL	Area (acreage)
65-70	938.1
70-75	296.7
75+	216.9
Total 65 and higher	1,451.7

Sources: Ricondo & Associates, Inc., based on noise exposure contours depicted on Exhibit IV-5 calculated using FAA INM 7.0a and data described in Appendix D. Area calculated via ArcGIS version 9.2, September 2008.
Prepared by: Ricondo & Associates, Inc., October 2008.

Table IV-4

Area Exposed to Aircraft Noise by Land Use Category – 2007 (in acres)

Land Use	DNL 65-70	DNL 70-75	DNL 75+	DNL 65 and higher
Residential	0	0	0	0
Commercial	1.65	0	0	1.65
Mixed Use	0	0	0	0
Industrial	0	0	0	0
Government	37.38	0	0	37.38
Parks and Recreation	88.86	42.67	0	131.53
Water	595.98	79.99	5.81	681.78
The Airport	144.53	166.17	210.95	521.65
Roadways/Right-of-Ways	69.70	7.87	0.14	77.71
Total	938.10	296.70	216.90	1,451.70

Sources: Ricondo & Associates, Inc., plan drawings developed based on land use data from Arlington County Department of Environmental Services, City of Alexandria Department of Planning & Zoning, 2008, Maryland Department of Planning, District of Columbia Office of Planning, 2002 (existing land use); Ricondo & Associates, Inc., calculated using FAA INM Version 7.0a and data described in Appendix D, September 2008 (aircraft noise exposure).
Prepared by: Ricondo & Associates, Inc., October 2008.

GIS software was used to estimate the number of people exposed to various levels of aircraft noise in 2007 based on U.S. Department of Commerce, Bureau of the Census 2000 data. **Table IV-5** summarizes the estimated numbers of people, dwelling units, religious facilities, convalescent homes, libraries, day care centers, schools, parks, and hospitals exposed to aircraft noise of DNL 65 and higher in 2007. No people, dwelling units, religious facilities, convalescent homes, libraries, day care centers, schools, or hospitals were exposed to aircraft noise of DNL 65 and higher in 2007. Daingerfield Island (southwest of the Airport) was exposed to aircraft noise levels between DNL 65 and DNL 70. Gravelly Point, just north of the Airport, was exposed to noise levels between DNL 70

and DNL 75. Northeast of Gravelly Point is Lady Bird Johnson Park, which was exposed to noise levels between DNL 65 and DNL 70.

Table IV-5

Population, Dwelling Units, and Noise-Sensitive Facilities Exposed to Aircraft Noise – 2007

Population or Noise-Sensitive Facility	DNL 65-70	DNL 70-75	DNL 75+	Total DNL 65 and higher
Population	0	0	0	0
Dwelling Units	0	0	0	0
Religious Facilities	0	0	0	0
Convalescent Homes	0	0	0	0
Libraries	0	0	0	0
Day Care Centers	0	0	0	0
Schools	0	0	0	0
Parks	2	1	0	3
Hospitals	0	0	0	0

Sources: Ricondo & Associates, Inc. plan drawings developed based on land use data from Arlington County Department of Environmental Services, City of Alexandria Department of Planning & Zoning, 2008, Maryland Department of Planning, District of Columbia Office of Planning, 2002 (existing land use); Ricondo & Associates, Inc., calculated using FAA Version INM 7.0a and data described in Appendix D, September 2008 (aircraft noise exposure); U.S. Department of Commerce, Bureau of the Census, Census 2000, September 2008 (population data).
Prepared by: Ricondo & Associates, Inc., September 2008.

4.3.7 Light Emissions and Visual Impacts

4.3.7.1 Regulatory Background

No federal regulations govern light emissions or visual intrusions, although the FAA must consider potential effects on properties, and the use of properties, as covered by Section 4(f) of the U.S. DOT Act, Section 6(f) of the Land and Water Conservation Fund, and Section 106 of the National Historic Preservation Act (please refer to Section 4.3.4, U.S. DOT Section 4(f) and 6(f) Resources, and Section 4.3.5, Historic, Archaeological, Architectural, and Cultural Resources). Therefore, the potential for the lighting facilities and activities related to the Proposed Action to visually affect nearby light-sensitive areas and the potential visual impacts of the Proposed Action in contrast with the existing environment, architecture, historic, and cultural setting and land use planning were considered in this EA.

To facilitate a better mutual understanding of the Authority's plans and the relationship of these plans to federal activities and interests in the National Capital Region, the National Capital Planning Commission and the Authority entered into a Memorandum of Understanding,[15] which establishes the need for coordination of any development at the Airport that would alter the skyline when viewed from the opposing shoreline of the Potomac River or from the GWMP.

4.3.7.2 Methodology

Airport light sources associated with the Proposed Action were identified and described and areas potentially sensitive to light emissions from those sources were identified.

[15] *Memorandum of Understanding By and Between the National Capital Planning Commission and the Metropolitan Washington Airports Authority*, November 2, 1988.

4.3.7.3 Affected Environment

An approach lighting system is a configuration of lights starting at and extending from the runway landing threshold that provide approach guidance to landing aircraft. Runway 1 is equipped with an ALSF-2 system. The ALSF-2 system is 2,400 feet long, and consists of a series of lights located at 100-foot intervals from the runway threshold. Each light position includes a centerline bar supporting high-intensity, steady-burning white lights. The 100-foot through 1,000-foot positions include side row bars located on either side of the centerline bars supporting different types of lights dependent on the bar's position. Each position between 1,000 feet and 2,400 feet includes a flashing light or strobe. The flashing lights or strobes flash in a sequence starting with the strobe farthest from the runway and ending with the strobe closest to the runway threshold, and are referred to as sequenced flashers.

The ALSF-2 lights are oriented skyward along the Potomac River in the direction of an aircraft's approach to Runway 1. Currently, all centerline and side row bars up to and including the 1,000-foot bar are located on Airport land, while the centerline bars and flashers located from 1,100 feet through 2,400 feet beyond the runway end are located on a pier structure extending into the Potomac River.

The portion of the existing ALSF-2 on the pier structure is contained within the physical Airport property line, while the FAA's pier structure extends an additional 765 linear feet beyond the Airport property line. The portion of the pier structure beyond the Airport property line does not currently support an approach lighting system; however, the pier structure remains in place and is available for use with the Proposed Action.

Areas and facilities potentially sensitive to light emissions within the vicinity of the Airport include:

- GWMP and related sites
  - Daingerfield Island (south of the Airport)
  - Indigo Landing Restaurant (NPS concession on the north side of Daingerfield Island)
  - Washington Sailing Marina (NPS concession on the north side of Daingerfield Island)
  - Mount Vernon Trail (paralleling GWMP west of the Airport)
  - Roaches Run Waterfowl Sanctuary
  - Gravelly Point (north of the Airport)
- Monumental Core of the nation's capital
  - East Potomac Park
  - West Potomac Park
  - Jefferson Memorial
  - Franklin Delano Roosevelt Memorial Park

Indigo Landing Restaurant is the facility nearest the Runway 1 approach lighting system, located approximately 1,930 feet from the nearest approach light. The above identified facilities that are potentially sensitive to light are located in an urban, high ambient light environment. The approach lighting system is oriented directly down the Potomac River, not toward the potentially sensitive facilities identified above or toward residential areas. Furthermore, the lights emitted from the Runway 1 approach system are part of the ambient light environment of these facilities.

4.3.8 Solid Waste

Solid waste concerns related to the development and operation of an airport include the ability of the local waste management agencies and facilities to accept and process solid wastes generated at the airport. The location of solid waste disposal sites and landfills in relation to an airport's Air

Operations Area and the potential for these sites to attract wildlife is also a concern. Hazardous materials are addressed in Section 4.4.4.

4.3.8.1 Regulatory Background

Applicable laws and regulations related to solid waste disposal include:

- Solid Waste Disposal Act of 1965[16]
- 40 CFR Part 258.10, "Solid Wastes – Airport Safety"[17]

The Solid Waste Disposal Act provides safeguards to reduce the danger of solid waste disposal on human health and the environment. Overseeing and implementing these safeguards is the responsibility of the Virginia Department of Environmental Quality and the Arlington County Department of Environmental Services. In conjunction with FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or near Airports,* 40 CFR Part 258.10, addresses and restricts the proximity of landfills to the Air Operations Area.

4.3.8.2 Methodology

To identify solid waste disposal practices at the Airport, the study team consulted with the Authority.[18] Additionally, readily available mapping sources and information on the Arlington County's Department of Environmental Services' web site[19] were reviewed to identify the location of nearby landfills.

4.3.8.3 Affected Environment

Solid waste managed by the Authority is collected and removed from the Airport by an offsite contractor (Metro Waste) and disposed of at approved regional facilities. In 2007, 3,006 tons of waste and recyclables were generated at and removed from the Airport. Of that total, approximately 238 tons were recyclable materials, including cardboard, mixed paper, aluminum, plastic, scrap metal, pallets, printer cartridges, batteries, tires, antifreeze, and oil. This amount does not include waste generated by all Airport tenants, as many tenants contracted separately for waste disposal. In 2008, the amount of waste managed by the Authority will increase as the Authority has assumed responsibility for all waste disposal on the Airport with the primary exception of the retail concessions. Total solid waste tonnage will fluctuate commensurate with operations.

According to the *Arlington County Solid Waste Management Plan*[20] the County does not own or operate a landfill for municipal solid waste. In addition, no landfills or major transfer stations are

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16 Solid Waste Disposal Act of 1965 [42 USC § 6901 et seq. (now stated in Subtitle D of the Resource Conservation and Recovery Act)].

17 "Municipal Solid Waste Landfill Location Restrictions for Airport Safety" [40 CFR Part 258.10] (October 2003, under the Resource Conservation and Recovery Act, the U.S. EPA added a clarifying note regarding landfill-airport separation distances.)

18 Ed Brewer, Metropolitan Washington Airports Authority, "Solid Waste Disposal at DCA," email to Charles Baummer, Jr., Metropolitan Washington Airports Authority, September 29, 2008.

19 County of Arlington, Virginia, Department of Environmental Services, http://www.arlingtonva.us/Departments/EnvironmentalServices/swd/EnvironmentalServicesSwdSwmp.aspx#final (accessed September 28, 2008).

20 County of Arlington, Virginia, Department of Environmental Services, *Arlington County Solid Waste Management Plan*, June 12, 2004.

located in Arlington County. The nearest landfill is the I-95 Sanitary Landfill in Lorton, Virginia, which is more than 18 miles from the Airport.

4.4 Physical Environment

The existing physical environmental conditions and activities that may be affected by the Proposed Action are discussed below.

4.4.1 Water Resources

Surface water and ground water are sensitive to changes in land cover and uses, such as converting areas of grass to impervious materials. Surface water and ground water resources can be affected temporarily or permanently and directly or indirectly by actions such as the construction of airport improvements or operational changes. An increase in impervious surfaces could influence storm water runoff patterns of the multiple water resources near the Airport.

4.4.1.1 Regulatory Background

Applicable laws and regulations related to water resources include:

- Section 401 of the Clean Water Act; and Section 404 of the Clean Water Act, which regulates placing fill in Waters of the United States[21]
- Section 10 of the Rivers and Harbors Act, which regulates construction and obstructions in navigable waters[22]
- Safe Drinking Water Act,[23] as amended, also known as the Public Health Service Act, which prohibits federal agencies from funding actions that would contaminate a sole source aquifer or its recharge area
- District of Columbia Municipal Regulations on Water Quality Standards[24]
- Virginia Stormwater Management Program, authorized under the Virginia Stormwater Management Act[25]
- Virginia Erosion and Sediment Control Law[26]
- Virginia Water Protection Permit Program[27]
- Commonwealth of Virginia *Sediment and Erosion Control Handbook*[28]
- Code of Virginia Water Quality Standards[29]

Section 404 of the Clean Water Act invokes Section 401, the Water Quality Certification

[21] Clean Water Act [33 U.S.C. 1251 and 40 CFR Parts 110-112, 116, 117, 122, 125, 129, 130, 131, 136, 142, 149, 311, 401, 403, and 404].

[22] The Rivers and Harbors Act of 1899 [33 CFR 403, Section 10].

[23] Safe Drinking Water Act, as amended, 42 USC § 300.f, et seq.

[24] *District of Columbia Municipal Regulations*, Title 21, Chapter 11, "Water Quality Regulations", DC Official Code § 8-103.01 et seq.

