POTOMAC YARD METRORAIL STATION
ENVIRONMENTAL IMPACT STATEMENT

Noise & Vibration Technical Memorandum

February 2013

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1.0 INTRODUCTION

The Federal Transit Administration (FTA), as the lead federal agency, and the City of Alexandria, as the project sponsor and joint lead agency, have prepared a Draft Environmental Impact Statement (Draft EIS) in accordance with the National Environmental Policy Act (NEPA) for the proposed Potomac Yard Metrorail Station ("the project"). The Draft EIS has been prepared in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) and the National Park Service (NPS).

This technical memorandum identifies the potential permanent effects related to noise and vibration due to the No Build and Build Alternatives. The memorandum describes the following:

- Project alternatives
- Applicable regulations and guidance
- Methodology
- Opening year conditions
- Potential effects of each alternative

Temporary construction effects are described separately in the *Construction Impacts Technical Memorandum*. The findings of this analysis are incorporated in the Draft EIS.

1.1 Project Alternatives

The Draft EIS evaluates a No Build Alternative and three Build Alternatives. Each Build Alternative includes the same area improvements as the No Build Alternative in addition to construction and operation of a Metrorail station.

1.1.1 No Build Alternative

The No Build Alternative is defined as the existing highway and transit network and committed transportation improvements from the National Capital Region Transportation Planning Board's Financially Constrained Long Range Plan (CLRP). The Draft EIS assumes that any improvements that are anticipated to be implemented by the project horizon year, whether physical or operational, are part of the No Build Alternative, with the exception of the new Metrorail Station at Potomac Yard.

The No Build Alternative includes the build-out of an internal street network within Potomac Yard (roughly from Four Mile Run to Braddock Road) and additional investments in transit and bicycle/pedestrian facilities, including a pedestrian bridge over the Metrorail and CSX Transportation (CSXT) rights-of-way between Potomac Greens and Potomac Yard. Anticipated transit investments include the Crystal City/Potomac Yard (CCPY) Transitway and an expansion of local transit service. The No Build Alternative also includes an off-street, multi-use trail through the planned linear park between Potomac Avenue and the CSXT right-of-way. This new off-street, multi-use trail will enhance access to the existing regional trail network, which serves both recreational users and commuters.

1.1.2 Build Alternatives

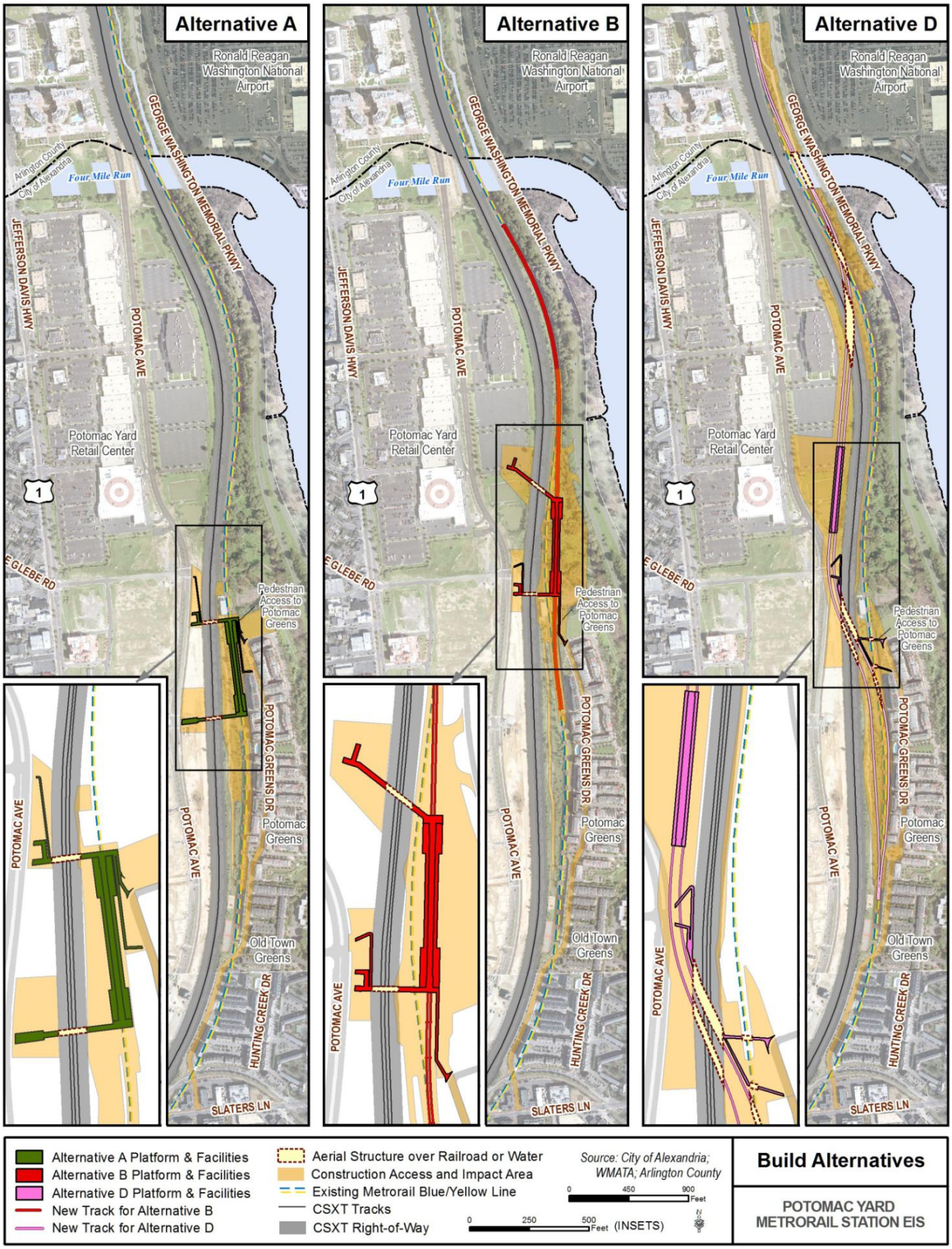
The Build Alternatives are described below and shown in **Table 1-1** and **Figure 1-1**.

Build Alternative A

Build Alternative A would be located between the CSXT right-of-way and the north end of the Potomac Greens neighborhood in the existing Metrorail Reservation easement designated during earlier planning efforts for the Potomac Yard area. The station would be at-grade with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard. The bridge at the northern end of the station would provide 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood.

Build Alternative A would require minimal track realignment within the station area and would include construction of a double crossover located approximately 900 feet south of the station.

Figure 1-1: Build Alternatives



Build Alternative B

Build Alternative B would be located between the George Washington Memorial Parkway (GWMP) and the CSXT right-of-way, north of the Potomac Greens neighborhood, and east of the existing Potomac Yard Shopping Center and the CSXT right-of-way. The station would be at-grade. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard. The bridge at the southern end of the station would provide 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood.

Build Alternative B would require the realignment of approximately 650 feet of existing track, as well as the installation of approximately 1,450 feet of new track. Special track work – a double crossover – would be required approximately 100 feet north of the station.

The new track and station would be built on retained fill, and a new retaining wall would be constructed on the east side of the track and station to support the structures.

Build Alternative D

Build Alternative D would be located west of the CSXT right-of-way near the existing Potomac Yard Shopping Center. The station would be aerial with a center platform layout. One pedestrian bridge over the CSXT right-of-way would be constructed, providing 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood. The pedestrian bridge would be parallel to the adjacent new Metrorail bridge over the CSXT right-of-way.

Build Alternative D would require the realignment of approximately 550 feet of existing track, as well as the installation of approximately 5,800 feet of new track. The majority of new track would be elevated. Build Alternative D would also include construction of two Metrorail aerial bridges crossing the CSXT right-of-way to the north and south of the station, and a new, single span, aerial structure over Four Mile Run. Construction of a double crossover would be required in a location approximately 100 feet north of the station. Following completion of construction, the old Metrorail tracks would be removed from service.

Additional structural improvements would include the removal and replacement of the existing retaining wall near the Potomac Greens neighborhood and the removal of an additional retaining wall west of the existing Metrorail tracks, north of the portal at the southern end of the neighborhood.

Table 1-1: Build Alternatives

Alternative	Type and Layout	Track Work	Facilities for Station Access	Additional Structures Required
Build Alternative A	At-grade, side platform	Minimal track work	Two pedestrian bridges over CSXT right-of-way; access to Potomac Greens via walkway	None
Build Alternative B	At-grade, side platform	Moderate track work	Two pedestrian bridges over CSXT right-of-way; access to Potomac Greens via walkway	Structures (retaining wall) to support new track and station
Build Alternative D	Aerial, center platform	Major track work	One pedestrian bridge over CSXT right-of-way to provide access between Potomac Yard and Potomac Greens	Two aerial structures over CSXT right-of-way, one Metrorail bridge over Four Mile Run, aerial track and supports, and retaining wall replacement on the east and west sides of the tracks north of the existing Metrorail portal. New structures would pass over the existing Metrorail tracks, which would be removed following construction.

Note: Track work for Build Alternatives B and D assumes existing Blue and Yellow Line Metrorail track would be removed where track is realigned.

1.2 Human Perception of Noise and Vibration

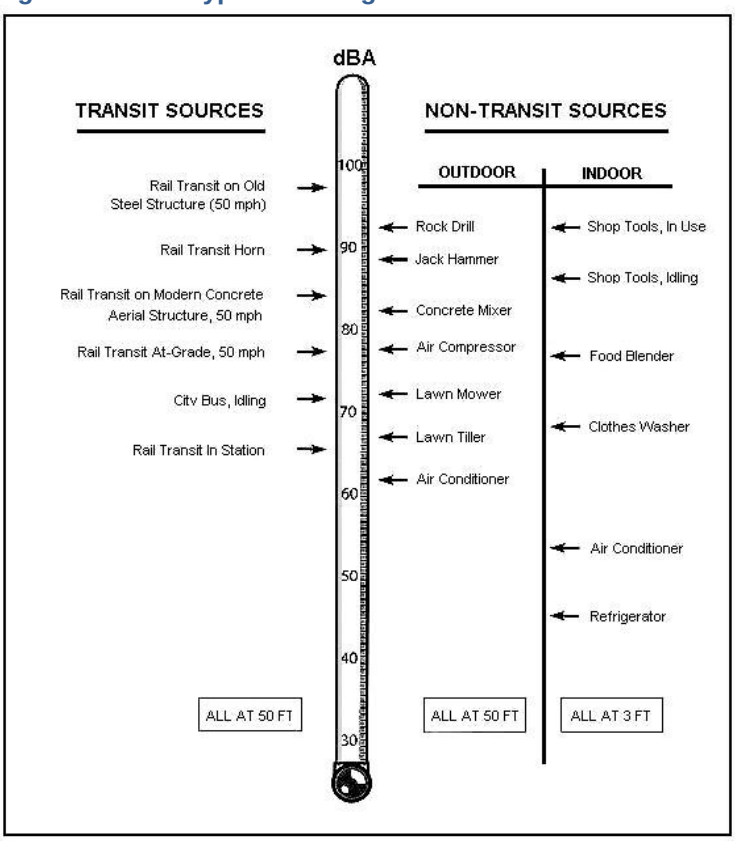
1.2.1 Noise

Noise is "unwanted sound" and, by this definition, the perception of noise is a subjective process. Several factors affect the actual level and quality of sound (or noise) as perceived by the human ear and can generally be described in terms of loudness, pitch (or frequency), and time variation. The loudness, or magnitude, of noise determines its intensity and is measured in decibels (dB) that can range from below 40 dB (the rustling of leaves) to over 100 dB (a rock concert). Pitch describes the character and frequency content of noise, such as the very low "rumbling" noise of stereo subwoofers or the very high-pitched noise of a piercing whistle. Finally, the time variation of noise sources can be characterized as continuous, such as with a building ventilation fan; intermittent, such as for trains passing by; or impulsive, such as pile-driving activities during construction.

Various sound levels are used to quantify noise from transit sources, including a sound's loudness, duration, and tonal character. For example, the A-weighted decibel (dBA) is commonly used to describe the overall noise level because it more closely matches the human ear's response to audible frequencies. Because the A-weighted decibel scale is logarithmic, a 10 dBA increase in a noise level is generally perceived as a doubling of loudness, while a 3 dBA increase in a noise level is just barely perceptible to the human ear. Typical A-weighted sound levels from transit and other common sources are shown in **Figure 1-2**.

Several A-weighted noise descriptors are used to determine impacts from stationary and transit-related sources including the L_{max}, which represents the maximum noise level that occurs during an event such as a bus or train pass-by; the L_{eq}, which represents a level of constant noise with the same acoustical energy as the fluctuating noise levels observed during a given interval, such as one hour ($L_{eq}(h)$); and the 24-hour day-night noise level (L_{dn}), which includes a 10-decibel penalty for all nighttime activity between 10:00 p.m. and 7:00 a.m.

Figure 1-2: Typical A-Weighted Noise Levels



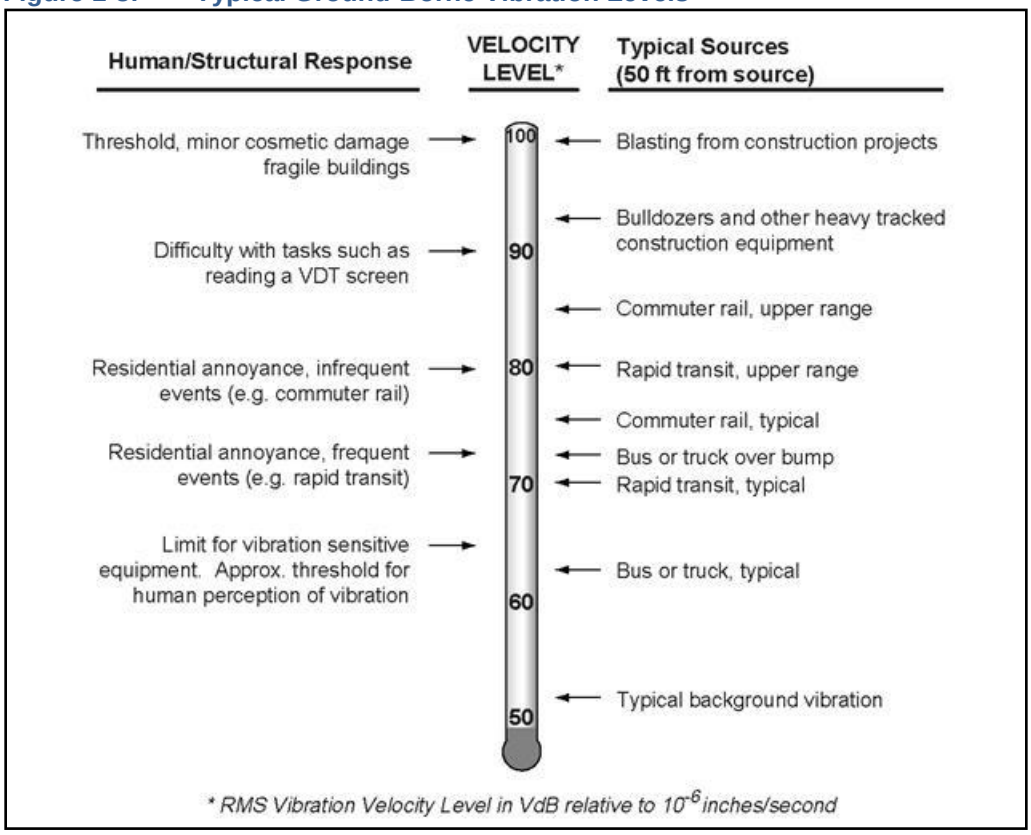
Source: *Transit Noise and Vibration Impact Assessment*. Federal Transit Administration. Washington, DC. May 2006.

1.2.2 Vibration

Ground-borne vibration associated with vehicle movements is usually the result of uneven interactions between wheels and the road or rail surfaces. Examples of such interactions (and subsequent vibrations) include train wheels over a jointed rail, an untrue rail car wheel with "flats," and a motor vehicle wheel hitting a pothole, a manhole cover, or any other uneven surface. Typical ground-borne vibration levels from transit and other common sources are summarized in **Figure 1-3**. For example, typical ground-borne vibration levels, expressed in vibration decibels (VdB), at a receptor 50 feet from different transportation sources traveling at 50 miles per hour range from 61 VdB for trucks and buses, to 73 VdB for LRT vehicles, to 85 VdB for diesel locomotives. Similarly, a typical background vibration velocity level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans, which is around 65 VdB (FTA 2006). The typical background levels refer to ambient ground vibrations not related to any specific transportation source (e.g., naturally occurring ground vibration). This background vibration level is assumed to be fairly constant from site to site, except in the vicinity of active fault lines.

Unlike noise, which travels in air, transit vibration typically travels along the surface of the ground. Depending on the geological properties of the surrounding terrain and the type of building structure exposed to transit vibration, vibration propagation can be more or less efficient. Buildings with a solid foundation set in bedrock are "coupled" more efficiently to the surrounding ground and experience relatively higher vibration levels than buildings located in sandier soil. Heavier buildings (such as masonry structures) are less susceptible to vibration than wood-frame buildings because they absorb more vibration energy.

Figure 1-3: Typical Ground-Borne Vibration Levels



Source: *Transit Noise and Vibration Impact Assessment*. Federal Transit Administration. Washington, DC. May 2006.

Vibration induced by passing vehicles can generally be discussed in terms of displacement, velocity, or acceleration. However, human responses and responses by monitoring instruments and other objects are most accurately described with velocity. Therefore, the vibration velocity level is used to assess vibration impacts from transit projects.

To describe the human response to vibration, the average vibration amplitude (called the root mean square, or RMS, amplitude) is used to assess impacts. The RMS velocity level is expressed in inches per second or VdB. All VdB vibration levels are referenced to one micro-inch per second (μips). Similar to noise decibels, vibration

decibels are dimensionless because they are referenced to (i.e., divided by) a standard level (such as $1x10^{-6}$ ips in the U.S.). This convention allows compression of the scale over which vibration occurs, such as 40-100 VdB rather than 0.0001 ips to 0.1 ips.

1.3 Regulatory Framework and Evaluation Criteria

The noise and vibration assessment was prepared in accordance with guidelines set forth by FTA's *Transit Noise and Vibration Impact Assessment* (2006). The future predicted noise and vibration levels from the project were evaluated using both the FTA guidelines and the WMATA *Manual of Design Criteria for Maintaining and Continued Operation of Facilities and Systems* (2010). While the FTA criteria are used to evaluate cumulative noise exposure (such as the L_{dn}), the WMATA criteria are used to evaluate instantaneous levels from single events (such as a single Metrorail pass-by). Other federal and local criteria from the NPS, Arlington County and the City of Alexandria were also evaluated for their applicability to this project.

1.3.1 FTA Criteria

Operational Noise Criteria

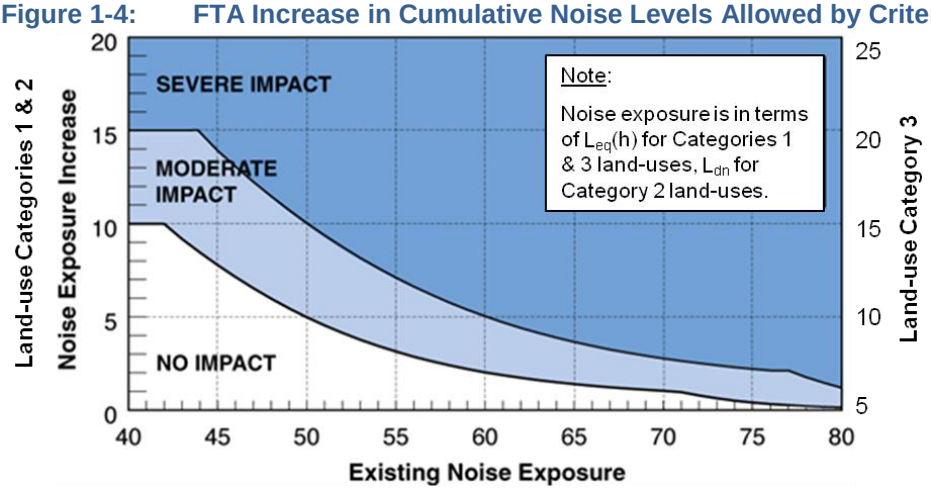
FTA's guidance manual, *Transit Noise and Vibration Impact Assessment,* presents the basic concepts, methods, and procedures for evaluating the extent and severity of noise impacts from transit projects. Transit noise impacts are assessed based on land use categories and sensitivity to noise from transit sources under the FTA guidelines. As shown in **Figure 1-4**, the FTA noise impact criteria are defined by two curves that allow increasing project noise levels as existing noise increases up to a point, beyond which impact is determined based on project noise alone. The FTA land use categories and required noise metrics are described in **Table 1-2**.

Table 1-2: FTA Land Use Categories and Noise Metrics

Land Use Category	Noise Metric	Description
1	$L_{eq}(h)$[1]	Tracts of land set aside for serenity and quiet, such as outdoor amphitheaters, concert pavilions, and historic landmarks.
2	L_{dn}[1]	Buildings used for sleeping such as residences, hospitals, hotels, and other areas where nighttime sensitivity to noise is of utmost importance.
3	$L_{eq}(h)$[1]	Institutional land uses with primarily daytime and evening uses including schools, libraries, churches, museums, cemeteries, historic sites, and parks, and certain recreational facilities used for study or meditation.

[1]Noise metrics include the $L_{eq}(h)$ or Average hourly equivalent noise level and the L_{dn} or 24-hour day-night noise level.
Source: FTA, 2006.

Figure 1-4: FTA Increase in Cumulative Noise Levels Allowed by Criteria



Source: *Transit Noise and Vibration Impact Assessment*. FTA. Washington, DC. May 2006

The FTA noise criteria are delineated into two categories: *moderate* and *severe* impact. The *moderate* impact threshold defines areas where the change in noise is noticeable but may not be sufficient to cause a strong, adverse community reaction. The *severe* impact threshold defines the noise limits above which a significant percentage of the population would be highly annoyed by new noise.

In most cases when a new transit source is proposed, the level of impact at any specific site can be established by comparing the predicted future project noise level at the site to the existing noise level at the site. However, for this project, the existing noise sources (e.g., Metrorail operations) change as a result of the project (i.e. the alignment is shifted slightly), and so it is not possible to define project noise separately from existing noise. In other words, for the project, changes are proposed to an existing transit system, as opposed to a new project in an area previously without transit. In this case, the existing noise can be determined and a new future noise can be calculated, but it is not possible to accurately describe what constitutes the "project noise." Normally the project noise is added to the existing noise to come up with a new cumulative noise, but in this case, the existing noise was dominated by a source that changed due to the project so it would be incorrect to add the project noise to the existing noise. Consequently, the baseline noise levels used for comparison were the predicted future (Opening Year) noise levels under the No Build Alternative. The Opening Year No Build condition was compared with the calculated future noise for the Build Alternatives using the cumulative form of the noise criteria shown in **Figure 1-4**.

The average day-night noise level over a 24-hour period (L_{dn}) was used to characterize noise exposure for residential areas (FTA Category 2). The L_{dn} descriptor describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 pm and 7:00 am increased by 10 decibels to account for greater nighttime sensitivity to noise. For other noise-sensitive land uses, such as parks and schools (FTA Category 3), the average hourly equivalent noise level (or $L_{eq}(h)$) was used to represent the rail corridor's peak operating period.

Operational Vibration Criteria

The FTA vibration criteria for evaluating ground-borne vibration impacts from train pass-bys at nearby sensitive receptors are shown in **Table 1-3**. These vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance, and are based on RMS velocity levels expressed in VdB referenced to one μips. FTA's experience with community response to ground-borne vibration indicates that when there are only a few train events per day, it would take higher vibration levels to evoke the same community response that would be expected from more frequent events. This experience is taken into account in the FTA criteria by distinguishing between projects with *frequent*, *occasional*, or *infrequent* events. The *frequent* events category is defined as more than 70 events per day, the *occasional* events category is defined as between 30 and 70 events per day, and the *infrequent* events category is defined as less than 30 events per day. To be conservative, the FTA *frequent* criteria were used to assess ground-borne vibration impacts in the study area.

However, because the FTA criteria do not incorporate existing vibration, additional impact from future vibration sources was evaluated based on a significant increase in vibration of 3 VdB or more above the Baseline Condition (predicted vibration levels under the No Build Alternative). For the project (which is proposed in an existing rail corridor with both freight and Metrorail activity), if the existing train vibration exceeds the impact criteria shown in **Table 1-3**, additional impact (or exceedance of the criteria) would occur only if the project significantly increases the resultant vibration 3 VdB or more than the existing vibration under the Baseline Condition.

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

Table 1-3: Ground-Borne RMS Vibration Impact Criteria for Annoyance during Operations and Construction

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

Source: *Transit Noise and Vibration Impact Assessment*. FTA. Washington, DC. May 2006.

1.3.2 WMATA Criteria

During the construction and development of the initial Metrorail rapid transit system in the 1970s, design criteria were developed specifically for the WMATA system. The most current version of these design criteria is described in the WMATA *Manual of Design Criteria for Maintaining and Continued Operation of Facilities and Systems*[1]. The WMATA criteria for "Criteria for Maximum Airborne Noise from Train Operations" were used to evaluate impacts from Metrorail pass-bys and operations within the study area. The WMATA *Manual of Design Criteria* provides design criteria for all community-related noise and vibration control problems relating to the construction and operations of the WMATA Metrorail System.

Pass-by Noise Criteria

As shown in **Table 1-4**, the WMATA design criteria for single pass-by maximum airborne noise levels from transit trains were developed for various types of buildings in each of the land use area categories listed in **Table 1-5**. These noise limits are based on the maximum level that would not cause significant intrusion or alteration of the pre-existing noise environment and represent noise levels which are considered acceptable for the type of land use in each area. The criteria presented in **Table 1-4** are generally applicable outdoors at the nearside of the nearest occupied building or area under consideration, but not less than 50 feet from track centerline.

Table 1-4: WMATA Criteria for Maximum Airborne Noise from Train Operations

Community Area	Category	Maximum Pass by Noise Level (dBA)		
		Single Family Dwellings	Multi Family Dwellings	Commercial Buildings
I	Low Density Residential	70	75	80
II	Average Residential	75	75	80
III	High Density Residential	75	80	85
IV	Commercial	80	80	85
V	Industrial/Highway	80	85	85

Note: The WMATA criteria are generally applicable outdoors at the nearside of the nearest occupied building or area under consideration, but not less than 50 ft from track centerline.
Source: WMATA 2010.

[1] WMATA Manual of Design Criteria for Maintaining and Continued Operation of Facilities and Systems. Section 16. Washington Metropolitan Area Transit Authority, Department of Operations Services, Office of Engineering Support Services. Release 9. February 18, 2010.

Other than the Potomac Greens Park, Potomac Yard Park, and Landbay D (also referred to as the Rail Park), all of the sensitive land uses identified within the proposed project area include multi-family residences in high-density or mixed-use commercial developments. Therefore, the WMATA criterion of 80 dBA was used for evaluating maximum pass-by noise impacts from train pass-bys at residences.

Table 1-5: General Categories of Communities along WMATA Metrorail System Corridors

Area Category	Area Description	Typical Ambient Noise Levels (Average or L50)	Typical Day/Night Exposure Levels L_{dn}
I	Low density urban residential, open space park, suburban residential or quiet recreation area. No nearby highways or boulevards.	40-50 (day) 35-45 (night)	Below 55
II	Average urban residential, quiet apartments and hotels, open space, suburban residential, or occupied outdoor areas near busy streets.	45-55 (day) 40-50 (night)	50-60
III	High density urban residential, average semi-residential/commercial areas, urban parks, museum, and non-commercial public building areas.	50-60 (day) 45-55 (night)	55-65
IV	Commercial areas with office buildings, retail stores, etc., primarily daytime occupancy. Central Business Districts.	60-70	Over 60
V	Industrial areas or Freeway and Highway Corridors	Over 60	Over 65

Source: WMATA 2010.

Pass-by Vibration Criteria

The appropriate vibration criteria for maximum ground-borne vibration for various types of residential buildings are shown in **Table 1-6**. These criteria apply to measurements of vertical vibration of floor surfaces within the buildings. Based on the land uses identified in the vicinity of the proposed project, the WMATA criterion for evaluating ground-borne vibration impacts from train pass-bys at all residences is 75 VdB.

Table 1-6: Criteria for Maximum Ground-borne Vibration from Train Operations for Buildings with Sleeping Areas

Community Area	Category	Maximum Pass-by Ground-borne Vibration Velocity Level (dB re 10^{-6} in/sec)		
		Single Family Dwellings	Multi Family Dwellings	Commercial Buildings
I	Low Density Residential	72	72	72
II	Average Residential	72	72	75
III	High Density Residential	72	75	75
IV	Commercial	72	75	75
V	Industrial/Highway	75	75	75

Note: The WMATA criteria are generally applicable outdoors at the nearside of the nearest occupied building or area under consideration, but not less than 50 ft from track centerline.
Source: WMATA 2010.

1.3.3 Other Noise Criteria

In addition to the federal and WMATA criteria, several other noise criteria were also identified including the following:

- City of Alexandria's Noise Control Code, Section 11-5;
- Arlington County's Noise Control Code, Chapter 15;
- National Park Service
  - NPS Soundscape Management Policy 4.9;
  - NPS Cultural Soundscape Management Policy 5.3.1.7; and
  - NPS Director's Order 47: Soundscape Preservation and Noise Management.

However, these other noise ordinances deal with noise annoyance in general and are not relevant for assessing transit noise or vibration impacts. Nevertheless, these noise ordinances are adhered to in principle using the FTA and the WMATA criteria to assess and mitigate any impacts from Metrorail operations. For example, although the GWMP is considered a national park, it is also a self-noise generator due to the roadway traffic and would not include any noise-sensitive receivers. Although this parkway was considered as part of the noise evaluation using the NPS Soundscape directives, no noise impacts can be reasonable expected since the PYMS project would have little effect on the existing roadway traffic. Additionally, WMATA would work closely with the NPS, Arlington County and the City of Alexandria to address any noise concerns in the community during the construction phase of the project.

1.4 Analysis Methodology and Assumptions

Noise impacts were evaluated using the FTA's "Detailed Assessment" guidelines to more accurately reflect the type of input data available. However, operational vibration impacts were evaluated using the FTA's "General Assessment" guidelines to reflect average or typical ground conditions. The FTA's "General Assessment" guidelines are more than adequate to assess the potential for impact during the environmental phase of the project. If impacts are predicted, a more detailed and refined vibration monitoring program may be necessary during final design to verify (or dismiss) any impacts that were predicted using the default FTA guidelines.

Where exceedances of the project impact criteria are predicted, mitigation measures were developed and evaluated to determine whether they are both "feasible" (able to provide adequate noise reduction benefits) and "reasonable" (mitigation is cost-effective based on the benefit provided).

1.4.1 Noise

The reference noise levels for each of the proposed noise sources (such as Metrorail pass-bys) and other operating characteristics (such as average dwell times and source heights) were used to predict future project noise levels at nearby sensitive receptors. These levels are based on default FTA data as well as information included in recent WMATA projects (such as the *Dulles Corridor Rapid Transit Project, Phase II*, May 2012). 34 noise-sensitive receptors were identified in the project area that could be affected by the project (see **Figure 1-6**). These 34 sites were evaluated to determine the potential for impact and all other sites were not expected to be adversely affected by the project. The following reference noise level assumptions were used:

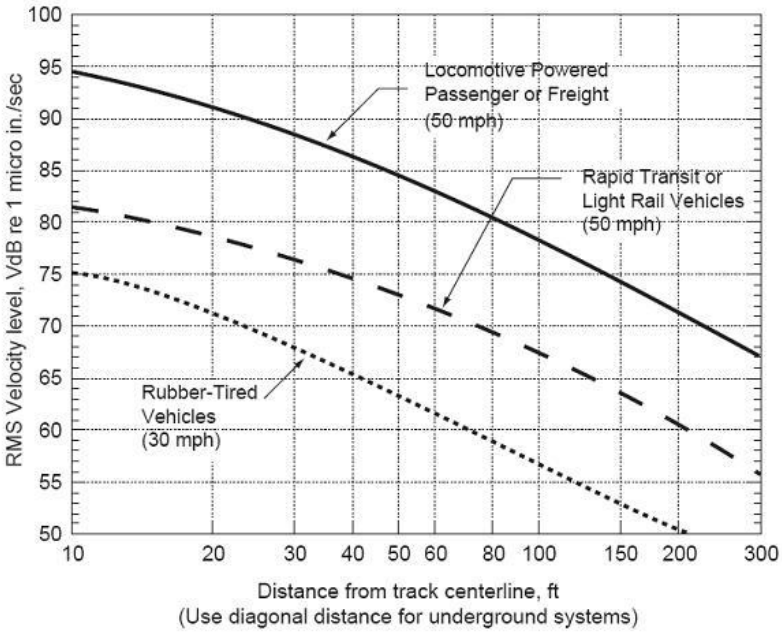
- The corridor is served by both the Blue and Yellow Metrorail Lines. Total daily Metrorail operations were based on the following headways:
    - 7-minute headways during the peak period for all Yellow Line trains between Huntington and Mt. Vernon;
    - 14-minute headways during peak periods of the day for all other Yellow and Blue Line trains;
    - 12-minute headways during all off-peak periods; and,
    - 12-minute headways during all late night periods between 9:30 pm and 3:00 am.
- As a conservative assumption, a Friday Metrorail schedule was used with an operating schedule of 5:00 am to 3:00 am with peak and shoulder-peak periods occurring from 6:00-9:00 am and 3:30-6:30 pm;
- An eight-vehicle train consist was assumed for all peak periods of the day, a six-vehicle consist was assumed for all off-peak periods, and a 7.2-vehicle consist was assumed for all transitional periods between the peak and off-peak periods. This transitional value is based on different consist lengths of 6 and 8 vehicles along the Huntington and Fort Totten line;
- An average idling time of 20 seconds was used at each station to compute the noise contribution from stationary or auxiliary vehicle noise (such as rooftop mechanical equipment);
- A maximum Metrorail operating speed of 55 miles per hour (mph) was applied to all sections of the proposed project alignment as a conservative modeling assumption;
- Based on default FTA reference noise levels, a single Metrorail vehicle operating at 50 mph on ballast-and-tie track with continuous welded rail track generates a maximum noise level of 80 dBA at 50 feet from the track centerline;
- Similarly, the default FTA reference noise level for auxiliary equipment from Metrorail vehicle air conditioning and heating equipment at stations is 65 dBA at 50 feet;
- Wheel impacts at switches and other special track work are based on a maximum FTA default noise level of 90 dBA at 50 feet;

- Noise from feeder buses at stations was evaluated to account for 20-second idling while waiting for passengers to embark/disembark at the proposed station. The default FTA idling level of 75 dBA for diesel buses was used for Metrobus and Alexandria Transit DASH routes;
- The modeled operating periods for Metrorail and feeder bus operations were as follows:
    - 5:30 am to 3:00 am – Metrorail operations (maximum Friday conditions);
    - 6:30 am to 9:30 pm – Feeder bus operations, Metrobus Route Extended 9S;
    - 6:30 am to 6:15 pm – Feeder bus operations, DASH Route AT10;
    - 6:30 am to 6:15 pm – Feeder bus operations, DASH Crosstown; and
    - 6:30 am to 6:15 pm – Feeder bus operations, DASH Potomac Yard Circulator.
- A solid transit barrier or parapet 3-feet 8-inches above top-of-rail was used as part of the noise modeling analysis for all elevated or aerial sections of Build Alternative D.
- Other ancillary noise sources associated with the proposed station, such as Metrorail door chimes, train announcements and station announcements, would be audible in the community as a new source but are not expected to contribute to any exceedance or noise impact. As a result, these ancillary sources were not included in the noise assessment but would be evaluated more closely during final design when the station features are finalized.

1.4.2 Vibration

Future ground-borne vibration levels from Metrorail pass-bys were predicted using the default FTA ground surface vibration curves shown in **Figure 1-5**. The FTA "Rapid Transit" prediction curve was adjusted using the FTA *Transit Noise and Vibration Impact Assessment* guidelines to reflect local conditions such as changes in train speed, special track work such as switches, aerial track structures, and different receptor building set-back distances. Except at locations where new track turnout switches are proposed, continuous welded rail track is proposed everywhere within the study area.

Figure 1-5: FTA Generalized Ground Surface Vibration Curves



Source: Transit Noise and Vibration Impact Assessment. FTA. Washington, DC. May 2006.

1.5 Noise-Monitoring Methodology

To determine the existing background noise levels at sensitive receptors in the vicinity of the proposed Metrorail Station, a noise-monitoring program was conducted at four representative locations described in **Table 1-7** and shown in **Figure 1-6**. Sites for noise monitoring stations were chosen to cover existing residential neighborhoods (Potomac Greens and Lynhaven) and planned/under construction residential neighborhoods (South Potomac Yard) near the proposed project site. The noise levels from these existing sources were adjusted to reflect distance propagation to other nearby clusters of residences where appropriate

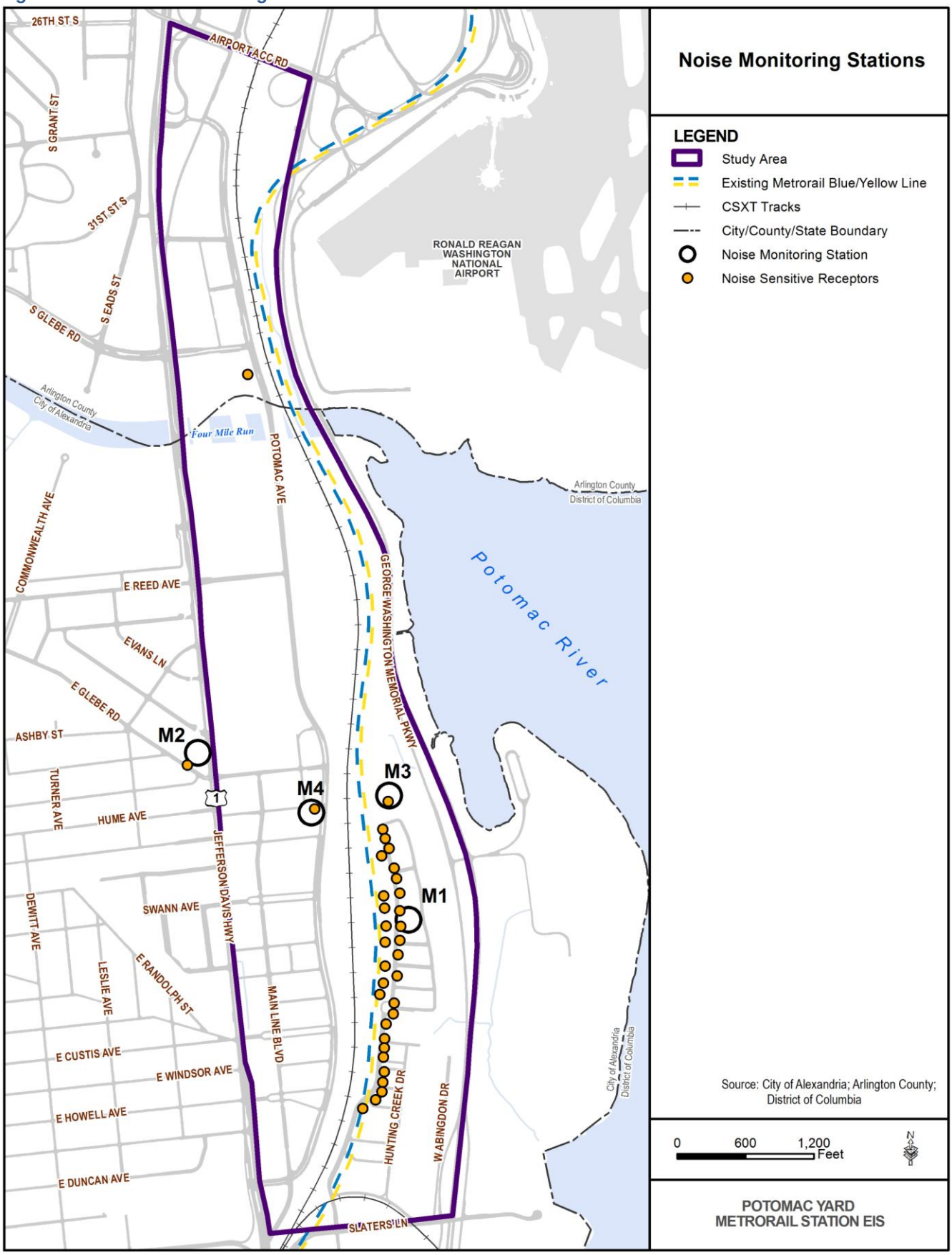
Hourly equivalent A-weighted noise levels were measured at various periods of the day in accordance with the FTA guidelines to determine the average ambient conditions during a typical weekday. At residences, hourly L_{eq} noise levels were measured continuously over a 24-hour period to determine the variation in noise throughout a typical weekday. At site M4 where future residences are proposed, hourly L_{eq} noise levels were measured during three periods of the day (peak-hour, midday and late night) to document background without ongoing construction activities. The noise measurements documented existing noise sources at the selected receptor sites such as aircraft from Ronald Reagan Washington National Airport (National Airport), Metrorail activity along the Blue and Yellow Lines, and background traffic along U.S. Route 1 and the GWMP. At residences and other FTA Category 2 land uses, the 24-hour day-night noise levels, or L_{dn}, were reported in accordance with the FTA guidelines. Similarly, peak-hour equivalent noise levels, or L_{eq}, were measured at one non-residential or institutional receptor, Potomac Greens Park, a park located between the Metrorail corridor, the GWMP and north of the Potomac Greens development (Site M3).