[25] Virginia Stormwater Management Act and Virginia Stormwater Management Regulations. The law is codified at Code of Virginia Title 10.1, Chapter 6, Article 1.1, and Section 4VAC3-20 of the Virginia Administrative Code.

[26] Virginia Erosion and Sediment Control Law Title 10.1, Chapter 5, Article 4 of the Code of Virginia.

[27] Code of Virginia [§§ 62.1-44.15 and 62.1-44.15:5].

[28] Virginia Department of Conservation & Recreation, Third Edition, 1992 (or current).

[29] State Water Quality Standards (9 VAC 25-260) under § 62.1-44.15(3) of the Code of Virginia.

requirement, which specifically addresses water quality. Because the Potomac River is under the jurisdiction of the District of Columbia, the requirements of the District's 401 Water Quality Certification programs and water quality standards would be applicable. The 401 process in the District of Columbia is administered by the Washington, D.C., Department of Health, Bureau of Environmental Quality, Water Quality Division. The Airport currently operates under an NPDES Permit for industrial activities.[30] This permit is issued by the U.S. EPA for storm water discharges from the Airport to Roaches Run, Four Mile Run, and the Potomac River.

4.4.1.2 Methodology

To determine the extent, condition, and jurisdiction of water resources present in and near the LOPD, the following methodology was used:

- Reviewed readily available studies and data maintained by the various state and local agencies and organizations (including data published online). These included data contained in previous environmental analyses conducted at the Airport and for the Woodrow Wilson Bridge Improvement Study.
- Contacted relevant agencies to ensure that the data and reports reviewed contained the most current information available.
- Conducted representative sediment sampling in the Potomac River to assess the potential for any pollutants contained in the sediment to impact water quality if disturbed by construction.
- Determined locations of groundwater aquifers and public wells in the vicinity of the Airport from published information.
- Interpreted groundwater recharge areas from the Arlington County Geologic Map.
- Obtained information regarding public water sources for the Airport and adjacent communities from local government agencies and the U.S. EPA.
- Reviewed an Authority map of Airport drainage basins and outfall locations.[31]
- Reviewed relevant published information to assess water quality.

4.4.1.3 Affected Environment

The Airport is located on a peninsula on the Virginia side of the Potomac River immediately south (downstream) of Gravelly Point. The Airport is surrounded by water on three sides: Roaches Run to the north (including a 53-acre lake at Roaches Run Waterfowl Sanctuary), the Potomac River to the east, and Four Mile Run to the south. The confluence of Roaches Run with the Potomac River is immediately adjacent to the north side of the Airport. The confluence of Four Mile Run with the Potomac River is immediately adjacent to the south side of the Airport. The confluence of the Anacostia River with the Potomac River is on the opposite shore of the Potomac River from the Airport. Refer to Exhibit IV-2. Of these water bodies, only the Potomac River is within the LOPD.

The Airport lies within the Potomac-Shenandoah River Basin, the Middle Potomac River Sub-basin, and the Potomac River Watershed. The Airport was constructed, in part, by placing fill in areas of the Potomac River between Roaches Run and Four Mile Run. One jurisdictional Water of the United States (a concrete-lined tidal channel) exists on the Airport, flowing under the existing pavement prior to the threshold of Runway 15 before emptying into Roaches Run (refer also to Section 4.5.3,

[30] Permit #05A066 issued February 7, 2001.

[31] Metropolitan Washington Airports Authority, Maintenance and Engineering Division, *Plate 7A Stormwater Site Map, Authority Pollutant Sources, Ronald Reagan National Airport*, March 1998.

Wetlands and Waterways). This channel is located outside of the LOPD. The concrete-lined channel is considered a perennial stream, and, along with Four Mile Run and Roaches Run, is regulated by the Norfolk District of the U.S. Army Corps of Engineers, the Virginia Marine Resources Commission, and the Virginia Department of Environmental Quality.

The Baltimore District of the U.S. ACE and the D.C. Department of Environment, Water Quality Division, have Section 404 and 401 jurisdiction over the Potomac River, respectively. The NPS manages the tidal basin of Roaches Run and the river bottom of the Potomac River.

There are no public water supply intakes from the Potomac River in the vicinity of the Airport. The nearest intake is at Little Falls, which is over 6 miles north (upstream) of the Airport.[32] No public groundwater supply wells are located on the Airport. It is understood that Arlington County, including the Airport, acquires its public water from the Dalecarlia Treatment Plant of the Washington Aqueduct Division of the U.S. ACE. The City of Alexandria purchases its public water from the Fairfax County Water Authority, which obtains and treats water from the Potomac River and the Occoquan Reservoir.

Surface Water Resources

Although the stretch of the Potomac River adjacent to the Airport is not listed as wild and scenic, it is listed as an American Heritage River by the U.S. EPA. American Heritage Rivers include rivers that represent the natural, historical, cultural, social, and economic diversity of American waterways. An American Heritage River designation requires federal agencies to ensure that their actions have a positive effect on the natural, historical, economic, and cultural resources of American Heritage River communities.[33]

Based on the Code of Virginia, Water Quality Standards,[34] the Virginia section of the Potomac River (located approximately 2.8 miles south of the Airport) and Four Mile Run are designated as Class II (freshwater-tidal) waterways. The District of Columbia section of the Potomac River is designated by the District of Columbia Municipal Regulations for the five following use classifications:

- A – Primary contact recreation
- B – Secondary contact recreation and aesthetic enjoyment
- C – Protection and propagation of fish, shellfish, and wildlife
- D – Protection of human health related to consumption of fish and shellfish
- E – Navigation

The U.S. Geological Survey, as part of the National Water Quality Assessment program, and the VDEQ monitor water quality in the Potomac River; the Northern Virginia Regional Commission monitors water quality in Four Mile Run. As of 2008, water quality had not been monitored in Roaches Run.

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[32] Metropolitan Washington Council of Governments, Metropolitan Washington Region Water Supply Agencies website, http://www.mwcog.org/environment/water/watersupply/suppliers.asp (accessed November 8, 2008).

[33] Executive Order 13061, *Federal Support of Community Efforts along American Heritage Rivers*, September 11, 1997.

[34] Virginia State Water Control Board, 2005, 9 VAC 25-260 *Virginia Water Quality Standards, Statutory Authority § 62.1-44.15 3a of the Code of Virginia.*

Potomac River Water Quality

The District of Columbia's 2008 report on water quality[35] indicates that, of the five designated use categories, the portion of the Potomac River within the District fully supports uses B and E. The section from Haines Point to the Woodrow Wilson Bridge (the section nearest the Airport) also supports use C. The sections north of the Airport, from the Montgomery County, Maryland, line to Haines Point, does not support use C. None of the Potomac River within the District supports use A or D. The reason for nonattainment of uses A and D includes high fecal coliform levels; a 1994 District Commissioner of Public Health advisory urged nonconsumption of fish caught within District waters. Refer to **Appendix G**.

VDEQ data[36] indicate that nitrogen and phosphorous loads in the Potomac River watershed have decreased over the past 20 years and that the Potomac River is not designated as a nutrient-enriched waterway of concern. As documented by the City of Alexandria in 2001, the Potomac River failed water quality standards for available sunlight and suspended solids.[37] U.S. Geological Survey (USGS) water quality data[38] indicate that the Potomac River can exceed the suspended sediment standard of 500 milligrams per liter (mg/l) at drinking water intakes during high discharge events. High sediment loads were also observed in the Potomac River during the 2004 water monitoring period.[39] As of September 2005, the most recent USGS water quality data on record for Arlington County indicate that the Potomac River is in compliance with the dissolved oxygen, pH, and temperature standards for Class II waterways in Virginia.[40]

Four Mile Run Water Quality

The 20-square-mile Four Mile Run watershed is one of the most urbanized drainage basins in Virginia.[41] After seven major floods in the 1960s and 1970s, the U.S. ACE channelized the 2.3 miles of the Run farthest downstream to manage storm water runoff and flooding. The Clean Water Act requires states to publish a list of streams that violate water quality standards, known as the 303(d)

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35 District of Columbia, Department of the Environment, *The District of Columbia Water Quality Assessment 2008 Integrated Report to the Environmental Protection Agency and the U.S. Congress Pursuant to Section 305(b) and 303(d) Clean Water Act*, September 2008.

36 Virginia Department of Environmental Quality, Virginia Department of Conservation and Recreation, *Virginia 305(b)/303(d) Water Quality Integrated Report to Congress and the EPA Administrator for the Period January 1, 2000 to December 31, 2004*, 2006.

37 City of Alexandria, *City of Alexandria Master Plan, Water Quality Management Supplement*, 2001.

38 White, Roger K., Donald C. Hayes, Joel R. Guyer, and Eugene D. Powell, U.S. Geological Survey, Virginia Water Science Center, *Water Resources Data, Virginia, Water Year 2004, Volume 1: Surface-Water Discharge and Surface-Water Quality Records, USGS Water Data Report VA-04-1*, 2005.

39 Federal Highway Administration, Virginia Department of Transportation, Maryland State Highway Administration, and D.C. Department of Public Works, *Woodrow Wilson Bridge Improvement Study Final Environmental Impact Statement/Section 4f Evaluation*, Baltimore, Maryland, 1997.

40 U.S. Geological Survey, http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=01646580&agency_cd=USGS&begin_date=2004-09-13&end_date=2005-09-13&format=html_table&inventory_output=0&rdb_inventory_output=file&date_format=YYYY-MM-DD&rdb_compression=file&qw_sample_wide=0&submitted_form=brief_list (accessed September 30, 2008).

41 Northern Virginia Regional Commission, *Four Mile Run, History of the Project*, http://www.novaregion.org/fourmilerun.htm (accessed June 10, 2006).

List of Impaired Waters. The 2008 draft 303(d) List of Impaired Waters for Virginia[42,43] includes Four Mile Run for multiple pollutants, as identified below:

- Swimming-use impaired due to excessive fecal coliform and *e. coli* bacteria levels[44,45] primarily due to domestic waterfowl populations.[46]
- Fish-consumption impaired due to the presence of excessive PCBs in fish tissue sampled from the waterway in 1997; VDEQ has issued a fish consumption advisory for the tidal portion of Four Mile Run, recommending no consumption of carp or channel catfish larger than 18 inches and limited consumption of multiple fish species.[47]
- Macrophyte-impaired (macroscopic aquatic plant) due to excessive nutrients.[48]

The watercourse has been targeted as a "high priority watershed" for controlling non-point-source pollution by the Commonwealth of Virginia.[49] A Total Maximum Daily Load Implementation Plan was completed for the non-tidal portion of Four Mile Run in 2002.[50] Although Four Mile Run is not located within the LOPD, any future changes in runoff patterns from the Airport or impervious surface cover within the drainage basins outfalling near the confluence of Four Mile Run with the Potomac River, permanent or temporary, will need to be managed in the LOPD.

Groundwater Resources

As depicted on **Exhibit IV-6**, the groundwater recharge area closest to the Airport is located west of I-395, near Arlington National Cemetery. This recharge area is well beyond Airport property and more than one mile from the LOPD.

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42 Virginia Department of Environmental Quality, *Draft 2008 305(b)/303(d) Water Quality Assessment Integrated Report*, http://www.deq.virginia.gov/wqa/305b2008.html (accessed October 3, 2008).

43 Virginia Department of Environmental Quality, http://gisweb.deq.virginia.gov/FactSheets2008/FactSheets.aspx?loc=ARLINGTON+CO.&style=1 (accessed October 3, 2008).

44 Virginia Department of Environmental Quality, Virginia Department of Conservation and Recreation, , *Virginia 305(b)/303(d) Water Quality Integrated Report to Congress and the EPA Administrator for the Period January 1, 1998 to December 31, 2002*, 2004.

45 Northern Virginia Regional Commission, *Fecal Coliform TMDL Development for Four Mile Run, Virginia*, Annandale, Virginia, 2002.

46 Simmons, G. M., D. F. Waye, S. Herbein, S. Myers, and E. Walker, "Estimating nonpoint fecal coliform sources in Northern Virginia's Four Mile Run watershed", pp. 248-267, in T. Younos and J. Poff (ed.), *Abstracts, Virginia Water Research Symposium 2000, VWRRC Special Report SR-19-2000*, Blacksburg, Virginia, 2000.

47 Virginia Department of Environmental Quality, Virginia Department of Conservation and Recreation, *Virginia 305(b)/303(d) Water Quality Integrated Report to Congress and the EPA Administrator for the Period January 1, 2000 to December 31, 2004*, 2006.

48 Rybicki, N.B., S. Yoon, E. Schenk, and J. Baldizar, U.S. Geological Survey Report to Metropolitan Washington Council of Governments, Potomac Aquatic Plant Management Committee, *Submersed Aquatic Vegetation Distribution in the Fresh and Oligohaline Tidal Potomac River,* 2004.

49 City of Alexandria, *City of Alexandria Master Plan, Water Quality Management Supplement*, 2001.

50 Northern Virginia Regional Commission, http://www.novaregion.org/tmdlresource.htm (accessed October 3, 2008).

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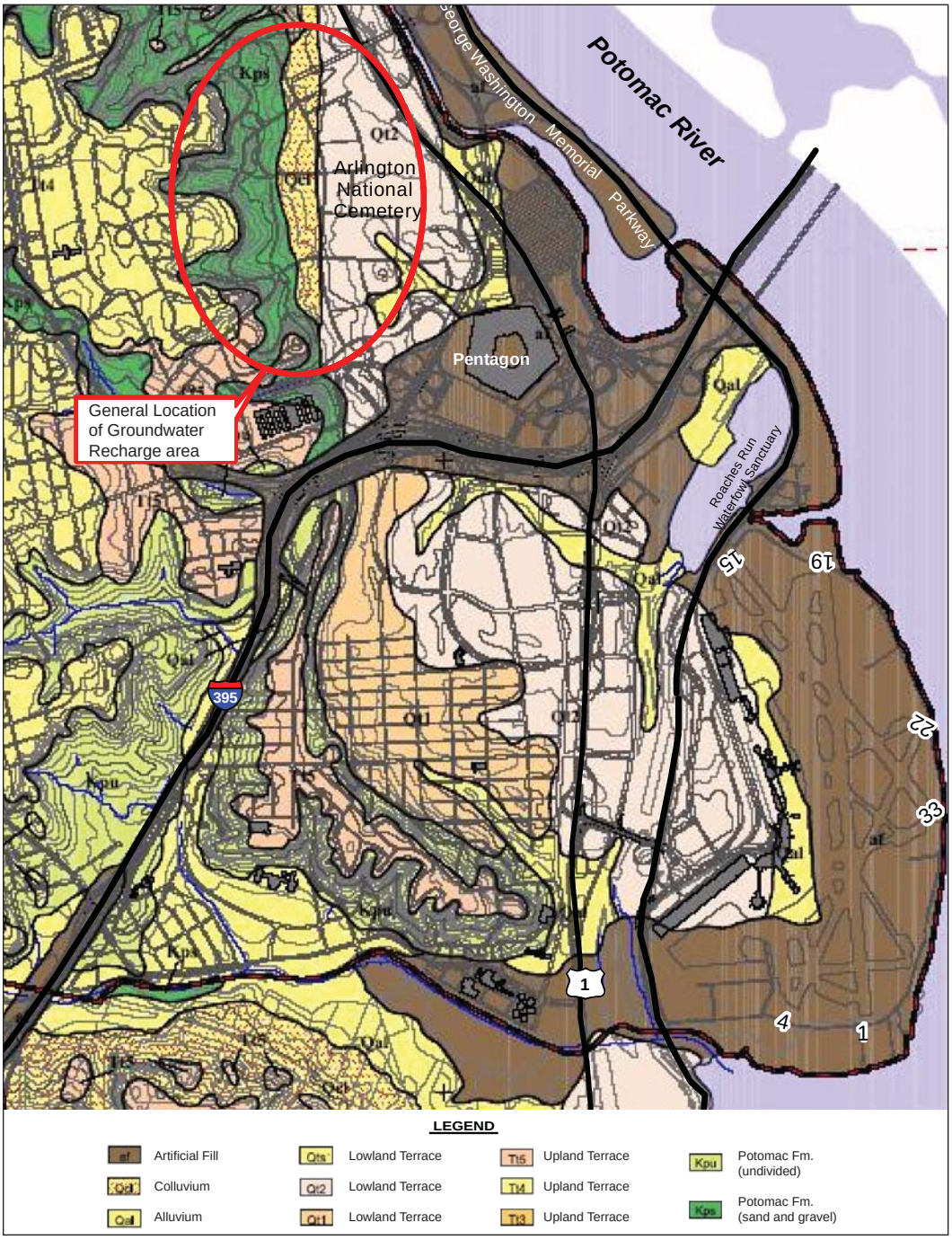

Sources: Frost, W. and T. Ernest, Simplified Geological Map of Arlington County, Virgina, and Vicinity, 1999.
Prepared by: Straughan Environmental Services, Inc., October 2006.

Exhibit IV-6

Not to Scale

north

Site Geology and Groundwater Recharge Area

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Based on information from the District of Columbia,[51] the regional groundwater table is located approximately 15 feet below the surface, except in areas where building foundations or tunnels exist, where groundwater may be as much as 25 feet below the surface. The groundwater table fluctuates seasonally by 3 to 5 feet. Geotechnical investigations in the Potomac River near the Runway 22 and 33 ends were conducted in August and September 2006.[52] During these investigations, it was not logistically feasible to maintain dry conditions within the boreholes, so the existence of any subsurface water body could not be determined.

River Bottom Resources and Sediment Quality

In 2006/2007, the quality of the sediment in the Potomac River was assessed[53] in support of the Authority's Phase III Study. Although the area directly south of Runway 1 within the LOPD was not sampled, similar findings could be expected in that area because of its relatively close proximity to the Runway 33 sampling area. The investigations indicated that surface water depths vary from 10.5 feet to 16.5 feet.[54] Collected samples indicate that the local river sediments are predominantly fine sand and silt (with high organic content) between 0 and 15 feet deep. Boreholes for these investigations were driven until refusal, which varied from elevation -35 feet to -93 feet. Water and mud extended to a depth of -35 feet surface elevation near the Runway 22 end and to a depth of -49 feet surface elevation at the Runway 33 end. Beneath the mud, relatively firm subsurface material, consisting of sand and gravel with some silt and clay, was found in all borehole locations. Varying concentrations of metals, pesticides, semivolatile organic compounds (SVOCs), arsenic, tributyl tin, dioxins, and petroleum hydrocarbons were detected in the sediment samples. Refer to Appendix G for the results of the chemical analysis on these sediment samples.

4.4.2 Floodplains

4.4.2.1 Regulatory Background

Applicable laws and regulations related to floodplains include:

- Executive Order 11988, *Floodplain Management* (May 24, 1977)
- National Flood Insurance Program (NFIP)[55]
- Virginia Flood Damage Reduction Act[56]
- Virginia Floodplain Management Program[57]
- Arlington County Code of Ordinances, Chapter 48, "Floodplain Management"
- Washington D.C., Municipal Regulations, Titles 20, *Environment*, and 21, *Water and Sanitation*

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51 D.C. Water Resources Research Center, University of the District of Columbia, *Background Study of the Ground Water in the District of Columbia,* 1992.

52 Thomas L. Brown Associates, P.C., *Geotechnical Study, Runways 4-22 & 15-33 RSA, Constructability Assessment, Ronald Reagan Washington National Airport,* November 2006.

53 Straughan Environmental Services, Inc., *River Sediment Quality Assessment Report Runway 15/33 and 4/22 Safety Area Study*, July 2007.

54 Thomas L. Brown Associates, P.C. *Geotechnical Study, Runways 4-22 & 15-33 RSA, Constructability Assessment, Ronald Reagan Washington National Airport,* November 2006.

55 National Flood Insurance Act, 42 U.S.C. 4121, 1968 (as amended).

56 Code of Virginia, Section 10.1-602.

57 Flood Damage Reduction Act, Code of Virginia, Section 10.1-602.

- Four Mile Run Management Program[58]

Federal and state regulation and local ordinances protect areas prone to flooding by assessing flood risks and preventing or mitigating flood damage. Executive Order 11998, *Floodplain Management,* requires that federal actions, to the extent possible, avoid impacts to floodplains and avoid floodplain development where a practicable alternative exists. Multiple local ordinances govern floodplains in the vicinity of the Airport given that the boundary between Virginia and the District of Columbia is the high water mark along the Virginia shoreline of the Potomac River and that the NPS manages the tidal basin of Roaches Run. The Virginia Department of Conservation and Recreation regulates floodplains based on the Code of Virginia §10.1-602 and implements the Virginia Floodplain Management Program to include coordination with the NFIP. Arlington County regulates floodplain development under the Arlington County Code of Ordinances, Chapter 48: "Floodplain Management," which stipulates that the floodplain regulations are adopted from the NFIP regulations. It should be noted that the Airport is not subject to Arlington County floodplain regulations.

4.4.2.2 Methodology

To determine the existence, extent, and governing jurisdictions of any floodplains within the LOPD, the study team reviewed the following information from multiple sources:

- FEMA data for Federal Insurance Rate Map (FIRM) panel number 5155200013B
- Woodrow Wilson Bridge Project, *Hydrology and Hydraulic Report for Purpose of Scour Evaluation*, May 2000
- Lowe Engineers, *Watershed Analysis of the Washington, D.C., National Airport*, 1991
- EA Engineering, *Runway 4-22 Modifications, Environmental Assessment, and Federal Consistency Certification*, 2007
- National Park Service, George Washington Memorial Parkway Unit[59]
- United States Geological Survey, *Streamflow Measurements for the Nation*
- National Oceanic and Atmospheric Administration, *Nautical Chart number 12289*

4.4.2.3 Affected Environment

Based on a review of available floodplain information, floodplains do exist on Airport property and within the LOPD. Roughly 200 acres of the Airport are located within the 100-year floodplain (see **Exhibit IV-7**). In a 1991 watershed analysis for an earlier project at the Airport,[60] the 100-year base flood elevation for the Potomac River was found to occur at 11.4 feet above MSL, with approximately 3 feet of tidal range.[61,62]

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58 Northern Virginia Regional Commission, *Memorandum of Agreement,* 1977 (as amended, 1998).

59 National Park Service, George Washington Memorial Parkway Unit, August 1, 2006 (Brent Steury, Natural Resources Manager).

60 Lowe Engineers, *Watershed Analysis of the Washington D.C., National Airport*, Arlington, Virginia, 1991.

61 Federal Aviation Administration and Metropolitan Washington Airports, *Final Environmental Impact Statement, Runway Safety Area Modifications at Washington National Airport,* 1982.

62 Metropolitan Washington Airports Authority, *Final Environmental Assessment, Airport Traffic Control Tower Site Selection and Related Terminal Improvements,* 1993.

Note: Terminal construction in 1997 affected floodplain limits near buildings

Sources: US Department of Agriculture, 2005 (aerial photo); EA Engineering, 2006, based on 100-Year Floodplain elevation of 11.4 feet from Federal Emergency Management Agency, 1985 (Floodplain).
Prepared by: Straughan Environmental Services, Inc., November 2008.

Exhibit IV-7

Not to Scale

north

100-Year Floodplain

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4.4.3 Air Quality

The air quality regulations that apply to airport improvement projects are summarized below, and the existing air quality conditions in the Washington, D.C., area are described**.**

4.4.3.1 Regulatory Background

The federal Clean Air Act of 1970, 42 USC 7401, *et seq.*, as amended, requires that states identify those areas where the NAAQS are not met for specific air pollutants. The U.S. EPA designates such areas as nonattainment areas. A state with one or more nonattainment areas must prepare a SIP for each nonattainment area, detailing the programs and requirements that the state will implement to meet the NAAQS by the deadlines specified in the Clean Air Act Amendments of 1990 (CAAA).[63] SIPs must address each pollutant for which the NAAQS are not met.

The U.S. EPA, under mandates of the CAAA, has established primary and secondary NAAQS for seven air contaminants, or criteria pollutants. These contaminants include carbon monoxide, nitrogen dioxide, ozone, lead, sulfur dioxide, particulate matter, and fine particulates. The primary standards were established at levels sufficient to protect public health with a satisfactory margin of safety. The secondary standards were established to protect public welfare from other adverse effects of air pollution. The criteria pollutants are described below.

Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels. The primary sources of this pollutant are automobiles and other ground-based vehicles. The health effects associated with exposure to CO are related to its affinity for hemoglobin in the blood. At high concentrations, CO reduces the amount of oxygen in the blood, causing heart difficulties in people with chronic diseases, reduced lung capacity, and impaired mental abilities.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a poisonous, reddish-brown to dark brown gas with an irritating odor. NO_2 forms when nitric oxide (NO) reacts with atmospheric oxygen (O_2). Most sources of NO_2 are manmade; the primary source is high-temperature combustion. Significant sources of NO_2 at airports are boilers, aircraft operations, and vehicle movements. NO_2 emissions from these sources are highest during high-temperature combustion, such as in aircraft take-off mode.