Table 1-7: Noise Monitoring Sites

Receptor ID	Description	Land Use Category
M1	Potomac Greens, Potomac Greens Drive	Residential
M2	Lynhaven Community, East Glebe Road	Residential
M3	Potomac Greens Park/Trail (north of Potomac Greens)	Park
M4	South Potomac Yard (proposed development)	Residential

The sound-level meters that were used to measure current noise conditions (Brüel & Kjær Model 2236) meet or exceed the American National Standards Institute (ANSI) standards for Type I accuracy and quality. The sound-level meters were calibrated using a Brüel & Kjær Model 4231 before and after each measurement. All measurements were conducted according to ANSI Standard *S1.13-2005, Measurement of Sound Pressure Levels in Air*. All noise levels are reported in A-weighted decibels (or dBA), which best approximates the sensitivity of human hearing.

Figure 1-6: Noise Monitoring Stations



1.6 Vibration General Assessment

As part of the Draft EIS, a General Assessment for vibration in the study area was completed for each of the Build Alternatives. Typically, a General Assessment does not include a vibration measurement. Instead, the General Assessment relies on the identification of existing vibration sources and new vibration sources that would be introduced as part of the project.

2.0 OPENING YEAR CONDITIONS

2.1 Existing Noise Levels

Existing background noise levels are from roadway and rail sources as well as aircraft take-offs and landings, particularly during the nighttime period. The residential communities in the study area are located near an existing freight/intercity passenger rail corridor, Metrorail tracks, highway corridors (U.S. Route 1 and the GWMP), and National Airport. As shown in **Table 2-1**, existing peak-hour average noise levels (L_{eq}) measured in the vicinity of the project range from 60 dBA within South Potomac Yard to 72 dBA at single- and multi-family residences along East Glebe Road near U.S. Route 1. Similarly, the 24-hour day-night noise levels (L_{dn}) range from 62 dBA to 72 dBA at these sites. (See **Appendix B** for the detailed results of the Baseline Monitoring Program).

Table 2-1: Existing Noise Levels at Representative Locations in the Vicinity of the Proposed Potomac Yard Metrorail Station

Receptor ID	Description	Land Use Category	Peak-Hour L_{eq} (dBA)	24-Hour L_{dn} (dBA)
M1	Potomac Greens, Potomac Greens Drive	Residential	63	63
M2	Lynhaven Community, East Glebe Road	Residential	72	72
M3	Potomac Greens Park/Trail (north of Potomac Greens)	Park	63	--
M4	Potomac Yard (proposed development)	Residential	60	62

Source: Field measurements, June 2012.

As no major new sources of noise will be introduced between now and 2016, the future noise levels are expected to remain approximately the same in the Opening Year of 2016 as the current conditions. For example, it takes a doubling of the traffic volumes (or Metrorail operations) for the noise levels to increase by three dBA (the threshold where most listeners detect the change). However, based on the results of the Metropolitan Washington Council of Governments (MWCOG) version 2.2 regional travel model, traffic in the study area is not expected to increase between 2010 and 2016.

2.2 Existing Vibration Conditions

Current ambient vibration levels are dominated by existing CSXT freight train operations, Metrorail pass-bys and vehicular traffic, particularly heavy trucks at locations adjacent to active roadways such as U.S. Route 1. As no new sources of vibration will be introduced between now and 2016, the future vibration levels in the Opening Year of 2016 are expected to remain the same as the current conditions.

In accordance with accepted practice, a General Assessment of vibration did not include vibration measurements. Instead, the general assessment identified existing vibration sources, plus new vibration sources that would be introduced as part of the project.

3.0 POTENTIAL EFFECTS

3.1 Noise

This section describes the potential noise impacts from the No Build Alternative and three Build Alternatives. **Appendix C** provides the expanded results of the Noise & Vibration Prediction Monitoring Analysis.

To evaluate the future noise levels at residences (FTA land use Category 2), the L_{dn} descriptor was used to reflect the particularly heightened sensitivity to nighttime noise. The change in noise levels from the baseline No Build Condition to the Build Alternatives was used to assess the onset and magnitude of potential impact under the FTA guidelines. Noise impacts at the selected noise monitoring locations (see **Figure 1-6**) were used to characterize

noise impacts from the Build Alternatives at 34 receptors within the study area. The same receptor locations used to monitor current noise levels were used to predict future noise levels.

At representative receptor Site M2, background noise is dominated by traffic along U.S. Route 1. The modeling of future No Build and Build conditions does not include background traffic noise. Since any change in modeled noise levels between the No Build and Build Alternatives at M2 would in reality likely be drowned out by existing traffic noise, the change in noise at M2 was instead assessed based on the difference between the existing noise level and the future cumulative level under the Build Alternative. Similarly, the background noise at Site M3 (a park near Potomac Greens) is dominated by aircraft over flights from National Airport, traffic along the GWMP and rail operations along the WMATA and CSXT corridors.

Although the GWMP may be considered a sensitive receptor due to its designation as a cultural resource, it would not be considered noise sensitive under the FTA guidelines because it is a self-noise generator. Although there are passive uses along the parkway (such as walking and bird-watching), these passive uses are clearly dominated by traffic along the parkway. To evaluate impacts from Metrorail pass-bys and station operations in accordance with the FTA criteria, cumulative day-night noise levels (or L_{dn}) over a 24-hour period using typical weekday operating conditions were used to assess impacts at residences. Similarly, cumulative peak-hour noise levels (or L_{eq}) were used to assess impacts at institutional or non-residential receptors such as parks. Finally, maximum pass-by noise levels (L_{max}) from Metrorail operations were used to assess impacts in accordance with the WMATA criteria. Unlike the L_{eq} and L_{dn} noise metrics (which are statistically derived), the L_{max} noise level is the sound that people actually hear during a noise event.

3.1.1 No Build Alternative

FTA Criteria

Future noise levels under the No Build Alternative are anticipated to be similar to those under existing conditions.

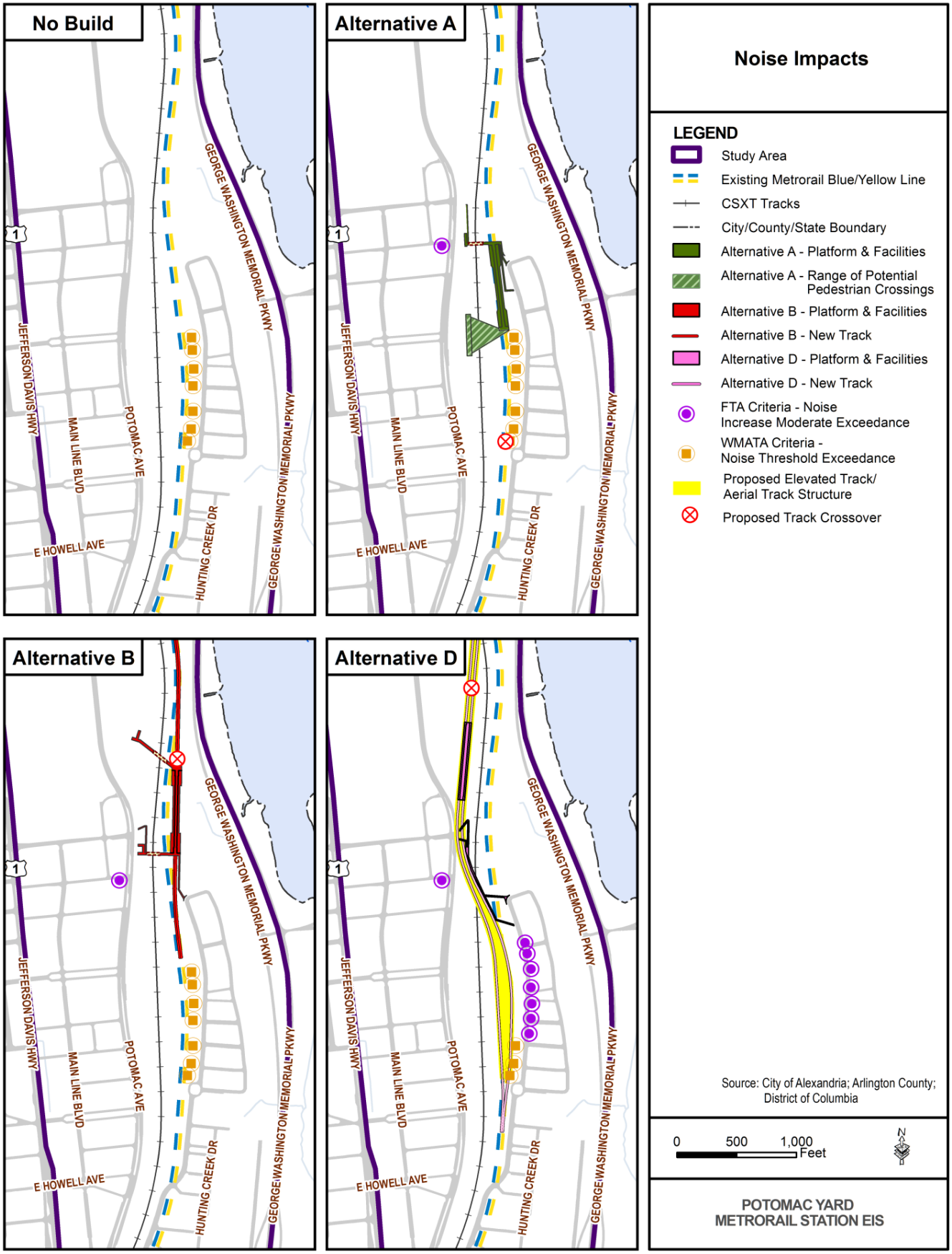
The study area is characterized by urban communities that will continue to include several major transportation-related sources of ambient noise, such as the Metrorail Blue and Yellow Line corridor, the CSXT freight rail corridor, flights from National Airport, and background traffic along U.S. Route 1 and the GWMP.

Ambient noise levels under the future No Build Alternative are anticipated to be similar to those under existing conditions. For example, it takes a doubling of the traffic volumes (or Metrorail operations) for the noise levels to increase by three dBA, the threshold where most listeners detect the change. However, based on the results of the MWCOG version 2.2 regional travel model, traffic in the study area is not expected to increase between 2010 and 2016. Therefore, no FTA noise impact is expected under the No Build Condition.

WMATA Criteria

The maximum noise level from Metrorail pass-bys is predicted to exceed the WMATA criterion of 80 dBA at seven multi-family residences in the Potomac Greens development under the future No Build Condition. **Figure 3-1** shows the locations of the potentially affected residences. These predicted exceedances, based on modeling of Metrorail operations, do not represent a change in noise levels from current conditions, because there is no change in Metrorail operations between the existing condition and No Build Alternative.

Figure 3-1: No Build Alternative Noise Impacts



3.1.2 Build Alternative A

FTA Criteria

The predicted future noise levels from operations under Build Alternative A are summarized below in **Table 3-1.** The L_{dn} day-night noise levels at residences in the study area are predicted to range from 56 dBA to 60 dBA. At the selected representative receptors, only the change in noise level at Site M4 (future residences in South Potomac Yard at the corner of Maskell Street and Potomac Avenue) is predicted to exceed the FTA *moderate* allowable increase criterion of 2.5 dBA.

Table 3-1: Build Alternative A Predicted Noise Levels at Representative Receptors

ID	Receptor Description	Land Use[1]		Noise Metric	Noise Levels (dBA)			Change in Noise (dBA)[2]	FTA Criteria	
		Type	FTA		Existing	No Build	Build		Moderate (dBA)	Severe (dBA)
M1	Potomac Greens, Potomac Greens Dr.	Res	2	L_{dn}	63	60.0	60.0	0.0	2.0	5.0
M2	Lynhaven Community, East Glebe Road	Res	2	L_{dn}	72	55.7	56.0	0.01[3]	0.8	2.5
M3	Potomac Greens Park/Trail	Park	3	L_{eq}	63	60.7	61.2	0.5	4.8	9.2
M4	Potomac Yard (prop. development)	Res	2	L_{dn}	62	57.5	60.3	**2.8**	2.5	6.0

[1]Land use types include single- or multi-family residences (Res) and parks (Park).
[2]FTA moderate impacts are bold and underlined.
[3]Since traffic along Route 1 dominates the ambient conditions at Site M2, the change in project noise is based on the difference between the measured Existing noise and the cumulative noise under the Build Alternative.

Overall, only one exceedance of the FTA Category 2 (residential areas) *moderate* criteria is predicted under Build Alternative A; one residence at Site M4 would potentially be affected by additional bus idling at on-street stops by the station. **Figure 3-1** shows the location of the residence(s) with potential impacts. No exceedance of the FTA *severe* impact criteria is predicted. Additionally, none of the project noise levels under Build Alternative A is predicted to exceed the FTA impact criteria at any FTA Category 3 receptors (parks and schools).

WMATA Criteria

As summarized in **Table 3-2**, maximum noise levels from Metrorail pass-bys under Build Alternative A are predicted to range from 66 dBA to 73 dBA. Most of these levels are equal to or less than the levels under the No Build Condition. However, since the WMATA criteria do not account for the change in noise from existing conditions, maximum pass-by noise levels from Metrorail operations are predicted to exceed the WMATA criterion of 80 dBA at seven multi-family residences in the Potomac Greens development under Build Alternative A. These exceedances are also predicted for the No Build Alternative. **Figure 3-1** shows the locations of the residences with potential impacts.

Table 3-2: Build Alternative A Predicted Maximum Noise Levels from Metrorail Pass-bys at Representative Receptors

ID	Receptor Description	Land Use[1]		Metric	No Build Noise (dBA)	Build Noise (dBA)	Change in Noise (dBA)[2]	WMATA Criterion (dBA)
		Type	WMATA					
M1	Potomac Greens, Potomac Greens Dr.	MFam	III	L_{max}	70.3	70.3	0.0	80
M2	Lynhaven Community, Glebe Road	MFam	IV	L_{max}	66.0	66.0	0.0	80
M3	Potomac Greens Park/Trail	Park	N/A[3]	L_{max}	72.9	72.9	0.0	N/A
M4	Potomac Yard (prop. development)	MFam	III	L_{max}	67.9	67.9	0.0	80

[1]Land use types include multi-family residences (MFam) and parks (Park).
[2]FTA moderate impacts are bold and underlined.
[3]"N/A" means not applicable. The WMATA noise criteria are applicable to residential and commercial buildings; not parks.

3.1.3 Build Alternative B

FTA Criteria

The predicted future noise levels from operations under Build Alternative B are summarized below in **Table 3-3**. The L_{dn} day-night noise levels at residences in the study area are predicted to range from 56.7 dBA to 61.0 dBA. At the selected representative receptors, only the change in noise level at Site M4 is predicted to exceed the FTA *moderate* allowable increase criterion of 2.5 dBA.

Table 3-3: Build Alternative B Predicted Noise Levels at Representative Receptors

ID	Receptor Description	Land Use[1]		Noise Metric	Noise Levels (dBA)			Change in Noise (dBA)[2]	FTA Criteria (dBA)	
		Type	FTA		Existing	No Build	Build		*Moderate*	*severe*
M1	Potomac Greens, Potomac Greens Dr.	Res	2	L_{dn}	63	60.0	60.0	0.0	2.0	5.0
M2	Lynhaven Community, East Glebe Road	Res	2	L_{dn}	72	55.7	56.7	0.03[3]	0.8	2.5
M3	Potomac Greens Park/Trail	Park	3	L_{eq}	63	60.7	62.5	1.8	4.8	9.2
M4	Potomac Yard (prop. development)	Res	2	L_{dn}	62	57.5	61.0	**3.5**	2.5	6.0

1Land use types include single- or multi-family residences (Res) and parks (Park).
2FTA moderate impacts are bold and underlined.
3Since traffic along Route 1 dominates the ambient conditions at Site M2, the change in project noise is based on the difference between the measured Existing noise and the cumulative noise under the Build Alternative.

Overall, only one exceedance of the FTA Category 2 (residential areas) *moderate* criteria is predicted under Build Alternative B; one residence at Site M4 would potentially be affected by additional bus idling at on-street stops by the station. **Figure 3-1** shows the location of the residence with the potential impacts. No exceedance of the FTA *severe* impact criteria is predicted. Additionally, none of the project noise levels under Build Alternative A is predicted to exceed the FTA impact criteria at any FTA Category 3 receptors (parks and schools).

WMATA Criteria

As summarized in **Table 3-4**, maximum noise levels from Metrorail pass-bys under Build Alternative B are predicted to range from just under 65.8 dBA to 74.3 dBA. Most of these levels are equal to or less than the levels under the No Build Condition. However, since the WMATA criteria do not account for the change in noise from existing conditions, maximum pass-by noise levels from Metrorail operations are predicted to exceed the WMATA criterion of 80 dBA at seven multi-family residences in the Potomac Greens development under Build Alternative B. **Figure 3-1** shows the locations of the potentially affected residences. These exceedances are also predicted for the No Build Alternative.

Table 3-4: Build Alternative B Predicted Maximum Noise Levels from Metrorail Pass-bys at Representative Receptors

ID	Receptor Description	Land Use[1]		No Build Noise (dBA)	Build Noise (dBA)	Change in Noise (dBA)[2]	WMATA Criteria (dBA)
		Type	WMATA				
M1	Potomac Greens, Potomac Greens Dr.	MFam	III	70.3	70.3	0.0	80
M2	Lynhaven Community, East Glebe Road	MFam	IV	66.0	65.8	-0.2	80
M3	Potomac Greens Park/Trail	Park	N/A[3]	72.9	74.3	1.4	N/A
M4	Potomac Yard (prop. development)	MFam	III	67.9	67.3	-0.5	80

[1]Land use types include multi-family residences (MFam) and parks (Park).
[2]FTA moderate impacts are **bold** and underlined.
[3]"N/A" means not applicable. The WMATA noise criteria are applicable to residential and commercial buildings; not parks.

3.1.4 Build Alternative D

FTA Criteria

The predicted future noise levels from operations under Build Alternative D are summarized below in **Table 3-5.** The L_{dn} day-night noise levels at residences in the study area are predicted to range from 60.2 dBA to 62.4 dBA. At the selected representative receptors, only the changes in noise levels at Sites M1 and M4 are predicted to exceed the FTA *moderate* allowable increase criterion. At Site M3, for example, the proposed solid parapet wall along the aerial track would reduce noise under the Build Alternative by over 3 dBA compared with the No Build Condition.

Table 3-5: Build Alternative D Predicted Noise Levels at Representative Receptors

ID	Receptor Description	Land Use[1]		Noise Metric	Noise Levels (dBA)			Change in Noise (dBA)[2]	FTA Criteria (dBA)	
		Type	FTA		Existing	No Build	Build		*Moderate*	*severe*
M1	Potomac Greens, Potomac Greens Dr.	Res	2	L_{dn}	63	60.0	62.4	**2.4**	2.0	5.0
M2	Lynhaven Community, East Glebe Road	Res	2	L_{dn}	72	55.7	60.2	0.18[3]	0.8	2.5
M3	Potomac Greens Park/Trail	Park	3	L_{eq}	63	60.7	57.3	-3.4	4.8	9.2
M4	Potomac Yard (prop. development)	Res	2	L_{dn}	62	57.5	62.1	**4.6**	2.5	6.0

[1]Land use types include single- or multi-family residences (Res) and parks (Park).
[2]FTA moderate impacts are **bold** and underlined.
[3]Since traffic along Route 1 dominated the ambient conditions at Site M2, the change in project noise is based on a comparison with the measured Existing noise rather than the predicted No Build level.

Overall, eight exceedances of the FTA Category 2 (residential areas) *moderate* criteria are predicted under Build Alternative D; eight residences would potentially be affected by the change in noise levels due to the elevated Metrorail alignment shifted closer to the Potomac Greens development. **Figure 3-1** shows the locations of the potentially affected residences. No exceedances of the FTA *severe* impact criteria are predicted. Additionally, none of the project noise levels under Build Alternative D are predicted to exceed the FTA impact criteria at any FTA Category 3 (parks and schools) receptors.

WMATA Criteria

As summarized in **Table 3-6**, maximum noise levels from Metrorail pass-bys under Build Alternative D are predicted to range from just over 69 dBA to almost 73 dBA. Most of these levels are equal to or less than the levels under the No Build Condition. However, since the WMATA criteria do not account for changes from existing conditions, maximum pass-by noise levels from Metrorail operations are predicted to exceed the WMATA criterion of 80 dBA at three multi-family residences in the Potomac Greens development under Build Alternative D (four fewer impacts than under the No Build Alternative). **Figure 3-1** shows the locations of the residences with potential impacts.

Table 3-6: Build Alternative D Predicted Maximum Noise Levels from Metrorail Pass-bys at Representative Receptors

ID	Receptor Description	Land Use[1]		No Build Noise (dBA)	Build Noise (dBA)	Change in Noise (dBA)[2]	WMATA Criteria (dBA)
		Type	WMATA				
M1	Potomac Greens, Potomac Greens Dr.	MFam	III	70.3	72.8	2.4	80
M2	Lynhaven Community, East Glebe Road	MFam	IV	66.0	70.4	4.4	80
M3	Potomac Greens Park/Trail	Park	N/A[3]	72.9	69.5	-3.4	N/A
M4	Potomac Yard (prop. development)	MFam	III	67.9	72.4	4.5	80

[1]Land use types include multi-family residences (MFam) and parks (Park).
[2]FTA moderate impacts are **bold** and underlined.
[3]"N/A" means not applicable. The WMATA noise criteria are applicable to residential and commercial buildings; not parks.

The four L_{max} noise impacts predicted for the No Build Condition were eliminated under Build Alternative D. The Metrorail noise levels at these four sites were adjusted upward to reflect an aerial track alignment (+4 dBA) and adjusted downward to reflect shielding due to the solid trackside parapet wall (-7 dBA). The net difference in noise resulted in a "No Impact" status for these four sites.

3.2 Vibration

Unlike noise, which is assessed using cumulative noise levels over one-hour and 24-hour periods, transit vibration impacts are assessed based on individual events, such as a train pass-by. To reduce transit vibration impacts at residences and other sensitive receptors along the Build Alternatives, the Metrorail corridor would be constructed with continuous welded rail track with ballast along at-grade sections and direct fixation along aerial sections. These measures are expected to reduce vibration levels that are caused by steel wheels rolling over steel rails at rail joints. Along aerial sections, the sheer mass of the elevated structures and the additional separation between the train source and the ground-level receptors would result in greater attenuation compared to at-grade track.

All predicted vibration levels were compared with the FTA significant increase criterion of 3 VdB and the WMATA vibration criteria to assess the onset of impact. For consistency, transit vibration levels were predicted at the same receptor locations as for the noise analysis.

Ground-borne noise is typically not a concern for at-grade track due to lower vibration frequencies compared to subway tunnels and the predominance of airborne noise. As a result, ground-borne noise was evaluated indirectly with ground-borne vibration, which is an indicator for the potential for ground-borne noise effects.

3.2.1 No Build Alternative

Future vibration levels under the No Build Alternative are expected to be similar to those currently experienced under existing conditions. The Metrorail alignment would remain the same with no changes in vehicle types or level of activity expected. Roadway traffic, including heavy trucks and buses, rarely creates perceptible ground-borne vibration unless vehicles are operating very close to buildings (such as in Old Town Alexandria) or there are irregularities in the road, such as potholes or expansion joints. The pneumatic tires and suspension systems of automobiles, trucks, and buses eliminate most ground-borne vibration. Since no project components or design elements are proposed under the No Build Alternative, the alternative would not cause any new vibration impacts. No exceedance of the WMATA vibration criterion of 75 VdB is predicted under the No Build Alternative.

3.2.2 Build Alternative A

As summarized in **Table 3-7**, maximum vibration levels from Metrorail pass-bys under Build Alternative A are predicted to range from well below background levels at Site M2 (furthest from the Metrorail corridor) to 61 VdB at Site M1 (multi-family residences along Potomac Greens Drive). None of the vibration levels at the representative receptors is predicted to exceed the FTA criteria.

However, vibration levels from Metrorail pass-bys over switches are predicted to exceed the FTA significant increase criterion of 3 VdB and *frequent* criterion threshold of 72 VdB at six other residences in Potomac Greens. Similarly, vibration levels from Metrorail operations under Build Alternative A are also predicted to exceed the WMATA design criterion of 75 VdB at one residence. **Figure 3-2** shows the locations of the potentially affected residences.

Figure 3-2: Vibration Impacts

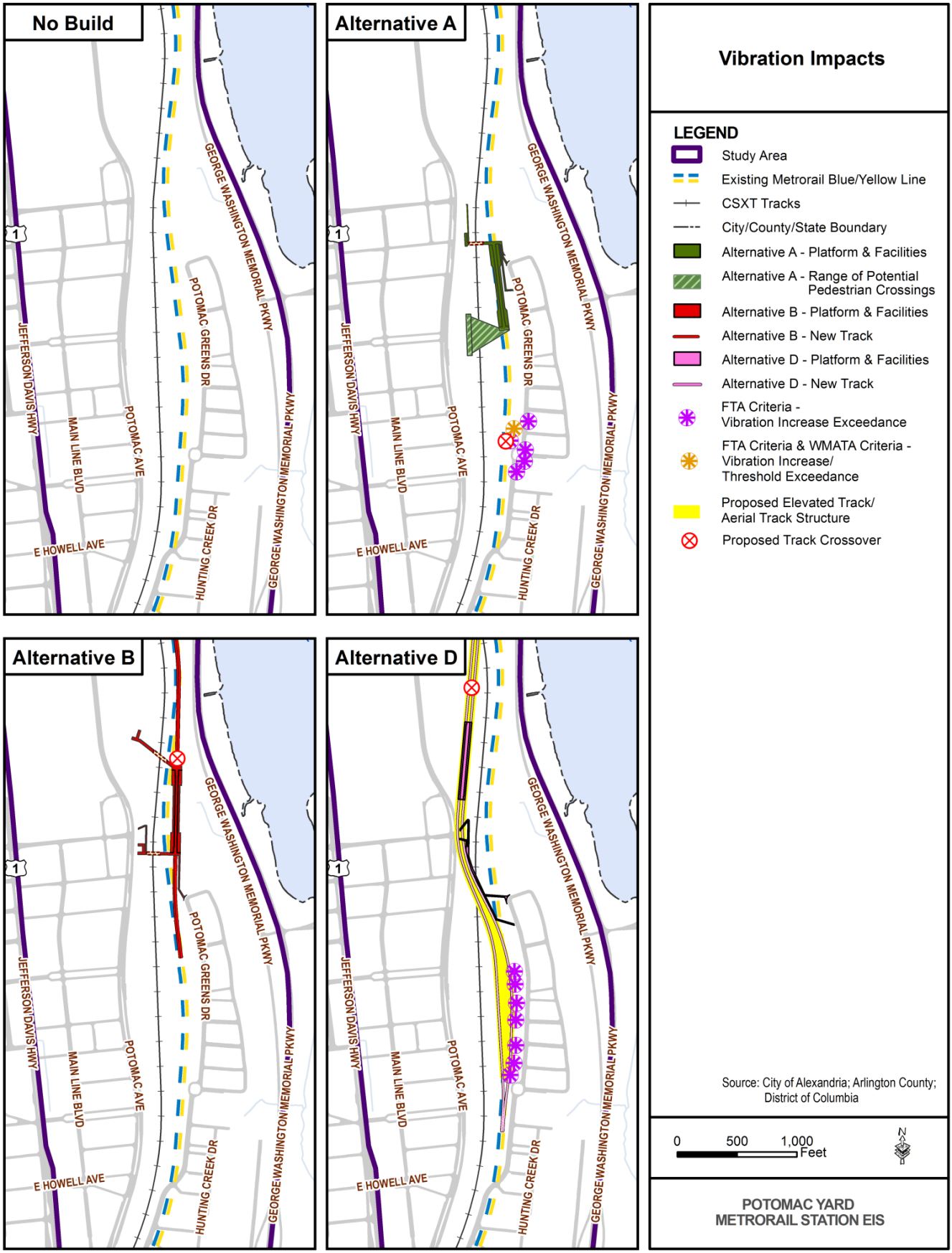


Table 3-7: Build Alternative A Predicted Vibration Levels at Representative Receptors

ID	Receptor Description	Land Use[1]			Pass-by Levels (VdB)			Criteria (VdB)[2]	
		Type	FTA	WMATA	No Build	Build	Change	FTA	WMATA
M1	Potomac Greens, Potomac Greens Dr.	Res	2	MF3	60.6	60.6	0.0	≥ 3	75
M2	Lynhaven Community, East Glebe Road	Res	2	MF4	BD[3]	BD	BD	≥ 3	75
M3	Potomac Greens Park/Trail	Park	3	N/A	59.8	59.8	0.0	≥ 3	--
M4	Potomac Yard (prop. development)	Res	2	MF3	38.0	38.0	0.0	≥ 3	75

[1]Land use types include single- or multi-family residences (Res) and parks (Park).
[2]The FTA significant increase criteria are applied to the change in vibration for all levels greater than 72 VdB, while the WMATA pass-by criteria are applied to the Build vibration levels.
[3]"BD" means below detection. The predicted vibration level is well below the ambient background level.

3.2.3 Build Alternative B

As summarized in **Table 3-8**, maximum vibration levels from Metrorail pass-bys under Build Alternative B are predicted to range from well below background levels to 62 VdB. None of the vibration levels at the representative receptors or elsewhere in the study area are predicted to exceed the FTA significant increase criterion of 3 VdB under Build Alternative B. Similarly, vibration levels from Metrorail operations under Build Alternative B are also not predicted to exceed the WMATA design criterion of 75 VdB at any receptor locations.

Table 3-8: Build Alternative B Predicted Vibration Levels at Representative Receptors

ID	Receptor Description	Land Use[1]			Pass-by Levels (VdB)			Criteria (VdB)[2]	
		Type	FTA	WMATA	No Build	Build	Change	FTA	WMATA
M1	Potomac Greens, Potomac Greens Dr.	Res	2	MF3	60.6	60.6	0.0	≥ 3	75
M2	Lynhaven Community, East Glebe Road	Res	2	MF4	BD[3]	BD	BD	≥ 3	75
M3	Potomac Greens Park/Trail	Park	3	N/A	59.8	61.6	1.8	≥ 3	--
M4	Potomac Yard (prop. development)	Res	2	MF3	BD	BD	BD	≥ 3	75

[1]Land use types include single- or multi-family residences (Res) and parks (Park).
[2]The FTA significant increase criteria are applied to the change in vibration for all levels greater than 72 VdB, while the WMATA pass-by criteria are applied to the Build vibration levels.
[3]"BD" means below detection. The predicted vibration level is well below the ambient background level.

3.2.4 Build Alternative D

As summarized in **Table 3-9**, maximum vibration levels from Metrorail pass-bys under Build Alternative D are predicted to range from well below background levels to 62 VdB. Vibration levels from Metrorail pass-bys along the relocated track are predicted to exceed the FTA significant increase criterion of 3 VdB and minimum frequent criterion threshold of 72 VdB at seven residences in Potomac Greens (See **Figure 3-2**). Although receptor M4 in Potomac Yard is predicted to experience a significant increase in vibration levels (21.8 Vdb) over the No Build condition from Metrorail pass-bys over switches, the predicted absolute level is still well under the FTA frequent criterion threshold of 72 VdB. Therefore, no impact is predicted at M4. **Figure 3-2** shows the locations of the potentially affected residences. However, vibration levels from Metrorail operations under Build Alternative D are not predicted to exceed the WMATA design criterion of 75 VdB at any receptor locations.

Table 3-9: Alternative D Predicted Vibration Levels at Representative Receptors

ID	Receptor Description	Land Use[1]			Pass-by Levels (VdB)			Criteria (VdB)[2]	
		Type	FTA	WMATA	No Build	Build	Change	FTA	WMATA
M1	Potomac Greens, Potomac Greens Dr.	Res	2	MF3	60.6	61.7	1.1	≥ 3	75
M2	Lynhaven Community, East Glebe Road	Res	2	MF4	BD[3]	BD	BD	≥ 3	75
M3	Potomac Greens Park/Trail	Park	3	N/A	59.8	48.6	-11.2	≥ 3	--
M4	Potomac Yard (prop. development)	Res	2	MF3	BD	BD	BD	≥ 3	75

[1]Land use types include single- or multi-family residences (Res) and parks (Park).
[2]The FTA significant increase criteria are applied to the change in vibration for all levels greater than 72 VdB, while the WMATA pass-by criteria are applied to the Build vibration levels.
[3]"BD" means below detection. The predicted vibration level is well below the ambient background level.

4.0 MITIGATION MEASURES

Mitigation measures were investigated to determine their effectiveness in reducing the identified impacts. The following mitigation measures are proposed to eliminate noise and vibration criteria exceedances in the study area.

4.1 No Build Alternative

Although exceedances of the WMATA noise and vibration criteria are predicted under the No Build Alternative, these exceedances represent current or existing conditions. Therefore, since no project elements or components are proposed under the No Build Alternative, no mitigation is proposed.

4.2 Build Alternative A

Both noise and vibration impacts are predicted for Build Alternative A. The following mitigation measures are proposed to eliminate noise and vibration criteria exceedances in the study area:

- Locate on-street bus stops for the station away from new residences planned in the vicinity of Site M4 to minimize noise impacts from idling buses. In other words, utilize the proposed station building to shield future residences from the idling buses; or,
- Apply vibration control devices, such as ballast mats under the switches and replacing standard swing switches with spring frogs or other "gapless" switches to eliminate the gaps in the rail vibration control measures, such as ballast mats under the switches and replacing standard swing switches with spring frogs or other "gapless" switches.

4.3 Build Alternative B

One noise impact is predicted for Build Alternative B. The following mitigation measure is proposed to eliminate noise impacts in the study area:

- Locate on-street bus stops for the station away from new residences planned in the vicinity of Site M4 to minimize noise impacts from idling buses.

Since no vibration impacts are predicted, no vibration control measure is proposed.

4.4 Build Alternative D

Both noise and vibration impacts are predicted for Build Alternative D. The following mitigation measures are proposed to eliminate noise and vibration impacts in the study area:

- Increase the height of the standard 3-foot 8-inch parapet along aerial track to 7 feet to shield nearby residences from new elevated Metrorail operations;

- Install standard 3-foot 8-inch parapets along at-grade sections of track by the Potomac Greens neighborhood; and
- Apply vibration control devices (such as resilient rail fasteners or resilient tie pads to decouple the track from the ground) along continuous welded rail track by the Potomac Greens neighborhood to eliminate impacts from Metrorail pass-bys." vibration control measures, such as resilient rail fasteners or resilient tie pads, along continuous welded rail track by the Potomac Greens neighborhood to eliminate impacts from Metrorail pass-bys.

For all Build Alternatives, several mitigation options are available to eliminate or reduce annoyance due to other ancillary sources at the station (such as Public Address (PA) announcements and door chimes) and track switches:

- To shield the closest residences from the station activities and noise (such as door chimes and PA announcements), the proposed stations would be designed to include wind screens (solid or clear walls, such as "plexi-glass", and sufficiently dense to block the noise source). Proper station design and these wind screens would play the biggest role in shielding the nearby residents from these new station sounds. The details of the station structure, design and layout are commonly developed during the final design phase of the project.
- For impacts due to switches, the use of the following passive control measures is another option when eliminating noise and vibration at the source is not possible:
    - Low-profile barriers that shield the wheel-rail interaction only, or
    - Relocate the switches behind the station structure thereby using the station itself as a barrier.

APPENDIX A:
References

Regulatory Guidance

National Park Service. 2006 Management Policies. “NPS Soundscape Management Policy 4.9” and “NPS Cultural Soundscape Management Policy 5.3.1.7.”

National Park Service. “Director’s Order #47: Soundscape Preservation and Noise Management”

Noise Control Code (Chapter 5), Part II- The Code of General Ordinances, Title 11- Health, Environmental and Sanitary Regulations. Office of Environmental Quality (OEQ). City of Alexandria.

Noise Control. Chapter 15. Arlington County Code. Arlington County. September 2011.

Transit Noise and Vibration Impact Assessment. Federal Transit Administration. FTA-VA-90-1003-06. Washington, D.C. May 2006.

WMATA Manual of Design Criteria for Maintaining and Continued Operation of Facilities and Systems. Section 16. Washington Metropolitan Area Transit Authority, Department of Operations Services, Office of Engineering Support Services. Release 9. February 18, 2010.

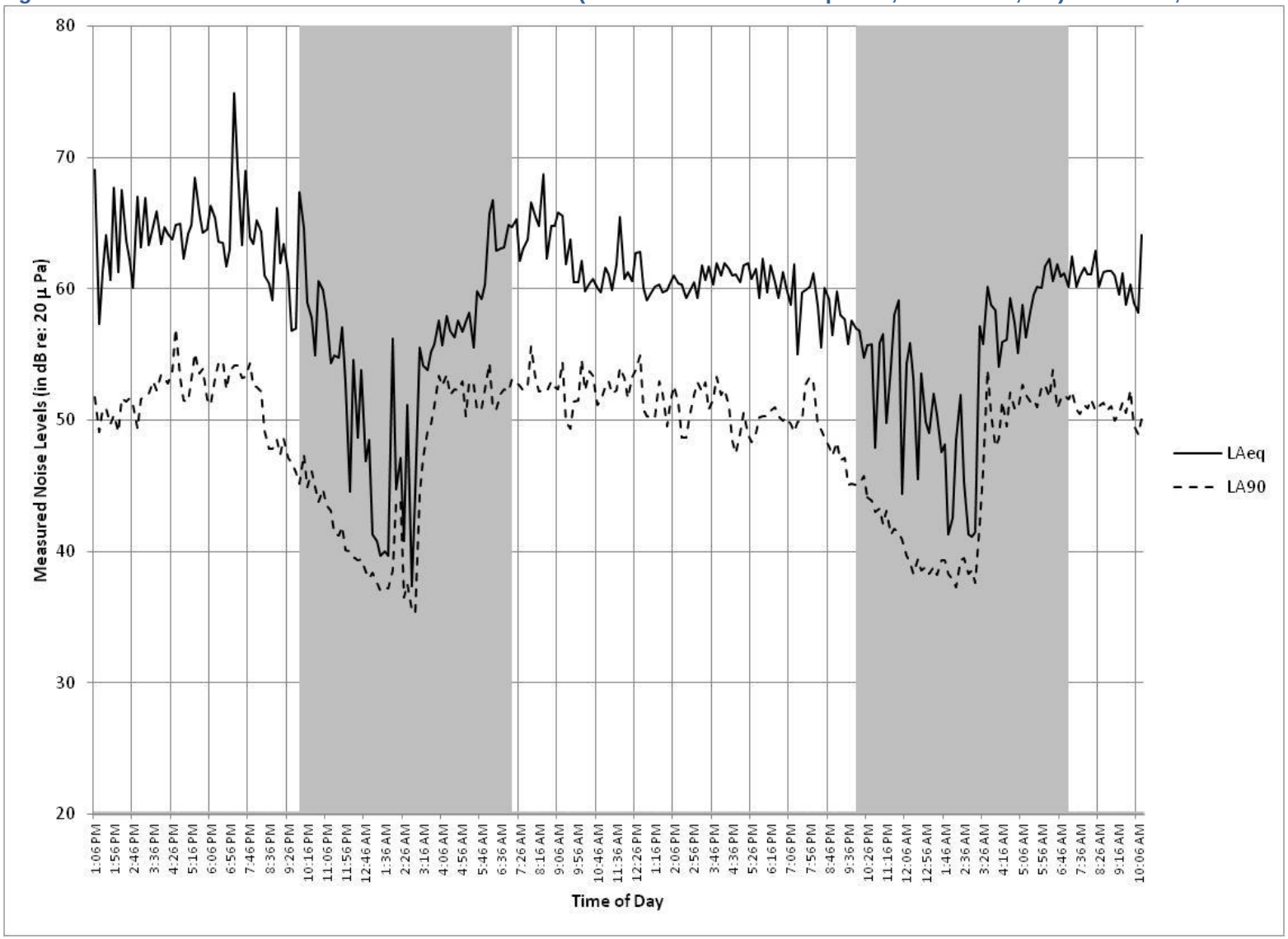
Appendix B:
Results of the Baseline Noise Monitoring Program

Table B-1: Results of the Baseline Noise Monitoring Program

	Receptor				Time Period				L_{eq}	L_{dn}
ID	Description	Type	FTA	Type	AM-PK	Midday	PM-PK	Late night	PK-Hr	24-Hr
M1	Potomac Greens, Potomac Greens Dr.	Res	2	24-hr	-- See Figure A1 --				63	63
M2	Lynhaven Community, East Glebe Road	Res	2	24-hr	-- See Figure A2 --				72	72
M3	Potomac Greens Park/Trail	Park	3	Pk-hr	63	--[1]	63	--	63	--
M4	Potomac Yard (prop. development)	Res	2	24-hr	62	66	56	46	60	62

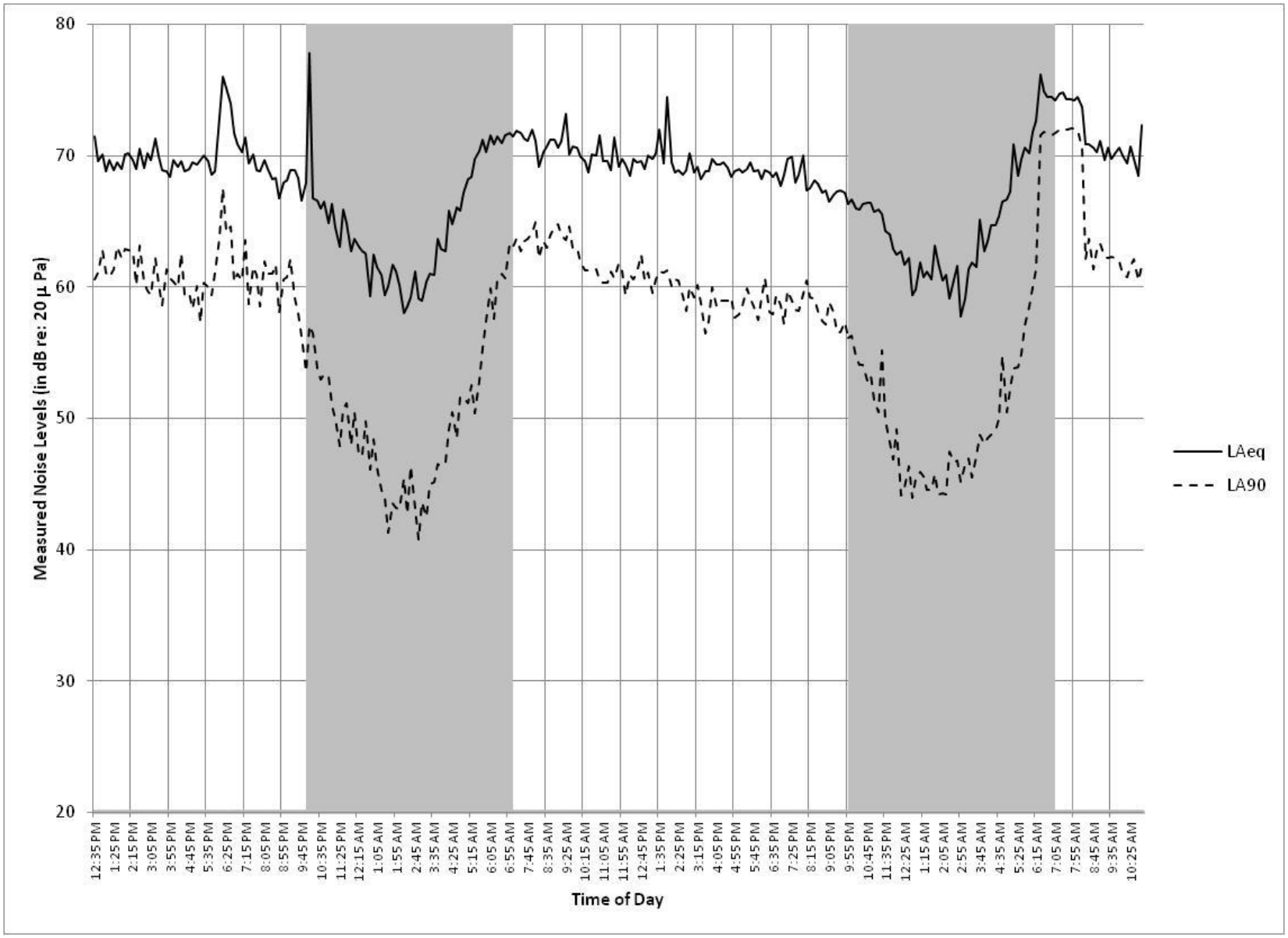
1Institutional land-uses (FTA Category 3) are evaluated during the peak hour period using the Leq noise metric.
Source: AECOM, November 2012.

Figure C1: Baseline Noise Levels Measured at Site M1 (Potomac Green Development, Alexandria, VA) on June 6, 2012



Source: AECOM, November 2012.

Figure A2: Baseline Noise Levels Measured at Site M2 (Lynhaven Community, Glebe Road, Alexandria, VA) on June 6, 2012



Source: AECOM, November 2012.

Appendix C:

Expanded Results of the Noise & Vibration Prediction Monitoring Analysis

Figure C1: Expanded Results of the Noise and Vibration Prediction Modeling Analysis – Build Alternative A

WMATA PYMS EIS - Summary of Noise & Vibration Results

08/03/12

BUILD_Alt_A4

Inputs: PYMS_NZ_NB4.xlsx

PYMS_NZ_Alt_A4.xlsx

Criteria based on EXISTING level along Rt. 1

MOD 1

SEV 0 7 WMATA 7

Inputs: PYMS_VIB_NB3.xlsx

PYMS_VIB_Alt_A3.xlsx

Impact: ABS_Round 0.5 INCR 2.5 6

WMATA Crit. MFAM: III-IV 79.5 0 1

Receptor No.	Description	Sta. No.	Noise Levels (dBA) Existing	Future Alt. NB	Future Alt. BD	Criteria Limits, Absolu MOD	Criteria Limits, Absolu SEV	Criteria Limits, Relativ MOD	Criteria Limits, Relativ SEV	FTA Noise Impacts BD	FTA Noise Impacts BD	WMATA Noise Impacts Lmax_NB	WMATA Noise Impacts Lmax_BD	WMATA Noise Impacts Lmax_Crit	WMATA Noise Impacts Lmax_Incr	WMATA Noise Impacts Lmax_IMP	FTA VIB Criteria	Vibration Levels (VdB) No Build VdB_MAX	Vibration Levels (VdB) Build VdB_MAX	Vibration Levels (VdB) VdB_del	FTA VIB Criteria ABS	FTA VIB Criteria INCR	FTA VIB Criteria VIB_Imp_BD	FTA VIB Criteria Source	WMATA VIB Impacts WMATA_Crit	WMATA VIB Impacts VIB_Imp_WV	WMATA VIB Impacts 3D_Imp_WV
2		3	18	15	15	9	9	11	13	23	23	56	56	14			9	22	22	22	9			15			
1	Potomac Greens, Poton	468.00	63.0	60.0	60.0	57.8	63.4	2.0	5.0	0.00	NO	70.3	70.3	80.0	0.0	0	72	60.6	60.6	0.0	71.5	2.5	0		79.5	0	0
2	Lynhaven Community, (	453.00	72.0	55.7	56.0	55.6	61.4	0.1	0.4	0.01	NO	66.0	66.0	80.0	0.0	0	72	0.0	0.0	0.0	71.5	2.5	0		79.5	0	0
3	Park/Trail	457.00	63.0	60.7	61.2	63.2	68.8	4.4	8.7	0.50	NO	72.9	72.9	999.0	0.0	0	75	59.8	59.8	0.0	74.5	2.5	0		79.5	0	0
4	Potomac Yard (propose	457.00	62.0	57.5	60.3	56.5	62.2	2.5	6.0	2.80	MOD	67.9	67.9	80.0	0.0	0	72	38.0	38.0	0.0	71.5	2.5	0		79.5	0	0
5	Potomac Greens Develi	459.00	63.0	65.8	66.4	61.4	66.7	1.3	3.5	0.60	NO	76.1	76.1	80.0	0.0	0	72	64.0	64.0	0.0	71.5	2.5	0		79.5	0	0
6	Potomac Greens Develi	460.00	63.0	65.3	65.9	61.0	66.4	1.4	3.6	0.60	NO	75.7	75.7	80.0	0.0	0	72	63.3	63.3	0.0	71.5	2.5	0		79.5	0	0
7	Potomac Greens Develi	461.00	63.0	64.2	64.8	60.3	65.7	1.5	3.8	0.60	NO	74.6	74.6	80.0	0.0	0	72	61.9	61.9	0.0	71.5	2.5	0		79.5	0	0
8	Potomac Greens Develi	461.00	63.0	68.3	69.1	63.1	68.3	1.1	3.0	0.80	NO	78.7	78.7	80.0	0.0	0	72	67.6	67.6	0.0	71.5	2.5	0		79.5	0	0
9	Potomac Greens Develi	465.00	63.0	70.5	70.6	64.7	69.8	1.0	2.7	0.10	NO	80.9	80.9	80.0	0.0	1	72	70.6	70.6	0.0	71.5	2.5	0		79.5	0	0
10	Potomac Greens Develi	466.00	63.0	71.0	71.0	65.1	70.2	1.0	2.6	0.00	NO	81.4	81.4	80.0	0.0	1	72	71.3	71.3	0.0	71.5	2.5	0		79.5	0	0
11	Potomac Greens Develi	468.00	63.0	71.0	71.0	65.1	70.2	1.0	2.6	0.00	NO	81.4	81.4	80.0	0.0	1	72	71.3	71.3	0.0	71.5	2.5	0		79.5	0	0
12	Potomac Greens Develi	469.00	63.0	72.5	72.5	65.0	71.3	0.7	2.5	0.00	NO	82.8	82.8	80.0	0.0	1	72	73.1	73.1	0.0	71.5	2.5	0		79.5	0	0
13	Potomac Greens Develi	471.00	63.0	71.7	71.7	65.0	70.7	0.8	2.5	0.00	NO	82.1	82.1	80.0	0.0	1	72	72.2	72.3	0.1	71.5	2.5	0		79.5	0	0
14	Potomac Greens Develi	472.00	63.0	72.4	72.5	65.0	71.2	0.7	2.5	0.10	NO	86.6	87.6	80.0	1.0	1	72	73.0	82.6	9.6	71.5	2.5	1	Switches	79.5	0	1
15	Potomac Greens Develi	474.00	63.0	76.9	76.9	65.0	74.7	0.3	2.0	0.00	NO	87.2	87.2	80.0	0.0	1	72	72.0	75.6	3.6	71.5	2.5	1	Switches	79.5	0	0
16	Potomac Greens Develi	474.00	63.0	64.5	64.5	60.5	65.9	1.5	3.8	0.00	NO	76.0	76.6	80.0	0.5	0	72	62.2	73.8	11.6	71.5	2.5	1	Switches	79.5	0	0
17	Potomac Greens Develi	475.00	63.0	64.5	64.6	60.5	65.9	1.5	3.8	0.10	NO	74.9	74.9	80.0	0.0	0	72	62.3	72.6	10.3	71.5	2.5	1	Switches	79.5	0	0
18	Potomac Greens Develi	476.00	63.0	67.8	67.8	62.7	68.0	1.2	3.1	0.00	NO	78.2	78.2	80.0	0.0	0	72	66.9	71.5	4.6	71.5	2.5	1	Switches	79.5	0	0
19	Potomac Greens Develi	477.00	63.0	68.0	68.0	62.9	68.1	1.2	3.1	0.00	NO	78.4	78.4	80.0	0.0	0	72	67.2	67.2	0.0	71.5	2.5	0		79.5	0	0
20	Potomac Greens Develi	479.00	63.0	67.9	67.9	62.8	68.1	1.2	3.1	0.00	NO	78.3	78.3	80.0	0.0	0	72	67.0	67.0	0.0	71.5	2.5	0		79.5	0	0
21	Potomac Greens Develi	479.00	63.0	68.0	68.0	62.9	68.1	1.2	3.1	0.00	NO	78.4	78.4	80.0	0.0	0	72	67.1	67.1	0.0	71.5	2.5	0		79.5	0	0
22	Potomac Greens Develi	479.00	63.0	66.1	66.1	61.6	66.9	1.3	3.4	0.00	NO	76.5	76.5	80.0	0.0	0	72	64.5	64.5	0.0	71.5	2.5	0		79.5	0	0
23	Potomac Greens Develi	479.00	63.0	63.5	63.5	59.9	65.3	1.6	4.0	0.00	NO	73.9	73.9	80.0	0.0	0	72	61.0	61.0	0.0	71.5	2.5	0		79.5	0	0
24	Potomac Greens Develi	479.00	63.0	61.2	61.2	58.5	64.0	1.9	4.6	0.00	NO	71.5	71.5	80.0	0.0	0	72	57.8	57.8	0.0	71.5	2.5	0		79.5	0	0
25	Potomac Greens Develi	479.00	63.0	59.8	59.8	57.7	63.3	2.1	5.1	0.00	NO	70.2	70.2	80.0	0.0	0	72	54.5	54.5	0.0	71.5	2.5	0		79.5	0	0
26	Potomac Greens Develi	479.00	63.0	58.1	58.1	56.8	62.5	2.4	5.7	0.00	NO	68.5	68.5	80.0	0.0	0	72	44.9	44.9	0.0	71.5	2.5	0		79.5	0	0
27	Potomac Greens Develi	463.00	63.0	58.2	58.8	56.8	62.5	2.4	5.7	0.60	NO	68.6	68.6	80.0	0.0	0	72	60.7	60.7	0.0	71.5	2.5	0		79.5	0	0
28	Potomac Greens Develi	464.00	63.0	58.0	58.4	56.7	62.4	2.4	5.7	0.40	NO	68.3	68.3	80.0	0.0	0	72	60.4	60.4	0.0	71.5	2.5	0		79.5	0	0
29	Potomac Greens Develi	465.00	63.0	57.5	57.7	56.5	62.2	2.5	6.0	0.20	NO	67.8	67.8	80.0	0.0	0	72	59.7	59.7	0.0	71.5	2.5	0		79.5	0	0
30	Potomac Greens Develi	466.00	63.0	60.1	60.2	57.8	63.4	2.0	5.0	0.10	NO	70.4	70.4	80.0	0.0	0	72	60.5	60.5	0.0	71.5	2.5	0		79.5	0	0
31	Potomac Greens Develi	469.00	63.0	58.5	58.6	57.0	62.7	2.3	5.6	0.10	NO	68.9	68.9	80.0	0.0	0	72	61.1	61.1	0.0	71.5	2.5	0		79.5	0	0
32	Potomac Greens Develi	470.00	63.0	59.1	59.1	57.3	63.0	2.2	5.4	0.00	NO	69.5	69.5	80.0	0.0	0	72	61.8	63.5	1.7	71.5	2.5	0		79.5	0	0
33	Potomac Greens Develi	472.00	63.0	59.0	59.1	57.2	62.9	2.2	5.4	0.10	NO	70.6	71.1	80.0	0.5	0	72	61.7	72.0	10.3	71.5	2.5	1	Switches	79.5	0	0
34	The Eclipse on Center F	446.00	63.0	60.5	60.5	58.1	63.7	2.0	4.9	0.00	NO	70.8	70.8	80.0	0.0	0	72	56.4	56.4	0.0	71.5	2.5	0		79.5	0	0

PYMS_Summary_Appx1.xlsx - Alt_A

Page A.1

Figure C2: Expanded Results of the Noise and Vibration Prediction Modeling Analysis – Build Alternative B

WMATA PYMS EIS - Summary of Noise & Vibration Results

BUILD_Alt_B4

Inputs: PYMS_NZ_NB4.xlsx

PYMS_NZ_Alt_B4.xlsx

Criteria based on EXISTING level along Rt. 1

08/02/12

MOD 1

SEV 0 7 WMATA 7

Inputs: PYMS_VIB_NB3.xlsx

PYMS_VIB_Alt_B3.xlsx

Impact: ABS_Round 0.5 *INCR 2.5* 0

WMATA Crit. MFAM: III-IV 79.5 0 0

Receptor No.	Description	Sta. No.	Noise Levels (dBA) Existing	Future Alt. NB	Future Alt. BD	Criteria Limits, Absolu MOD	Criteria Limits, Absolu SEV	Criteria Limits, Relativ MOD	Criteria Limits, Relativ SEV	FTA Noise Impacts BD	FTA Noise Impacts BD	WMATA Noise Impacts Lmax_NB	Lmax_BD	Lmax_Crit	Lmax_Incr	Lmax_IMP	Vibration Levels (VdB) FTA VIB Criteria	No Build VdB_MAX	Build VdB_MAX	VdB_del	FTA VIB Criteria ABS	INCR	VIB_Imp_BD	Source	WMATA VIB Impacts WMATA_Crit	VIB_Imp_WV	3D_Imp_WV
	2	3	18	15	15	9	9	11	13	23	23	56	56	14			9	22	22	22	9			15			
1	Potomac Greens, Poton	468.00	63.0	60.0	60.0	57.8	63.4	2.0	5.0	0.00	NO	70.3	70.3	80.0	0.0	0	72	60.6	60.6	0.0	71.5	2.5	0		79.5	0	0
2	Lynhaven Community, (	453.00	72.0	55.7	56.7	55.6	61.4	0.1	0.4	0.03	NO	66.0	65.8	80.0	-0.2	0	72	0.0	0.0	0.0	71.5	2.5	0		79.5	0	0
3	Park/Trail	457.00	63.0	60.7	62.5	63.2	68.8	4.4	8.7	1.80	NO	72.9	74.3	999.0	1.4	0	75	59.8	61.6	1.8	74.5	2.5	0		79.5	0	0
4	Potomac Yard (propose	457.00	62.0	57.5	61.0	56.5	62.2	2.5	6.0	3.50	MOD	67.9	67.3	80.0	-0.5	0	72	38.0	29.3	-8.7	71.5	2.5	0		79.5	0	0
5	Potomac Greens Develo	459.00	63.0	65.8	66.5	61.4	66.7	1.3	3.5	0.70	NO	76.1	76.6	80.0	0.5	0	72	64.0	64.7	0.7	71.5	2.5	0		79.5	0	0
6	Potomac Greens Develo	460.00	63.0	65.3	65.7	61.0	66.4	1.4	3.6	0.40	NO	75.7	75.9	80.0	0.2	0	72	63.3	63.6	0.3	71.5	2.5	0		79.5	0	0
7	Potomac Greens Develo	461.00	63.0	64.2	64.4	60.3	65.7	1.5	3.8	0.20	NO	74.6	74.6	80.0	0.0	0	72	61.9	62.0	0.1	71.5	2.5	0		79.5	0	0
8	Potomac Greens Develo	461.00	63.0	68.3	68.4	63.1	68.3	1.1	3.0	0.10	NO	78.7	78.7	80.0	0.0	0	72	67.6	67.6	0.0	71.5	2.5	0		79.5	0	0
9	Potomac Greens Develo	465.00	63.0	70.5	70.4	64.7	69.8	1.0	2.7	-0.10	NO	80.9	80.8	80.0	-0.1	1	72	70.6	70.5	-0.1	71.5	2.5	0		79.5	0	0
10	Potomac Greens Develo	466.00	63.0	71.0	71.0	65.1	70.2	1.0	2.6	0.00	NO	81.4	81.3	80.0	0.0	1	72	71.3	71.2	-0.1	71.5	2.5	0		79.5	0	0
11	Potomac Greens Develo	468.00	63.0	71.0	71.0	65.1	70.2	1.0	2.6	0.00	NO	81.4	81.3	80.0	-0.1	1	72	71.3	71.2	-0.1	71.5	2.5	0		79.5	0	0
12	Potomac Greens Develo	469.00	63.0	72.5	72.4	65.0	71.3	0.7	2.5	-0.10	NO	82.8	82.8	80.0	-0.1	1	72	73.1	73.0	-0.1	71.5	2.5	0		79.5	0	0
13	Potomac Greens Develo	471.00	63.0	71.7	71.7	65.0	70.7	0.8	2.5	0.00	NO	82.1	82.1	80.0	0.0	1	72	72.2	72.2	0.0	71.5	2.5	0		79.5	0	0
14	Potomac Greens Develo	472.00	63.0	72.4	72.4	65.0	71.2	0.7	2.5	0.00	NO	86.6	82.7	80.0	-3.9	1	72	73.0	73.0	0.0	71.5	2.5	0		79.5	0	0
15	Potomac Greens Develo	474.00	63.0	76.9	76.7	65.0	74.7	0.3	2.0	-0.20	NO	87.2	87.1	80.0	-0.1	1	72	72.0	71.9	-0.1	71.5	2.5	0		79.5	0	0
16	Potomac Greens Develo	474.00	63.0	64.5	64.5	60.5	65.9	1.5	3.8	0.00	NO	76.0	74.8	80.0	-1.2	0	72	62.2	62.2	0.0	71.5	2.5	0		79.5	0	0
17	Potomac Greens Develo	475.00	63.0	64.5	64.5	60.5	65.9	1.5	3.8	0.00	NO	74.9	74.9	80.0	0.0	0	72	62.3	62.3	0.0	71.5	2.5	0		79.5	0	0
18	Potomac Greens Develo	476.00	63.0	67.8	67.8	62.7	68.0	1.2	3.1	0.00	NO	78.2	78.1	80.0	-0.1	0	72	66.9	66.8	-0.1	71.5	2.5	0		79.5	0	0
19	Potomac Greens Develo	477.00	63.0	68.0	67.9	62.9	68.1	1.2	3.1	-0.10	NO	78.4	78.3	80.0	-0.1	0	72	67.2	67.0	-0.2	71.5	2.5	0		79.5	0	0
20	Potomac Greens Develo	479.00	63.0	67.9	67.8	62.8	68.1	1.2	3.1	-0.10	NO	78.3	78.2	80.0	-0.1	0	72	67.0	66.9	-0.1	71.5	2.5	0		79.5	0	0
21	Potomac Greens Develo	479.00	63.0	68.0	68.0	62.9	68.1	1.2	3.1	0.00	NO	78.4	78.3	80.0	0.0	0	72	67.1	67.1	0.0	71.5	2.5	0		79.5	0	0
22	Potomac Greens Develo	479.00	63.0	66.1	66.1	61.6	66.9	1.3	3.4	0.00	NO	76.5	76.5	80.0	0.0	0	72	64.5	64.5	0.0	71.5	2.5	0		79.5	0	0
23	Potomac Greens Develo	479.00	63.0	63.5	63.5	59.9	65.3	1.6	4.0	0.00	NO	73.9	73.9	80.0	0.0	0	72	61.0	61.0	0.0	71.5	2.5	0		79.5	0	0
24	Potomac Greens Develo	479.00	63.0	61.2	61.2	58.5	64.0	1.9	4.6	0.00	NO	71.5	71.5	80.0	0.0	0	72	57.8	57.8	0.0	71.5	2.5	0		79.5	0	0
25	Potomac Greens Develo	479.00	63.0	59.8	59.8	57.7	63.3	2.1	5.1	0.00	NO	70.2	70.2	80.0	0.0	0	72	54.5	54.5	0.0	71.5	2.5	0		79.5	0	0
26	Potomac Greens Develo	479.00	63.0	58.1	58.2	56.8	62.5	2.4	5.7	0.10	NO	68.5	68.5	80.0	0.0	0	72	44.9	44.9	0.0	71.5	2.5	0		79.5	0	0
27	Potomac Greens Develo	463.00	63.0	58.2	58.4	56.8	62.5	2.4	5.7	0.20	NO	68.6	68.6	80.0	0.0	0	72	60.7	60.7	0.0	71.5	2.5	0		79.5	0	0
28	Potomac Greens Develo	464.00	63.0	58.0	58.1	56.7	62.4	2.4	5.7	0.10	NO	68.3	68.3	80.0	0.0	0	72	60.4	60.3	-0.1	71.5	2.5	0		79.5	0	0
29	Potomac Greens Develo	465.00	63.0	57.5	57.6	56.5	62.2	2.5	6.0	0.10	NO	67.8	67.8	80.0	0.0	0	72	59.7	59.7	0.0	71.5	2.5	0		79.5	0	0
30	Potomac Greens Develo	466.00	63.0	60.1	60.1	57.8	63.4	2.0	5.0	0.00	NO	70.4	70.4	80.0	0.0	0	72	60.5	60.4	-0.1	71.5	2.5	0		79.5	0	0
31	Potomac Greens Develo	469.00	63.0	58.5	58.6	57.0	62.7	2.3	5.6	0.10	NO	68.9	68.9	80.0	0.0	0	72	61.1	61.0	-0.1	71.5	2.5	0		79.5	0	0
32	Potomac Greens Develo	470.00	63.0	59.1	59.1	57.3	63.0	2.2	5.4	0.00	NO	69.5	69.4	80.0	-0.1	0	72	61.8	61.7	-0.1	71.5	2.5	0		79.5	0	0
33	Potomac Greens Develo	472.00	63.0	59.0	59.0	57.2	62.9	2.2	5.4	0.00	NO	70.6	69.4	80.0	-1.2	0	72	61.7	61.6	-0.1	71.5	2.5	0		79.5	0	0
34	The Eclipse on Center F	446.00	63.0	60.5	60.5	58.1	63.7	2.0	4.9	0.00	NO	70.8	70.8	80.0	0.0	0	72	56.4	56.4	0.0	71.5	2.5	0		79.5	0	0

PYMS_Summary_Appx1.xlsx - Alt_B

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Figure C3: Expanded Results of the Noise and Vibration Prediction Modeling Analysis – Build Alternative D

WMATA PYMS EIS - Summary of Noise & Vibration Results

BUILD_Alt_D4

Inputs: PYMS_NZ_NB4.xlsx

PYMS_NZ_Alt_D4.xlsx

Criteria based on EXISTING level along Rt. 1

08/02/12

MOD 8

SEV 0 7 WMATA 3

Inputs: PYMS_VIB_NB3.xlsx

PYMS_VIB_Alt_D3.xlsx

Impact: ABS_Round 0.5 INCR 2.5

7 WMATA Crit. MFAM: III-IV 79.5 0 7

Receptor No.	Description	Sta. No.	Noise Levels (dBA) Existing	Future Alt. NB	Future Alt. BD	Criteria Limits, Absolu MOD	Criteria Limits, Absolu SEV	Criteria Limits, Relativ MOD	Criteria Limits, Relativ SEV	FTA Noise Impacts BD	FTA Noise Impacts BD	WMATA Noise Impacts Lmax_NB	WMATA Noise Impacts Lmax_BD	WMATA Noise Impacts Lmax_Crit	WMATA Noise Impacts Lmax_Incr	WMATA Noise Impacts Lmax_IMP	FTA VIB Criteria	Vibration Levels (VdB) No Build VdB_MAX	Vibration Levels (VdB) Build VdB_MAX	Vibration Levels (VdB) VdB_del	FTA VIB Criteria ABS	FTA VIB Criteria INCR	FTA VIB Criteria VIB_Imp_BD	FTA VIB Criteria Source	WMATA VIB Impacts WMATA_Crit	WMATA VIB Impacts VIB_Imp_WV	WMATA VIB Impacts 3D_Imp_WV
		2	3	18	16	15	9	9	11	13	23	23	56	56	14		9	22	22	22	9			15	14		
1	Potomac Greens, Poton	468.00	~~63.0~~	60.0	62.4	57.8	63.4	2.0	5.0	2.40	MOD	70.3	72.8	80.0	2.4	0	72	60.6	64.9	4.3	71.5	2.5	0		79.5	0	0
2	Lynhaven Community, (	453.00	72.0	55.7	60.2	65.0	70.9	0.8	2.5	0.18	NO	66.0	70.4	80.0	4.4	0	72	0.0	0.0	0.0	71.5	2.5	0		79.5	0	0
3	Park/Trail	457.00	~~63.0~~	60.7	57.3	63.2	68.8	4.4	8.7	-3.40	NO	72.9	69.5	999.0	-3.4	0	75	59.8	50.7	-9.1	74.5	2.5	0		79.5	0	0
4	Potomac Yard (propose	457.00	~~62.0~~	57.5	62.1	56.5	62.2	2.5	6.0	4.60	MOD	67.9	72.4	80.0	4.5	0	72	38.0	60.4	22.4	71.5	2.5	0		79.5	0	0
5	Potomac Greens Develo	459.00	~~63.0~~	65.8	61.8	61.4	66.7	1.3	3.5	-4.00	NO	76.1	72.2	80.0	-3.9	0	72	64.0	60.9	-3.1	71.5	2.5	0		79.5	0	0
6	Potomac Greens Develo	460.00	~~63.0~~	65.3	62.3	61.0	66.4	1.4	3.6	-3.00	NO	75.7	72.6	80.0	-3.0	0	72	63.3	61.7	-1.6	71.5	2.5	0		79.5	0	0
7	Potomac Greens Develo	461.00	~~63.0~~	64.2	62.3	60.3	65.7	1.5	3.8	-1.90	NO	74.6	72.7	80.0	-1.9	0	72	61.9	61.9	0.0	71.5	2.5	0		79.5	0	0
8	Potomac Greens Develo	461.00	~~63.0~~	68.3	65.7	63.1	68.3	1.1	3.0	-2.60	NO	78.7	76.1	80.0	-2.6	0	72	67.6	69.5	1.9	71.5	2.5	0		79.5	0	0
9	Potomac Greens Develo	465.00	~~63.0~~	70.5	67.5	64.7	69.8	1.0	2.7	-3.00	NO	80.9	77.9	80.0	-3.0	0	72	70.6	85.5	14.9	71.5	2.5	1 Passbys		79.5	0	1
10	Potomac Greens Develo	466.00	~~63.0~~	71.0	67.8	65.1	70.2	1.0	2.6	-3.20	NO	81.4	78.2	80.0	-3.2	0	72	71.3	87.3	16.0	71.5	2.5	1 Passbys		79.5	0	1
11	Potomac Greens Develo	468.00	~~63.0~~	71.0	68.1	65.1	70.2	1.0	2.6	-2.90	NO	81.4	78.5	80.0	-2.9	0	72	71.3	86.4	15.1	71.5	2.5	1 Passbys		79.5	0	1
12	Potomac Greens Develo	469.00	~~63.0~~	72.5	69.1	65.0	71.3	0.7	2.5	-3.40	NO	82.8	79.4	80.0	-3.4	0	72	73.1	85.7	12.6	71.5	2.5	1 Passbys		79.5	0	1
13	Potomac Greens Develo	471.00	~~63.0~~	71.7	71.7	65.0	70.7	0.8	2.5	0.00	NO	82.1	82.1	80.0	0.0	1	72	72.2	82.3	10.1	71.5	2.5	1 Passbys		79.5	0	1
14	Potomac Greens Develo	472.00	~~63.0~~	72.4	72.5	65.0	71.2	0.7	2.5	0.10	NO	86.6	92.8	80.0	-3.8	1	72	73.0	83.1	10.1	71.5	2.5	1 Passbys		79.5	0	1
15	Potomac Greens Develo	474.00	~~63.0~~	76.9	75.5	65.0	74.7	0.3	2.0	-1.40	NO	87.2	86.3	80.0	-1.4	1	72	72.0	81.3	9.3	71.5	2.5	1 Passbys		79.5	0	1
16	Potomac Greens Develo	474.00	~~63.0~~	64.5	65.0	60.5	65.9	1.5	3.8	0.50	NO	76.0	75.4	80.0	-0.6	0	72	62.2	64.1	1.9	71.5	2.5	0		79.5	0	0
17	Potomac Greens Develo	475.00	~~63.0~~	64.5	64.8	60.5	65.9	1.5	3.8	0.30	NO	74.9	75.2	80.0	0.3	0	72	62.3	63.2	0.9	71.5	2.5	0		79.5	0	0
18	Potomac Greens Develo	476.00	~~63.0~~	67.8	68.0	62.7	68.0	1.2	3.1	0.20	NO	78.2	78.4	80.0	0.2	0	72	66.9	67.3	0.4	71.5	2.5	0		79.5	0	0
19	Potomac Greens Develo	477.00	~~63.0~~	68.0	68.0	62.9	68.1	1.2	3.1	0.00	NO	78.4	78.4	80.0	0.0	0	72	67.2	67.2	0.0	71.5	2.5	0		79.5	0	0
20	Potomac Greens Develo	479.00	~~63.0~~	67.9	67.9	62.8	68.1	1.2	3.1	0.00	NO	78.3	78.3	80.0	0.0	0	72	67.0	67.0	0.0	71.5	2.5	0		79.5	0	0
21	Potomac Greens Develo	479.00	~~63.0~~	68.0	68.0	62.9	68.1	1.2	3.1	0.00	NO	78.4	78.4	80.0	0.0	0	72	67.1	67.1	0.0	71.5	2.5	0		79.5	0	0
22	Potomac Greens Develo	479.00	~~63.0~~	66.1	66.1	61.6	66.9	1.3	3.4	0.00	NO	76.5	76.5	80.0	0.0	0	72	64.5	64.5	0.0	71.5	2.5	0		79.5	0	0
23	Potomac Greens Develo	479.00	~~63.0~~	63.5	63.5	59.9	65.3	1.6	4.0	0.00	NO	73.9	73.9	80.0	0.0	0	72	61.0	61.0	0.0	71.5	2.5	0		79.5	0	0
24	Potomac Greens Develo	479.00	~~63.0~~	61.2	61.2	58.5	64.0	1.9	4.6	0.00	NO	71.5	71.5	80.0	0.0	0	72	57.8	57.8	0.0	71.5	2.5	0		79.5	0	0
25	Potomac Greens Develo	479.00	~~63.0~~	59.8	59.8	57.7	63.3	2.1	5.1	0.00	NO	70.2	70.2	80.0	0.0	0	72	54.5	54.5	0.0	71.5	2.5	0		79.5	0	0
26	Potomac Greens Develo	479.00	~~63.0~~	58.1	58.2	56.8	62.5	2.4	5.7	0.10	NO	68.5	68.5	80.0	0.0	0	72	44.9	44.9	0.0	71.5	2.5	0		79.5	0	0
27	Potomac Greens Develo	463.00	~~63.0~~	58.2	62.5	56.8	62.5	2.4	5.7	4.30	MOD	68.6	72.9	80.0	4.3	0	72	60.7	63.1	2.4	71.5	2.5	0		79.5	0	0
28	Potomac Greens Develo	464.00	~~63.0~~	58.0	62.7	56.7	62.4	2.4	5.7	4.70	MOD	68.3	73.1	80.0	4.7	0	72	60.4	63.9	3.5	71.5	2.5	0		79.5	0	0
29	Potomac Greens Develo	465.00	~~63.0~~	57.5	62.5	56.5	62.2	2.5	6.0	5.00	MOD	67.8	72.9	80.0	5.1	0	72	59.7	63.8	4.1	71.5	2.5	0		79.5	0	0
30	Potomac Greens Develo	466.00	~~63.0~~	60.1	63.5	57.8	63.4	2.0	5.0	3.40	MOD	70.4	73.8	80.0	3.4	0	72	60.5	65.3	4.8	71.5	2.5	0		79.5	0	0
31	Potomac Greens Develo	469.00	~~63.0~~	58.5	63.4	57.0	62.7	2.3	5.6	4.90	MOD	68.9	73.7	80.0	4.8	0	72	61.1	64.9	3.8	71.5	2.5	0		79.5	0	0
32	Potomac Greens Develo	470.00	~~63.0~~	59.1	63.9	57.3	63.0	2.2	5.4	4.80	MOD	69.5	74.3	80.0	4.8	0	72	61.8	65.6	3.8	71.5	2.5	0		79.5	0	0
33	Potomac Greens Develo	472.00	~~63.0~~	59.0	59.9	57.2	62.9	2.2	5.4	0.90	NO	70.6	70.3	80.0	-0.3	0	72	61.7	65.0	3.3	71.5	2.5	0		79.5	0	0
34	The Eclipse on Center F	446.00	~~63.0~~	60.5	60.2	58.1	63.7	2.0	4.9	-0.30	NO	70.8	70.5	80.0	-0.3	0	72	56.4	55.6	-0.8	71.5	2.5	0		79.5	0	0

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POTOMAC YARD METRORAIL STATION
ENVIRONMENTAL IMPACT STATEMENT

Water Resources Technical Memorandum

February 2013

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1.0 INTRODUCTION

The Federal Transit Administration (FTA), as the lead federal agency, and the City of Alexandria, as the project sponsor and joint lead agency, have prepared a Draft Environmental Impact Statement (Draft EIS) in accordance with the National Environmental Policy Act (NEPA) for the proposed Potomac Yard Metrorail Station ("the project"). The Draft EIS has been prepared in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) and the National Park Service (NPS).