NO_2 may produce adverse health effects, such as nose and throat irritation, coughing, choking, headache, nausea, stomach or chest pain, and lung inflammation (e.g., bronchitis, pneumonia).

Ozone

Ozone (O_3), a common constituent of smog, is formed in the atmosphere rather than being directly emitted from pollutant sources. Ozone forms as a result of volatile organic compounds (VOCs) and oxides of nitrogen (NO_X) reacting in the presence of sunlight in the atmosphere. Ozone levels are highest in warm-weather months. VOCs and NO_X are termed "ozone precursors" and their emissions are regulated in order to control the creation of ozone.

[63] *Clean Air Act Amendments of 1990*, Public Law 101-49, November 15, 1990.

Ozone damages lung tissue and reduces lung function. Scientific evidence indicates that ambient levels of ozone not only affect people with impaired respiratory systems (e.g., asthmatics), but also healthy children and adults. Ozone can cause health effects, such as chest discomfort, coughing, nausea, respiratory tract and eye irritation, and decreased pulmonary function.

Lead

Lead (Pb) is a bluish-white to silvery-gray heavy metal solid. Lead occurs in the atmosphere as lead oxide aerosol or lead dust. Historically, a significant source of lead in the air at airports was the ground access vehicles operating on leaded gasoline. The amount of lead emissions from vehicles has decreased, however, as a result of the significant federal controls on leaded gasoline, and the resultant increase in the use of unleaded gasoline in catalyst-equipped cars. Another source of lead at airports is the combustion of leaded aviation gasoline in piston-engine aircraft.

Sulfur Dioxide

Sulfur dioxide (SO_2) is formed when fuel containing sulfur (typically coal and oil) is burned during the metal smelting process and during other industrial processes. High SO_2 concentrations are found in the vicinity of large industrial facilities. The physical effects of SO_2 include temporary breathing impairment, respiratory illness, and aggravation of existing cardiovascular disease. Children and the elderly are most susceptible to the negative effects of exposure to SO_2.

Particulate Matter and Fine Particulates

Particulate matter (PM_{10}) and fine particulates ($PM_{2.5}$) consist of solid and liquid particles of dust, soot, aerosols, and other matter small enough to remain suspended in the air for a long period of time. PM_{10} refers to particulate matter with an aerodynamic diameter less than or equal to 10 micrometers and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers. Particulates smaller than 10 micrometers (i.e., PM_{10} and $PM_{2.5}$) represent that portion of particulate matter thought to represent the greatest hazard to public health.[64] PM_{10} and $PM_{2.5}$ can accumulate in the respiratory system and are associated with a variety of negative health effects. Exposure to particulates can aggravate existing respiratory conditions, increase respiratory symptoms and disease, decrease long-term lung function, and possibly cause premature death. The segments of the population that are most sensitive to the negative effects of particulate matter in the air are the elderly, individuals with cardiopulmonary disease, and children. Aside from the physical negative effects, particulate matter in the air reduces visibility and damages paints and building materials.

A portion of the particulate matter in the air comes from natural sources, such as windblown dust and pollen. Manmade sources of particulate matter include combustion of materials, automobiles, aircraft operations, field burning, factories, vehicle movements or other manmade disturbances of unpaved areas, and photochemical reactions in the atmosphere. Secondary formation of particulate matter may occur in some cases where gases such as sulfur oxides (SO_X) and NO_X interact with other compounds in the air to form particulate matter. Fugitive dust generated by construction activities can be a major source of particulate matter.

The secondary creators of particulate matter, SO_X and NO_X are also major precursors to acidic deposition (acid rain). While SO_X is a major precursor to particulate matter formation, NO_X has other environmental effects. NO_X has the potential to change the composition of some species of vegetation in wetland and terrestrial systems, create the acidification of freshwater bodies, impair

[64] U.S. Environmental Protection Agency, *Particle Pollution and Your Health*, September 2003.

aquatic visibility, create eutrophication[65] of estuarine and coastal waters, and increase the levels of toxins harmful to aquatic life.

Air Quality Standards

Federal and Commonwealth of Virginia ambient air quality standards are summarized in **Table IV-6**. The Virginia Air Quality Control Board has adopted ambient air quality standards that are identical to the federal standards. The Virginia Air Pollution Control Board has also adopted regulations prohibiting most types of open burning in the state, effective October 18, 2006.[66]

Table IV-6

Federal Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard
Ozone (O_3)	1 hour [a/]	0.12 ppm	Same as primary
	8 hours (1997 standard)	0.08 ppm	Same as primary
	8 hours (2008 standard) [b/]	0.075 ppm	Same as primary
Carbon Monoxide (CO)	8 hours	9.0 ppm	None
	1 hour	35.0 ppm	None
Nitrogen Dioxide (NO_2)	AAM	0.053 ppm	Same as primary
Sulfur Dioxide (SO_2)	AAM	0.03 ppm	Not applicable
	24 hours	0.14 ppm	Not applicable
	3 hours	--	0.50 ppm
Particulate Matter (PM_{10})	AAM	Revoked [c/]	Revoked [c/]
	24 hours	150 μg/m [b/]	Same as primary
Fine Particulate Matter ($PM_{2.5}$)	AAM	15 μg/m [b/]	Same as primary
	24 hours	35 μg/m [b/]	Same as primary
Lead (Pb)	Quarterly average	1.5 μg/m [b/]	Same as primary
	Rolling 3 month average	0.15 μg/m	Same as primary

Notes:
AAM = Annual arithmetic mean
$\mu g/m^3$ = Micrograms per cubic meter
ppm = Parts per million
a/ The one-hour ozone standard was revoked by the U.S. EPA on June 15, 2005, for all areas except those in nonattainment of the 8-hour ozone standard where the responsible governmental agency entered into an Early Action Compact (EAC). Arlington County is not an EAC area.
b/ Effective May 27, 2008.
c/ Because of the lack of evidence linking health problems to long-term exposure to coarse particulate matter, the U.S. EPA revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

Source: U.S. Congress, *Clean Air Act*, as amended *(*Public Law 91-604, and Public Law 101-549).
Prepared by: Ricondo & Associates, Inc., September 2008.

4.4.3.2 Methodology

Regulations governing air quality in the Commonwealth of Virginia and air quality planning documents covering the Airport environs were reviewed and are summarized in the following subsection. Ambient air quality datasets for air quality monitors in the vicinity of the Airport were also reviewed.

4.4.3.3 Affected Environment

Existing air quality conditions in the Washington, D.C., area are described below.

[65] Nitrogen-rich discharge/runoff into marine waters causes rapid growth and accumulation of algae (eutrophication), which depletes the oxygen supply in the water. Phosphates are the primary nutrient that causes eutrophication in fresh waters.

[66] Article 40 (9 VAC 5-40-5600 et seq.) of Part II of 9 VAC 5 Chapter 40; 23 Virginia Register 28, September 18, 2006.

Attainment Status

The Airport is located in the Metropolitan Washington region. The Airport and adjacent areas are all within Arlington County in the Commonwealth of Virginia. The areas north and east of the Airport and across the Potomac River are within the District of Columbia. Arlington County, Virginia, has been designated by the U.S. EPA as nonattainment for the 8-hour ozone and $PM_{2.5}$ NAAQS. The U.S. EPA designated the region as a moderate nonattainment area for the 8-hour ozone standard in April 2004.[67] The region was designated a nonattainment area for the 1997 $PM_{2.5}$ standard in January 2005; however, on October 22, 2008, the U.S. EPA changed the region's classification to attainment/maintenance.[68] Arlington County is designated as a moderate attainment/maintenance area for CO and as an attainment area for all other criteria pollutants.

State Implementation Plans

The Virginia Air Pollution Control Board (VAPCB) considers and adopts air pollution regulations and controls throughout the state. The VDEQ administers the regulations adopted by the VAPCB through implementation of air pollution programs and issuance and enforcement of permits. The Metropolitan Washington Air Quality Committee (MWAQC) is the entity that prepares air quality plans (i.e., SIPs) for the Metropolitan Washington region, which includes Washington, D.C., and areas of southern Maryland and northern Virginia. Each state and the District of Columbia then submit the same SIP under separate state covers for approval.

The MWAQC prepared an 8-hour ozone[69] SIP for the Metropolitan Washington region[70] in May 2007 and a $PM_{2.5}$ SIP in March 2008[71]. The ozone SIP and the $PM_{2.5}$ SIP were then submitted to the U.S. EPA by each state and the District of Columbia. The U.S. EPA designated the region as moderate nonattainment for the 8-hour ozone standard in April 2004 with a deadline of June 15, 2010, to meet the standard.[72] The region is to attain the standard for $PM_{2.5}$ no later than April 2010. The MWAQC also prepared a maintenance plan for CO,[73] which was approved by the U.S. EPA on March 16, 1996. As part of the maintenance demonstration for CO, the MWAQC must demonstrate that emissions would not exceed the levels presented in the attainment inventory through 2016.[74]

Ambient Air Quality Monitoring

The U.S. EPA Office of Air Quality Monitoring operates one ambient (i.e., outdoor) air monitoring site in Arlington County for the following criteria pollutants: CO, NO_2, O_3, and $PM_{2.5}$. Air monitoring sites in Fairfax County provide ambient air monitoring data for SO_2 and PM_{10}. **Table IV-7** presents a summary of air quality monitoring data collected at three monitoring sites in

67 69 Federal Register 84, April 30, 2004.

68 70 Federal Register 3, January 5, 2005.

69 Metropolitan Washington Air Quality Committee, *8-Hour Ozone Attainment Plan for the Metropolitan Washington, D.C.-MD-VA Nonattainment Area,* May 23, 2007.

70 The Metropolitan Washington region includes Arlington County and the City of Alexandria in Virginia, and the District of Columbia, among other counties and cities in the region.

71 Metropolitan Washington Air Quality Committee, *State Implementation Plan (SIP) for Fine Particle ($PM_{2.5}$) Standards and 2002 Base Year Inventory for the Metropolitan Washington, D.C.-MC-VA Nonattainment Area*, March 7, 2008.

72 69 Federal Register 84, April 30, 2004.

73 Metropolitan Washington Air Quality Committee, *Revised Carbon Monoxide Maintenance Plan and Revised 1990 Carbon Monoxide Base Year Emissions Inventory for the Washington, D.C.-MD-VA Maintenance Area*, February 2004.

74 70 Federal Register 63, April 4, 2005.

2007. The reported averaging periods presented in the monitoring dataset are consistent with the NAAQS. **Exhibit IV-8** depicts the locations of the three ambient air quality monitor locations in relation to the Airport.

Table IV-7

2007 Air Quality Monitoring Data – Arlington County, Virginia

AQS Station Number	Geographic Station Location	Distance and Direction from the Airport	Pollutant Monitored	Averaging Time	Maximum Recorded Concentration	NAAQS [a/]	Above NAAQS
51-013-0020	38^0 51' 27" -77^0 03' 33"	1.2 linear miles west	CO	1 hour	2.1 ppm	35 ppm	No
				8 hours	1.6 ppm	9 ppm	No
			NO_2	1 hour	0.058 ppm	--	No
				Annual	n.a.	0.053 ppm	No
			O_3	1 hour	0.11 ppm	0.12 ppm	No
				8 hour	0.095 ppm	0.08 ppm	No
			$PM_{2.5}$	24 hours	44.5 $\mu g/m^3$	35 $\mu g/m^3$	Yes
				Annual	n.a.	15 $\mu g/m^3$	No
51-059-005	38^0 53' 38" -77^0 27' 55"	23.2 linear miles west	SO_2	3 hours	0.043 ppm	0.5 ppm	No
				24 hours	0.009 ppm	0.14 ppm	No
				Annual	n.a.	0.030 ppm	No
51-059-0018	38^0 44' 33" -77^0 04' 39" (monitor 2)	7.8 linear miles south	PM_{10}	24 hours	51 $\mu g/m^3$	150 $\mu g/m^3$	No
				Annual	n.a.	Revoked [b/]	No

Notes:
AQS = Air Quality System database
$\mu g/m^3$ = Micrograms per cubic meter
n.a. = Not available
NAAQS = National Ambient Air Quality Standards
ppm = Parts per million
a/ The one-hour ozone standard was revoked by the U.S. EPA on June 15, 2005, for all areas except those in nonattainment of the 8-hour ozone standard, where the responsible governmental agency entered into an Early Action Compact (EAC). Arlington County is not an EAC area.
b/ Because of the lack of evidence linking health problems to long-term exposure to coarse particulate pollution, the U.S. EPA revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

Source: U.S. EPA AirData, August 2008.
Prepared by: Ricondo & Associates, Inc., September 2008.