This technical memorandum identifies the potential effects to surface water resources in the study area including wetlands, Waters of the United States (WOUS), floodplains, coastal zones and navigable waterways of the No Build and three Build Alternatives. The memorandum describes the following:

- Project alternatives
- Applicable regulations and guidance
- Methodology
- Opening year conditions
- Potential effects of each alternative (note that construction effects are described separately in the Construction Impacts Technical Memorandum)
- Mitigation measures

The findings of this analysis will be incorporated into the Draft EIS.

The technical memorandum also describes local, state and federal regulatory requirements and approvals that would occur at the design phase of the project, after a Preferred Alternative has been selected, and the NEPA process is concluded.

Surface waters in the study area include the Potomac River and Four Mile Run. The study area is situated within the Middle Potomac-Anacostia-Occoquan watershed. The City of Alexandria and Arlington County are also both jurisdictions within Virginia's designated coastal zone. Thus the jurisdictions are subject to compliance with the requirements the Coastal Zone Management Act (CZMA) and Chesapeake Bay Preservation Act.

1.1 Project Alternatives

The Draft EIS evaluates a No Build Alternative and three Build Alternatives. Each Build Alternative includes the same area improvements as the No Build Alternative in addition to construction and operation of a Metrorail station.

1.1.1 No Build Alternative

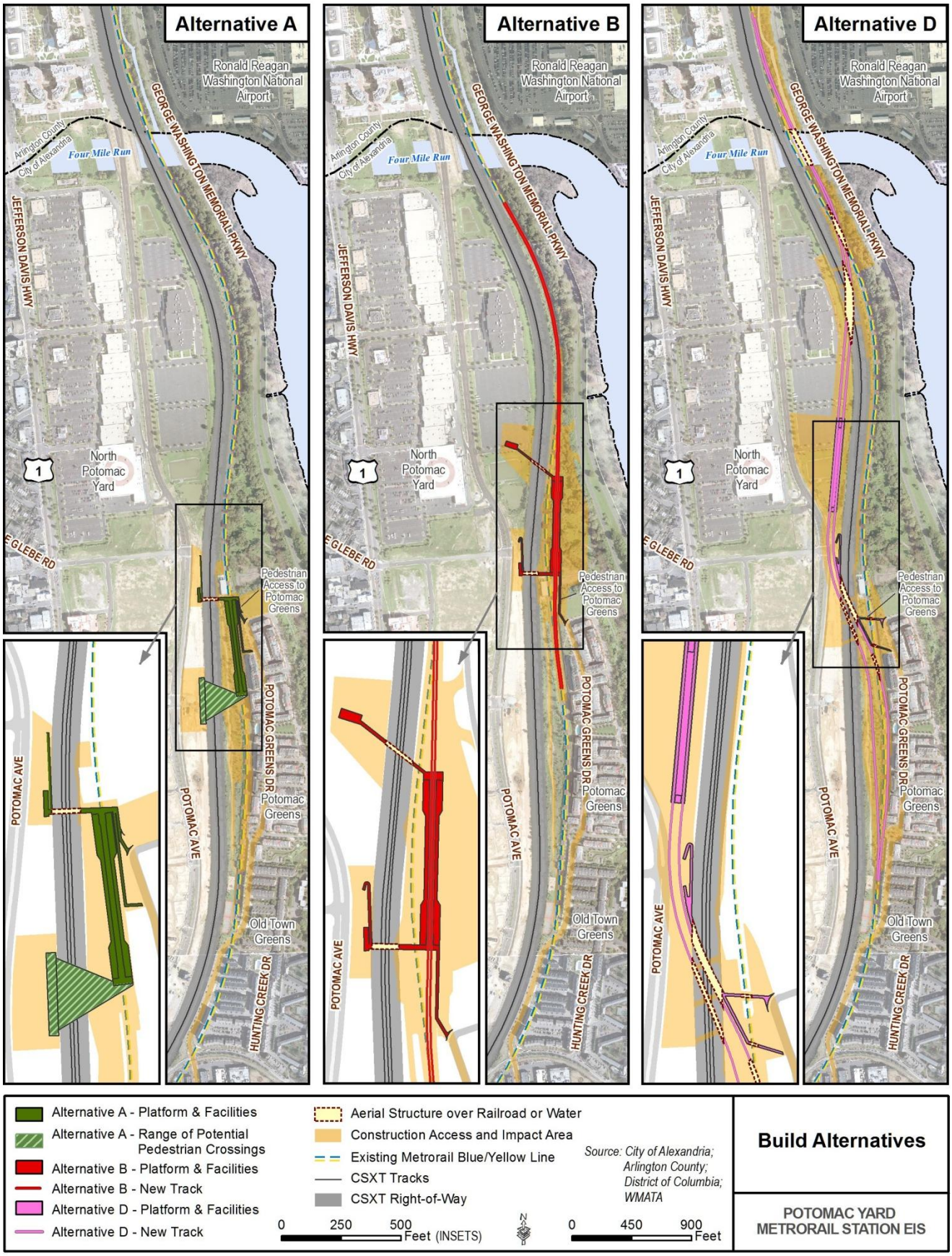
The No Build Alternative is defined as the existing highway and transit network and committed transportation improvements from the National Capital Region Transportation Planning Board's Financially Constrained Long Range Plan (CLRP). The Draft EIS assumes that any improvements that are anticipated to be implemented by the project horizon year, whether physical or operational, are part of the No Build Alternative, with the exception of the new Metrorail Station at Potomac Yard.

The No Build Alternative includes the build-out of an internal street network within Potomac Yard (roughly from Four Mile Run to Braddock Road) and additional investments in transit and bicycle/pedestrian facilities, including a pedestrian bridge over the Metrorail and CSX Transportation (CSXT) rights-of-way between Potomac Greens and Potomac Yard. Anticipated transit investments include the Crystal City/Potomac Yard (CCPY) Transitway and an expansion of local transit service. The No Build Alternative also includes an off-street, multi-use trail through the planned linear park between Potomac Avenue and the CSXT right-of-way. This new off-street, multi-use trail will enhance access to the existing regional trail network, which serves both recreational users and commuters.

1.1.2 Build Alternatives

The Build Alternatives are described below and shown in **Table 1-1** and **Figure 1-1**.

Figure 1-1: Build Alternatives



Build Alternative A

Build Alternative A would be located between the CSXT right-of-way and the north end of the Potomac Greens neighborhood in the existing Metrorail Reservation easement designated during earlier planning efforts for the Potomac Yard area. The station would be at-grade with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard. The bridge at the northern end of the station would provide 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood.

Build Alternative A would require minimal track realignment within the station area and would include construction of a double crossover located approximately 900 feet south of the station.

Build Alternative B

Build Alternative B would be located between the George Washington Memorial Parkway (GWMP) and the CSXT right-of-way, north of the Potomac Greens neighborhood, and east of the existing Potomac Yard Shopping Center and the CSXT right-of-way. The station would be at-grade. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard. The bridge at the southern end of the station would provide 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood.

Build Alternative B would require the realignment of approximately 650 feet of existing track, as well as the installation of approximately 1,450 feet of new track. Special track work – a double crossover – would be required approximately 100 feet north of the station.

The new track and station would be built on retained fill, and a new retaining wall would be constructed on the east side of the track and station to support the structures.

Build Alternative D

Build Alternative D would be located west of the CSXT right-of-way near the existing Potomac Yard Shopping Center. The station would be aerial with a center platform layout. One pedestrian bridge over the CSXT right-of-way would be constructed, providing 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood. The pedestrian bridge would be parallel to the adjacent new Metrorail bridge over the CSXT right-of-way.

Build Alternative D would require the realignment of approximately 550 feet of existing track, as well as the installation of approximately 5,800 feet of new track. The majority of new track would be elevated. Build Alternative D would also include construction of two Metrorail aerial bridges crossing the CSXT right-of-way to the north and south of the station, and a new, single span, aerial structure over Four Mile Run. Construction of a double crossover would be required in a location approximately 100 feet north of the station. Following completion of construction, the old Metrorail tracks would be removed from service.

Additional structural improvements would include the removal and replacement of the existing retaining wall near the Potomac Greens neighborhood and the removal of an additional retaining wall west of the existing Metrorail tracks, north of the portal at the southern end of the neighborhood.

Table 1-1: Build Alternatives

Alternative	Type and Layout	Track Work	Facilities for Station Access	Additional Structures Required
Build Alternative A	At-grade, side platform	Minimal track work	Two pedestrian bridges over CSXT right-of-way; access to Potomac Greens via walkway	None
Build Alternative B	At-grade, side platform	Moderate track work	Two pedestrian bridges over CSXT right-of-way; access to Potomac Greens via walkway	Structures (retaining wall) to support new track and station
Build Alternative D	Aerial, center platform	Major track work	One pedestrian bridge over CSXT right-of-way to provide access between Potomac Yard and Potomac Greens	Two aerial structures over CSXT right-of-way, one Metrorail bridge over Four Mile Run, aerial track and supports, and retaining wall replacement on the east and west sides of the tracks north of the existing Metrorail portal. New structures would pass over the existing Metrorail tracks, which would be removed following construction.

Note: Track work for Build Alternatives B and D assumes existing Blue and Yellow Line Metrorail track would be removed where track is realigned.

1.2 Applicable Regulations and Guidance

Surface water resources within the study area are protected by federal, state and local laws and regulation. The analysis of water resources is being developed consistent with the following laws and regulations:

1.2.1 Federal Law and Guidance

Clean Water Act of 1972

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Sections 303, 305, 401 402 and 404 of the CWA are potentially relevant to project activities.

Presidential Executive Order 11990, *Protection of Wetlands*

This Executive Order directs federal agencies to “avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.”

Presidential Executive Order 11988, *Floodplain Management*

This Executive Order directs federal agencies to “avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.” The intent of Executive Order 11988 is to avoid and minimize development within the 100-year floodplain, where practicable, and to encourage compatible land use within floodplains.

National Park Service, Director's Order #77-1: Wetland Protection

This Order establishes NPS policies, requirements, and standards for implementing Executive Order 11990, Protection of Wetlands. NPS has also developed a procedural manual for implementation of this order.

National Park Service, Director's Order #77-2: Floodplain Management

This Order establishes NPS policies, requirements, and standards for implementing Executive Order 11988, Floodplain Management. NPS has also developed a procedural manual for implementation of this order.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act of 1972 and reauthorization amendments of 1990, require that federal actions that are likely to affect any land or water use or natural resources of the coastal zone be consistent with the enforceable policies of a state coastal zone management program. The Commonwealth of Virginia established the Virginia Coastal Resources Management Program in 1986 to protect and manage Virginia's coastal zone.

Rivers and Harbors Appropriations Act of 1899 (33 USC 401, 403, 407)

The Rivers and Harbors Appropriations Act prohibits the construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. without the approval of the U.S. Coast Guard (USCG).

Navigation and Navigable Waterways (33 CFR Part 114)

This section of the Code of Federal Regulations provides implementation guidelines to the USCG for the issuance of bridge permits into navigable waters of the U.S.

Wild and Scenic Rivers Act of 1968

The Wild and Scenic Rivers Act of 1968 protects rivers designated by Congress or the Secretary of Interior as wild, scenic or recreational rivers.

Energy Independence and Security Act

Section 438 of the Energy Independence and Security Act (EISA) instructs federal agencies to "use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate," for any project with a footprint that exceeds 5,000 square feet[1]. Section 438 of EISA states that the law applies to the "sponsor of any development or redevelopment project involving a Federal facility."[2] The "sponsor" of a project is generally regarded as a federal department or agency that owns, operates, occupies or is the primary user of the facility and has initiated the development or redevelopment project.

WMATA ultimately would own and operate the proposed Metrorail station facility. WMATA is not considered a federal agency in the Commonwealth of Virginia. Therefore, the analysis assumes that EISA is not applicable to this project.

1.2.2 State Law

Waters of the State, Ports and Harbors (Title 62.1 of the Code of Virginia)

Title 62.1 of the Virginia Code establishes state regulatory authority for activities within surface and ground water of the Commonwealth of Virginia such as activities within navigable waterways, wetlands and discharges. Title 62.1 provides the enabling legislation for Virginia's compliance with the CWA.

Chesapeake Bay Preservation Act of 1988

Virginia's Chesapeake Bay Preservation Act protects certain activities within the coastal areas of "Tidewater Virginia". The purpose of the law is to protect the water quality of the Chesapeake Bay and its tributaries.

Tidal Wetlands Act of 1972

This state law provides the enabling authority for the Virginia Department of Environmental Quality (VDEQ) to regulate and enforce activities in wetlands.

Fisheries and Habitat of the Tidal Waters (Title 28.2 of the Code of Virginia)

Title 28.2 of the Virginia Code establishes state regulatory authority for fisheries and habitat of tidal waters in the Commonwealth of Virginia.

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[1] Source: U.S. Environmental Protection Agency, *Federal Stormwater Management Requirements*, Accessed at: http://www.epa.gov/oaintrnt/stormwater/requirements.htm

[2] Source: U.S. Environmental Protection Agency, *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*, Accessed at: http://www.epa.gov/oaintrnt/documents/epa_swm_guidance.pdf

Scenic Rivers Act of 1970

The Scenic Rivers Act established Virginia's Scenic Rivers Program which gives the General Assembly the authority to designate certain rivers within the Commonwealth as "scenic rivers" due to "superior natural and scenic beauty, fish and wildlife, and historic, recreational, geologic, cultural, and other assets".

Stormwater Management Act

The Stormwater Management Act established the Virginia Stormwater Management Program, which is administered by the Virginia Department of Conservation and Recreation (VDCR). VDCR is authorized to issue Stormwater Management Permits for the regulation of construction activities.

1.2.3 Local Regulation

City of Alexandria Zoning Ordinance, Article XIII, Environmental Management

Article XIII establishes local development restrictions in accordance with the Virginia's Chesapeake Bay Preservation Act. The zoning ordinance defines Chesapeake Bay Preservation Areas (CBPAs) within the City of Alexandria, restrictions on development, as well as review and approval processes for impacts to CBPAs. The ordinance establishes two types of CBPAs within the City: Resource Management Areas (RMAs) and Resource Protection Areas (RPAs). The ordinance defines an RPA as consisting of "sensitive land that has either an intrinsic water quality value due to the ecological and biological processes that is sensitive to uses or activities such that the use results in significant degradation to the quality of state waters"[3] and identifies the types of land which are defined as RPAs to include tidal wetlands, tidal shores, non-tidal wetlands, and the 100-foot buffer areas adjacent to these lands. The ordinance defines RMAs as consisting of: "land that, if improperly used or developed, has a potential for causing significant water quality degradation or for diminishing the functional value of the RPA. Therefore, all lands in the city, not included in the RPA, shall constitute the RMA since all such land drains through natural or manmade conveyances to the Potomac River and Chesapeake Bay." The ordinance includes a Chesapeake Bay Preservation Area Map, which illustrates the locations of existing RMAs and RPAs within the City.

In addition to the existing designated RPAs, the ordinance requires development applications to delineate site-specific RPA boundaries for any tidal or non-tidal wetlands found on a property. Site-specific delineations are preliminary until accepted by the City. The ordinance also requires the development of Stormwater Management Plans for new construction, describing permanent stormwater management facilities.

City of Alexandria Zoning Ordinance, Floodplain Districts (Sec. 6-300)

Section 6-300 establishes and regulates the City's floodplain district, restrictions on development in the district, and the review and approval process for building in 100-year flood zones within the City of Alexandria.

City of Alexandria Code, Erosion and Sediment Control (Sec. 5-4)

Section 5-4-1 of the City's Code establishes and regulates erosion and sediment control resulting from land disturbing activities within the City's jurisdiction, including construction. Section 5-4-1 requires the development of an Erosion and Sediment Control Plan for new construction.

Arlington County Code, Chesapeake Bay Preservation Ordinance (Chapter 61)

Chapter 61 establishes local development restrictions in accordance with Virginia's Chesapeake Bay Preservation Act. The zoning ordinance defines Chesapeake Bay Preservation Areas (CBPAs) within the County, restrictions on development, as well as review and approval processes for impacts to CBPAs. The ordinance also requires the development of the Arlington County Resource Protection Area Map.

Arlington County Code, Floodplain Management (Chapter 48)

Chapter 48 of the County's Code establishes and regulates the City's floodplain district, restrictions on development in the district, and the review and approval process for building in 100-year flood zones within Arlington County.

[3] *Zoning Ordinance.* City of Alexandria. §§ 13-105.

Arlington County Code, Erosion and Sediment Control (Chapter 57)

Chapter 57 of the County's Code establishes and regulates erosion and sediment control resulting from land disturbing activities within the County's jurisdiction, including construction. Chapter 57 requires the development of an Erosion and Sediment Control Plan for new construction.

Arlington County Code, Stormwater Detention (Chapter 60)

Chapter 60 of the County's Code establishes and regulates stormwater detention activities within the County's jurisdiction, including construction. Chapter 60 requires the development of a Stormwater Detention Plan for new construction.

1.3 Methodology

1.3.1 Wetlands and Waters of the United States

The wetland analysis methodology consisted of the following tasks:

- Regulatory agency coordination;
- Background research and preliminary field walk;
- WOUS and wetlands field delineation;
- Preparation of a WOUS and wetlands delineation report;
- Preparation of a Jurisdictional Determination (JD) application package; and
- Wetlands impact assessment.

Regulatory agencies were first contacted to determine requirements for the submittal of a Wetland Jurisdictional Determination (JD) Review Package to the U.S. Army Corps of Engineers-Norfolk District (USACE). Regulatory agencies for the project include USACE, NPS (in fulfillment of Executive Order 11990 Protection of Wetlands), and VDEQ.

Available federal, state and local natural environmental data were used to assist in identification of study area wetlands and WOUS prior to the field delineation. Data sources included the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI), U.S. Geological Survey (USGS) National Hydrography Dataset (NHD), and USGS topographic maps. A complete set of references is provided in **Appendix A**.

Field reviews and wetland delineation of the study area were conducted between October and December 2011. The delineation consisted of augur pulls (soil samples), vegetation surveys, and hydrologic indicator studies consistent with both USACE and NPS wetland delineation techniques in accordance with USACE methodology. In addition to using the USACE methodology, WOUS and wetlands on NPS property were delineated using NPS procedures described in NPS Director's Order (DO) #77-1. The NPS methodology requires one wetland characteristic to be identified for a wetland boundary; the USACE requires all three characteristics to be identified for "normal circumstances", but only two characteristics for previously disturbed sites. Disturbance includes both human activities and natural events. Examples of disturbance include, but are not limited to, things such as placement of fill, levees, agriculture, beaver dams, and wildfire.

The project team prepared the JD application following the completion of field delineation efforts and survey. The JD application includes site descriptions, procedural descriptions for the delineation, study findings, proposed wetland boundaries, background information, map exhibits, and completed USACE data sheets. The JD application and USACE approval are provided in **Appendix C**. In April 2012, a JD field review was conducted with USACE, NPS and FTA representatives. The purpose of the field review was to obtain regulatory agency concurrence for the wetland delineation and to confirm site conditions and address any comments the agencies may have regarding the wetland delineation.

Based on the review of existing data and initial site walk, a full delineation was not necessary, nor conducted for the portion of land between the CSXT and WMATA tracks due to the absence of potential WOUS and wetlands.

The impact analysis was completed using geographic information systems (GIS) mapping by overlaying the delineated wetland areas with the proposed temporary Limits of Construction (LOC) and permanent Limits of Disturbance (LOD) for the three Build Alternatives.

1.3.2 Water Quality

The water quality analysis identified designated impaired streams in the study area using the VDEQ 305(b)/303(d) Water Quality Assessment Integrated Report. The CWA requires states to identify and develop a list of water bodies that are both impaired and are not in attainment of water quality standards. The analysis reviewed existing water quality testing data within the study area using National Pollutant Discharge Elimination System (NPDES) and Virginia Pollutant Discharge Elimination System (VPDES) information for permit holders. The analysis also qualitatively assessed the capacity for NPDES and VPDES permit holders to accommodate the project. Project impacts to water quality were assessed by identifying anticipated point and non-point sources and operational impacts such as oil or lubricant leakage, deicing chemicals, or long-term stormwater runoff.

1.3.3 Floodplains

Floodplains were analyzed using Flood Insurance Rate Maps (FIRMs) developed by the Federal Emergency Management Agency (FEMA). The FIRMs depict 100-year and 500-year flood zones within the study area. The impact analysis was completed in GIS by overlaying the 100-year and 500-year flood zone areas with the proposed LOC and LOD for the three Build Alternatives.

1.3.4 Coastal Zones

To ensure project consistency with the CZMA, a Coastal Zone Consistency Determination for the project will be submitted to VDEQ (See **Appendix D**). The consistency determination demonstrates the project's compliance with "enforceable policies" in Virginia's coastal zone. Enforceable policies relevant to the project include the following:

- Fisheries management;
- Subaqueous lands management;
- Wetlands management;
- Non-point source pollution control;
- Point source pollution control;
- Shoreline sanitation;
- Air pollution control; and
- Coastal lands management.

The impact analysis was completed in GIS intersecting RPA boundaries with the proposed temporary LOC and permanent LOD for the three Build Alternatives.

1.3.5 Navigable Waterways

The project team coordinated with the USCG to verify whether Four Mile Run is considered a Navigable Water of the United States. To further verify the navigability of Four Mile Run, National Oceanic and Atmospheric Administration (NOAA) navigation charts were reviewed as well as the USACE-Norfolk District *List of Navigable Waters*.

1.3.6 Designated Scenic Rivers

No federal or state designated scenic river is located in the study area, based on a review of the Interagency Wild & Scenic Rivers Council, Designated Wild & Scenic Rivers for Virginia and Washington, D.C. No scenic river designated by the Commonwealth of Virginia is located in the study area. Therefore, no impact to this resource is anticipated and no further analysis is necessary.

2.0 OPENING YEAR CONDITIONS

2.1 Wetlands and Waters of the United States

As described in the methodology section, qualified environmental scientists completed a wetland delineation of the study area. Following the delineation, a project JD was sought for the wetlands through the USACE-Norfolk District. The USACE approved the project JD in September 2012. The results of the delineation are summarized in **Table 2-1** and shown in **Figure 2-1.**

Identified wetlands and WOUS in the study area are regulated by the USACE, NPS, or both USACE and NPS.

- *USACE Only* – wetlands areas meet the criteria for wetlands consistent with USACE methodology and are not located on NPS parkland.
- *NPS Only* – wetlands areas meet the criteria for wetlands consistent with the NPS methodology only, and are located on NPS parkland.
- *USACE and NPS* – wetlands areas meet the criteria for wetlands consistent with both the USACE and NPS methodologies and are located on NPS parkland.

Table 2-1: USACE and NPS Wetlands and Waters of the U.S. in the Study Area

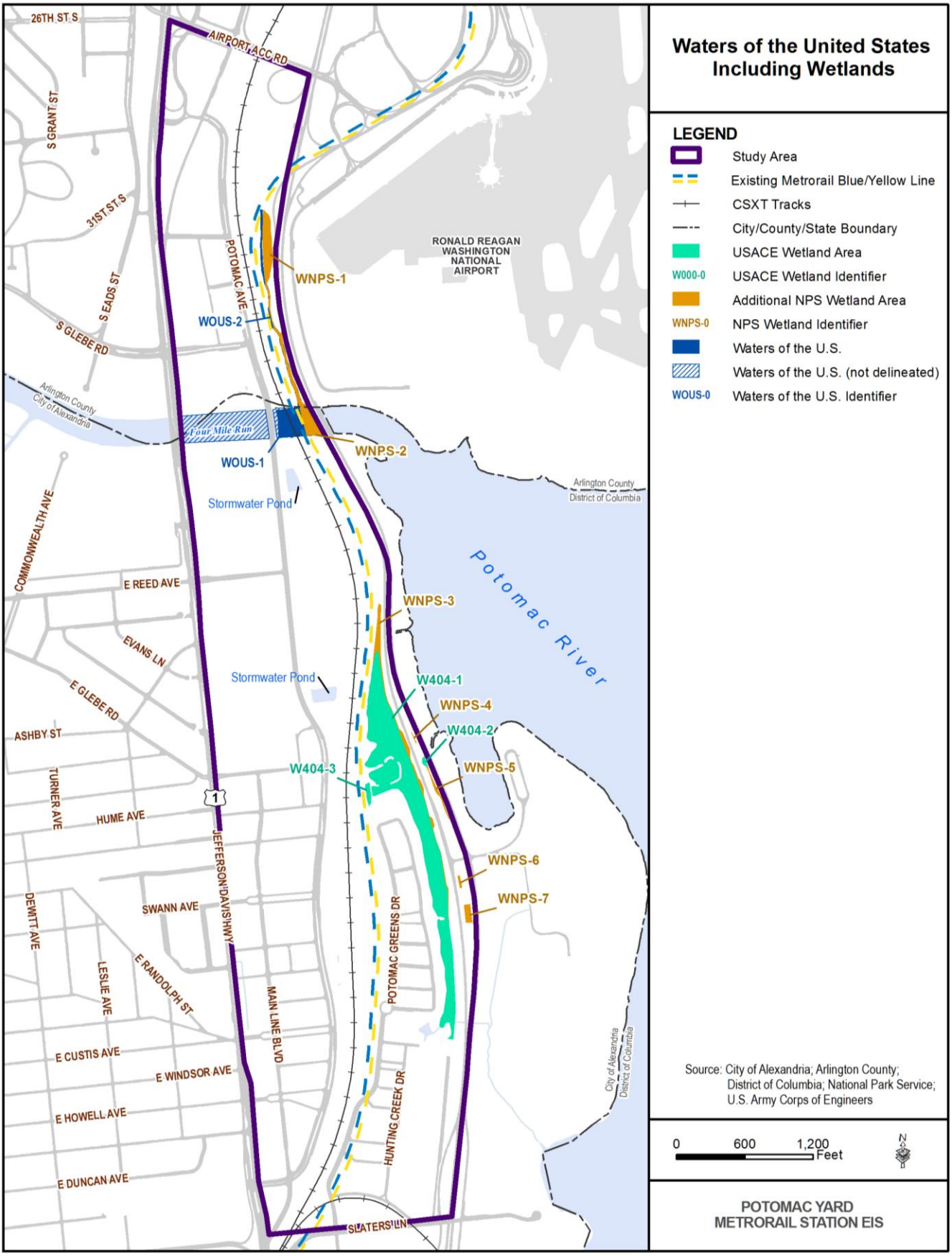
	USACE Only (acres)	NPS and USACE (acres)	NPS Only (acres)	Total (acres)	Linear Feet
Wetlands					
W404-1	9.78	2.41	N/A	**12.19**	N/A
W404-2	0.00	0.06	N/A	**0.06**	N/A
W404-3	0.17	0.00	N/A	**0.17**	N/A
TOTAL	**9.95**	**2.47**	**N/A**	**12.41**	**N/A**
Waters of the U.S.					
WOUS-1	1.33	0.61	N/A	**1.93**	396
WOUS-2	0.19	0.54	N/A	**0.73**	1,795
Area of Four Mile Run Not Delineated*	N/A	N/A	N/A	**4.40**	860
TOTAL	**1.51**	**1.15**	**N/A**	**7.06**	N/A
NPS Wetlands					
WNPS-1	N/A	N/A	0.92	**0.92**	N/A
WNPS-2	N/A	N/A	0.04	**0.04**	N/A
WNPS-3	N/A	N/A	0.99	**0.99**	N/A
WNPS-4	N/A	N/A	0.02	**0.02**	N/A
WNPS-5	N/A	N/A	0.17	**0.17**	N/A
WNPS-6	N/A	N/A	0.05	**0.05**	N/A
WNPS-7	N/A	N/A	0.21	**0.21**	N/A
TOTAL	**N/A**	**N/A**	**2.41**	**2.41**	**N/A**

**The area of Four Mile Run within the project Study Area and outside of the wetlands survey area (west of Potomac Avenue) was estimated using GIS.
N/A = Not Applicable

Wetlands regulated by NPS only within the study area amount to an additional 2.41 acres (orange wetland areas shown in **Figure 2-1**). These NPS wetlands are not subject to regulation by USACE. The area of Four Mile Run west of Potomac Avenue was estimated with GIS; however, wetland delineation was not conducted for the segment of the stream west of the bridge. Stormwater ponds are also shown in Figure 2-1**;** however, these ponds are not regulated by the USACE, because the ponds are not connected with WOUS.

The predominant types of wetlands identified within the study area are Palustrine Forested/Shrub Wetlands (PFO), Palustrine Emergent Wetlands (PEM), and Palustrine Scrub-Shrub (PSS) as defined by the guidance in Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). The Palustrine system can generally be defined as all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent.

Figure 2-1: Waters of the United States Including Wetlands



2.2 Water Quality

Designated Impaired Waters

Both the Potomac River and Four Mile Run are designated as impaired waters by USEPA and VDEQ. The causes of impairments in Four Mile Run are high levels of *Escherichia coli* and Polychlorinated Biphenyl (PCB). Sources of Escherichia coli (E. coli) contamination identified by VDEQ include illicit connections/hookups to storm sewers, sanitary sewer system outflows (collection system failures), waste from pets, waterfowl, and other wildlife. VDEQ identifies atmospheric deposition, contaminated sediments, combined sewer outflows and upstream sources as potential sources of PCB contamination in Four Mile Run. The section of the Potomac River adjacent to the study area has bacteria, organic compounds, and pH listed as causes of impairments. A water quality monitoring station is located on Four Mile Run, directly west of the project study area, which monitors both the general quality of Four Mile Run and discharges from the Arlington County Water Pollution Control Plant.

In compliance with reporting requirements of the CWA, Section 303(d), VDEQ monitors streams for water quality. Surface waters in violation of established criteria for clean water are listed as impaired. To restore and maintain the water quality of impaired waters, Total Maximum Daily Load (TMDL) plans are developed to determine the total amount of pollutants a waterbody can assimilate and still adhere to the standards. A TMDL has been developed for Four Mile Run, which is an impaired body of water. Pollutants enter Four Mile Run and the associated wetlands and Waters of the U.S. from area roadways, storm drains, and parking lots. Pollutants include grease, oil, metals, nutrients, nitrogen, deicing salts, roadside vegetation management chemicals, and suspended solids.

A TMDL or a “pollution diet” has been approved for both Four Mile Run and the Potomac River. Discharges of water to both water bodies are permitted through NPDES permits that regulate the amount of pollutants discharged. Virginia regulates discharges to Four Mile Run using the VPDES, and USEPA regulates discharges directly into the Potomac River. In the area of the project, the Potomac River is within the jurisdiction of the District of Columbia.

Within the project study area, there are three major NPDES permits: George Washington Memorial Parkway; City of Alexandria storm sewer; and Arlington County’s storm sewer. Additionally, individual sediment and erosion plans for construction within the study area would fall under the Construction Stormwater General Permit that Virginia holds for construction-related NPDES permits.

Stormwater Management

Polluted stormwater runoff in the City of Alexandria and Arlington County is transported through Municipal Separate Storm Sewer Systems (MS4s), from which stormwater is often discharged untreated into local water bodies. To reduce the quantity of pollutants discharged into an MS4, operators must obtain and comply with an NPDES permit, as well as develop a stormwater management program.

For the redevelopment of the Potomac Yard, the City of Alexandria requires the developer to provide a Water Management Master Plan (WMMP) to coordinate water supply, stormwater, and wastewater systems for the completed development. As parcels develop, the site plans are also required to employ small on-site Low Impact Design (LID) techniques such as green roofs, rainwater harvesting, and bioretention to reduce the amount of stormwater generated and reuse the remaining stormwater to the greatest extent possible. Developers of parcels within Potomac Yard have already begun implementing large-scale stormwater management techniques such as retention ponds and structural best management practices (BMPs). The City of Alexandria Department of Transportation and Environmental Services is responsible for approving all proposed WMMPs. The stormwater runoff is treated to meet the water quality standards of the City of Alexandria and Arlington County. All BMP facilities for Potomac Yard will be maintained privately, in accordance with the provisions of Potomac Yard CDD 10 and CDD 19.

Several BMPs are being implemented to improve water quality in Potomac Yard. Much of the stormwater is being processed through sand filters and structural BMPs called “bay separators,” a technology that efficiently and effectively treats stormwater by separating debris and trapping pollutants before they enter the surface waters. Additionally, three stormwater ponds have been constructed to regulate stormwater in the immediate area of the project. These ponds regulate both stormwater quantity and quality. The completed development of Potomac Yard will have four major stormwater drainage system outfalls. Three of the four outfalls will drain water collected from the study area. The fourth outfall discharges transported stormwater from the Del Ray neighborhood. The stormwater runoff is treated to meet the water quality standards of the City of Alexandria and Arlington County. All BMP facilities for Potomac Yard are to be maintained privately.

Water Quality Management

To guide City development policies, the *Water Quality Management Supplement* (2001) of the *City of Alexandria Master Plan* classifies areas of the City with "constraints to development" based on potential impacts to water quality that could occur as a result of development in these areas. Wetlands and stream buffer areas are considered to be generally unsuitable for development, and floodplains and floodplain soils are considered to have limited development potential that requires special consideration. The project study area contains wetlands, floodplains, and stream buffer areas; these resources are described in their respective sections below.

2.3 Floodplains

Figure 2-2 illustrates 100-year and 500-year flood zones within the study area. The Base Flood Elevation for 100-year flood zones within the study area is 10 feet NAVD88 (FIRM datum). The average elevation for the 500-year flood zone is estimated at 12 feet NAVD88.

The 100-year floodplain extends from the Potomac River to the eastern edge of the Potomac Greens neighborhood and to the eastern side of the Metrorail tracks north of the Potomac Greens neighborhood. Approximately 39.88 acres of the project area are located within the 100-year floodplain.

The 500-year floodplain covers an additional 6.29 acres of the study area (excluding the area also within the 100-year floodplain), mostly along the edges of the Potomac Greens neighborhood and along the existing Metrorail tracks near the northern edge of the Potomac Greens neighborhood.

2.4 Coastal Zones

Figure 2-3 illustrates RPAs in the study area that are associated with the Potomac River and Four Mile Run. Existing RPAs are designated in Chesapeake Bay Preservation Area Overlay District maps adopted by the City and County. RPAs in the study area include areas identified on the City and County's adopted RPA maps, USACE-regulated wetlands delineated for the project and 100-foot buffers around the delineated wetlands. RPAs were identified for the project in accordance with the Virginia Chesapeake Bay Preservation Act, and Sec. 13-105(B) of the City Zoning Ordinance.

The Coastal Zone Consistency Determination Application for the project is provided in **Appendix D**. The certification demonstrates the project's compliance, subject to review by VDEQ, in relation to the enforceable coastal zone policies described in Section 1.3.4.

2.5 Navigable Waterways

Through consultations with the FTA for the project, the USCG confirmed that Four Mile Run is considered both a Navigable Water of the U.S. and tidal water body within the study area. The NOAA navigation chart for the study area identifies Four Mile Run and indicates that the approximate depth of the river is 1 to 2 feet within the study area. **Figure 2-4** provides the NOAA navigation chart for the study area.