Although ozone continues to be an issue across the state, ozone concentrations have generally declined in the last 10 years as a result of emission reduction programs and controls aimed at industrial sources and motor vehicles. As shown in Table IV-7, the $PM_{2.5}$ NAAQS in Arlington County was exceeded in 2007. No exceedances of the other NAAQS were recorded in 2007 at the three monitoring locations.

4.4.4 Hazardous Materials

Properties where hazardous materials have either been generated or stored have the potential to be contaminated. Contaminants that are contained and stable have a low risk of release that could adversely affect human health and safety or the natural environment. Construction projects, however, have the potential to disturb hazardous sites, thus increasing the risk of release and exposure.

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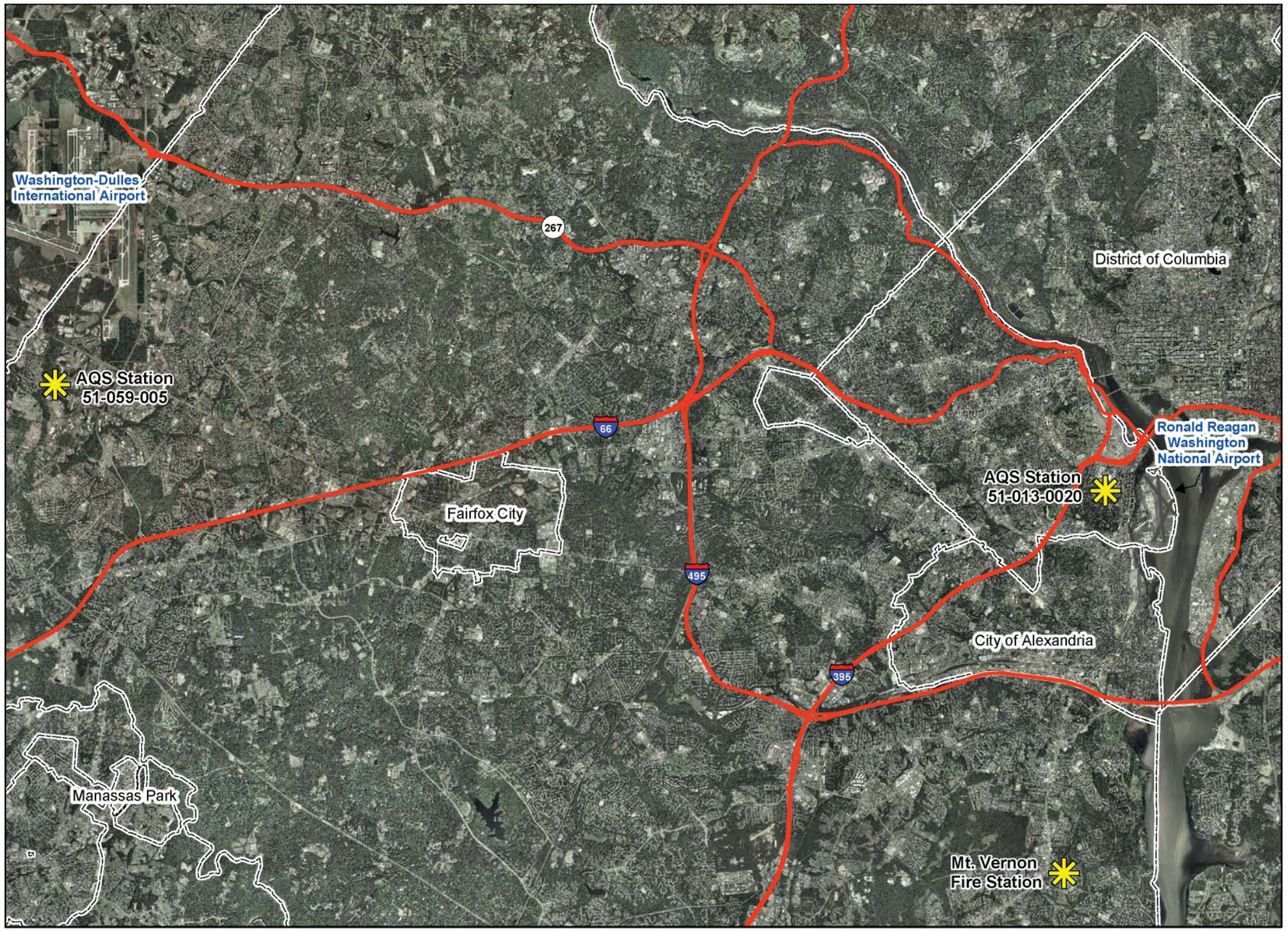

Source: Aerials Express Inc., 2007.
Prepared by: Ricondo & Associates, Inc., 2008.

Exhibit IV-8

0 12,000 ft.
north

Ambient Air Quality Monitor Locations

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4.4.4.1 Regulatory Background

Applicable laws, regulations, and guidance related to hazardous materials include the following:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[75]
- Superfund Amendments and Reauthorization Act (SARA)
- Resource Conservation and Recovery Act (RCRA)[76]

Under CERCLA, the U.S. EPA maintains a National Priorities List of the most serious uncontrolled or abandoned places that contain hazardous waste. The U.S. EPA, with the cooperation of state and local agencies, then seeks to clean up those sites. Commonly referred to as "Superfund," CERCLA also provides funds for cleaning up these sites. SARA was enacted to improve the administration of the CERCLA Superfund. RCRA authorizes the U.S. EPA to control hazardous materials generation, transportation, treatment, storage, and disposal. The RCRA Information System is the U.S. EPA's inventory of sites where hazardous materials are managed.

4.4.4.2 Methodology

To determine the existence of any known hazardous material sites within or near the LOPD, documentation from previous studies and Phase I Environmental Site Assessments at the Airport were reviewed. These studies include:

- *Ronald Reagan Washington National Airport, Runway 1-19 Safety Area Study – Phase III*[77]
- *Phase I Environmental Site Assessment Report Runway 15-33 and 4-22 Safety Area Study* (2007)[78]
- *South Investigation Site, Supplemental Site Investigation Sampling and Analysis Plan*[79]

4.4.4.3 Affected Environment

The Phase III Study focused on an investigation area generally located in and around the southern RSA of Runway 1. In this study, a site was identified that had previously been used by the Airport's fire safety crew as a training area. At this site, excavated pits were used to train crews on ways to extinguish solvent/gas fires. The depth of those pits was not specified. The Authority's Engineering Maintenance Department anticipated the soil at that site to be contaminated. That study also documented:

- One federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) site: The "Washington National Airport – South End of Airport" site was listed in 1988 when buried corroded and leaking drums were discovered

[75] Comprehensive Environmental Response, Compensation, and Liability Act [42 USC §9601, et seq. (In particular, see Sections 101, 102, 103, 105, 107, and 120.)]

[76] Resource Conservation and Recovery Act [42 USC § 6901 et seq., (P.L. 94 580) Sections 3001, 3010].

[77] HNTB Corporation; Ricondo & Associates, Inc.; and Straughan Environmental Services, Inc.; *Ronald Reagan Washington National Airport, Runway 1-19 Safety Area Study – Phase III,* August 2005.

[78] Ricondo & Associates, Inc. and Straughan Environmental Services, Inc., *Phase I Environmental Site Assessment Report Runway 15-33 and 4-22 Safety Area Study, Ronald Reagan Washington National Airport, Arlington County, Virginia,* June 2007.

[79] Lockheed Martin, *South Investigation Site, Supplemental Site Investigation Sampling and Analysis Plan, Ronald Reagan Washington National Airport, Alexandria, Virginia, Final,* September 21, 2007.

during grading for the now existing satellite parking lot located west of the Runway 1 RSA. The contaminants were removed and a site inspection was completed in 1995.

- One underground storage tank (UST): In total, seven permanently out-of-use USTs and three removed USTs were identified at the Airport. One of these was near the general study area. Because these USTs were either out-of-use or removed from the ground, they are not expected to pose an environmental threat or be a source of contamination.
- Three leaking UST cases: Commonwealth of Virginia records identified two cases of leaking USTs at the old terminal facility, which is more than 0.5 mile from the Runway 1 RSA. The three cases of leaking have all been remediated and the USTs closed and, therefore, they are not expected to pose an environmental threat. The records also identified a case of a leaking UST at the National Car Rental facility. No further information was available at the time; however, this facility is located more than 0.5 mile from the Runway 1 RSA.
- Thirteen Commonwealth spill cases and three federal Emergency Response Notification System (ERNS) incidents: These spills occurred at several places throughout the Airport, were contained by the Airport's emergency response team, and were reported to the appropriate federal and state agencies. As of 2005, several of the incidents had been closed and others were lacking definitive status information. According to information from interviews with the Authority's Engineering Maintenance Department staff, none of these spills occurred in the general study area. The Authority's Office of Engineering believes that the 13 reported spill cases have been resolved.

The Limit of Physical Disturbance in relation to the area referred to as the South Investigation Site (SIS) is shown in **Exhibit IV-9**. It is possible that the SIS would not be resolved by the time that the Authority would need to start construction of the Runway 1-19 RSA enhancements and the rest of the Proposed Action. See Sections 5.14.2, 5.15.4.2, and 5.18.2.13 for a discussion on how hazardous materials excavated from the SIS would be handled under that scenario.

Given the long history of heavy industrial operations located along the Potomac River and the use and undocumented disposal of hazardous substances as well as unconfirmed fill materials, sediments in the Potomac River may have been affected by nearby releases of hazardous substances. A separate representative sediment sampling study[80] was completed in 2006, the results of which are discussed in Section 4.4.1, Water Resources.

4.4.5 Natural Resources and Energy Supply

Airport development projects have the potential to change energy requirements or use consumable natural resources.

4.4.5.1 Regulatory Background

Applicable statutes and regulations related to natural resources and energy supply include:

- 40 CFR 1502.16(e) and (f) requires the consideration of potential impacts to energy requirements, energy conservation, and the use of natural or consumable resources, resulting from a proposed action and its reasonable alternatives.

[80] Ricondo & Associates, Inc. and Straughan Environmental Services, Inc., *River Sediment Quality Assessment Report Runway 15-33 and 4-22 Safety Area Study, Ronald Reagan Washington National Airport, Arlington County, Virginia* November 2006.

Source: Ricondo & Associates, Inc., July 2008.
Prepared by: Ricondo & Associates, Inc., July 2008.

Exhibit IV-9

0 1,200 ft.

north

South Investigation Site Areas

Drawing: Z:\MWAA\DCA\RSA EAs\Task 1-RW 1-19\1.2 PDEA Number 1\AutoCAD Files\Exhibit IV-9 South Investigation Site Areas.dwg_Layout: 8.5 x 11L_Jun 10, 2009, 1:55pm

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- Executive Order 13123, *Greening the Government through Efficient Energy Management*,[81] encourages federal agencies to increase the use of renewable energy.

4.4.5.2 Methodology

Facilities that would be affected by the Proposed Action were reviewed for their use of electrical, natural gas, water, and sewage utilities.

4.4.5.3 Affected Environment

The Airport's airfield is a well-illuminated environment that includes lighting of the three runways and associated taxiways, hold aprons, and the terminal/gate area apron. Facilities that would be affected by the Proposed Action are supported by electrical utilities—Runway 1-19 has both runway edge lights and the approach lighting system to Runway 1; Taxiway J and the Runway 1 Hold Apron are also illuminated. The Authority anticipates the continued availability of sufficient electricity to operate the Airport.

4.5 Biological and Natural Environment

The natural environment in the Airport area consists of an interdependent group of species and their associated habitats.

4.5.1 Fish, Wildlife, and Plants

A variety of federal and state agencies and local wildlife organizations manage public resources and monitor wildlife habitat, including settings such as the Potomac River that contain open water, tidal wetland, and riparian forest habitats for fish, wildlife, and plants.