Figure 2-2: Floodplains

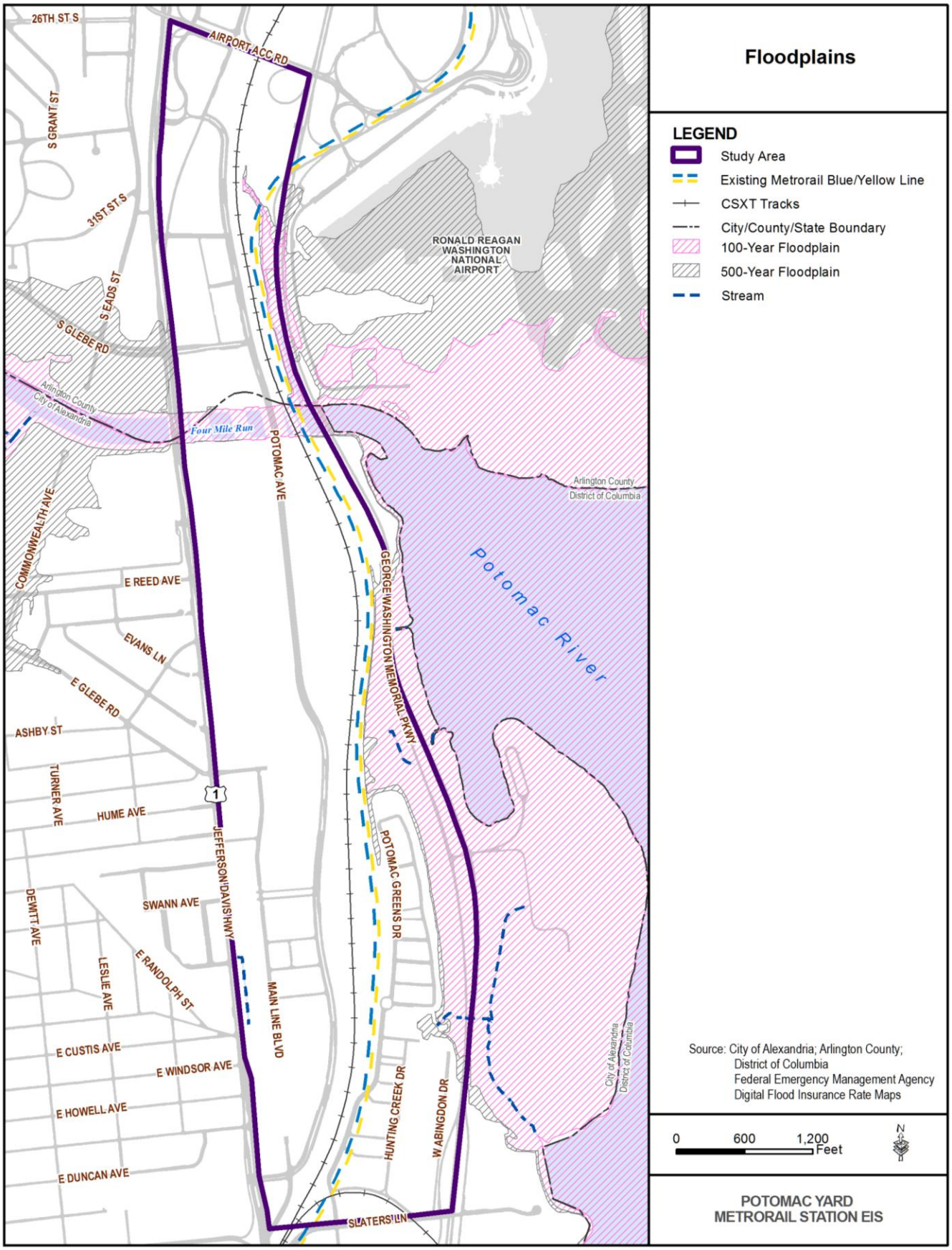


Figure 2-3: Wetlands and Resource Protection Areas

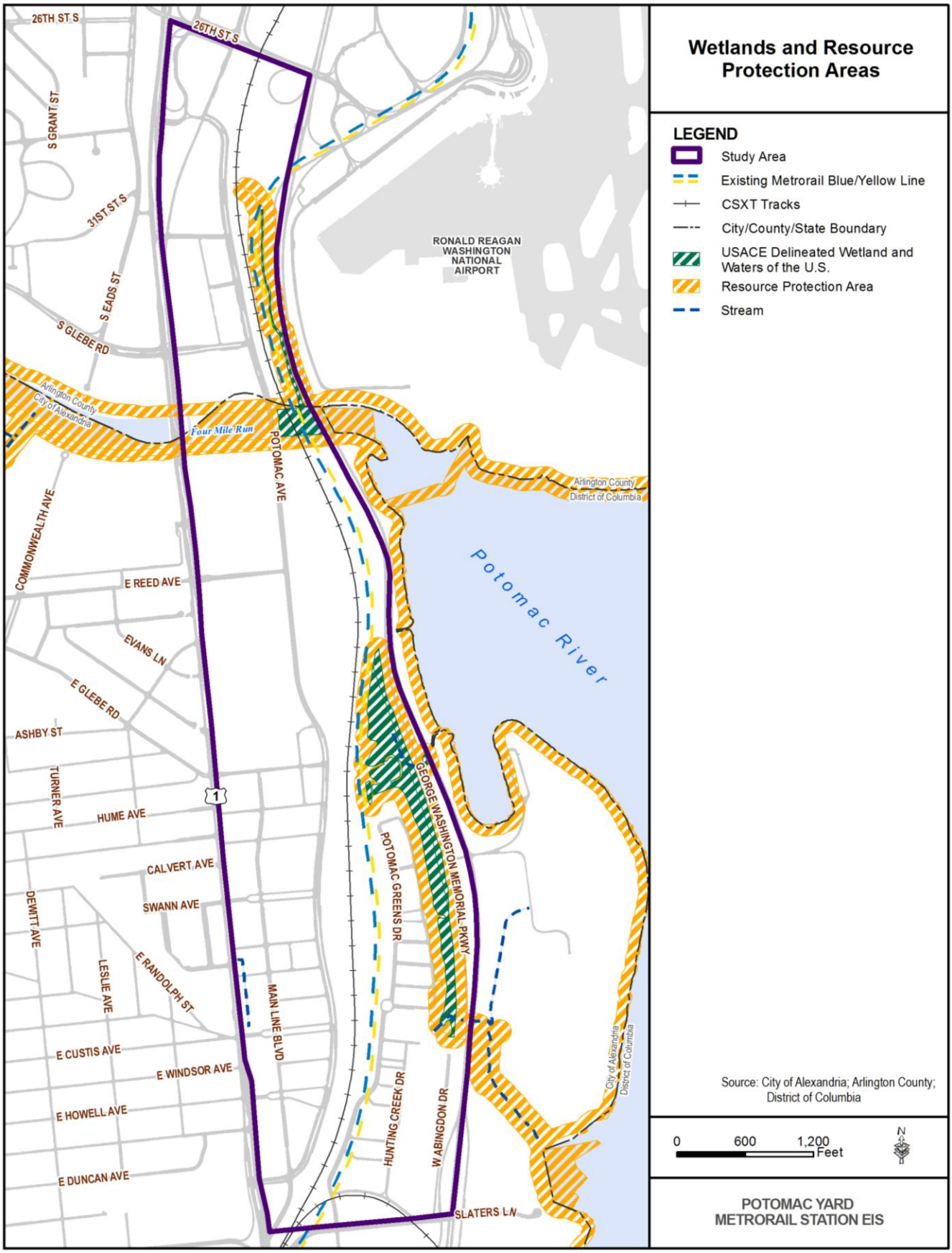
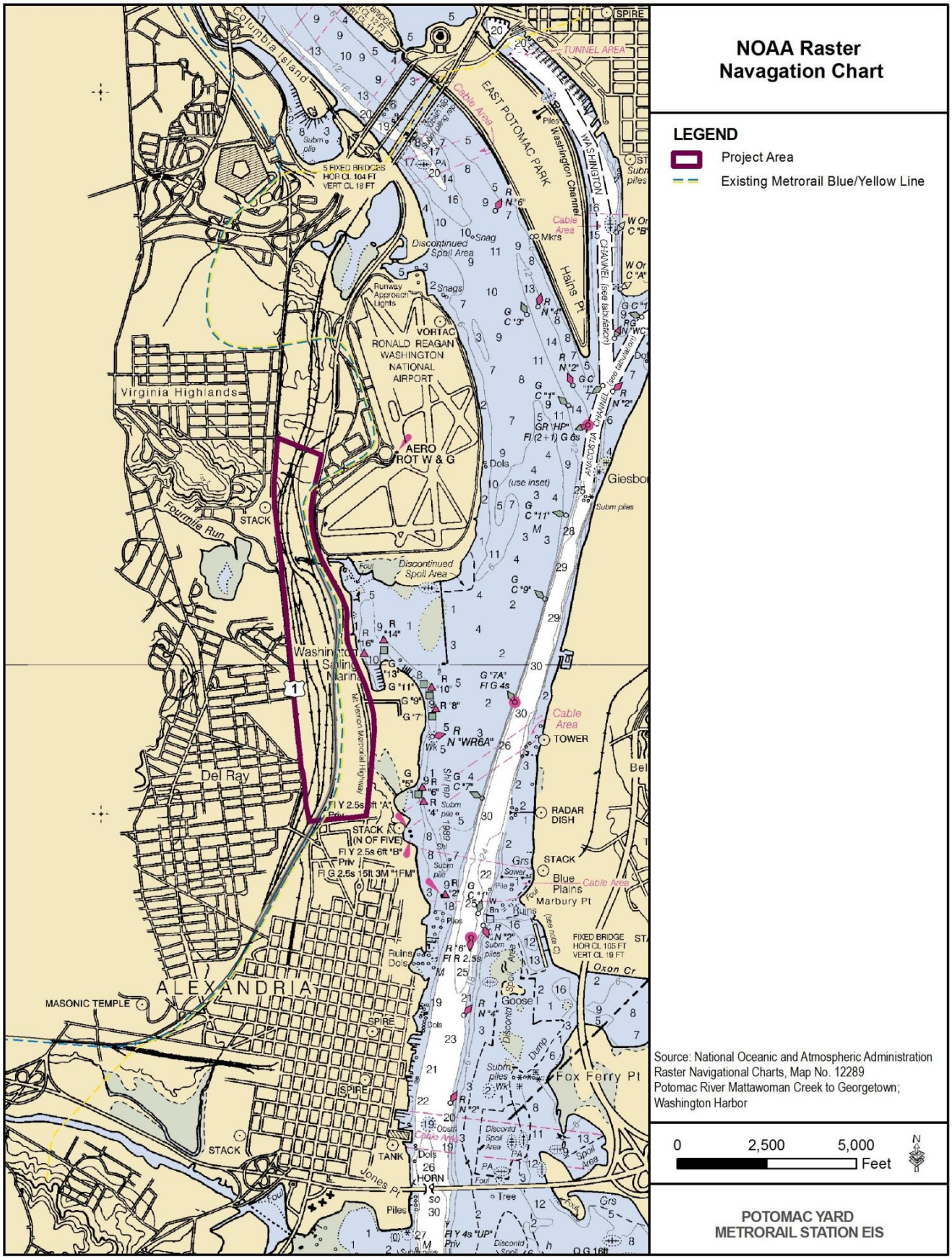


Figure 2-4: NOAA Raster Navigation Chart



3.0 POTENTIAL EFFECTS

3.1 No Build Alternative

No effect to water resources is anticipated as a result of the No Build Alternative.

3.2 Build Alternatives

3.2.1 Wetlands and Waters of the United States

Table 3-1 summarizes permanent wetland impacts for USACE, NPS and USACE/NPS regulated wetlands. Temporary impact to wetlands is described in the Construction Impacts Technical Memorandum. **Table 3-2** summarizes permanent impact to wetland and WOUS for each Build Alternative. As described in Section 2, NPS has developed agency policies for analyzing and mitigating wetland impacts in compliance with Executive Order 11988. NPS polices are described in DO #77-1: Wetland Protection, which is provided in the Wetland Report (**Appendix C**).

Figures 3-1 and 3-2 illustrate the wetland and WOUS impact areas for the Build Alternatives.

Table 3-1: Permanent Impacts to NPS and USACE Regulated Wetlands

Alternative	USACE-only Wetlands (acres) and WOUS	NPS-only Wetlands (acres)	USACE and NPS Wetlands (acres)	TOTAL (acres)
No Build	0.00	0.00	0.00	**0.00**
Build Alternative A	0.01	0.00	0.00	**0.01**
Build Alternative B	1.13	0.00	0.01	**1.14**
Build Alternative D*	0.01	0.04	0.34	**0.39**

* WOUS impacts only.

Table 3-2: Permanent Wetland and WOUS Impact (USACE Regulated)

Alternative	Wetlands (acres)				WOUS (acres)		
	W404-1*	W404-2*	W404-3*	TOTAL	WOUS-1	WOUS-2	TOTAL
No Build	0.00	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Build Alternative A	0.00	0.00	0.01	**0.01**	0.00	0.00	**0.00**
Build Alternative B	0.97	0.00	0.17	**1.14**	0.00	0.00	**0.00**
Build Alternative D	0.00	0.00	0.00	**0.00**	0.21	0.14	**0.35**

*Refers to delineated wetlands shown in Figures 3-1, 3-2 and 3-3.

Build Alternative A

Build Alternative A would impact approximately 0.01 acre of delineated wetlands east of the Metrorail tracks. Alternative A would not impact delineated WOUS or wetlands on NPS property.

Build Alternative B

Build Alternative B would fill wetland areas and require a retaining wall to accommodate the eastward shift of the Metrorail track alignment. Build Alternative B would permanently impact over one acre of the wetland areas delineated east of the Metrorail tracks, including approximately 0.01 acre of wetland regulated by both USACE and NPS. Build Alternative B would not impact delineated WOUS.

Build Alternative D

Build Alternative D would impact the two WOUS identified in the northern part of the study area. Build Alternative D would require a new bridge over Four Mile Run, placing new bridge piers in the stream. Build Alternative D would require fill and piers within the tributary channel where the tracks tie back to the existing Metrorail alignment in Arlington (at the northern end of the study area). Build Alternative D would not impact any USACE-regulated wetlands delineated east of the Metrorail tracks and south of Four Mile Run. However, it would impact 0.04 acres of NPS-only wetland and 0.35 acres of WOUS regulated by both USACE and NPS.

Figure 3-1: Build Alternatives A and B Permanent Impacts on NPS and USACE Wetland and Areas

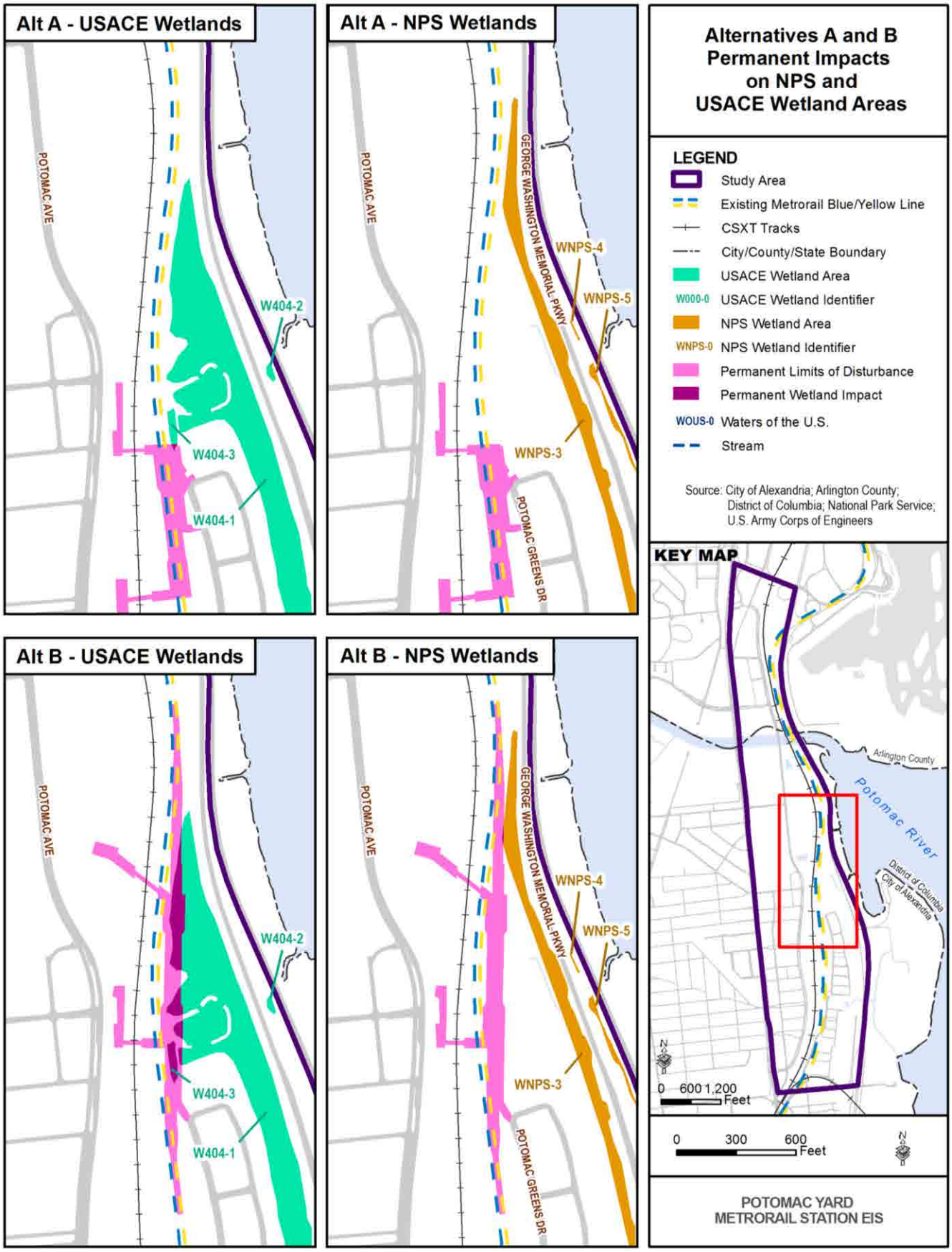
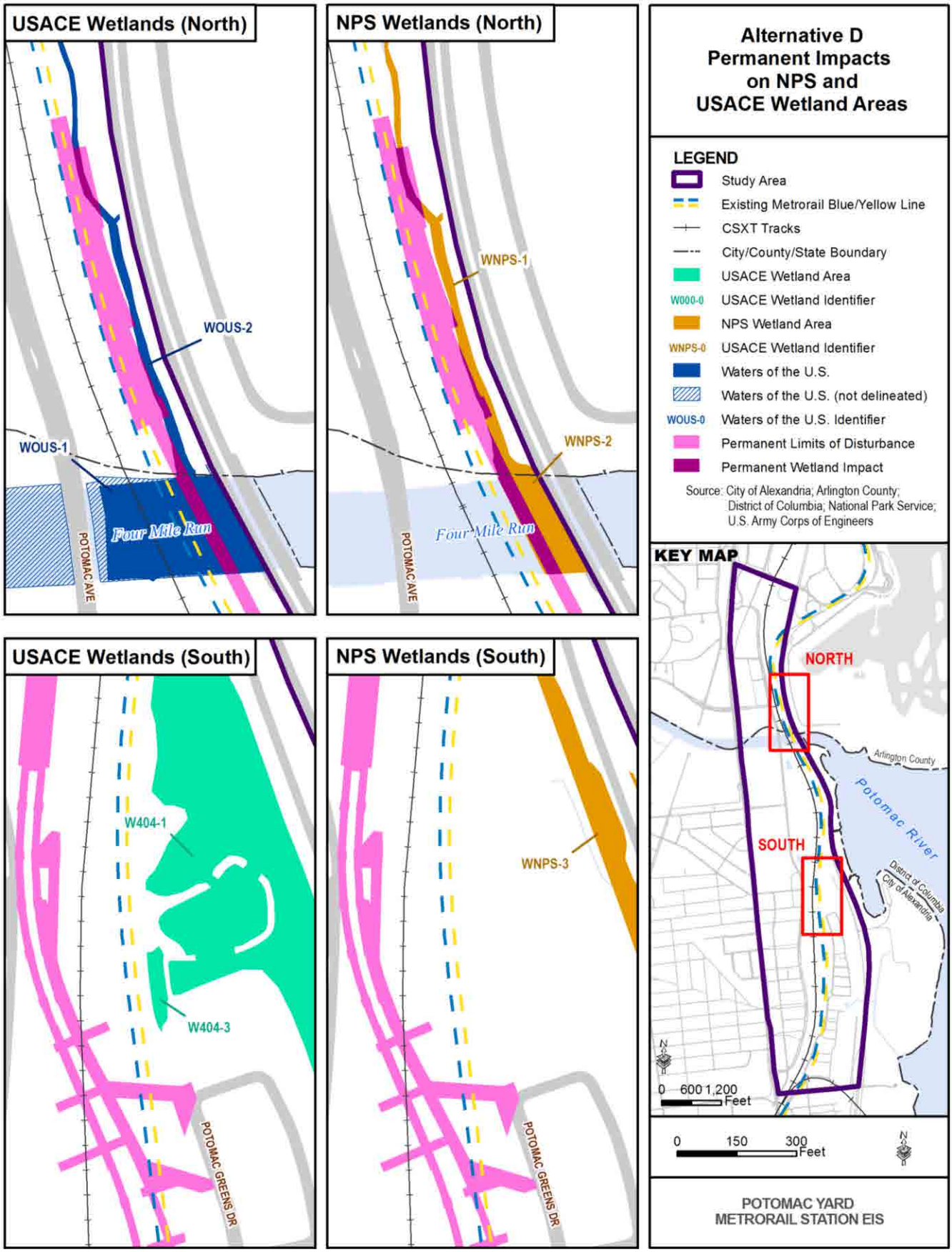


Figure 3-2: Build Alternative D Permanent Impacts on NPS and USACE Wetland Areas



Permitting Requirements

A Joint Permit Application (JPA) will be required for both permanent and temporary project-related wetland impacts in compliance with Section 401 and Section 404 of the CWA. The permit will be obtained through the JPA process which is administered by the Virginia Marine Resources Commission (VMRC), VDEQ and USACE-Norfolk District within Virginia. The JPA is initiated through VMRC which determines regulatory jurisdiction at the state level. VDEQ and USACE must review and approve the JPA prior to starting any work that would impact wetlands, as well as VMRC if tidal wetlands are identified. The JPA would present impact and mitigation strategies for both permanent and temporary wetland and WOUS impacts. The JPA process is normally initiated at the design phase of a project, after a Preferred Alternative is selected. The JPA is submitted through VMRC which would make a determination if tidal wetlands exist in the study area under the agency's regulatory authority.

USACE regulates activities in waters of the United States, including wetlands, under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. The VDEQ regulates activities in state waters and wetlands under Section 401 of the CWA and Title 62.1 of the Code of Virginia. VMRC regulates activities on state-owned submerged lands, tidal wetlands, and dunes/beaches in accordance with Chapters 12, 13 and 14 of Title 28.2 of the Code of Virginia.

Impact to wetlands on NPS land require a Wetland Statement of Findings and compensation as described in NPS DO #77-1 which would also be developed at the design phase. Certain actions are exempted by the NPS; however, this project would not quality as an exempted action. The NPS Water Resources Division will determine if a Wetlands Statement of Findings is necessary if there are any impacts to NPS wetlands.

3.2.2 Water Quality

The project is not anticipated to impact or degrade the quality of surface waters within the study area. The station would connect to the existing municipal sanitary sewer system which serves Potomac Yard. Potential pollutants resulting from project activities include point and non-point sources, such as sewerage generated by the station, and operational impacts such as oil or lubricant leakage, deicing chemicals. These pollutants would be captured and treated using stormwater management techniques approved by the City of Alexandria and Arlington County, and to avoid water quality impacts to wetlands and RPAs on NPS park land.

Table 3-3 lists the estimated net new impervious surface for each Build Alternative. All Build Alternatives would increase the amount of impervious surface and resulting stormwater runoff at the site beyond the opening year condition. Although additional impervious surface and runoff would result from the project, the project would adhere to water quality performance management criteria set by the City of Alexandria in accordance with Sec. 13-109(E)(5) of the City Zoning Ordinance or by Arlington County in accordance with Chapter 60 of the Arlington County Code, which control the rate and water quality of stormwater runoff. These existing stormwater management plans and practices in the City of Alexandria and Arlington County would minimize potential effects from increases in impervious surfaces.

Table 3-3: Net New Impervious Surface

Alternative	Impervious Area (acres)
No Build	0.00
Build Alternative A	1.82
Build Alternative B	1.66
Build Alternative D	9.24

Impervious surface calculations were based on proposed impervious structures, which include the station structures and platforms, aerial track structures, and pedestrian bridges. Areas of existing impervious surface, such as asphalt parking lots, were subtracted from the estimate. The at-grade railroad track is not considered an impervious surface and was not included in the calculation. The impervious surface for Alternative D includes new elevated tracks that would replace the existing tracks.

Permitting Requirements

At the design phase, a Stormwater Management Plan would be developed for the project in compliance with Sec. 13-113 of the City of Alexandria Zoning Ordinance and Chapter 60 of the Arlington County Code. The Stormwater Management Plan would detail the location and design of all planned stormwater management facilities serving the project.

3.2.3 Floodplains

Floodplain impacts for each Build Alternative are summarized in **Table 3-4** and shown in **Figure 3-3**.

100-year flood zones have a one percent chance of flooding in any given year, and 500-year flood zones have a 0.2 percent chance of flooding in any given year. Based on discussions with the City of Alexandria and Arlington County's engineering staff, none of the Build Alternatives is expected to raise the 100-year Base Flood Elevation within the study area if constructed within the flood zones. This statement is based on the location of the large surface area of the Potomac River relative to the station area.

Table 3-4: Permanent Floodplain Impact

Alternative	100-year (acres)	500-year* (acres)
No Build	0.00	0.00
Build Alternative A	0.00	0.36
Build Alternative B	1.39	0.90
Build Alternative D	0.70	0.24

*Acreage excludes areas in 100-year floodplain

For construction within 100-year flood zones, the project would be subject to local development approvals and federal approvals for any activities on NPS land. Approvals would be obtained in accordance with Section 6-300 of City of Alexandria Zoning Ordinance, Chapter 48 of the Arlington County Code and NPS Director's Order #77-2: Floodplain Management, which includes the development of a Floodplain Assessment and Floodplain Statement of Findings. As part of the City of Alexandria and Arlington County development review processes, the project would quantify how the Preferred Alternative would change the 100-year Base Flood Elevation through a hydrologic engineering analysis. The City of Alexandria Zoning Ordinance also requires that structures built within the 100-year flood zones be "flood-proof." The City of Alexandria defines flood-proofing as "any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents" (Section 6-200, City of Alexandria Zoning Ordinance).

Build Alternative A

Build Alternative A would not impact 100-year flood zones but would impact the 500-year flood zone, east of the existing Metrorail tracks in the vicinity of the delineated wetlands. The flood zone that is affected spans the George Washington Memorial Parkway from the Potomac River.

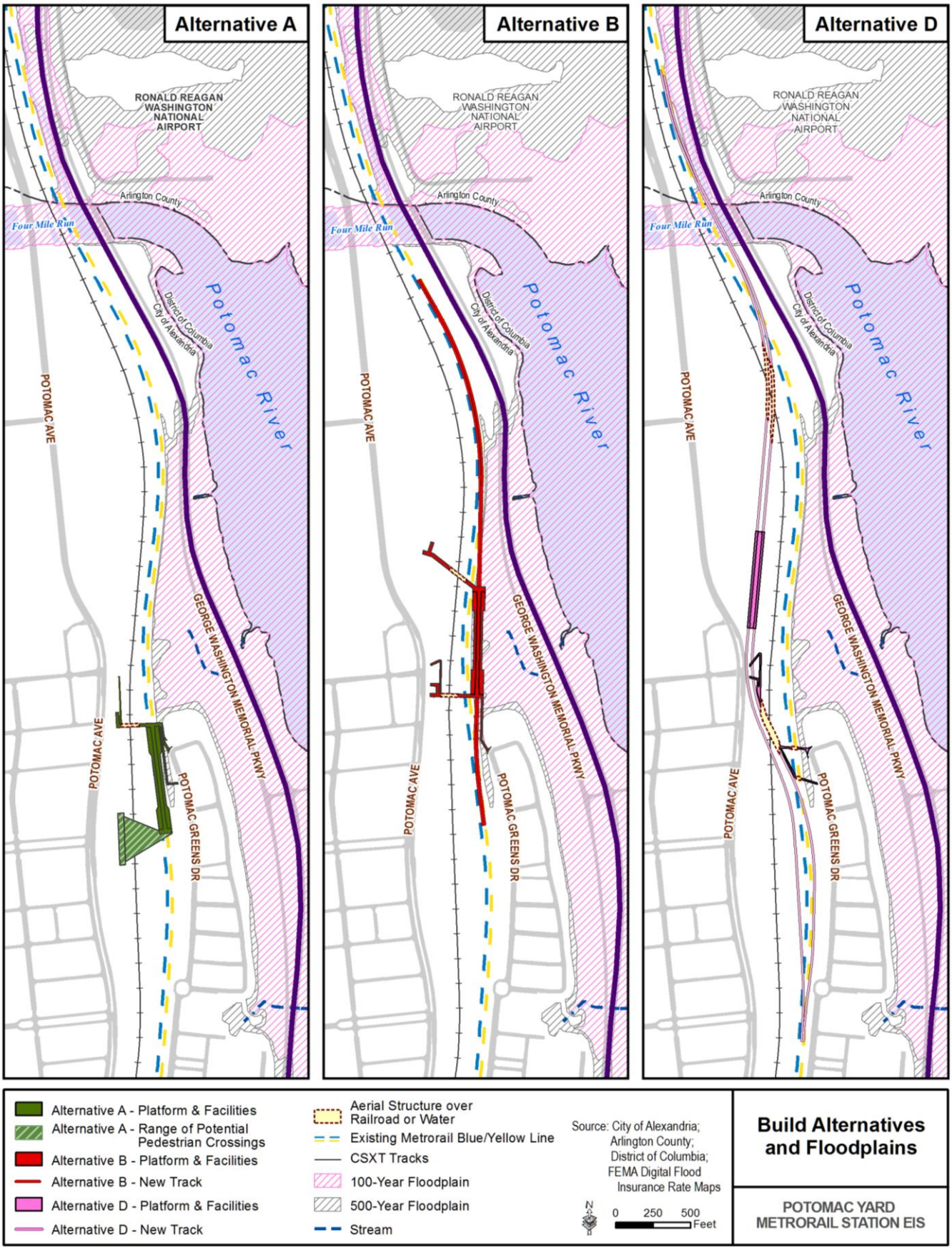
Build Alternative B

Build Alternative B would impact both 100-year and 500-year flood zones, east of the existing Metrorail tracks. The impacted flood zones span the George Washington Memorial Parkway from the Potomac River. The station platform and realigned track would be constructed on retained or graded fill for a segment approximately 1,400 feet in length. The fill and retaining walls would be constructed within the 100-year flood zone. The station and track would be built at approximately the same elevation as the existing Metrorail tracks, 25 feet above sea level North American Vertical Datum 88 (NAVD88), which is above the 100-year Base Flood elevation of 10 feet NAVD88 (FIRM datum).

Build Alternative D

Build Alternative D would impact 100-year and 500-year flood zones associated with Four Mile Run. A section of fill is necessary for the segment of track north of Four Mile Run where the aerial structure touches down before tying back into the existing Metrorail alignment. The fill would be placed within the 100-year flood zone. The track segment to be constructed on fill would extend approximately 600 feet in length at an elevation of approximately 25 feet NAVD88, which is above the Base Flood Elevation of 10 feet NAVD88 (FIRM datum).

Figure 3-3: Build Alternatives and Floodplains



3.2.4 Coastal Zones and Chesapeake Bay Preservation Areas

Table 3-5 summarizes the estimated permanent impacts to RPAs. These impact estimates include RPA identified on the City's adopted RPA map, wetlands delineated for the project and 100-foot buffers around the delineated wetlands consistent with Sec. 13-105(B) of the City zoning ordinance.

Table 3-5: Permanent Resource Protection Area Impacts

Alternative	Impact (acres)
No Build	0.00
Build Alternative A	0.38
Build Alternative B	3.07
Build Alternative D	1.48

Coastal Zone Consistency

The project is expected to be consistent with the enforceable policies of Virginia's Coastal Zone Management Program as described in the draft Consistency Determination (pending review by VDEQ) provided in **Appendix D**. To comply with the City of Alexandria and Arlington County's Chesapeake Bay Preservation Ordinances, the project would disturb no more land than is necessary, preserve indigenous vegetation, develop a project-specific landscape plan, and minimize impervious surface cover.

Build Alternative A

Build Alternative A would impact 0.38 acres of RPA around the proposed platform areas where wetlands have been delineated east of the Metrorail tracks.

Build Alternative B

Build Alternative B would impact 3.07 acres of RPAs around the proposed platform areas where wetlands have been delineated east of the Metrorail tracks.

Build Alternative D

Build Alternative D would impact 1.48 acres buffering Four Mile Run with a new bridge crossing the waterway.

3.2.5 Navigable Waterways

Build Alternatives A and B would not impact or cross any navigable waterways in the study area.

Build Alternative D would require the construction of a new bridge approximately 75 feet east of the existing Metrorail bridge over Four Mile Run. The horizontal clearance of the replacement bridge is expected to be similar as the existing Metrorail bridge, and the vertical clearance would be higher. The bridge design would utilize two piers in the waterway for support similar to the existing bridge. If Build Alternative D is selected as the Preferred Alternative, and is advanced to design, a bridge permit or waiver would be sought through the USCG in accordance with Section 10 of the Rivers and Harbors Act.

4.0 MITIGATION

4.1 Wetlands

A Joint Permit Application (JPA) would be developed for both permanent and temporary project-related wetland impacts in compliance with Section 404 of the CWA. If the wetlands are deemed tidal wetlands, the permitting process would be initiated with VMRC. In addition to the JPA, the NPS Water Resources Division would determine if a Wetlands Statement of Findings is necessary (pursuant to NPS Director's Order 77-1) for any impacts to any wetlands on NPS property. The JPA and NPS processes would be initiated at the design phase of the project.

Specific wetland mitigation strategies would be determined through the JPA and NPS processes for unavoidable impacts to WOUS and wetlands resulting from the Preferred Alternative. USACE, VDEQ, VMRC, and NPS would determine mitigation measures, as part of the JPA process and NPS Director's Order 77-1, where appropriate. Typical wetland mitigation measures include on-site or off-site wetland compensation according to specified ratios of acres of created or restored wetland to be provided for each acre of impacted wetland; ratios are based on the size and function of existing wetland impacted and the type of wetland compensation (on-site, off-site, fee-in-lieu) as determined during the JPA process.

VDEQ defines compensatory mitigation in accordance with the Virginia Water Protection Permit Program as "actions taken that provide some form of substitute aquatic resource for the impacted aquatic resource."[4] VDEQ identifies the following types of compensatory mitigation as acceptable for wetland impacts[5]:

- Wetland creation or restoration;
- Stream restoration;
- Purchase or use of wetland mitigation bank credits at a VDEQ-approved mitigation bank;
- Contributing to a VDEQ-approved in-lieu fee fund;
- Preservation of existing wetland and streams when utilized in conjunction with creation, restoration, or mitigation bank credits; and
- Preservation or restoration of upland buffers adjacent to surface waters, when utilized in conjunction with creation, restoration, or mitigation bank credits.

Both VDEQ and VMRC provide general guidance on wetland mitigation compensation ratios. For non-tidal wetlands, regulated by VDEQ, compensation ratios are as follows[6]:

- Two acres of compensation for each one acre of impact for forested wetland (2:1);
- 1.5 acres of compensation for every one acre of scrub-shrub wetland impact (1.5:1);
- One acre of compensation for every one acre of emergent wetland (1:1); and
- Project-specific ratios for other surface water impacts.

For tidal wetlands regulated by VMRC[7]:

- Four acres of compensation for every one acre of impact minimum (4:1); and
- Six acres of compensation for every one acre of impact maximum (6:1).

To determine proper mitigation quantities for this project, the WOUS and wetlands would be evaluated based on their health, value, quality and amount affected. For example, forested and tidal wetlands generally have higher mitigation measures associated with them, because they are more difficult to replace. VMRC develops compensation ratios for tidal wetland impacts based on multiple attributes: wetland type, ecosystem production, habitat value, erosion and flood buffer potential, water quality, geographic location, and adjacent land use. The intent of the mitigation would be to replace the functional value of the lost wetland resources on an equal or greater basis. The mitigation would be accomplished through the JPA and consistent with Title 62.1 of the Code of Virginia which requires compensation for both permanent and temporary wetland impacts that result from the project. The law states that "such compensation requirements shall be sufficient to achieve no net loss of existing wetlands acreage and functions."[8]

VDEQ identifies the following policy guidance documents for developing wetland mitigation strategies:

- U.S. Army Corps of Engineers - Norfolk District, Public Notice - *Virginia Off Site Mitigation Location Guidelines*, March 5, 2008;
- U.S. Army Corps of Engineers - Norfolk District Corps and Virginia Department of Environmental Quality, *Recommendations for Wetland Compensatory Mitigation: Including Site Design, Permit Conditions, Performance Criteria, and Monitoring Criteria,* July 2004;
- U.S. Department of the Army and U.S. Environmental Protection Agency, *The Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines*, February 6, 1990; and
- Virginia Department of Environmental Quality, Division of Water Quality, *Guidance Memorandum Number 04-2007, Avoidance & Minimization of Impacts to Surface Waters*, February 6, 2004.

Specific wetland mitigation quantities would be decided through the JPA process for unavoidable impacts to WOUS and wetlands resulting from the Preferred Alternative. USACE, VDEQ, VMRC, and NPS would negotiate

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[4] *Virginia Water Protection Permit Regulation,* Virginia Administrative Code, 9 VAC 25-210-10.
[5] Compensatory Mitigation. Virginia Department of Environmental Quality. Accessed on July 23, 2012. http://www.deq.virginia.gov/Programs/Water/WetlandsStreams/Mitigation.aspx.
[6] Ibid.
[7] Wetland Mitigation Compensation Policy. Virginia Marine Resources Commission. Accessed at: http://www.mrc.state.va.us/regulations/fr391.shtm#a
[8] *Impacts to Wetlands*. U.S. Code of Virginia. § 62.1-44.15:21 B

mitigation measures, as part of the JPA process and NPS DO #77.1, where appropriate. Wetland mitigation on NPS lands is determined by the NPS Water Resources Division.

4.2 Water Quality

Mitigation for potential water quality impacts would include site specific stormwater management features that would be developed at the design phase of the project consistent with the requirements of Sec. 13-113 of the City of Alexandria Zoning Ordinance and Chapter 60 of the Arlington County Code. Stormwater management features would be designed to reduce the amount of nutrients, metals, and heavy petroleum products that could impact water quality.

4.3 Floodplains

Development and mitigation within the 100-year flood zone would require authorization by the City of Alexandria, Arlington County, and NPS (for activities which impact 100-year flood zones on NPS property). Development within the 100-year flood zone would be designed so that the Base Flood Elevation would not be raised more than 0.5 feet, in accordance with Sec. 6-306 of the City of Alexandria Zoning Ordinance.

Local floodplain ordinances require that structures built within the 100-year flood zones be “floodproof.” The City of Alexandria defines floodproofing as “any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.”

The ordinance requires floodproofing design techniques be used for structures within 100-year zones. Examples of the design techniques include using materials resistant to flood damage and anchoring structures to prevent flotation. Other flood mitigation guidance is provided in the FEMA Technical Bulletin 3-93, *Non-Residential Floodproofing — Requirements and Certification.*

4.4 Coastal Zones and Chesapeake Bay Preservation Areas

Mitigation would be developed in accordance with the VDCR Chesapeake Bay Local Assistance Department (CBLAD), *Riparian Buffers Modification & Mitigation Manual* planting recommendations or other mitigation deemed appropriate to the satisfaction of the City of Alexandria Director of the Department of Transportation and Environmental Services. In lieu of mitigation, contribution to the City of Alexandria Water Quality Improvement Fund may be acceptable, or a combination of strategies involving mitigation and contribution to the Water Quality Improvement Fund.

4.5 Navigable Waterways

As no effect to the navigability of Four Mile Run is anticipated under any of the alternatives, no mitigation is proposed.

APPENDIX A:

REFERENCES

Correspondence

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Impacts to Wetlands. U.S. Code of Virginia. § 62.1-44.15:21 B

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APPENDIX B:

LIST OF ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
CBPA	Chesapeake Bay Preservation Act
CBPO	Chesapeake Bay Preservation Ordinance
CDD	Coordinated Development District
CCPY	Crystal City Potomac Yard Transitway
CFR	Code of Federal Regulations
CSXT	CSX Transportation
CZMA	Coastal Zone Management Act
CWA	Clean Water Act
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FTA	Federal Transit Administration
GIS	Geographic Information System
JPA	Joint Permit Application
LID	Low Impact Design
LOC	Limits of Construction
LOD	Limits of Disturbance
LMOR	FEMA Letter of Map Revision
MS4	Municipal Separate Storm Sewer System
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory

PCB	Polychlorinated Biphenyls
RMA	Resource Management Area
RPA	Resource Protection Area
Section 401	Section 401 of the Clean Water Act
Section 404	Section 404 of the Clean Water Act
SWM	Stormwater Management
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VPDES	Virginia Pollutant Discharge Elimination System
WMATA	Washington Metropolitan Area Transit Authority
WMMP	Water Management Master Plan
WOUS	Waters of the United States

APPENDIX C:

JURISDICTIONAL DETERMINATION APPLICATIONS

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

REPLY TO
ATTENTION OF:

September 28, 2012

Northern Virginia Regulatory Section
NAO-2012-02012 (Potomac Yard Metrorail)

James A. Ashe, PE, CPG
Manager, Environmental Planning and Compliance
Office of Chief Engineer, Infrastructure
Transit Infrastructure and Engineering Services
Washington Metropolitan Area Transit Authority
600 5th Street, NW
Washington, DC 20001

Dear Mr. Ashe:

This letter is in regard to your request for verification of an approved jurisdictional determination for waters of the U.S. (including wetlands) on property known as the Potomac Yard Metrorail Station, located on an approximately 117.0 acre parcel in Alexandria and Arlington County, Virginia.

An on-site jurisdictional determination has found waters and/or wetlands regulated under Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) and/or Section 404 of the Clean Water Act (33 U.S.C. 1344) on property listed above. Nontidal wetlands and/or waters have been identified on the site. This letter shall serve to confirm the wetlands delineation by AECOM, Inc. as surveyed and shown on the maps titled, "Potomac Yard Metrorail Station" dated April 2012 (on file at the Corps).

Our basis for this determination is the application of the Corps' 1987 Wetland Delineation Manual and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation. The wetland is a water of the United States and is part of a tributary system to interstate waters (33 CFR 328.3(a)). These waters meet the Corps' definition of waters of the United States, are part of a tributary system to interstate waters (33 CFR 328.3 (a)) and have an ordinary high water mark.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into jurisdictional waters and/or wetlands on this site will require a Department of the Army permit and may require authorization by state and local authorities, including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these jurisdictional areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This letter contains an approved jurisdictional determination for your subject site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the North Atlantic Division Office at the following address:

Mr. Michael Vissichelli
Regulatory Appeals Review Officer
U.S. Army Corps of Engineers
Fort Hamilton Military Community
301 General Lee Avenue
Brooklyn, NY 11252-6700

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 C.F.R. part 33 1.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by ****November 28, 2012.**** It is not necessary to submit an RFA form to the Division office if you do not object to the determination in this letter.

This jurisdictional determination is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date. If you have any questions, please contact Ms. Theresita Crockett-Augustine in the Northern Virginia Field Office at 18139 Triangle Plaza, Suite 213, Dumfries, Virginia 22026, (703) 221-9736 or **theresita.m.crockett-augustine@usace.army.mil**.

Sincerely,

for Nicholas L. Konchuba
Chief, Northern Virginia
Regulatory Section

Copy Furnished: DEQ, Woodbridge.

JURISDICTIONAL DETERMINATION WEST PACKAGE

March 1, 2011

U.S. Army Corps of Engineers
Norfolk District
Regulatory Office
803 Front Street
Norfolk, Virginia 23510-1096

RE: Request for verification of Wetland Delineation and approved Jurisdictional Determination

Dear Sir/Madam,

The City of Alexandria is proposing the construction of a new Metrorail station located along the existing Blue and Yellow Lines between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail stations within the Potomac Yard mixed-use development site in Alexandria, Virginia. As part of the planning process, the project management team wishes to determine the extent, if any, of Waters of the United States (WOUS), including wetlands, located in the areas being considered for the proposed Metrorail station. The project management team consists of the Federal Transit Administration (FTA), the City of Alexandria, the Washington Metropolitan Area Transit Authority (WMATA), and the National Park Service (NPS). The area proposed for construction can be viewed in Figures 1 and 2 of the enclosed *Wetlands and Waters Delineation Report* (Attachment 2).

The project management team seeks an approved Jurisdictional Determination for the presence and confirmation of regulated Waters of the U.S., including wetlands, within the JDRA (Attachment 3) at your earliest convenience. Approved Jurisdictional Determination Forms are included in Attachment 1.

The entire area that was investigated is approximately 116.5 acres. A detailed view of the area that was investigated can be viewed in Figures 7 through 8 of the enclosed *Wetlands and Waters Delineation Report* (Attachment 2). However, this Jurisdictional Determination Review package is for a 66.4-acre area, which is considered the Jurisdictional Determination Review Area (JDRA). Within the JDRA, the only WOUS identified was a section of Four Mile Run measuring 1.1 acres and 235 linear feet. A detailed view of the JDRA can be found in Figures JDRA-W-1, JDRA-W-1a, JDRA-W-1b, and JDRA-W-1c (Attachment 3).

Arrangements for access to the site can be provided at your earliest convenience. Should you have any questions or comments concerning our request or this report, please contact me at (202) 962-1745 or by email at jashe@wmata.com.

Washington Metropolitan Area Transit Authority

600 Fifth Street, NW
Washington, D.C. 20001
202/962-1234

All formal responses should be sent to:

James A. Ashe, PE, CPG
Manager, Environmental Planning and Compliance
Office of Chief Engineer, Infrastructure
Transit Infrastructure and Engineering Services
Washington Metropolitan Area Transit Authority
600 5th Street, NW
Washington, DC 20001

Sincerely,

James A. Ashe, PE, CPG
Manager, Environmental Planning and Compliance

ENCLOSURES:

1. Attachment 1: Approved Jurisdictional Determination Application Form
2. Attachment 2: *Wetlands and Waters Delineation Report* (May 2011)
3. Attachment 3: Jurisdictional Determination Review Area – West – Figures
   a. JDRA-W-1
   b. JDRA-W-1a
   c. JDRA-W-1b
   d. JDRA-W-1c

NORFOLK DISTRICT REGULATORY OFFICE PRE-APPLICATION AND/OR JURISDICTIONAL WATERS DETERMINATION REQUEST FORM

This form is used when you want to determine if areas on your property fall under regulatory requirements of the U.S. Army Corps of Engineers (USACE). Please supply the following information and supporting documents described below. This form can be filled out online and/or printed and then mailed, faxed, or e-mailed to the Norfolk District. Submitting this request authorizes the US Army Corps of Engineers to field inspect the property site, if necessary, to help in the determination process. **THIS FORM MUST BE SIGNED BY THE PROPERTY OWNER TO BE CONSIDERED A FORMAL REQUEST.**

The printed form and supporting documents should be mailed to:

U.S. Army Corps of Engineers, Norfolk District
Regulatory Office
803 Front Street
Norfolk, Virginia 23510-1096

Or faxed to (757) 201-7678

Or sent via e-mail to: CENAO.REG_ROD@usace.army.mil

Additional information on the Regulatory Program is available on our website at:
http://www.nao.usace.army.mil/technical%20services/Regulatory%20branch/homepage.asp

Please contact us at 757-201-7652 if you need any assistance with filling out this form.

Location and Information about Property to be subject to a Jurisdictional Determination:

1. Date of Request:
2. City or County where property located:
3. Address of property and directions (attach a map of the property location and a copy of the property plat):
4. Size of property in acres:
5. Tax Parcel Number / GPIN (if available):
6. Name of Nearest Waterway: Four Mile Run; Potomac River

7. Brief Description of Proposed Activity, Reason for Preapplication Request, and/or Reason for Jurisdictional Waters Determination Request:

8. Has a wetland delineation/determination been completed by a consultant or the Corps on the property previously? ☐ YES ☐ NO ☐ UNKNOWN

   If yes, please provide the name of the consultant and/or Corps staff and Corps permit number, if available:

Property Owner Contact Information:

Property Owner Name:
Mailing Address:
City: State: Zip:
Daytime Telephone:
E-mail Address:

If the person requesting the Jurisdictional Determination is **NOT** the Property Owner, please also supply the Requestor's contact information here:

Requestor Name:
Mailing Address:
City: State: Zip:
Daytime Telephone:
E-mail Address:

Additionally, if you have any of the following information, please include it with your request: wetland delineation map, other relevant maps, drain tile survey, topographic survey, and/or site photographs.

CERTIFICATION: I am hereby requesting a preapplication consultation or jurisdictional waters and/or wetlands determination from the U.S. Army Corps of Engineers, for the property(ies) I have described herein. I agree to allow the duly authorized representatives of the Norfolk District Corps of Engineers and other regulatory or advisory agencies to enter upon the premises of the project site at reasonable times to evaluate inspect and photograph site conditions. This consent to enter the property is superior to, takes precedence over, and waives any communication to the contrary. For example, if the property is posted as "no trespassing" this consent specifically supercedes and waives that prohibition and grants permission to enter the property despite such posting. I hereby certify that the information contained in the Request for a Jurisdictional Determination is accurate and complete:

_____ _____

Property Owner's Signature Date

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Norfolk District,

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: Virginia County/parish/borough: Arlington and City: Alexandria
Center coordinates of site (lat/long in degree decimal format): Lat. 38.833005° **N**, Long. -77.045960° **W**.
Universal Transverse Mercator:
Name of nearest waterbody: Four Mile Run and the Potomac River
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Potomac River
Name of watershed or Hydrologic Unit Code (HUC): 02070010

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☐ Office (Desk) Determination. Date:
- ☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☒ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☒ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: Section of Four Mile Run linear feet: 216 width (ft) and/or 0.94 acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW: **Four Mile Run**.

Summarize rationale supporting determination: Permanent body of water draining to the Potomac River, well documented on both USGS topoquads and NOAA nautical charts.

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **acres**
Drainage area: **acres**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: Four Mile Run flows into the Potomac River.

---

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary stream order, if known: unknown.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain: The lower portion of Four Mile Run has been channelized.
- ☐ Manipulated (man-altered). Explain: tributary has SWM features.

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Sands
- ☐ Concrete
- ☐ Cobbles
- ☐ Gravel
- ☐ Muck
- ☐ Bedrock
- ☐ Vegetation. Type/% cover:
- ☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): >1 %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
- ☐ Dye (or other) test performed: .

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☐ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☐ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: water quality is low.
Identify specific pollutants, if known: no specific pollutants known.

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[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
  ☐ Federally Listed species. Explain findings: .
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☐ Aquatic/wildlife diversity. Explain findings: migratory birds, small mammals, micro and macrafauna.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
Wetland size: acres
Wetland type. Explain: .
Wetland quality. Explain: .
Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:
Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**
Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☐ Directly abutting
☐ Not directly abutting
  ☐ Discrete wetland hydrologic connection. Explain: .
  ☐ Ecological connection. Explain: .
  ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .
Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .
☐ Vegetation type/percent cover. Explain: .
☐ Habitat for:
  ☐ Federally Listed species. Explain findings: .
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☐ Aquatic/wildlife diversity. Explain findings: migratory birds, small mammals, micro and macrafauna.

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☒ TNWs: 216linear feet 242 width (ft), Or, 0.94acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24,000 Alexandria, VA.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: NRCS SSURGO 2011.
☒ National wetlands inventory map(s). Cite name: Alexandria, VA.
☐ State/Local wetland inventory map(s): .
☒ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): .
or ☒ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

POTOMAC YARD METRORAIL STATION
ENVIRONMENTAL IMPACT STATEMENT

Waters of the U.S. (Including Wetlands) Delineation Report

February 2012

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APPENDIX B	NRCS SOILS REPORT
APPENDIX C	FEMA FLOOD INSURANCE RATE MAPS
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1.0 INTRODUCTION

The City of Alexandria is proposing the construction of a new Metrorail station located along the existing Blue and Yellow Lines between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail stations within the Potomac Yard mixed-use development site in Alexandria, Virginia (see Figures 1 and 2). The project management team consists of the Federal Transit Administration (FTA), the City of Alexandria, the National Park Service (NPS), and the Washington Metropolitan Area Transit Authority (WMATA). As part of the planning process, the project management team wishes to determine the extent, if any, of Waters of the United States (WOUS), including wetlands, located in the areas being considered for the proposed Metrorail station.

1.1 Purpose

The purpose of this report is to document the methodology and results of the delineation of WOUS, including wetlands, within the 117.8-acre investigation study area (see Figures 1 and 2). Field investigations for WOUS, including wetlands, were conducted from October 2011 to December 2011.

This report does not constitute a jurisdictional determination of Waters of the United States. All WOUS and wetland boundaries presented in this report are preliminary and subject to verification by the U.S. Army Corps of Engineers (USACE), Norfolk District, and the Virginia Department of Environmental Quality (VDEQ). Portions of these WOUS and wetlands, which are tidal, would also be regulated by the Virginia Marine Resources Commission (VMRC). Findings in this report are subject to review by the U.S. Environmental Protection Agency (EPA). This report does not constitute a stream characterization determination, since such determinations must be verified by VDEQ, nor does it constitute a resource protection area determination, which must be verified by the City of Alexandria.

1.2 Regulatory Requirements

1.2.1 Federal Regulations

Under Section 404 of the Clean Water Act (CWA)(33 U.S.C. § 1251. et seq.), the deposition of dredge or fill materials into federally jurisdictional wetlands or WOUS is regulated by the USACE. Mitigation may be required if impacts to wetlands are expected to occur. Before a permit can be approved, reasonable proof that avoidance or minimization of wetland impacts will be attempted must be provided to the USACE.

Any future projects associated with wetlands or WOUS that fall under the jurisdiction of the USACE must be reviewed in accordance with Section 404 of the Clean Water Act. If any proposed project would potentially impact WOUS, a Section 404 (b)(1) analysis would be conducted. If the wetlands would be avoided and erosion near a wetland would be controlled, a permit is generally not required.

1.2.2 State Regulations

Since 1992, the Virginia Water Protection Permit Program has served as the Commonwealth's Section 401 Certification process for both tidal and nontidal impacts permitted under Section 404 of the Clean Water Act. In 2000, the General Assembly removed the dependence of the State nontidal wetlands program on the issuance of a Federal permit, thus enabling VDEQ to use the Virginia Water Protection Permit Program to regulate activities in wetlands. Such activities as certain types of excavation in wetlands and fill in isolated wetlands (which may not be under Federal jurisdiction) were added to the activities already regulated through the Section 401 Certification process.

VDEQ can provide Section 401 Certification through issuing a Virginia Water Protection individual or general permit or by certifying USACE nationwide or regional permits. Some USACE permit certifications contain conditions which must be met for the certification to apply. Some USACE permits are not Section 401 certified, and, thus, impacts under these USACE permits would also require a Virginia Water Protection permit to ensure State natural resources are protected.

1.3 Organization

The report is organized into the following sections:

- Section 2.0: Site Description, provides an overview of the study area, including a description of historical uses of the site, as well as existing topography, hydrology, soils, wetlands as identified in the National Wetland Inventory, and floodplains.
- Section 3.0: Methodology, describes the process followed to identify WOUS, including wetlands, in the study area. The section describes the process for both the in-office review and the field investigation.
- Section 4.0: Results, describes the water features and wetlands that were identified within the investigation study area.
- Section 5.0: References, includes citations of documents referenced in report.

2.0 SITE DESCRIPTION

The study area investigated for WOUS, including wetlands, is approximately bounded by Potomac Avenue on the west, George Washington Memorial Parkway on the east, Slaters Lane on the south, and the Ronald Reagan Washington National Airport Access Road on the north (see Figure 2). The existing residential neighborhood between the George Washington Memorial Parkway and the WMATA right-of-way (Potomac Greens) is excluded from the study area. The study area is 117.8 acres in size and is located partly within the City of Alexandria and partly within Arlington County, Virginia.

Potomac Yard served as a railroad switching and maintenance yard until 1990, and was used by Norfolk Southern Corporation, Delaware and Hudson Railway, Consolidated Rail Corporation, the Richmond, Fredericksburg, and Potomac Railroad (RF&P), and CSX Transportation (CSXT). Locomotive engines were fueled at the site from four 25,000-gallon above ground storage tanks (ASTs). Diesel fuel from these tanks was pumped through underground piping to a dispensing system in the fueling area of Potomac Yard. Since 1990, Potomac Yard has undergone extensive dismantling, including the removal of most of the switching track, locomotive maintenance facilities and associated buildings. Most of the former railroad yard has been redeveloped (e.g., the Potomac Greens neighborhood and the Potomac Yard Shopping Center).

EPA designated Potomac Yard as a “Superfund” site in 1992 (EPA, 2011). Investigations identified hazardous chemicals of concern such as: metals (specifically, arsenic, antimony, cadmium, lead, mercury, and thallium), pesticides (chlordane), and petroleum hydrocarbons. An underground plume of free product (diesel fuel and oil) was identified and remediated under the supervision of VDEQ.

Due to extensive remediation, EPA removed the Superfund designation in 2004 (EPA, 2011). EPA considers Potomac Yard, including the study area, safe for people and the environment. According to the conditions of a 2004 removal order, many of the existing outfalls were closed or regraded, and stormwater drains were re-routed into Four Mile Run. According to EPA, these actions decreased the threat to humans and the environment, as well as long-term ecological threats (EPA, 2011).

During the field investigation for the WOUS and wetlands delineation, field investigators noted likely petrochemical contamination in some of the soil samples. Proper safety procedures will need to be followed during any subsequent field work.

The following sections describe features of the site based on U.S. Geological Survey (USGS) topographic mapping and aerial imagery, Federal Emergency Management Agency (FEMA) flood maps, National Wetlands Inventory (NWI) data, and Natural Resources Conservation Service (NRCS) soils data. These data sources were used for preliminary investigation and informational purposes only. Section 3.2 describes the methodology used for the field investigation, which yielded the results described in Section 4.0.

2.1 Topography

Figure 3 shows the site topography and existing features. The study area is generally a flat, low-lying area with an average topographic elevation change less than a range of 30 to 50 feet. USGS topographic data is shown in Figure 4. The ground surface slopes to the north toward Four Mile Run and east toward the Potomac River.

2.2 Hydrology

Figure 5 depicts local hydrology. The study area is situated within the Middle Potomac-Anacostia-Occoquan watershed (HUC 02070010). Surface water bodies within, or adjacent to, the study area include Four Mile Run and the Potomac River. Network intermittent streams, ditches, and stormwater management features connect to the Potomac River or Four Mile Run. Four Mile Run flows into the Potomac River; each is considered a Traditional Navigable Body of Water (TNW) by the USACE.

2.3 Natural Resources Conservation Service (NRCS) Soil Survey

According to the NRCS Soil Survey, three types of soil occur in the study area: Grist Mill Sandy Loam, Urban Land, and Urban Land-Udorthents Complex soils (see Figure 6). None of these soil types meets the hydric criteria. For additional details on each soil type, see Appendix B. Relevant soil information is summarized in Table 1 below.

Table 1: NRCS Soil Survey Data, Study Area, City of Alexandria and Arlington County, Virginia

Soil	Symbol	Hydric	Erosion Factor (Kf)
Grist Mill Sandy Loam	40	No	0.24
Urban Land	95	No	-*
Urban Land-Udorthents Complex	12	No	-*

Source: NRCS, 2011
* NRCS does not indicate an erosion factor for Urban Land or Urban Land-Udorthents Complex soils.

2.4 National Wetlands Inventory

The NWI map for the project area (U.S. Fish and Wildlife Service [USFWS], 2011) shows several WOUS, including wetlands, within the study area (see Figure 5). The NWI data depict three main types of wetlands within the study area:

- Freshwater Emergent Wetlands (PEM, PUB)
- Freshwater Forested/Shrub Wetlands (PFO)
- Palustrine Scrub-Shrub (PSS)

Four Mile Run and the Potomac River are both identified in the NWS database and, as noted above, are located within, or adjacent to, the study area.

2.5 Federal Emergency Management Agency Floodplain Profile

According to the FEMA Flood Insurance Rate Maps (51013C0083C and 5155190033E), portions of the study area are within the 100-year and 500-year floodplains (see Appendix C).

3.0 METHODOLOGY

The identification of WOUS, including wetlands, in the study area followed a two-step process: an in-office review of available resource information, followed by a site walk and field investigation.

While most of the study area was included in the field investigation (i.e., full delineation), a portion of the study area only received an in-office review and site walk, but not a full delineation. Based on the in-office review and the site walk, it was presumed that a full delineation was not necessary for the portion of land between the CSXT railroad tracks and the WMATA railroad tracks.

3.1 In-Office Review

Available resource information was reviewed to evaluate the potential of jurisdictional waters of the U.S., including wetlands, that may occur in the study area. These data included USGS topographic mapping and aerial imagery, FEMA flood maps (Section 2.5), NWI data (Section 2.4), and NRCS soils data (Section 2.3). The in-office review is used for preliminary investigation and informational purposes only. It is not used to make a wetlands determination.

3.2 Field Investigation

Following the in-office review of resource documentation, a site walk and field investigation for WOUS, including wetlands, were performed on several dates from October to December 2011.

3.2.1 Applicable Procedures

The field investigation was performed in accordance with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and, where applicable, in accordance with methods identified in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Coastal Plain Region* (USACE, 2010).

The George Washington Memorial Parkway, administered by NPS, is located on the east side of the study area. Therefore, in addition to using the USACE methodology, WOUS and wetland boundaries on NPS property were also delineated using the methods described in the *National Park Service Procedural Manual #77-1: Wetland Protection* (April 2011 edition). The NPS method essentially requires one wetland characteristic to be identified, as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al*., 1979), for a wetland boundary to be determined. All data pertaining to WOUS, including wetlands that were identified on NPS property using the NPS method, including maps and *National Park Service Procedural Manual #77-1: Wetland Protection,* can be found in Appendix D.

3.2.2 Sampling Points

For purposes of USACE review, all WOUS, including wetland boundaries, that are presented in Figures 7, 7A, 7B, 7C and Figures 8, 8A, 8B, and 8C were determined using the methodology as described in the 1987 *Delineation Manual* and the 2010 *Atlantic and Coastal Plain Regional Supplement*. This methodology requires the investigation of the following three wetland parameters at selected sampling points within a study area:

- Hydrophytic vegetation
- Hydric soils
- Hydrological characteristics

For an area to be classified as a wetland, positive indicators of each of the three parameters must be present, with the exception of problem areas. The sampling points are positioned to ascertain upland/wetland boundaries and to record significant spatial changes in wetland plant communities. Data for all sample points are listed on the data sheets provided in Appendix A.

3.2.3 Hydrophytic Vegetation

Using the 1987 Manual and Regional Supplement methodology, dominant species of vegetation at any wetland, including associated upland control sampling points were identified and recorded. Vegetative data were interpreted and individual plant species were checked against the *Official National List of Plant Species that Occur in Wetlands: 1988 – Region 1* (Reed, 1988) to determine their appropriate regional wetland indicator status.

3.2.4 Hydric Soils

Under the 1987 Manual and Regional Supplement methodology, soil pits or borings may be required at wetland and upland control sampling points to reveal soil profiles and to investigate positive indicators of hydric (wetland) soils. Where possible, soil pits should be dug to at least 16 inches in depth. This process

was followed, and mapped soils were compared to field-examined profiles and matched with data found on the NRCS's Web Soil Survey website.

Field indicators of hydric soils were determined using the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Coastal Plain Region* (based on Version 7.0 of the *Field Indicators of Hydric Soils in the United States*). Hydric soils are defined as those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. Hydric soil indicators relate to color, structure, organic content, and the presence of reducing conditions.

If present, the abundance, contrast, and size of the redoximorphic features of each sample point were described on the data sheets (see Appendix A). Under this methodology, color characteristics (hue, value, and chroma) are recorded using Munsell® charts (GretagMacbeth, 2000), and observations are typically focused on the area immediately below the "A" horizon or 10 inches, whichever is shallower. All soil colors were determined from moist undisturbed peds using Munsell soil color charts based on samples using a soil auger.

3.2.5 Hydrological Characteristics

At each sampling point, hydrology was assessed according to the indicators found in the Regional Supplement. Observations were made on the presence of surface water, water table, and soil saturation. A checklist of primary and secondary indicators was followed to determine if wetland hydrology was present. At least one primary indicator or two secondary indicators are required for positive wetland hydrology identification.

3.2.6 Extent of WOUS, including Wetlands

Data collected to determine the extent of WOUS, including wetlands, within the study area can be found in Appendix A. WOUS and wetland features identified during this investigation are presented in Figures 7 and subsequent Figures 7A, 7B, and 7C, which illustrate associated topographic features, and in Figures 8, 8A, 8B, and 8C, which present all WOUS and wetland features on aerial imagery.

Sample points and boundaries on the associated figures indicate areas where vegetation, soils, and hydrology were assessed on the USACE data forms. Locations were marked using Global Positioning System (GPS) equipment and then flagged. A Trimble® Geo XH GPS unit (GeoExplorer® Series), typically accurate to less than one horizontal meter, was used to record the locations of jurisdictional boundaries, data points, and other pertinent features. Aerial photography was used to supplement the GPS data to determine the true extent of the WOUS and wetland boundaries. The GPS data were downloaded, differentially corrected, and superimposed onto existing aerial photographs and topography to create the figures presented in this report. Arcview GIS software was used to calculate all proposed jurisdictional boundaries and other pertinent features.

GPS data were collected in the thalweg of each stream/river, as well as at the Ordinary High Water Mark (OHWM) near the top of each stream bank. The thalweg is the deepest part of the stream/river bed and was interpreted from a combination of aerial imagery and subsequent visual determination in the field. The OHWM was distinguished by drift marks, bent foliage, and stained leaves or high water marks.

4.0 RESULTS

A total of two water features and three wetlands were identified. Table 2 provides a summary of the WOUS, including wetlands, that were identified within the study area.

WOUS and wetland features identified during this investigation are presented in Figure 7 and subsequent Figures 7A, 7B, and 7C, which illustrate associated topographic features, and Figures 8, 8A, 8B, and 8C, which present all WOUS and wetland features on aerial imagery.

The observed upland area surrounding the wetlands is dominated by broadleaf deciduous trees, including Red Maple (*Acer rubrum*) and Sweetgum (*Liquidambar styraciflua*). Also present are the evergreen trees

species American Holly (*Ilex opaca*) and Eastern Redcedar (*Juniperus virginiana*). Understory species that are common across the study area include American Holly (*Ilex opaca*), Greenbriar (*Smilax rotundifolia*), and Japanese Stiltgrass (*Microstegium vimineum*). Species common to the wetland area are Black Willow (*Salix nigra*), Broadleaf Cattail (*Typha latifolia*), and the Common Reed (*Phragmites australis*).

Table 2: Waters of the U.S. (WOUS), including Wetlands, located within the Study Area, City of Alexandria and Arlington County, Virginia

ID	Square Feet	Acres	Linear Feet
Wetlands			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
TOTAL	540,653	12.42	-
Waters of the U.S.			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1,795
TOTAL	115,923	2.66	2,191

The features listed in Table 2 and described and mapped in this report are likely Jurisdictional WOUS and are therefore subject to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. Wetland boundaries presented in this report are preliminary and subject to verification by USACE, Norfolk District and VDEQ.

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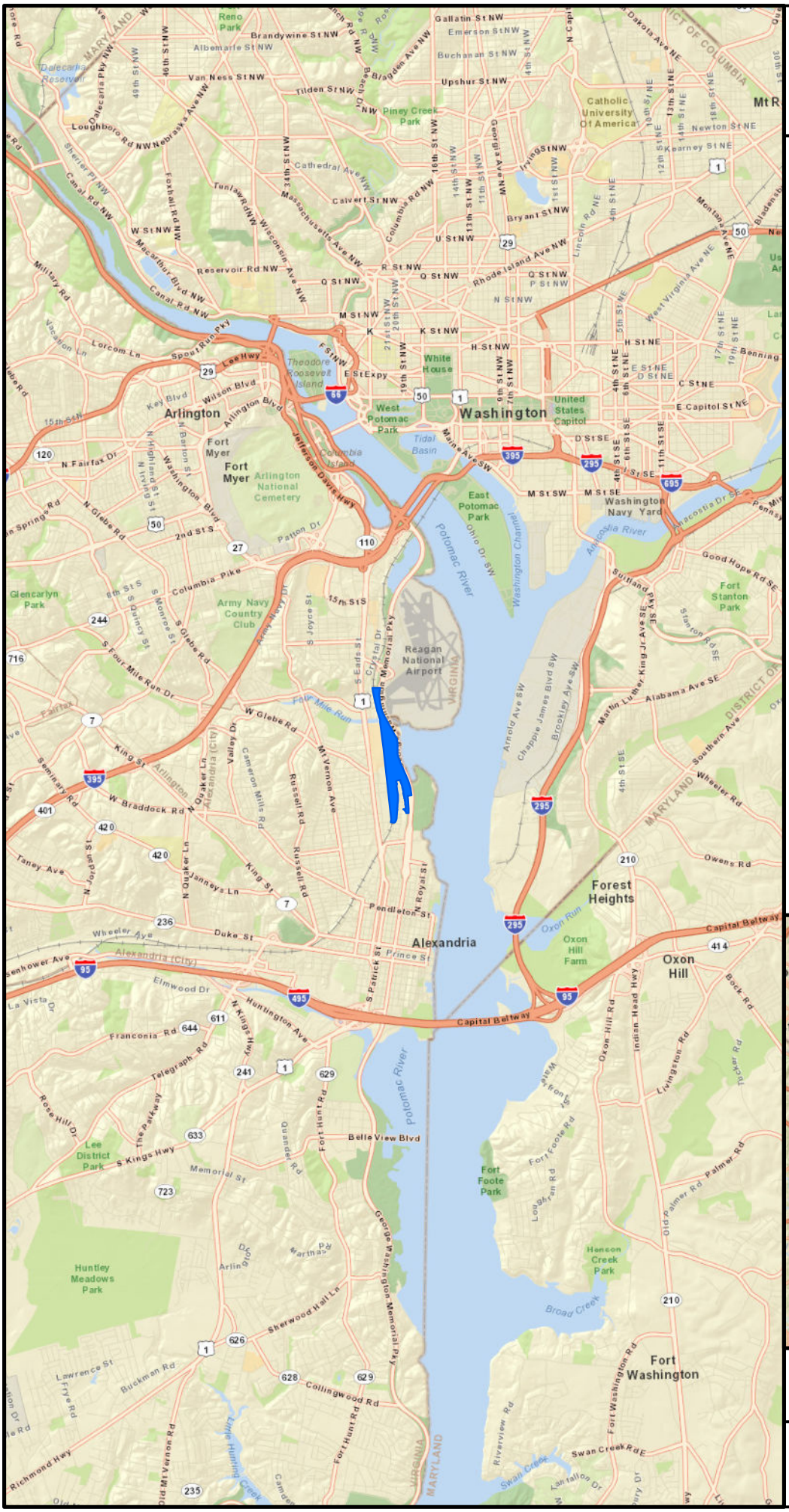
FIGURES

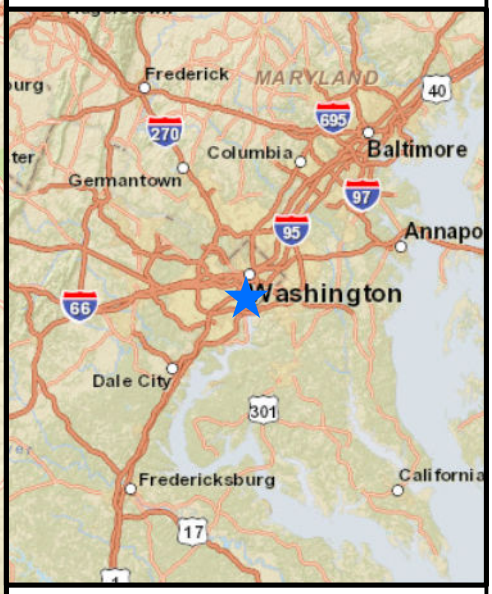
Figure 1
Regional Vicinity

LEGEND

- Study Area
- Project Location

Source: ESRI Data & Maps, DeLorme 2009





0 1 2 Miles

N

POTOMAC YARD
METRORAIL STATION EIS

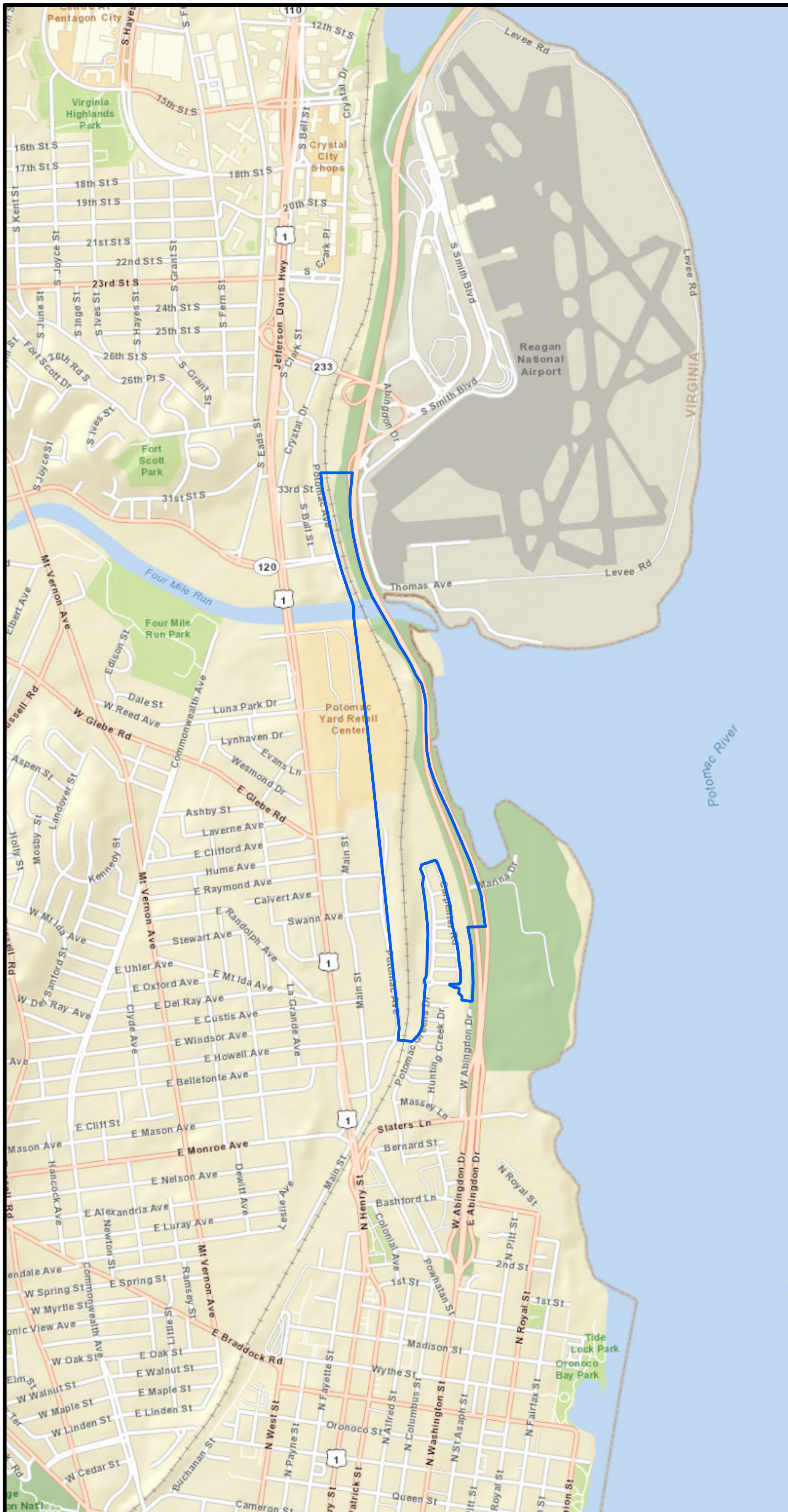


Figure 2
Local Vicinity

LEGEND

Study Area

Source: ESRI Data & Maps, DeLorme 2009

0 1,000 2,000 Feet

N

POTOMAC YARD METRORAIL STATION EIS

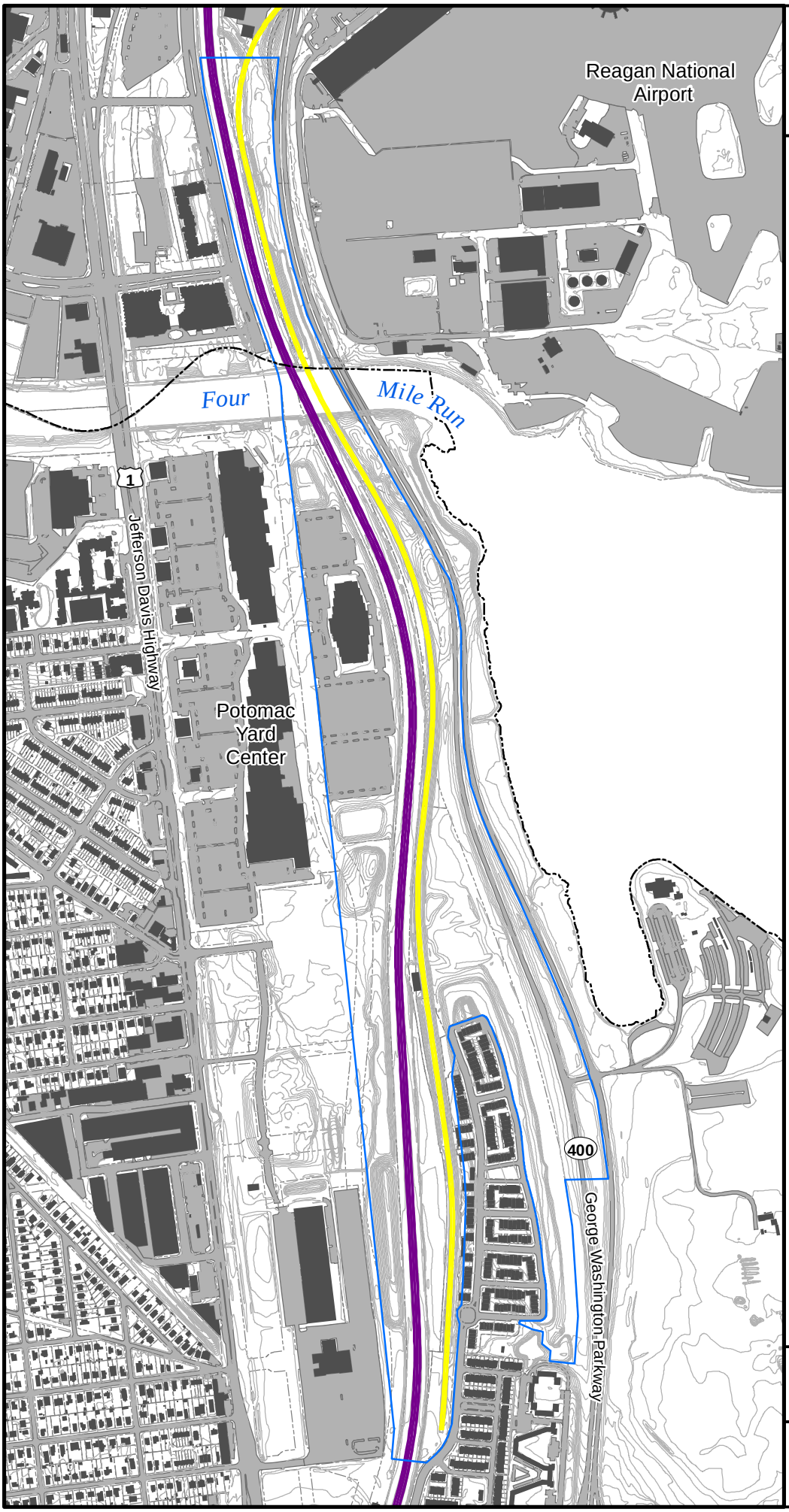


Figure 3
Existing Features

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Building/Structures
- 2 ft Contour
- Paved Surface
- Parcels