4.5.1.1 Regulatory Background

Applicable statutes and guidance relating to fish, wildlife, and plants include:

- Fish and Wildlife Coordination Act[82]
- Migratory Bird Treaty Act[83]

The following federal and state agencies maintain jurisdiction over plant and animal species and habitats on or near the Airport:

- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- Virginia Department of Conservation and Recreation
- Virginia Department of Game and Inland Fisheries (VDGIF)
- Virginia Department of Agriculture and Consumer Services (VDACS)
- District of Columbia's Fisheries and Wildlife Division (DCFWD)

[81] Executive Order 13123, *Greening the Government through Efficient Energy Management*, 64 Federal Register 30851, June 9, 1999.
[82] Fish and Wildlife Coordination Act of 1958 [16 U.S.C. Sections 661-666, PL 85-624].
[83] Migratory Bird Treaty Act of 1918 [16 U.S.C. Sections 703-711].

These agencies work cooperatively to ensure the continued survival and biodiversity of the District's and Virginia's flora and fauna. The VDCR also administers the Virginia Natural Heritage Program and works closely with other federal and state agencies, local governments, conservation organizations, and individuals to seek adequate protection of Virginia's plants, animals, and ecosystems.

4.5.1.2 Methodology

To determine the existence and extent of fish, wildlife, and plants present in the vicinity of the Airport, the study team contacted the agencies listed above and reviewed readily available studies and data collected and maintained by these and other local and state organizations. Information contained in previous environmental studies conducted at the Airport and for the Woodrow Wilson Bridge were reviewed, as well as field observations. The collected information was evaluated relative to the LOPD.

4.5.1.3 Affected Environment

The Potomac River, Four Mile Run, and Roaches Run Waterfowl Sanctuary provide a variety of open water, tidal wetland, and riparian forest habitats for fish, wildlife, and plants. The District of Columbia's *Wildlife Action Plan*[84] states that "the Potomac and Anacostia rivers and several streams provide habitat to over 62 species of greatest conservation need, making them the highest priority habitat." Forested, turf, and paved surfaces located on and adjacent to the Airport property provide terrestrial habitat. Although the *Wildlife Action Plan* identifies several Species of Greatest Conservation Need (including fish, birds, mammals, reptiles, amphibians, and invertebrates), the DCFWD acknowledged that not all of them use the habitats on or immediately adjacent to the Airport.[85]

The following paragraphs describe the biotic resources in the vicinity of the Airport by primary habitat type: aquatic, terrestrial, and avian. Endangered and threatened species and critical habitat are discussed separately in Section 4.5.2, Threatened and Endangered Species.

Aquatic Habitat

Aquatic habitats associated with the Potomac River, Four Mile Run, and Roaches Run capable of supporting populations of fish include unvegetated subtidal bottoms, intertidal flats, submerged aquatic vegetation (SAV), emergent marshes, and deepwater habitats.

Table E-1, contained in **Appendix E**, presents the combined results of several inventories of fish species in the upper tidal Potomac River in the vicinity of the Airport, including field observations,[86] recent field surveys conducted for the Woodrow Wilson Bridge Improvement Study[87] (the bridge is located approximately 3 miles downstream from the Airport and has similar tidal regimes), review of

84 District of Columbia, Department of the Environment, Fisheries and Wildlife Division, *District of Columbia Wildlife Action Plan*, 2006.

85 Bryan King, District of Columbia Fisheries and Wildlife Division, "National Airport-Fish and Wildlife Info," e-mail to Kevin Clarke, Straughan Environmental Services, Inc., August 20, 2008.

86 Straughan Environmental Services, Inc., field observations on July 13, 2006. Fish were observed, but were not identifiable as to species.

87 Federal Highway Administration, Virginia Department of Transportation, Maryland State Highway Administration, and D.C. Department of Public Works, *Woodrow Wilson Bridge Improvement Study Final Environmental Impact Statement/Section 4f Evaluation*, Baltimore, Maryland, 1997.

data maintained by the VDGIF,[88] and review of correspondence received from the VDGIF.[89] The Potomac River is used by species exhibiting unique life cycles that inhabit fresh, salt, and/or estuarine waters, including anadromous, semianadromous, and catadromous fish species. The Potomac River provides a migratory pathway for these fish and spawning grounds for some migratory species.

Essential Fish Habitat refers to those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. Consultation with the NMFS revealed that the boundary for any Essential Fish Habitat in the Potomac River is the farthest upstream extent of saltwater influence, which is near Quantico, Virginia, several miles downstream of the Airport. Therefore, no Essential Fish Habitats are located within the vicinity of the Airport.

The Potomac River and Four Mile Run provide habitat for benthic macroinvertebrates, which serve an important role in the aquatic food chain and also serve as indicators of water quality. Benthic macroinvertebrates collected in the Potomac River and Four Mile Run in the vicinity of the Airport are listed in **Table E-2** of Appendix E. Macroinvertebrate data collected in 2001[90] were assigned a biological integrity ranking of "fair" based on an index good, fair, and poor. The in-stream habitat was assigned an optimal rating on a scale of marginal, suboptimal, and optimal. Data collected in 2005 from the lower mainstem of Four Mile Run[91] showed, on average, low diversity of organisms and marginal abundance of pollution-sensitive organisms, but yielded an acceptable ratio of pollution-sensitive organisms to pollution-insensitive organisms. These data indicate that water quality is less than ideal yet not degraded to the point that pollution-sensitive species have been suppressed. It should be noted that several species of macroinvertebrates have also been listed as Species of Greatest Conservation Need by the DCFWD.[92] These are identified in **Table E-3** of Appendix E.

SAV has been documented by the Virginia Institute of Marine Science (VIMS)[93] in the vicinity of the Airport. SAV refers to vascular plants that remain below the water surface during the growing season. SAV provides food and cover for fish and wildlife, nutrient absorption, sediment retention, and shoreline stabilization. SAV beds are important to the regional fisheries resources relative to food, cover, and spawning habitat. Salinity, water quality, water temperature, and water depths are the major factors that influence the distribution, abundance, and species composition of the SAV beds.

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88 Virginia Department of Game and Inland Fisheries, *anad_reaches1783,* 2002, vector digital data, http://www.dgif.state.va.us/gis/gis_data.html (accessed July 18, 2006).

89 Virginia Department of Game and Inland Fisheries, *ESSLOG #225542, Reagan National Airport, Runways 15-33 and 4-22 Safety Area Study,* October 24, 2006.

90 Maryland Department of Natural Resources, *Data Summary for: Upper Tidal Potomac River (Metropolitan Washington Basin),* 2001, PRUT-116-R-2001, PRUT-116-R-2001, *Maryland Biological Stream Survey*, 2001, http://mddnr.chesapeakebay.net/mbss/SA_site2kcfm?siteyr=PRUT-116-R-2001 (website accessed July 23, 2008).

91 Arlington County Department of Environmental Services, Volunteer Stream Monitoring Program, *2005 Data Report*, http://www.arlingtonva.us/Departments/EnvironmentalServices/epo/pdffiles/streammon_05.pdf (accessed July 23, 2008).

92 District of Columbia, Department of the Environment, Fisheries and Wildlife Division, *District of Columbia Wildlife Action Plan*, 2006.

93 Virginia Institute of Marine Science, www.vims.edu/bio/sav/sav06/quads1a1034th.html (accessed September 2008).

Common species of SAV found in the upper tidal section of the Potomac River in which the Airport is located are listed in **Table E-4** of Appendix E.

Information on the distribution and abundance of SAV beds in the Chesapeake Bay, its tributaries, and the coastal bays of the Delmarva Peninsula is presented annually in the *Submerged Aquatic Vegetation Monitoring Reports* prepared by the VIMS. As of September 2008, DCFWD has been conducting a site specific inventory of SAV in the areas surrounding the Airport.[94] Based on a review of VIMS survey data, both the distribution and density of SAV are expected to fluctuate due to varying precipitation levels from year to year, affecting the turbidity of the water within the mainstem of the Potomac River.

Terrestrial Habitat

Terrestrial habitats on and adjacent to the Airport include forest, turf, and paved areas. Aerial photography indicates a relatively large forest stand in the vicinity of Roaches Run Waterfowl Sanctuary, including a narrow portion along the GWMP. Based on field observations,[95] the forest community along Roaches Run Waterfowl Sanctuary is characterized as early successional. Species observed in the vicinity of Roaches Run Waterfowl Sanctuary and the GWMP include green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), and silky dogwood (*Cornus amomum*). The shrub layer associated with the forest on site is generally composed of bush honeysuckle (*Lonicera* sp.).

Table E-5, contained in Appendix E, provides a list of mammal, reptile, and amphibian species that are likely to be found in the vicinity of the Airport. This list is based on surveys conducted in support of the Woodrow Wilson Bridge Improvement Study, the Maryland Biological Stream Survey, and field observations.[96,97] The setting of the Airport is similar to that of the Woodrow Wilson Bridge in that both are major transportation facilities situated near parks and sanctuaries adjacent to the Potomac River. Compared to the Airport, however, the Woodrow Wilson Bridge has more extensive areas of surrounding forests and park land habitats that are capable of supporting a wider variety and abundance of species. The diversity and abundance of species is likely to be lower at the Airport due to the prevalence of maintained turf areas and airfield operations. While many of these species could be within the general vicinity, the DCFWD acknowledged that not all of them use the habitats on or immediately adjacent to the Airport.[98]

Avian Habitat

Because of the variety of aquatic and terrestrial habitats surrounding the Airport, several classes of resident and migratory birds, including waders (herons and egrets), shorebirds (sandpipers and plovers), aerial-searching birds (gulls and terns), waterfowl (ducks, geese, and swans), and birds of prey (hawks and owls) may be found in the vicinity. Roaches Run Waterfowl Sanctuary is part of

94 Bryan King, District of Columbia, Fisheries and Wildlife Division, e-mail to Kevin Clarke, Straughan Environmental Services, Inc., August 20, 2008.

95 Straughan Environmental Services, Inc., field observations on July 13, 2006.

96 Maryland Department of Natural Resources, *Data Summary for: PRUT-116-R-2001, Maryland Biological Stream Survey*, 2001, http://mddnr.chesapeakebay.net/mbss/SA_site2k.cfm?siteyr=PRUT-116-R-2001 (accessed August 3, 2006).

97 Straughan Environmental Services, Inc., field observations on July 13, 2006. No reptile or amphibian species were observed.

98 Bryan King, District of Columbia Fisheries and Wildlife Division, "National Airport-Fish and Wildlife Info," e-mail to Kevin Clarke, Straughan Environmental Services, Inc, August 20, 2008.

the Great Falls Loop of the Virginia Birding and Wildlife Trail.[99] Bird species observed at the Airport, Roaches Run Waterfowl Sanctuary, the mouth of Four Mile Run, and Daingerfield Island are presented in **Table E-6**, contained in Appendix E.

4.5.2 Threatened and Endangered Species

4.5.2.1 Regulatory Background

Applicable laws related to threatened and endangered species include:

- Endangered Species Act of 1973[100]
- Sikes Act Amendments of 1974[101]
- Fish and Wildlife Coordination Act of 1958[102]
- Animal Damage Control Act of 1931[103]
- Virginia Endangered Species Act[104]
- Virginia Natural Area Preserves Act of 1989[105]
- Virginia Endangered Plant and Insect Act[106]

The U.S. FWS is the primary agency responsible for threatened and endangered species. In Virginia, VDGIF and VDACS have legal authority for state-listed threatened and endangered species and are responsible for their conservation. The Virginia Natural Area Preserves Act of 1989 established the Virginia Natural Heritage Program, which is managed by the VDCR. The Natural Heritage Division of the VDCR produces an inventory of the Commonwealth's natural resources and maintains a data bank of ecologically significant sites. The Virginia Endangered Plant and Insect Act gives the VDACS Office of Plant Protection the regulatory responsibility for listing and protecting Virginia's threatened and endangered plants and insects. The District of Columbia Fisheries and Wildlife Division prepares and implements a *Wildlife Action Plan*[107] that identifies Species of Greatest Conservation Need and strategies to protect the associated habitats.

VDGIF and VDACS databases of threatened and endangered species contain the legal status of Virginia's native animals (including vertebrates, invertebrates, and insects) and plants believed to be sufficiently threatened to merit an inventory of their status and location. The VANHP identifies natural communities, habitats, and ecosystems that are considered the most likely to be lost without conservation action in the near future. These listings include all species that are federally listed/protected (by the U.S. FWS), but may include additional species and resources of importance to the Commonwealth.