Source: City of Alexandria, 2010
Arlington County 2011
WMATA 2011

0 400 800 Feet

N

POTOMAC YARD METRORAIL STATION EIS

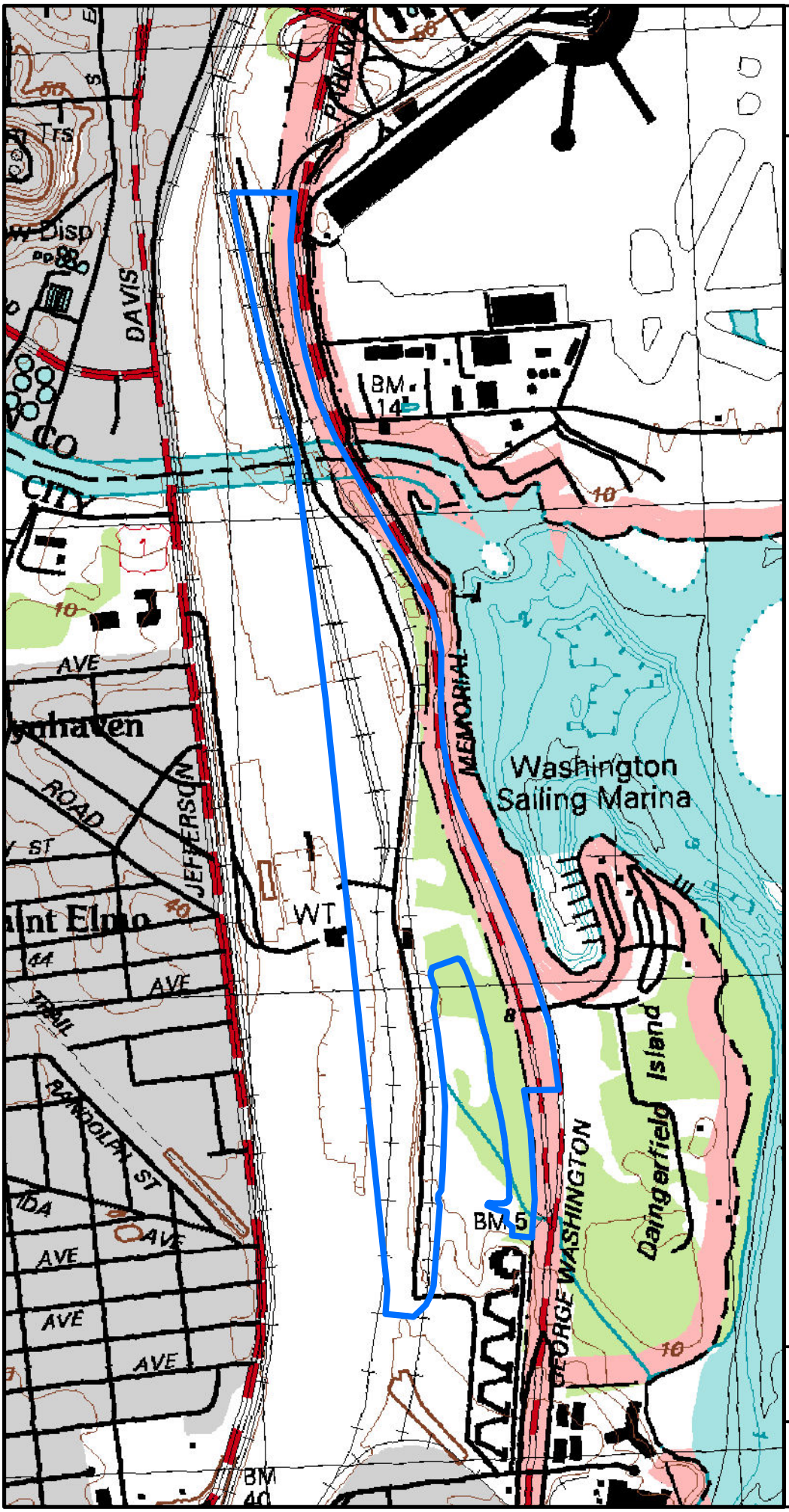


Figure 4
USGS Topography

LEGEND

Study Area

10ft Contour

Source: ESRI Data & Maps 2009
USGS QUADRANGLE
38077G1, ALEXANDRIA, 1994

0 400 800 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

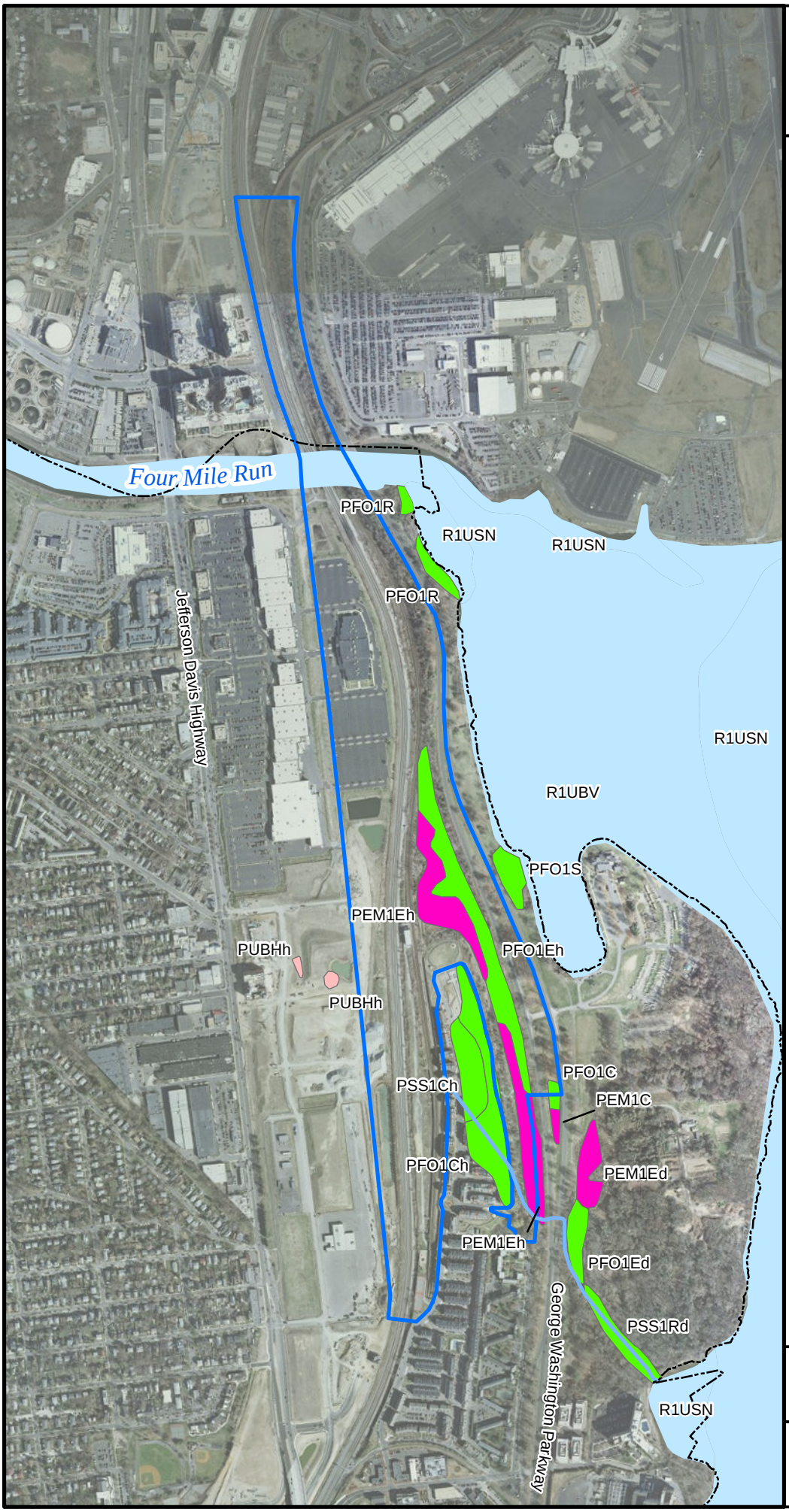


Figure 5
National Wetland Inventory and Local Hydrology

LEGEND

- Study Area
- City Boundary
- Stream/Creek
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Source: ESRI Data & Maps 2009
USFWS National Wetland Inventory (NWI) 2011
USGS National Hydrography Dataset (NHD) 2011

0 400 800 Feet

N

POTOMAC YARD METRORAIL STATION EIS

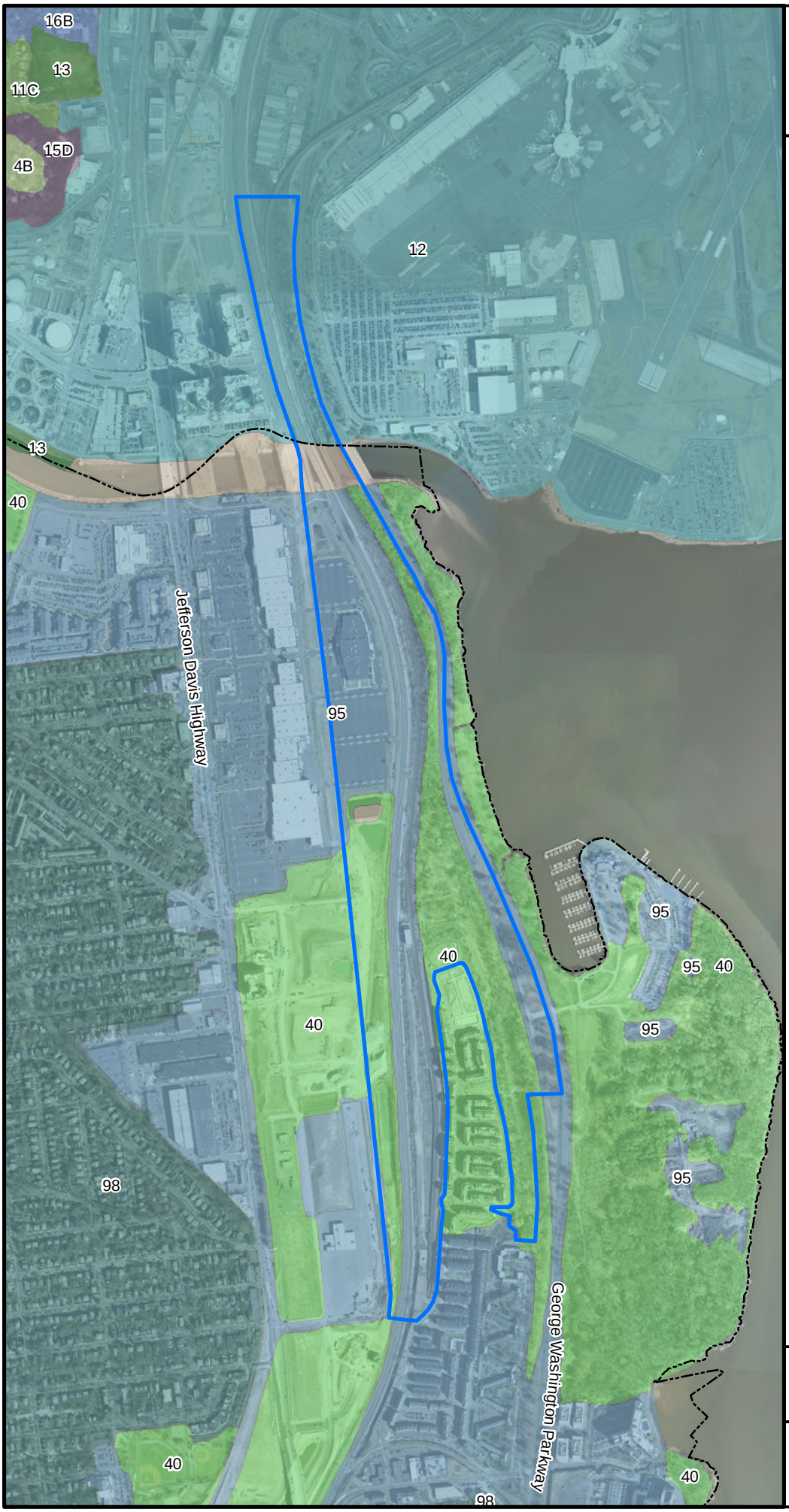


Figure 6
NRCS SSURGO Soils

LEGEND

Study Area

City Boundary

Soils found within the Study Area

12 - Urban land-Udorthents Complex

40 - Grist Mill Sandy Loam

95 - Urban Land

Source: ESRI Data & Maps 2009
NRCS SSURGO, 2011

0 400 800 Feet

N

POTOMAC YARD METRORAIL STATION EIS

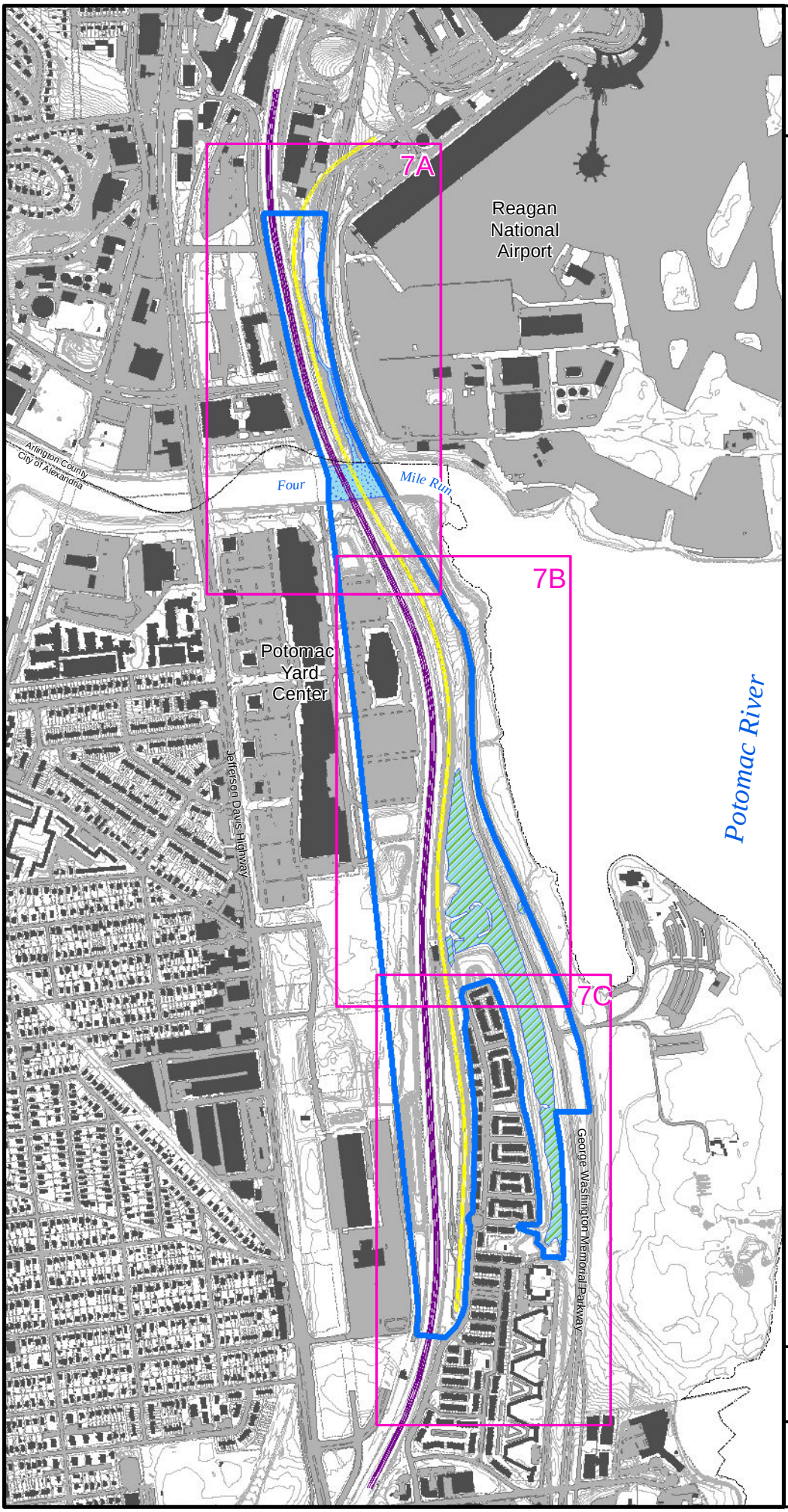


Figure 7
Wetland Delineation with Topography - Overall

LEGEND

- Study Area
- Waters of the U.S.
- USACE/Section 404 Wetland
- Tracks - CSXT
- Tracks - WMATA
- Building/Structures
- 2 ft Contour
- Paved Surfaces
- Parcels
- City Boundary
- Index Grid

Source: City of Alexandria 2010
Arlington County 2011
WMATA 2011

0 500 1,000 Feet

N

POTOMAC YARD METRORAIL STATION EIS

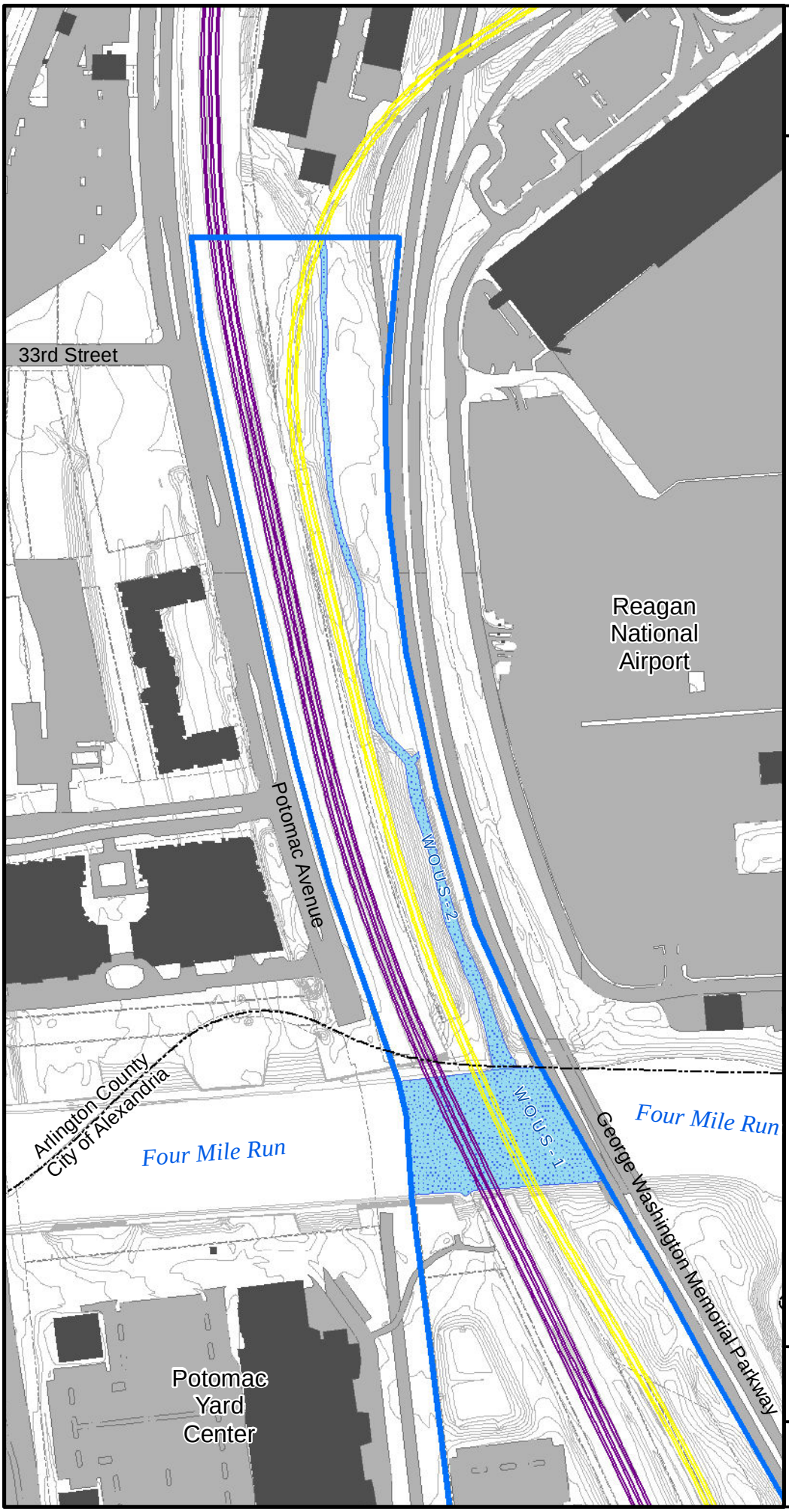


Figure 7A
Wetland Delineation with Topography - North

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Waters of the U.S.
- Building/Structures
- Paved Surfaces
- 2 ft Contour
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD METRORAIL STATION EIS

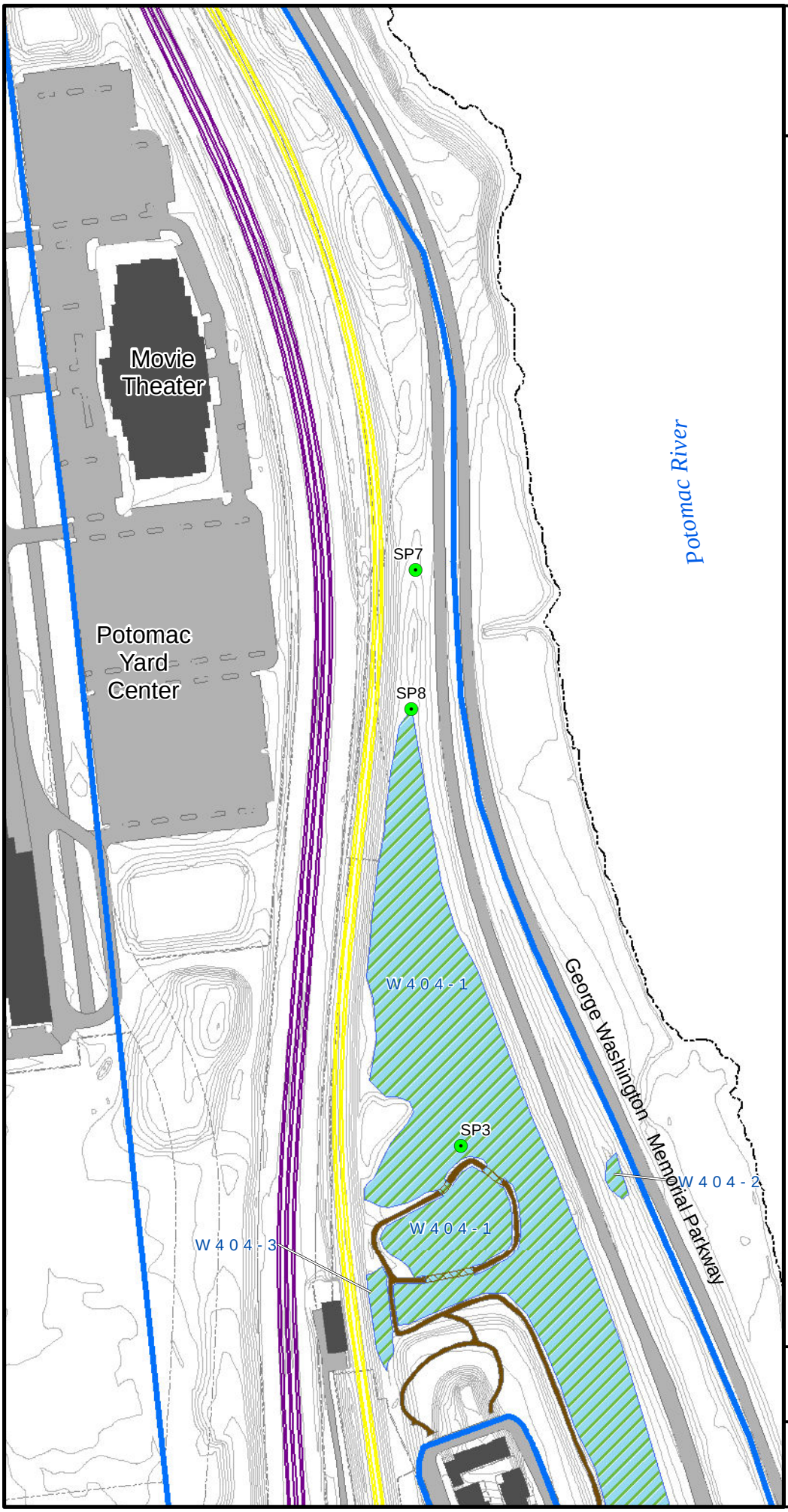


Figure 7B
Wetland Delineation with Topography - Central

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Wetland Sample Points
- Boardwalk
- Recreational Trail
- USACE/Section 404 Wetland
- Building/Structures
- Paved Surfaces
- 2 ft Contour
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

Figure 7C
Wetland Delineation with Topography - South

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Wetland Sample Points
- Recreational Trail
- USACE/Section 404 Wetland
- Building/Structures
- Paved Surfaces
- 2 ft Contour
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

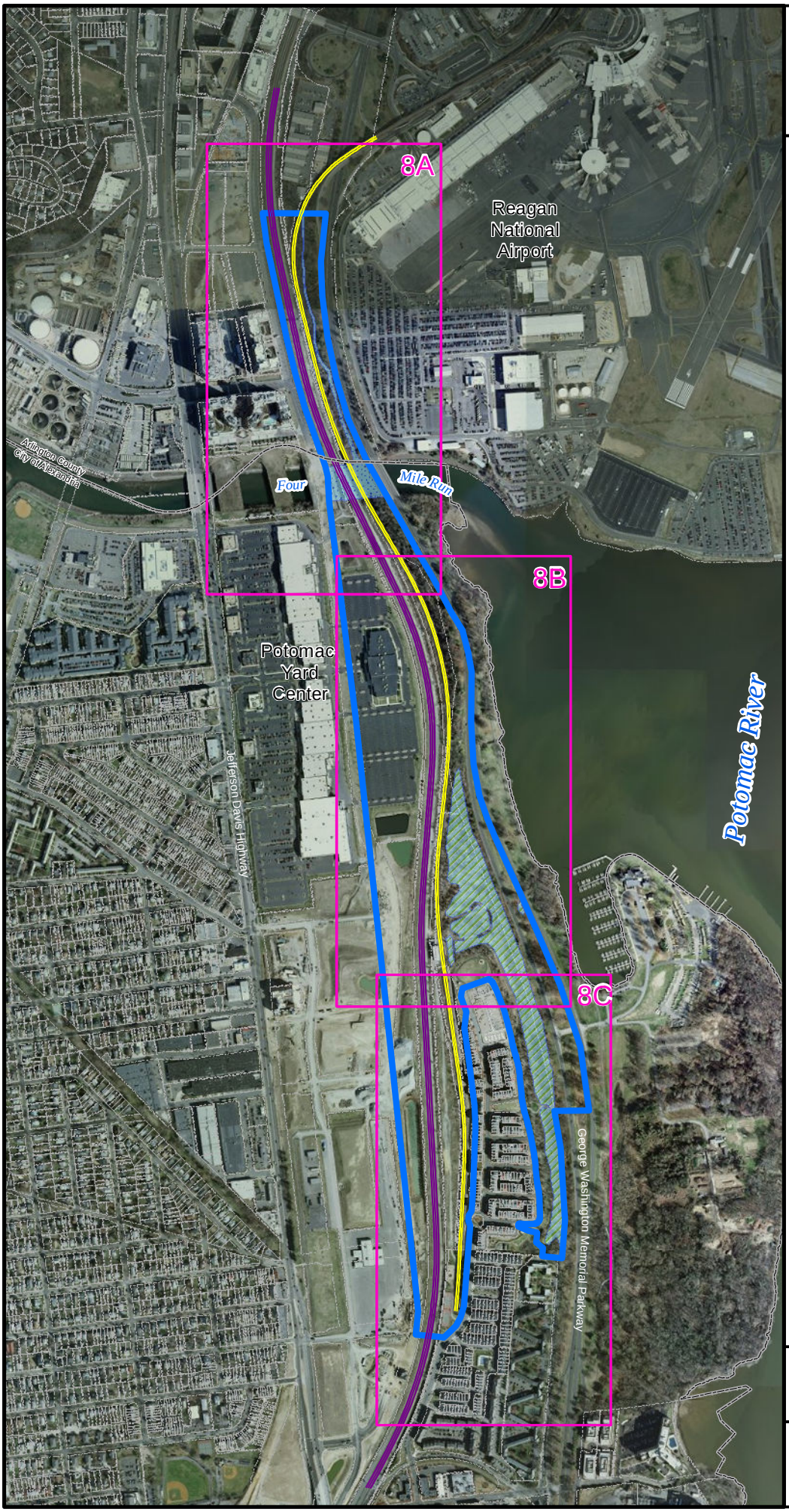


Figure 8
Wetland Delineation with Aerial Photography - Overall

LEGEND

- Study Area
- Tracks - WMATA
- Tracks - CSXT
- Waters of the U.S.
- USACE/Section 404 Wetland
- Parcels
- City Boundary
- Index Grid

Source: City of Alexandria 2010
Arlington County 2011
WMATA 2011
ESRI 2011

0 500 1,000 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

Figure 8A
Wetland Delineation with Aerial Photography - North

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Waters of the U.S.
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

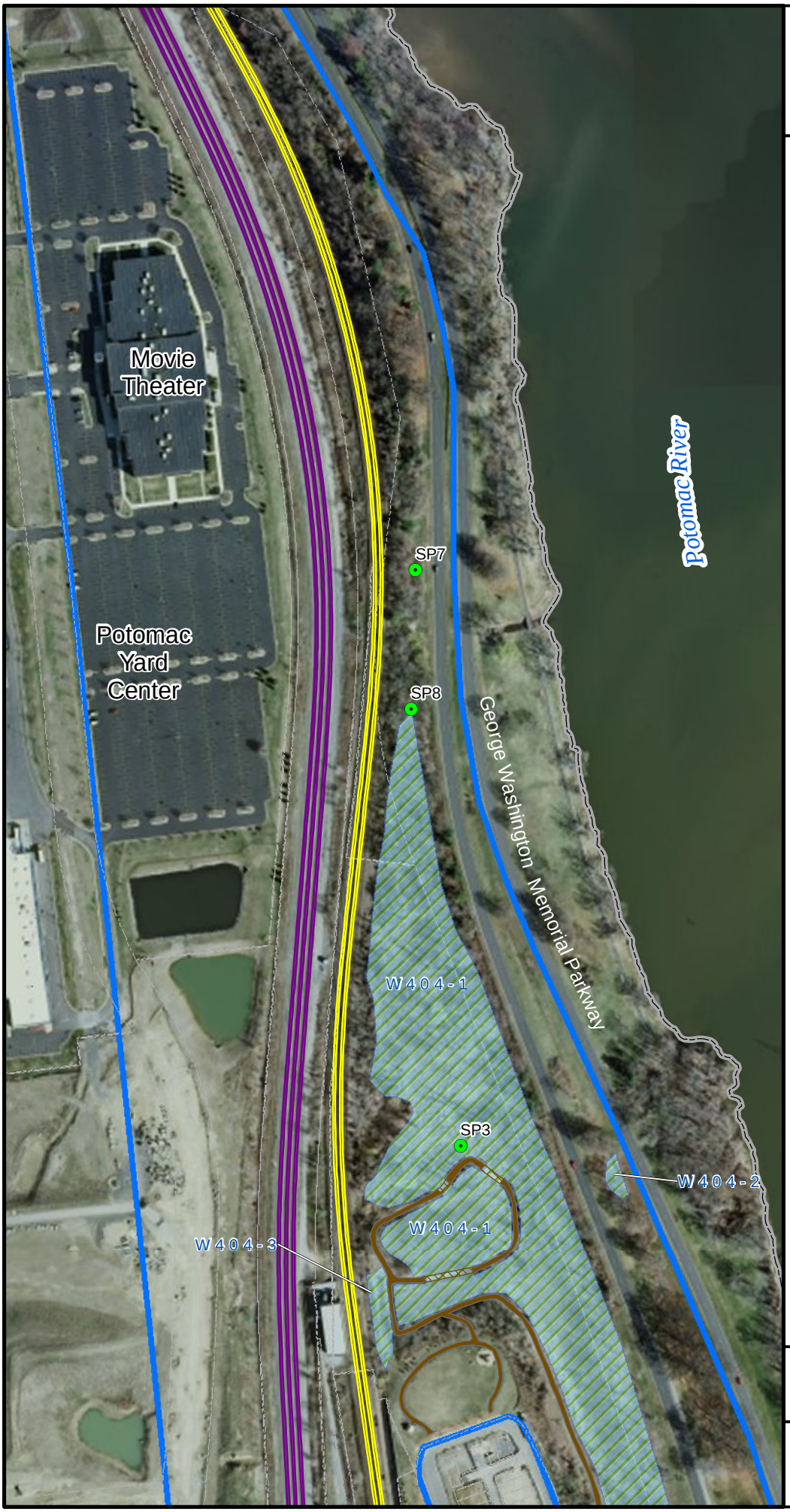


Figure 8B
Wetland Delineation with Aerial Photography - Central

LEGEND

- Study Area
- City Boundary
- Tracks - WMATA
- Tracks - CSXT
- Wetland Sample Points
- USACE/Section 404 Wetland
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entre study area.			

Source: City of Alexandria 2010, WMATA 2011, ESRI 2011

0 150 300 Feet

N

POTOMAC YARD METRORAIL STATION EIS

Figure 8C
Wetland Delineation with Aerial Photography - South

LEGEND

- Study Area
- City Boundary
- Tracks - WMATA
- Tracks - CSXT
- Wetland Sample Points
- USACE/Section 404 Wetland
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

JURISDICTIONAL DETERMINATION EAST PACKAGE

POTOMAC YARD METRORAIL STATION
ENVIRONMENTAL IMPACT STATEMENT

Waters of the U.S. (Including Wetlands) Delineation Report

Revised April 2012

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APPENDIX B	NRCS SOILS REPORT
APPENDIX C	FEMA FLOOD INSURANCE RATE MAPS
APPENDIX D	NATIONAL PARK SERVICE METHODS AND DATA

1.0 INTRODUCTION

The City of Alexandria is proposing the construction of a new Metrorail station located along the existing Blue and Yellow Lines between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail stations within the Potomac Yard mixed-use development site in Alexandria, Virginia (see Figures 1 and 2). The project management team consists of the Federal Transit Administration (FTA), the City of Alexandria, the National Park Service (NPS), and the Washington Metropolitan Area Transit Authority (WMATA). As part of the planning process, the project management team wishes to determine the extent, if any, of Waters of the United States (WOUS), including wetlands, located in the areas being considered for the proposed Metrorail station.

1.1 Purpose

The purpose of this report is to document the methodology and results of the delineation of WOUS, including wetlands, within the 117.8-acre investigation study area (see Figures 1 and 2). Field investigations for WOUS, including wetlands, were conducted from October 2011 to December 2011.

This report does not constitute a jurisdictional determination of Waters of the United States. All WOUS and wetland boundaries presented in this report are preliminary and subject to verification by the U.S. Army Corps of Engineers (USACE), Norfolk District, and the Virginia Department of Environmental Quality (VDEQ). Portions of these WOUS and wetlands, which are tidal, would also be regulated by the Virginia Marine Resources Commission (VMRC). Findings in this report are subject to review by the U.S. Environmental Protection Agency (EPA). This report does not constitute a stream characterization determination, since such determinations must be verified by VDEQ, nor does it constitute a resource protection area determination, which must be verified by the City of Alexandria.

1.2 Regulatory Requirements

1.2.1 Federal Regulations

Under Section 404 of the Clean Water Act (CWA)(33 U.S.C. § 1251. et seq.), the deposition of dredge or fill materials into federally jurisdictional wetlands or WOUS is regulated by the USACE. Mitigation may be required if impacts to wetlands are expected to occur. Before a permit can be approved, reasonable proof that avoidance or minimization of wetland impacts will be attempted must be provided to the USACE.

Any future projects associated with wetlands or WOUS that fall under the jurisdiction of the USACE must be reviewed in accordance with Section 404 of the Clean Water Act. If any proposed project would potentially impact WOUS, a Section 404 (b)(1) analysis would be conducted. If the wetlands would be avoided and erosion near a wetland would be controlled, a permit is generally not required.

1.2.2 State Regulations

Since 1992, the Virginia Water Protection Permit Program has served as the Commonwealth's Section 401 Certification process for both tidal and nontidal impacts permitted under Section 404 of the Clean Water Act. In 2000, the General Assembly removed the dependence of the State nontidal wetlands program on the issuance of a Federal permit, thus enabling VDEQ to use the Virginia Water Protection Permit Program to regulate activities in wetlands. Such activities as certain types of excavation in wetlands and fill in isolated wetlands (which may not be under Federal jurisdiction) were added to the activities already regulated through the Section 401 Certification process.

VDEQ can provide Section 401 Certification through issuing a Virginia Water Protection individual or general permit or by certifying USACE nationwide or regional permits. Some USACE permit certifications contain conditions which must be met for the certification to apply. Some USACE permits are not Section 401 certified, and, thus, impacts under these USACE permits would also require a Virginia Water Protection permit to ensure State natural resources are protected.

1.3 Organization

The report is organized into the following sections:

- Section 2.0: Site Description, provides an overview of the study area, including a description of historical uses of the site, as well as existing topography, hydrology, soils, wetlands as identified in the National Wetland Inventory, and floodplains.
- Section 3.0: Methodology, describes the process followed to identify WOUS, including wetlands, in the study area. The section describes the process for both the in-office review and the field investigation.
- Section 4.0: Results, describes the water features and wetlands that were identified within the investigation study area.
- Section 5.0: References, includes citations of documents referenced in report.

2.0 SITE DESCRIPTION

The study area investigated for WOUS, including wetlands, is approximately bounded by Potomac Avenue on the west, George Washington Memorial Parkway on the east, Slaters Lane on the south, and the Ronald Reagan Washington National Airport Access Road on the north (see Figure 2). The existing residential neighborhood between the George Washington Memorial Parkway and the WMATA right-of-way (Potomac Greens) is excluded from the study area. The study area is 117.8 acres in size and is located partly within the City of Alexandria and partly within Arlington County, Virginia.

Potomac Yard served as a railroad switching and maintenance yard until 1990, and was used by Norfolk Southern Corporation, Delaware and Hudson Railway, Consolidated Rail Corporation, the Richmond, Fredericksburg, and Potomac Railroad (RF&P), and CSX Transportation (CSXT). Locomotive engines were fueled at the site from four 25,000-gallon above ground storage tanks (ASTs). Diesel fuel from these tanks was pumped through underground piping to a dispensing system in the fueling area of Potomac Yard. Since 1990, Potomac Yard has undergone extensive dismantling, including the removal of most of the switching track, locomotive maintenance facilities and associated buildings. Most of the former railroad yard has been redeveloped (e.g., the Potomac Greens neighborhood and the Potomac Yard Shopping Center).

EPA designated Potomac Yard as a “Superfund” site in 1992 (EPA, 2011). Investigations identified hazardous chemicals of concern such as: metals (specifically, arsenic, antimony, cadmium, lead, mercury, and thallium), pesticides (chlordane), and petroleum hydrocarbons. An underground plume of free product (diesel fuel and oil) was identified and remediated under the supervision of VDEQ.

Due to extensive remediation, EPA removed the Superfund designation in 2004 (EPA, 2011). EPA considers Potomac Yard, including the study area, safe for people and the environment. According to the conditions of a 2004 removal order, many of the existing outfalls were closed or regraded, and stormwater drains were re-routed into Four Mile Run. According to EPA, these actions decreased the threat to humans and the environment, as well as long-term ecological threats (EPA, 2011).

During the field investigation for the WOUS and wetlands delineation, field investigators noted likely petrochemical contamination in some of the soil samples. Proper safety procedures will need to be followed during any subsequent field work.