4.5.2.2 Methodology

To determine the presence of known populations, or potential presence, of federal- or state-listed threatened and endangered species or supporting habitats within the vicinity of the Airport, the study

[99] Virginia Department of Game and Inland Fisheries, *Virginia Birding and Wildlife Trail*, 2004, http://www.dgif.state.va/wildlife/vbwt/index.asp (accessed July 25, 2006).
[100] Endangered Species Act [16 USC §§1531-1544].
[101] Public Law 93-452.
[102] 16 U. S. Code 661-666c; Public Law 85-624.
[103] 7 U. S. Code 426-426c; 46 stat. 1468.
[104] Virginia Endangered Species Act of 1973 [16 USC § 1531-1544].
[105] Virginia Natural Area Preserves Act of 1989 [Section 10.1-209 through 217, Code of Virginia].
[106] Virginia Endangered Plant and Insect Act [Code of Virginia, Section 3.1 -1020 through 1030].
[107] District of Columbia, Department of the Environment, Fisheries and Wildlife Division, *District of Columbia Wildlife Action Plan*, 2006.

team performed the following:

- Consulted with the U.S. FWS, VDGIF, VDCR, NMFS, and DCFWD.
- Searched online databases maintained by Virginia agencies regarding threatened and endangered species and habitat, including the Natural Heritage Resources Information and the Virginia Fish and Wildlife Information Service Geographic Search. Natural Heritage Resources are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The Natural Heritage Resources Information database allows for searches of species with federal or state legal status by county. The Virginia Fish and Wildlife Information Service database is maintained by the VDGIF, provides information on all wildlife in Virginia, and includes data on state and federal listings.

4.5.2.3 Affected Environment

The U.S. FWS identifies species meriting protection under the Endangered Species Act. During coordination with the U.S. FWS on the RSA studies of the crosswind Runways 15-33 and 4-22, the U.S. FWS commented that "except for occasional transient individuals, no proposed or federally-listed endangered or threatened species are known to exist within the project impact area."[108] See **Appendix B** for a copy of this letter. Additional coordination with the U.S. FWS in 2006 revealed concern over the federally endangered shortnose sturgeon (*Acipenser brevirostrum*).[109]

Correspondence with the NMFS identified that the shortnose sturgeon has been documented in the Potomac River. Recent surveys revealed shortnose sturgeon migrating to suspected spawning grounds north of the Airport, just above the Maryland-District line, from overwintering habitat approximately 13 stream miles downriver from the Airport.[110]

The VDCR maintains a statewide inventory of Natural Heritage Resources and their status under the VANHP. One state protected species, the wood turtle (*Glyptemys insculpta*), has been identified in Arlington County. It is listed as a state-threatened species but has no federal status.[111] This species is not known to exist on or near the Airport.

Table E-7, contained in Appendix E, provides a list of threatened species, endangered species, and species of concern identified by the VDGIF within a 3-mile radius of the Airport. Species listed in Table E-7 that have been confirmed at the Airport include the bald eagle and upland sandpiper. Both species have been observed engaging in behaviors such as flying, feeding, and loafing. Bald eagle observations have been recorded yearly between 1997 and 2006.[112] During the same time period, upland sandpipers were observed between 1997 and 1999, and in 2001.[113]

4.5.3 Wetlands and Waterways

Wetlands, waterways, and special aquatic sites (together referred to as "Waters of the United States")

[108] Mary J. Ratnaswamy, Ph.D., U.S. Fish and Wildlife Service, "Runways 15-33 and 4-22 Safety Area Study, DCA," correspondence to Straughan Environmental Services, Inc., July 18, 2006.

[109] Zepp, B., U.S. Fish and Wildlife Service, meeting with Metropolitan Washington Airports Authority; Straughan Environmental Services, Inc.; and Ricondo & Associates, Inc.; November 30, 2006.

[110] Julie Cocker, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, "A request of sturgeon information in the Potomac," email to Rob Savidge, Straughan Environmental Services, Inc., June 30, 2006.

[111] Virginia Natural Heritage Program, *Natural Heritage Resources by County*, 2001-2002, http://192.206.31.52/cfprog/dnh/naturalheritage/display_counties.cfm (accessed July 18, 2006).

[112] U.S. Department of Agriculture, Wildlife Services, bird survey data from DCA, January 1997-August 2006.

[113] U.S. Department of Agriculture, Wildlife Services, bird survey data from DCA, January 1997-August 2006.

are protected under federal and state regulations and have important functions and values.

The U.S. ACE defines wetlands as those areas that are inundated or saturated by surface or groundwater 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.[114] Wetlands provide valuable water quality functions as well as wildlife habitat. Some of the functions wetlands provide are groundwater recharge, sediment/toxicant retention, nutrient removal, and flood-flow alteration.[115] Recognized functions and values of wetlands include the following:[116]

- Flood-flow alteration, shoreline stabilization, storm protection, and climate control;
- Groundwater recharge, water purification, and sediment and nutrient retention and modification;
- Commercial products, recreation, and tourism; and
- Biodiversity, including fish, shellfish, and wildlife habitat, and the associated scientific and cultural benefits.

4.5.3.1 Regulatory Background

Laws, regulations, and policies related to wetlands include:

- Section 10 of the Rivers and Harbors Act of 1899[117]
- Clean Water Act, Sections 401 and 404[118]
- Executive Order 11990, *Protection of Wetlands*[119]
- DOT Order 5660.1A, *Preservation of the Nation's Wetlands*
- Virginia Wetlands Act, 1972[120]
- District of Columbia Department of Health, Water Pollution Control Act of 1984, D.C. Law 5-188, D.C. Code §6-923
- Definition of Navigable Waters of the United States[121]

These wetland laws, regulations, and policies are described in more detail in the following paragraphs, as they relate to the affected environment.

Section 10 of the Rivers and Harbors Act of 1899 prohibits the creation of an obstruction within Navigable Waters of the United States unless affirmatively authorized by Congress. The Rivers and Harbors Act defines "Navigable Waters" as those waters that are subject to the ebb and flow of the

[114] United States Department of the Army (Adamus, P.R., Clairain, E.J., Jr., Smith, R.D., and Young, R.E.), Waterways Experiment Station, Vicksburg, Mississippi, Environmental Laboratory, *Wetland Evaluation Technique (WET) v.2*, 1987.

[115] United States Department of the Army, Waterways Experiment Station, Vicksburg, Mississippi, Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual*, 1987.

[116] U.S. Army Corps of Engineers, New England District, *Wetlands Functions and Values: A Descriptive Approach, The Highway Methodology Workbook Supplement*, NAEEP-306-1-30a, 1999.

[117] Rivers and Harbors Act of 1899, Section 10.

[118] Clean Water Act, Section 404 [33 U.S.C. 1344 PL 92-500, as amended by PL 95-217 and PL 100-4].

[119] Executive Order 11990, *Protection of Wetlands*, 1977.

[120] Code of Virginia, Title 62.1, Chapters 2.1 and 3.1, *Virginia Wetlands Act of 1972 (Act 1992, c. 836) and State Water Control Law (Code 1950, § 62.1-14; 1968, c. 659; 1970, c. 638; 1978, c. 827; 2000, c. 972.).*

[121] Definition of Navigable Waters of the United States [33 CFR Part 329].

tide and/or are presently used, or have been used in the past, or may be susceptible for use, to transport interstate or foreign commerce. To determine if a body of water is appropriate for inclusion in Navigable Waters, there must be past, present, or potential presence of foreign or interstate commerce, physical capabilities for use by commerce, and defined geographic limits of the water body.

The Clean Water Act Section 401[122] gives the U.S. EPA, the Commonwealth of Virginia, and the District of Columbia certification responsibility and authority over violation of water quality standards.

The Clean Water Act Section 404[123] gives the U.S. ACE responsibility and authority over activities that result in the discharge of dredge or fill material into wetlands and waterways.

Executive Order 11990,[124] *Protection of Wetlands*, requires consideration of indirect effects on wetlands, provides a long-term goal of no net loss of wetlands, and requires federal agencies to adopt procedures that ensure compliance with Executive Order 11990.

DOT Order 5660.1A, *Preservation of the Nation's Wetlands*, sets DOT policy to assure the protection, preservation, and enhancement of the nation's wetlands to the fullest extent practicable, and establishes procedures for implementation of the policy.

The 1972 Virginia Wetlands Act established a permitting system for the protection of wetlands, authorized the creation of local wetland boards to make judgments on local wetlands issues, and empowered the VDEQ and VMRC to issue wetland permits.

The District of Columbia's Water Pollution Control Act prohibits the discharge of pollutants into District waters to protect and preserve aquatic life and resources for recreation, aesthetic enjoyment, and industry.

The following paragraphs describe regulated resources.

"Waters of the United States" are defined by the U.S. ACE as "coastal and inland waters, lakes, rivers, and streams that are Navigable Waters of the United States, including their adjacent wetlands," "tributaries to Navigable Waters of the United States, including adjacent wetlands," and special aquatic sites.[125]

The "Specification of Disposal Sites for Dredged or Fill Material"[126] identifies six categories of Special Aquatic Sites. Of the six, coral reefs and riffle pool complexes are not applicable to the surroundings of the Airport. Following are the four Special Aquatic Sites that could be present within the vicinity of the Airport:

- Sanctuaries and refuges are areas to be managed principally for the use of fish and wildlife resources.

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122 Code of Federal Regulations 33 CFR §1251 et seq. *Clean Water Act* 1987.

123 Code of Federal Regulations 33 CFR §1251 et seq. *Clean Water Act* 1987.

124 U.S. Environmental Protection Agency, *Executive Order No. 11990 – Protection of Wetlands*, 42 Federal Register 26961, May 24, 1977.

125 United States Department of the Army, Waterways Experiment Station, Vicksburg, Mississippi, Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual*, 1987.

126 Code of Federal Regulations 40 CFR 230, Clean Water Act Section 404 b(1), "Specification of Disposal Sites for Dredged or Fill Material," 1980.

- Wetlands are areas that are saturated by surface or groundwater 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.
- Mudflats are broad flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems.
- Vegetated shallows are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass, in estuarine or marine systems as well as a number of freshwater species in rivers and lakes.

The high water line of the Potomac River in the vicinity of the Airport is the division between Virginia and the District of Columbia. The Baltimore District of the U.S. ACE serves as the regulatory authority for projects within the Potomac River. The NPS maintains jurisdiction over the Potomac River bottom. Any wetlands or Waters of the United States found on Airport property would be regulated by the Norfolk District of the U.S. ACE, the VMRC, and the VDEQ.

4.5.3.2 Methodology

To determine the existence and extent of wetlands and Waters of the United States present in the LOPD, the study team first reviewed published *National Wetlands Inventory Map* information and then performed field investigations within the LOPD. The first field investigation occurred in October 2006 for the areas beyond Runways 4, 22, 15, and 33, and received a Jurisdictional Determination from the U.S. ACE in January 2008.[127] The second field investigation occurred in August 2008 for the areas near the ends of Runways 1 and 19 and received a Jurisdictional Determination from the U.S. ACE in October 2008.[128]

All fieldwork was performed according to the *Corps of Engineers Wetlands Delineation Manual*[129] using the Routine Determination, On-Site Inspection Necessary Method. The manual outlines a three-parameter approach to delineating wetlands. All three parameters (hydrophytic vegetation, hydric soils, and hydrology) must be evident to classify an area as a wetland, unless the site has been disturbed (atypical) or is considered a problem area. In the case of disturbed or problem areas, only two parameters must be evident to classify an area as a wetland. The study team classified each wetland and waterway into system, subsystem, class, and subclass according to the *Classification of Wetlands and Deep Water Habitats of the United States.*[130]

4.5.3.3 Affected Environment

The U.S. ACE Jurisdictional Determination concurred with the findings of the field investigation for the areas near the ends of Runways 1 and 19, confirming that no jurisdictional or nonjurisdictional wetlands are located within the LOPD.

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127 Paul R. Wettlaufer, Acting Chief, Maryland Section, U.S. Army Corps of Engineers, Baltimore District, no subject, letter to Metropolitan Washington Airports Authority c/o Justin Haynes, Straughan Environmental Services, Inc., January 29, 2008.

128 Theresita Crockett-Augustine, Project Manager, Northern Virginia Regulatory Section, U.S. Army Corps of Engineers, Norfolk District, "Northern Virginia Regulatory Section, NAO-2008-02979 (National Airport)," letter to Metropolitan Washington Airports Authority c/o Justin Haynes, Straughan Environmental Services, Inc., October 23, 2008.

129 United States Department of the Army, Waterways Experiment Station, Vicksburg, Mississippi, Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual*, 1987.

130 Cowardin, L.M., V. Carter, F. Golet, and E.T. LaRoe for the U.S. Fish and Wildlife Service, *Classification of Wetlands and Deep Water Habitats of the United States*, 1979.

4.5.4 Coastal Resources

Federal, state, and local laws protect coastal zone resources. Under the federal Coastal Zone Management Act, each state is encouraged "to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as the needs for compatible economic development."[131] Coastal zones are sensitive to changes in land cover and land use, such as converting areas of grass to impervious materials.

4.5.4.1 Regulatory Background

The primary legislation and orders related to coastal resources includes:

- Coastal Barrier Resources Act of 1982[132] as amended by the Coastal Barrier Improvement Act of 1990[133]
- Coastal Zone Management Act of 1972[134]
- Executive Order 13089: *Coral Reef Protection* (2006)
- Commonwealth Executive Order 21: *Continuation of the Virginia Coastal Zone Management Program* (2006)

According to FEMA's Coastal Barrier Resource System, there are no coastal barrier resources near the Airport or within the adjacent counties or cities. Furthermore, no coral reef resources are located in the mid-Atlantic region.

The Coastal Zone Management Act declares that the preservation of coastal zones is a national priority and provides the framework for coastal states to develop a Coastal Zone Management Program. NOAA reviews and approves state plans, which are required to include a definition of the coastal zone within the state and to identify the enforceable policies that support the overall goal of the Coastal Zone Management Act. Developed pursuant to the federal Coastal Zone Management Act, the Virginia Coastal Zone Management Program (VCP) is the NOAA-approved management program for the Commonwealth. All federal or federally funded activities with any reasonably foreseeable effect on coastal zones must be consistent with the approved state plan.

The VCP, established by executive order of the Office of the Governor of the Commonwealth of Virginia,[135] outlines how a network of state agencies and local governments work cooperatively to administer the enforceable laws, regulations, and policies that protect coastal resources. The VDEQ serves as the lead agency for Virginia's networked coastal program and helps agencies and localities develop and implement coordinated coastal policies and solve coastal management problems. Eight Coastal Planning District Commissions and 87 localities (including Arlington and Alexandria) constitute Virginia's network of coastal resource managers. The localities are responsible for implementing many of the VCP policies. The Airport is located within Arlington County, and is therefore subject to the VCP.

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131 The Coastal Zone Management Act of 1972, 16 USC §1452, *Congressional Declaration of Policy (Section 303)*.

132 Coastal Barrier Resources Act of 1982 [96 Stat. 1653; 16 USC 3501 et seq.].

133 Coastal Barrier Improvement Act of 1990 [P.L. 101-591; 104 Stat. 2931].

134 Coastal Zone Management Act of 1972 [16 USC §§ 1451-1464, October 27, 1972, as amended].

135 Commonwealth of Virginia, Office of the Governor, *Executive Order 21: Continuation of the Virginia Coastal Management Program*, 2006.

Under the VCP, specific enforceable policies address many of the coastal-related resources present near the Airport. As the political boundary between the Commonwealth of Virginia and the District of Columbia is the high tide mark of the Potomac River, many of the coastal resources in the vicinity of the Airport fall outside the jurisdiction of the VCP. Because the District does not have a commensurate Coastal Zone Management Program, the VCP is used as a logical means of identifying and evaluating those resources. The VCP policies, and the resource agency responsible for enforcing each policy, are listed in **Table IV-8**. VDEQ's Office of Environmental Impact Review acts as the Commonwealth's clearing house for coordinating the review of this EA and the Authority's "coastal zone consistency certification" relevant to the Proposed Action and these policies.

4.5.4.2 Methodology

To determine the existence of coastal resources in the vicinity of the Airport, as they pertain to the VCP, the study team performed the following actions:

- Contacted the state and local agencies (i.e., VDEQ and Arlington County) that manage the various VCPs.
- Identified enforceable policies relevant to the Proposed Action.
- Identified protected geographic areas based on Arlington County maps.
- Identified Arlington County review requirements for coastal resources identified within the LOPD.
- Consulted the FEMA Coastal Barrier Resource System website[136] for the locations of any coastal barriers within the Commonwealth of Virginia and the District of Columbia.

4.5.4.3 Affected Environment

The information collected was evaluated relative to the Proposed Action and proximity to the LOPD. The following describes coastal resources that are subject to the enforceable policies of the VCP.

Fisheries Management

The Potomac River, Four Mile Run, and Roaches Run provide fish habitat in the vicinity of the Airport. In addition to VCP oversight by the agencies listed in Table IV-8, the NMFS, the DCFWD, and the VDGIF also maintain regulatory authority over fisheries in the Potomac River. (Please refer to Sections 4.5.1 and 4.5.2 for more information.)

Subaqueous Lands Management

No Virginia subaqueous lands are located within the LOPD. The LOPD does extend into the Potomac River, south of Runway 1, where the subaqueous lands (e.g., the river bottom of the Potomac River) are managed by the NPS. The VMRC also claims the right to "exercise regulatory authority over all structures and improvements built or proposed by riparian property owners in the Potomac River appurtenant to the shore of the Commonwealth."[137]

[136] http://www.fema.gov/business/nfip/cbrs/cbrs.shtm (accessed August 21, 2008).
[137] Code of Virginia §28.2-101.

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Table IV-8

Enforceable Policies of the Virginia Coastal Resources Management Program and Responsible Agencies

Enforceable Policy	Applicable Statutes or Regulations	Description	Responsible Virginia Agencies						Other Agencies Managing the Resources				
			VMRC	VDGIF	VDOE	VDCR	VDEQ	VDOH	NMFS	DCFWD	USACE	USEPA	DOES
Fisheries Management	Code of Virginia § 28.2-200 through 28.2-713 Code of Virginia § 29.1-100 through 29.1-570	This management program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities.	•	•									
Subaqueous Lands Management	Code of Virginia § 28.2-1200 through 28.2-1213	The management program for subaqueous lands establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the VDEQ, Water Division.	•										
Wetlands Management	Code of Virginia § 28.2-1301 through § 28.2-1320 Code of Virginia § 62.1-44.15.5 Section 401 of the Clean Water Act of 1972.	The tidal wetlands program is administered by the Marine Resources Commission. The purpose of the wetlands management program is to preserve tidal wetlands, prevent their despoliation, and accommodate economic development in a manner consistent with wetlands preservation. The Virginia Water Protection Permit Program administered by the VDEQ includes protection of wetlands, both tidal and non-tidal.	•				•						
Dunes Management	Code of Virginia § 28.2-1400 through 28.2-1420	Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes.	•										
Non-Point Source Water Pollution Control	Code of Virginia § 10.1-560 et seq.	Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. This program is administered by the VDCR (through the issuance of Virginia Pollution Discharge Elimination System individual permits for construction activities). The VDCR, Division of Chesapeake Bay, Local Assistance Department regulates activities in Chesapeake Bay Resource Management Areas and Resource Protection Areas within 84 localities in Virginia's coastal zone.				•							•
Point Source Water Pollution Control	Section 402 of the Federal Clean Water Act Code of Virginia § 62.1-44.15.	The VDEQ regulates discharges into state waters through Virginia Pollutant Discharge Elimination System and Virginia Pollution Abatement permits accomplished through the implementation of the National Pollutant Discharge Elimination System permit program. The point-source program—the Virginia Pollutant Discharge Elimination System permit program—is administered by the State Water Control Board.					•						
Shoreline Sanitation	Code of Virginia § 32.1-164 through § 32.1-165	The Virginia Department of Health regulates the installation of septic tanks, sets standards concerning soil types suitable for septic tanks, and specifies minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth. This program, which includes shellfish closures due to bacterial contamination, is administered by the Department of Health.						•					
Air Pollution Control	Code of Virginia § 10-1.1300	The VDEQ implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board.					•						
Coastal Lands Management	Code of Virginia § 10.1-2100 through § 10.1-2114 Virginia Administrative Code 9 VAC 10-20-10 et seq.	The Division of Chesapeake Bay Local Assistance* at VDCR regulates activities in Chesapeake Bay Resource Management Areas and Resource Protection Areas within 84 localities in Virginia's coastal zone through a state-local cooperative program established pursuant to the Chesapeake Bay Preservation Act; and Chesapeake Bay Preservation Area Designation and Management Regulations. *Prior to July 1, 2004, the Division was a separate agency known as the Chesapeake Bay Local Assistance Department.				•							

DOES – Arlington County Department of Environmental Services
DCFWD – District of Columbia Fisheries and Wildlife Division
NMFS – National Marine Fisheries Service
USACE – U.S. Army Corps of Engineers
USEPA – U.S. Environmental Protection Agency
VAC – Virginia Administrative Code
VDCR – Virginia Department of Conservation and Recreation and the Chesapeake bay Local Assistance Department
VDEQ – Virginia Department of Environmental Quality
VDGIF – Virginia Department of Game and Inland Fisheries
VMRC – Virginia Marine Resources Commission
VDOE – Virginia Department of the Environment
VDOH – Virginia Department of Health

Source: Virginia Coastal Resources Management Program, September 2008.
Prepared by: Straughan Environmental Services, Inc., September 2008.

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Wetlands Management

Tidal and non-tidal wetlands associated with the Potomac River are present on and near the Airport; however, there are no jurisdictional or non-jurisdictional wetlands within the LOPD.[138] Please refer to Section 4.5.3 for more information on wetlands beyond the purview of the VCP.

Dunes Management

The Coastal Primary Sand Dune Act[139] defines several localities in the Commonwealth of Virginia in which jurisdictional dunes are to be protected. Arlington County is not one of the localities identified in the Coastal Primary Sand Dune Act as containing VMRC-jurisdictional dune resources.

Non-Point Source Water Pollution Control

Soil-disturbing projects must be designed and constructed in a manner to reduce soil erosion and to decrease potential inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth of Virginia. These waters include the Potomac River as well as Roaches Run and Four Mile Run, which are adjacent to the Airport. The VDCR manages potential erosion through the issuance of Virginia Pollutant Discharge Elimination System construction permits in an effort to protect water resources.

Point Source Water Pollution Control

The Airport operates under an NPDES general storm water discharge permit as described in Section 4.4.1, Water Resources. There are no discharges into Virginia waters.

Shoreline Sanitation

There are no septic tanks in the LOPD.

Air Pollution Control

The Proposed Action would not create any new point sources or modify any existing point sources. Section 4.4.3.3 provides detailed information on the air quality at the Airport and adjacent areas.

Coastal Lands Management

The Chesapeake Bay Preservation Act[140] was enacted in 1988 by the Virginia General Assembly following execution of the 1983 Chesapeake Bay Agreement among Virginia, Maryland, the District of Columbia, Pennsylvania, and the U.S. EPA. Virginia's Chesapeake Bay Preservation Act requires local tidewater governments to designate and protect Chesapeake Bay Preservation Areas. Chesapeake Bay Preservation Areas are any areas delineated by a local government in accordance with criteria established pursuant to the Code of Virginia.[141] Arlington County has adopted these

[138] Theresita Crockett-Augustine, Project Manager, Northern Virginia Regulatory Section, U.S. Army Corps of Engineers, Norfolk District, "Northern Virginia Regulatory Section, NAO-2008-02979 (National Airport)," letter to Metropolitan Washington Airports Authority c/o Justin Haynes, Straughan Environmental Services, Inc., October 23, 2008.

[139] Coastal Primary Sand Dune Act [Code of Virginia, §28.2-1400 *et seq.*].

[140] Code of Virginia [§10.1-2100 *et seq.*].

[141] Code of Virginia [§ 10.1-2107].

Chesapeake Bay Preservation Areas in its Chesapeake Bay Preservation Ordinance.[142] Arlington County separates Chesapeake Bay Preservation Areas into two categories of land use[143]:

- Resource Protection Areas, which protect the existence and quality of state waters and a 100-foot buffer adjacent to and landward of these features. The Code of Virginia (§10.1-559.1) defines state waters as all water, on the surface or in the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction. Thus, the Potomac River, although under the jurisdiction of the District, is considered a state water by Virginia when defining Resource Protection Areas. The LOPD is not within the 100-foot buffer along the Potomac River that defines a Resource Protection Area.
- Resource Management Areas are areas in which improper development has the potential to degrade water quality. All of Arlington County is designated as a Resource Management Area except for the areas meeting the specific criteria of a Resource Protection Area.

142 Arlington County Code [§ 61-1 through 61-19].

143 Commonwealth of Virginia, Arlington County website, *Chesapeake Bay Preservation Ordinance*, http://www.arlingtonva.us/Departments/EnvironmentalServices/epo/EnvironmentalServicesEpoChesapeakeBayProtectionOrdinance.aspx. (accessed August 2008).