The following sections describe features of the site based on U.S. Geological Survey (USGS) topographic mapping and aerial imagery, Federal Emergency Management Agency (FEMA) flood maps, National Wetlands Inventory (NWI) data, and Natural Resources Conservation Service (NRCS) soils data. These data sources were used for preliminary investigation and informational purposes only. Section 3.2 describes the methodology used for the field investigation, which yielded the results described in Section 4.0.

2.1 Topography

Figure 3 shows the site topography and existing features. The study area is generally a flat, low-lying area with an average topographic elevation change less than a range of 30 to 50 feet. USGS topographic data is shown in Figure 4. The ground surface slopes to the north toward Four Mile Run and east toward the Potomac River.

2.2 Hydrology

Figure 5 depicts local hydrology. The study area is situated within the Middle Potomac-Anacostia-Occoquan watershed (HUC 02070010). Surface water bodies within, or adjacent to, the study area include Four Mile Run and the Potomac River. Network intermittent streams, ditches, and stormwater management features connect to the Potomac River or Four Mile Run. Four Mile Run flows into the Potomac River; each is considered a Traditional Navigable Body of Water (TNW) by the USACE.

2.3 Natural Resources Conservation Service (NRCS) Soil Survey

According to the NRCS Soil Survey, three types of soil occur in the study area: Grist Mill Sandy Loam, Urban Land, and Urban Land-Udorthents Complex soils (see Figure 6). None of these soil types meets the hydric criteria. For additional details on each soil type, see Appendix B. Relevant soil information is summarized in Table 1 below.

Table 1: NRCS Soil Survey Data, Study Area, City of Alexandria and Arlington County, Virginia

Soil	Symbol	Hydric	Erosion Factor (Kf)
Grist Mill Sandy Loam	40	No	0.24
Urban Land	95	No	-*
Urban Land-Udorthents Complex	12	No	-*

Source: NRCS, 2011
* NRCS does not indicate an erosion factor for Urban Land or Urban Land-Udorthents Complex soils.

2.4 National Wetlands Inventory

The NWI map for the project area (U.S. Fish and Wildlife Service [USFWS], 2011) shows several WOUS, including wetlands, within the study area (see Figure 5). The NWI data depict three main types of wetlands within the study area:

- Freshwater Emergent Wetlands (PEM, PUB)
- Freshwater Forested/Shrub Wetlands (PFO)
- Palustrine Scrub-Shrub (PSS)

Four Mile Run and the Potomac River are both identified in the NWS database and, as noted above, are located within, or adjacent to, the study area.

2.5 Federal Emergency Management Agency Floodplain Profile

According to the FEMA Flood Insurance Rate Maps (51013C0083C and 5155190033E), portions of the study area are within the 100-year and 500-year floodplains (see Appendix C).

3.0 METHODOLOGY

The identification of WOUS, including wetlands, in the study area followed a two-step process: an in-office review of available resource information, followed by a site walk and field investigation.

While most of the study area was included in the field investigation (i.e., full delineation), a portion of the study area only received an in-office review and site walk, but not a full delineation. Based on the in-office review and the site walk, it was presumed that a full delineation was not necessary for the portion of land between the CSXT railroad tracks and the WMATA railroad tracks.

3.1 In-Office Review

Available resource information was reviewed to evaluate the potential of jurisdictional waters of the U.S., including wetlands, that may occur in the study area. These data included USGS topographic mapping and aerial imagery, FEMA flood maps (Section 2.5), NWI data (Section 2.4), and NRCS soils data (Section 2.3). The in-office review is used for preliminary investigation and informational purposes only. It is not used to make a wetlands determination.

3.2 Field Investigation

Following the in-office review of resource documentation, a site walk and field investigation for WOUS, including wetlands, were performed on several dates from October to December 2011.

3.2.1 Applicable Procedures

The field investigation was performed in accordance with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and, where applicable, in accordance with methods identified in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Coastal Plain Region* (USACE, 2010).

The George Washington Memorial Parkway, administered by NPS, is located on the east side of the study area. Therefore, in addition to using the USACE methodology, WOUS and wetland boundaries on NPS property were also delineated using the methods described in the *National Park Service Procedural Manual #77-1: Wetland Protection* (April 2011 edition). The NPS method essentially requires one wetland characteristic to be identified, as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al*., 1979), for a wetland boundary to be determined. All data pertaining to WOUS, including wetlands that were identified on NPS property using the NPS method, including maps and *National Park Service Procedural Manual #77-1: Wetland Protection,* can be found in Appendix D.

3.2.2 Sampling Points

For purposes of USACE review, all WOUS, including wetland boundaries, that are presented in Figures 7, 7A, 7B, 7C and Figures 8, 8A, 8B, and 8C were determined using the methodology as described in the 1987 *Delineation Manual* and the 2010 *Atlantic and Coastal Plain Regional Supplement*. This methodology requires the investigation of the following three wetland parameters at selected sampling points within a study area:

- Hydrophytic vegetation
- Hydric soils
- Hydrological characteristics

For an area to be classified as a wetland, positive indicators of each of the three parameters must be present, with the exception of problem areas. The sampling points are positioned to ascertain upland/wetland boundaries and to record significant spatial changes in wetland plant communities. Data for all sample points are listed on the data sheets provided in Appendix A.

3.2.3 Hydrophytic Vegetation

Using the 1987 Manual and Regional Supplement methodology, dominant species of vegetation at any wetland, including associated upland control sampling points were identified and recorded. Vegetative data were interpreted and individual plant species were checked against the *Official National List of Plant Species that Occur in Wetlands: 1988 – Region 1* (Reed, 1988) to determine their appropriate regional wetland indicator status.

3.2.4 Hydric Soils

Under the 1987 Manual and Regional Supplement methodology, soil pits or borings may be required at wetland and upland control sampling points to reveal soil profiles and to investigate positive indicators of hydric (wetland) soils. Where possible, soil pits should be dug to at least 16 inches in depth. This process

was followed, and mapped soils were compared to field-examined profiles and matched with data found on the NRCS's Web Soil Survey website.

Field indicators of hydric soils were determined using the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Coastal Plain Region* (based on Version 7.0 of the *Field Indicators of Hydric Soils in the United States*). Hydric soils are defined as those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. Hydric soil indicators relate to color, structure, organic content, and the presence of reducing conditions.

If present, the abundance, contrast, and size of the redoximorphic features of each sample point were described on the data sheets (see Appendix A). Under this methodology, color characteristics (hue, value, and chroma) are recorded using Munsell® charts (GretagMacbeth, 2000), and observations are typically focused on the area immediately below the "A" horizon or 10 inches, whichever is shallower. All soil colors were determined from moist undisturbed peds using Munsell soil color charts based on samples using a soil auger.

3.2.5 Hydrological Characteristics

At each sampling point, hydrology was assessed according to the indicators found in the Regional Supplement. Observations were made on the presence of surface water, water table, and soil saturation. A checklist of primary and secondary indicators was followed to determine if wetland hydrology was present. At least one primary indicator or two secondary indicators are required for positive wetland hydrology identification.

3.2.6 Extent of WOUS, including Wetlands

Data collected to determine the extent of WOUS, including wetlands, within the study area can be found in Appendix A. WOUS and wetland features identified during this investigation are presented in Figures 7 and subsequent Figures 7A, 7B, and 7C, which illustrate associated topographic features, and in Figures 8, 8A, 8B, and 8C, which present all WOUS and wetland features on aerial imagery.

Sample points and boundaries on the associated figures indicate areas where vegetation, soils, and hydrology were assessed on the USACE data forms. Locations were marked using Global Positioning System (GPS) equipment and then flagged. A Trimble® Geo XH GPS unit (GeoExplorer® Series), typically accurate to less than one horizontal meter, was used to record the locations of jurisdictional boundaries, data points, and other pertinent features. Aerial photography was used to supplement the GPS data to determine the true extent of the WOUS and wetland boundaries. The GPS data were downloaded, differentially corrected, and superimposed onto existing aerial photographs and topography to create the figures presented in this report. Arcview GIS software was used to calculate all proposed jurisdictional boundaries and other pertinent features.

GPS data were collected in the thalweg of each stream/river, as well as at the Ordinary High Water Mark (OHWM) near the top of each stream bank. The thalweg is the deepest part of the stream/river bed and was interpreted from a combination of aerial imagery and subsequent visual determination in the field. The OHWM was distinguished by drift marks, bent foliage, and stained leaves or high water marks.

4.0 RESULTS

A total of two water features and three wetlands were identified. Table 2 provides a summary of the WOUS, including wetlands, that were identified within the study area.

WOUS and wetland features identified during this investigation are presented in Figure 7 and subsequent Figures 7A, 7B, and 7C, which illustrate associated topographic features, and Figures 8, 8A, 8B, and 8C, which present all WOUS and wetland features on aerial imagery.

The observed upland area surrounding the wetlands is dominated by broadleaf deciduous trees, including Red Maple (*Acer rubrum*) and Sweetgum (*Liquidambar styraciflua*). Also present are the evergreen trees

species American Holly (*Ilex opaca*) and Eastern Redcedar (*Juniperus virginiana*). Understory species that are common across the study area include American Holly (*Ilex opaca*), Greenbriar (*Smilax rotundifolia*), and Japanese Stiltgrass (*Microstegium vimineum*). Species common to the wetland area are Black Willow (*Salix nigra*), Broadleaf Cattail (*Typha latifolia*), and the Common Reed (*Phragmites australis*).

Table 2: Waters of the U.S. (WOUS), including Wetlands, located within the Study Area, City of Alexandria and Arlington County, Virginia

ID	Square Feet	Acres	Linear Feet
Wetlands			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
TOTAL	540,653	12.42	-
Waters of the U.S.			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1,795
TOTAL	115,923	2.66	2,191

The features listed in Table 2 and described and mapped in this report are likely Jurisdictional WOUS and are therefore subject to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. Wetland boundaries presented in this report are preliminary and subject to verification by USACE, Norfolk District and VDEQ.

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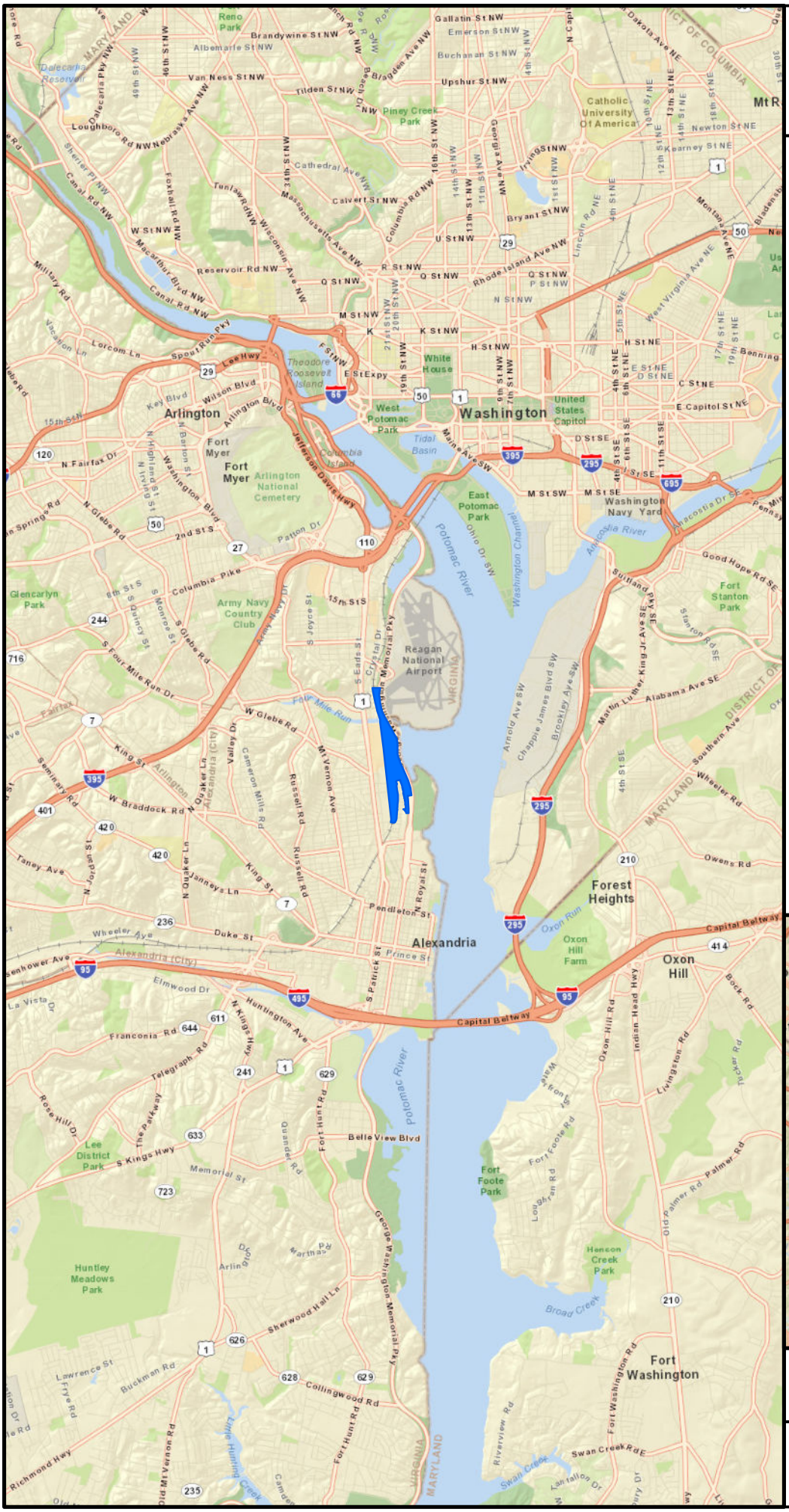
FIGURES

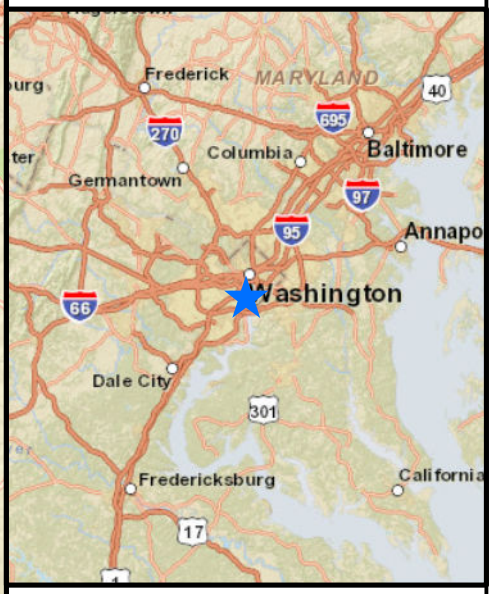
Figure 1
Regional Vicinity

LEGEND

- Study Area
- Project Location

Source: ESRI Data & Maps, DeLorme 2009





0 1 2 Miles

N

POTOMAC YARD
METRORAIL STATION EIS

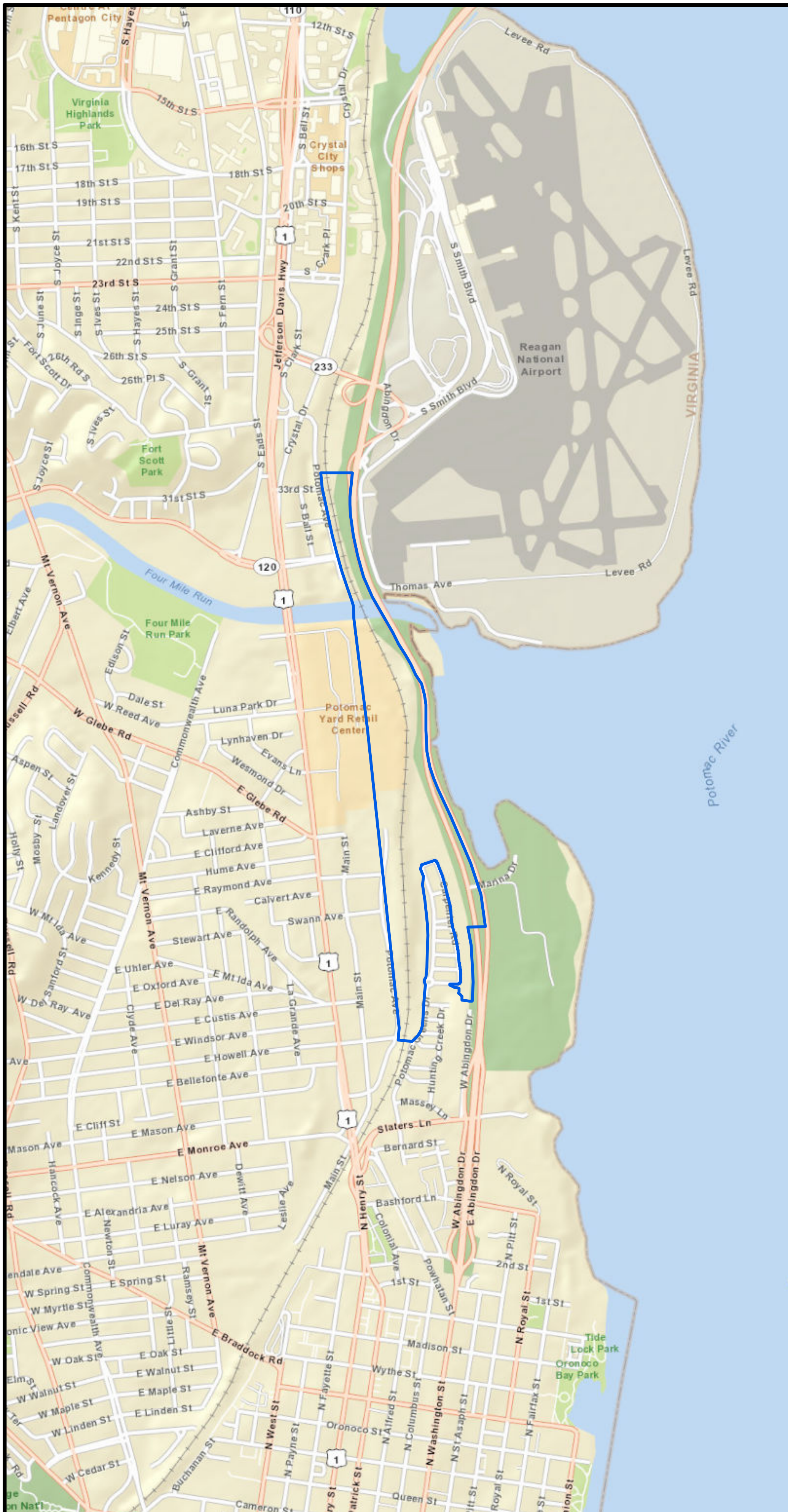


Figure 2
Local Vicinity

LEGEND

Study Area

Source: ESRI Data & Maps, DeLorme 2009

0 1,000 2,000 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

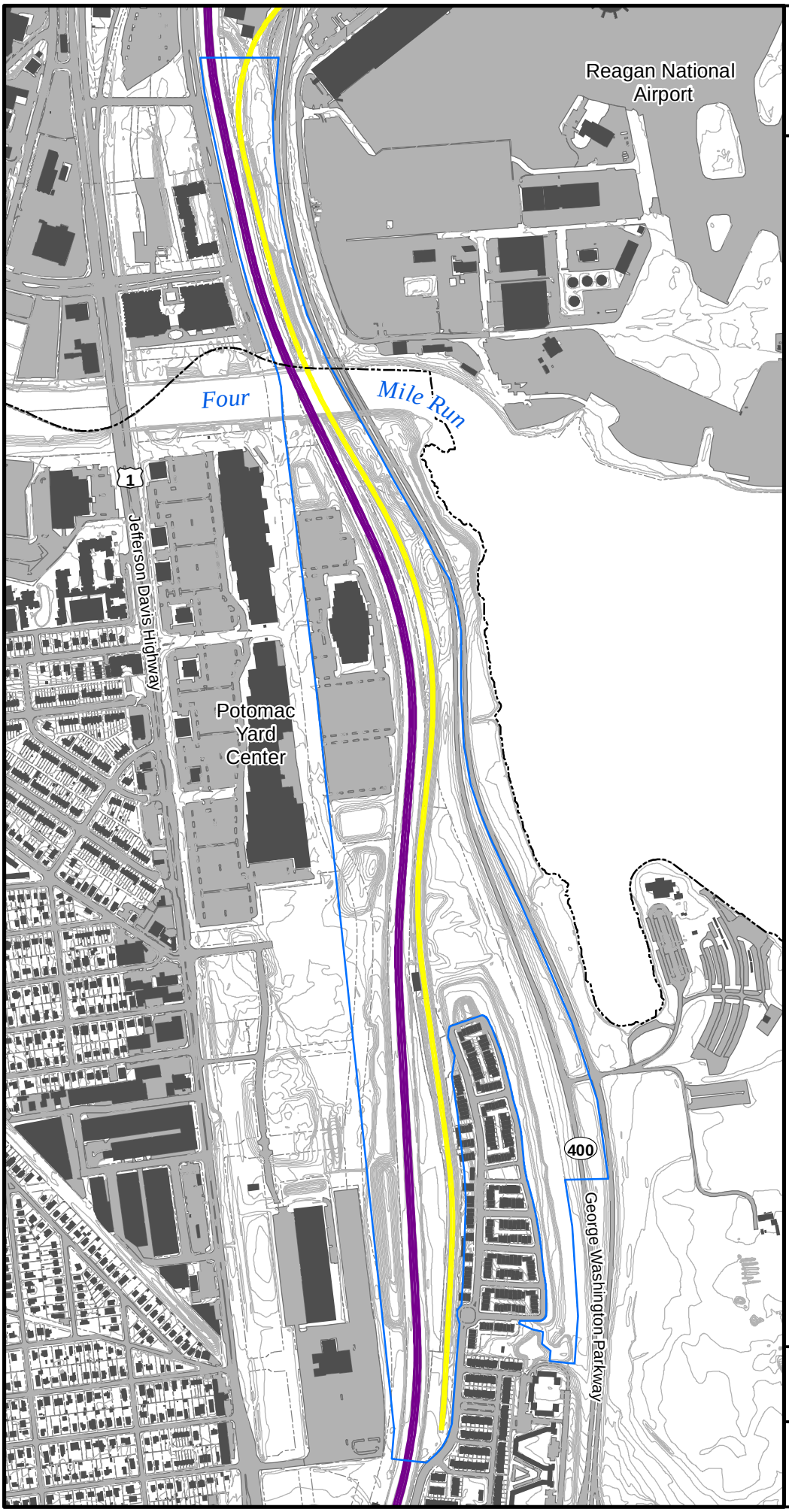


Figure 3
Existing Features

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Building/Structures
- 2 ft Contour
- Paved Surface
- Parcels

Source: City of Alexandria, 2010
Arlington County 2011
WMATA 2011

0 400 800 Feet

N

POTOMAC YARD METRORAIL STATION EIS

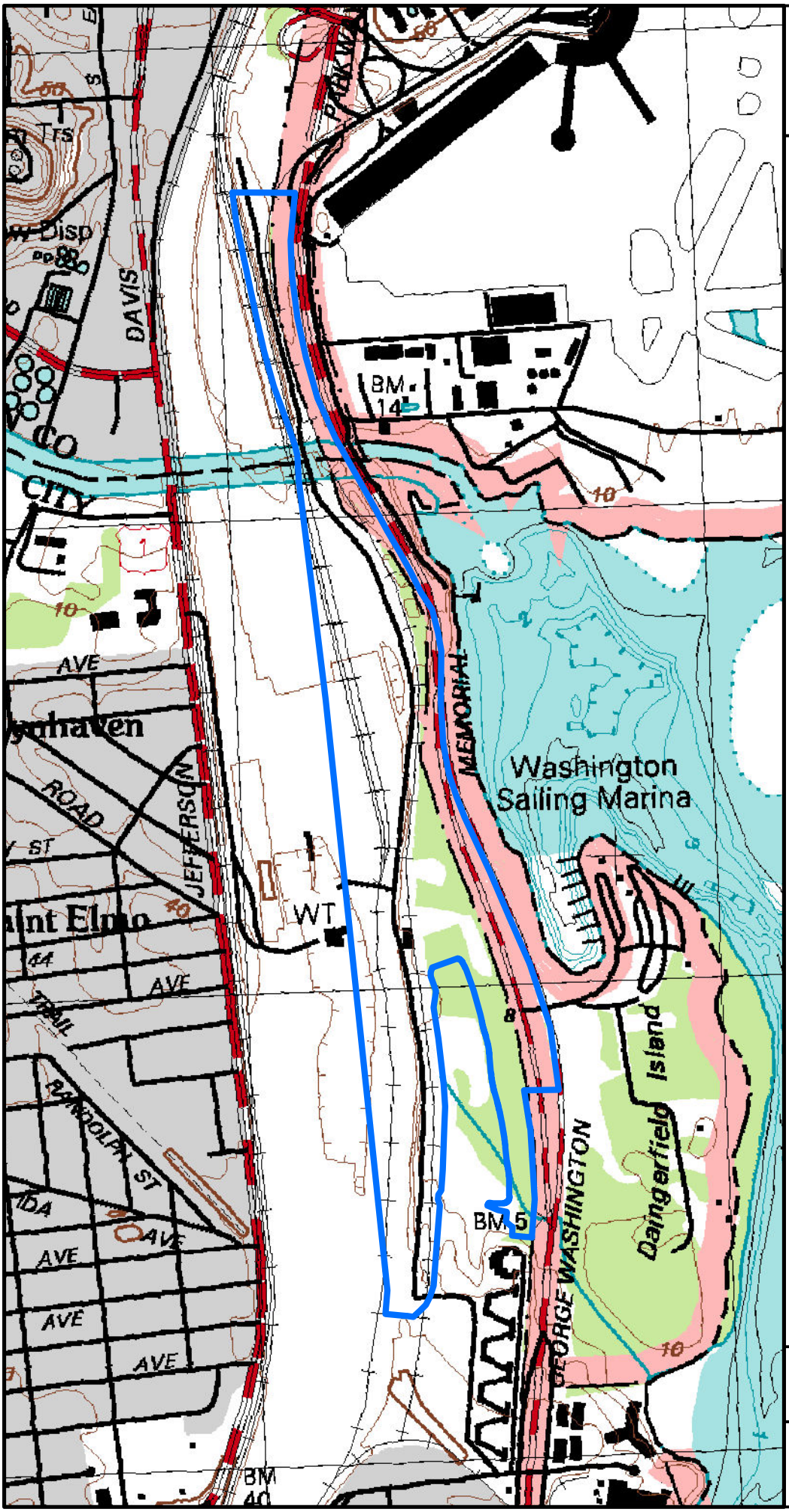


Figure 4
USGS Topography

LEGEND

Study Area

10ft Contour

Source: ESRI Data & Maps 2009
USGS QUADRANGLE
38077G1, ALEXANDRIA, 1994

0 400 800 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

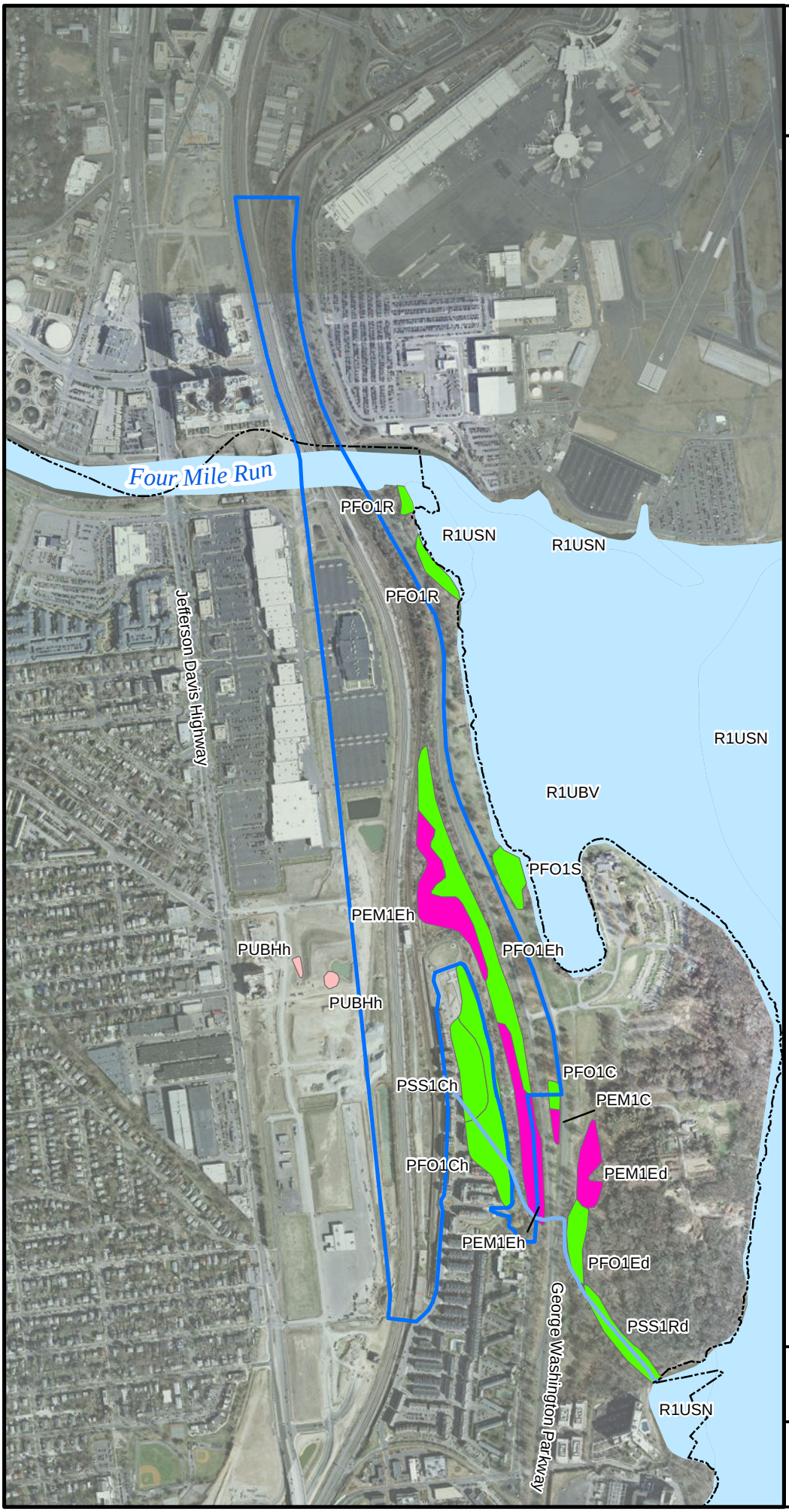


Figure 5
National Wetland Inventory and Local Hydrology

LEGEND

- Study Area
- City Boundary
- Stream/Creek
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Source: ESRI Data & Maps 2009
USFWS National Wetland Inventory (NWI) 2011
USGS National Hydrography Dataset (NHD) 2011

0 400 800 Feet

N

POTOMAC YARD METRORAIL STATION EIS

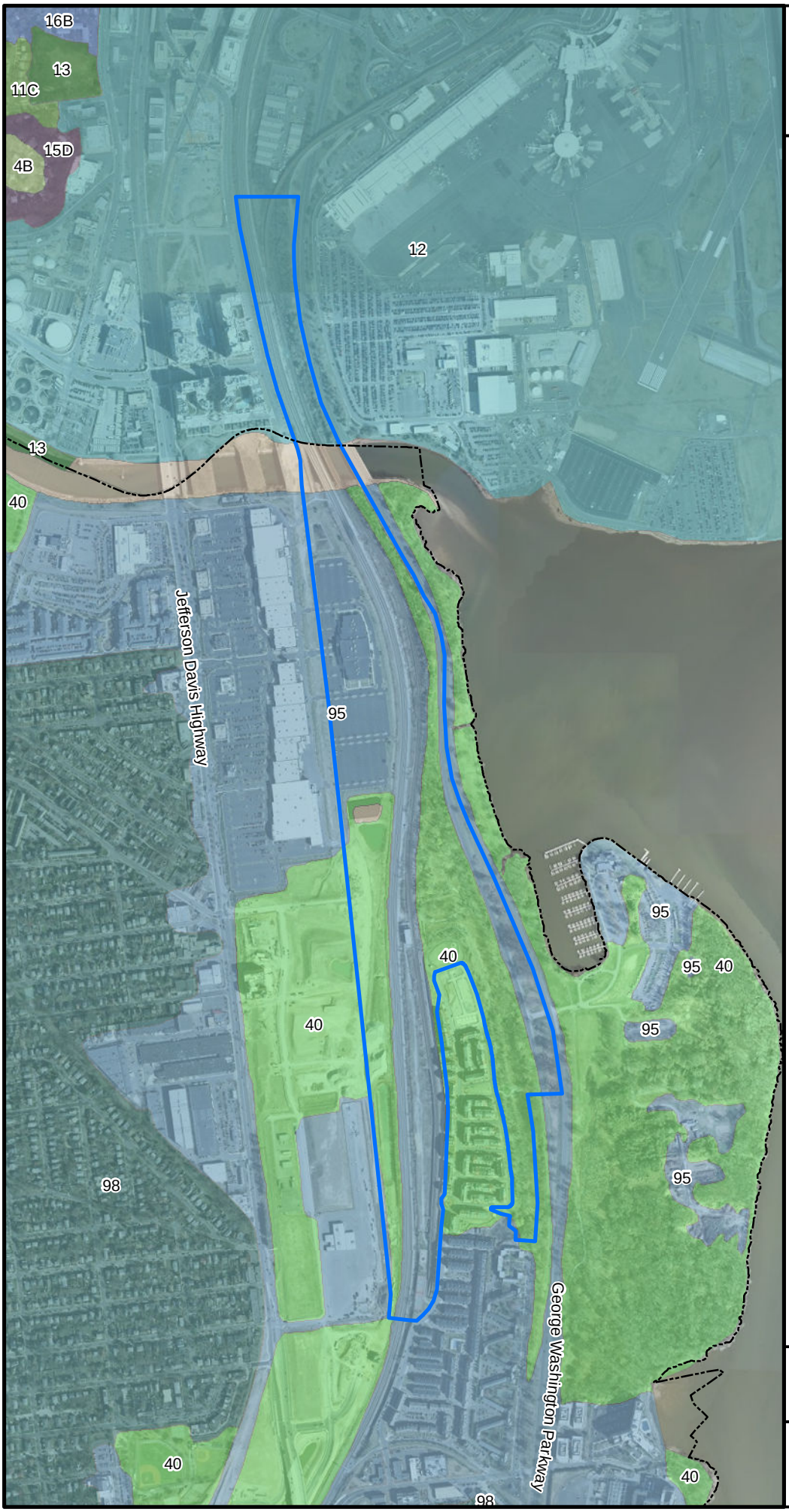


Figure 6
NRCS SSURGO Soils

LEGEND

Study Area

City Boundary

Soils found within the Study Area

12 - Urban land-Udorthents Complex

40 - Grist Mill Sandy Loam

95 - Urban Land

Source: ESRI Data & Maps 2009
NRCS SSURGO, 2011

0 400 800 Feet

N

POTOMAC YARD METRORAIL STATION EIS

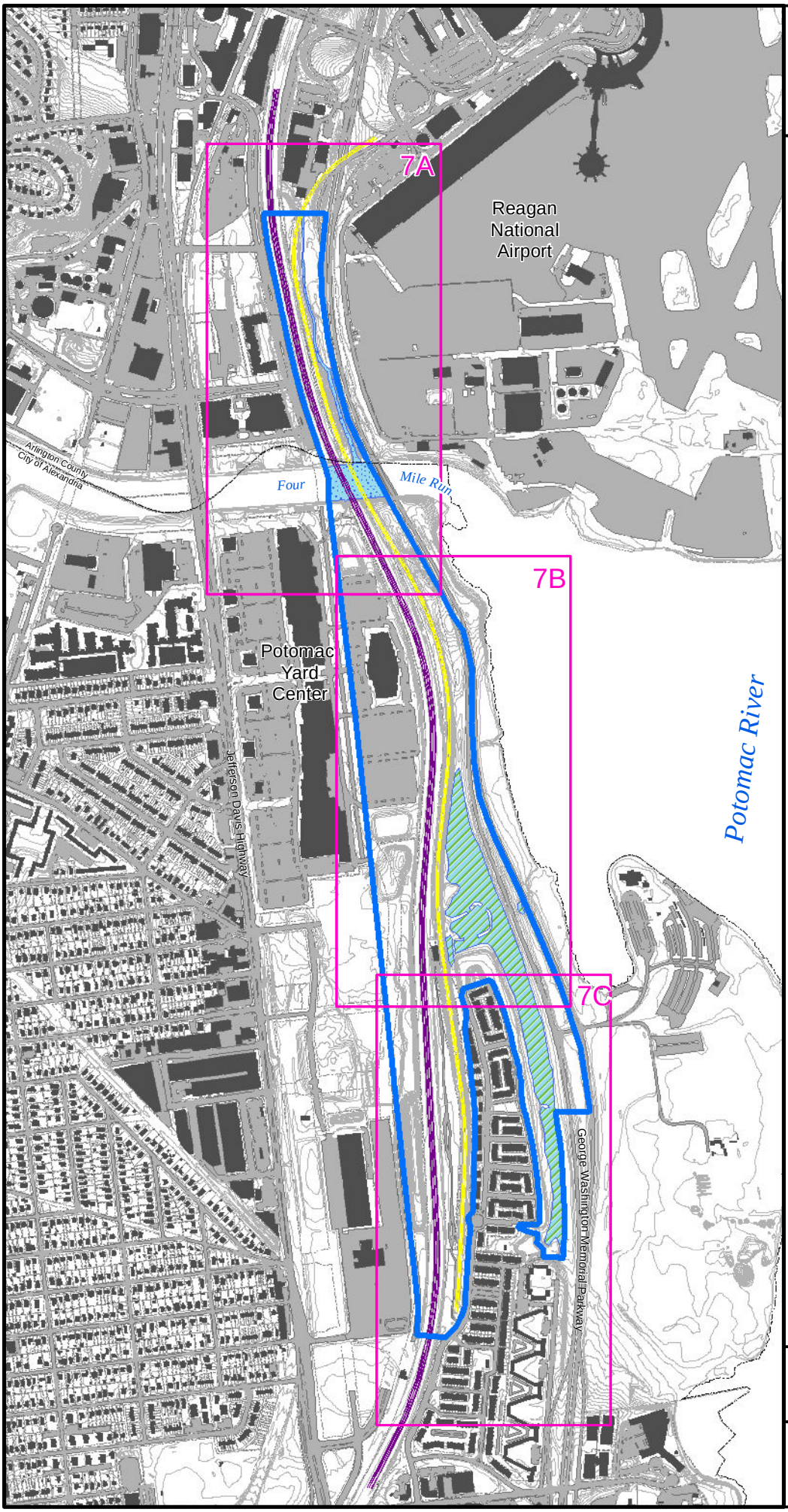


Figure 7
Wetland Delineation with Topography - Overall

LEGEND

- Study Area
- Waters of the U.S.
- USACE/Section 404 Wetland
- Tracks - CSXT
- Tracks - WMATA
- Building/Structures
- 2 ft Contour
- Paved Surfaces
- Parcels
- City Boundary
- Index Grid

Source: City of Alexandria 2010
Arlington County 2011
WMATA 2011

0 500 1,000 Feet

N

POTOMAC YARD METRORAIL STATION EIS

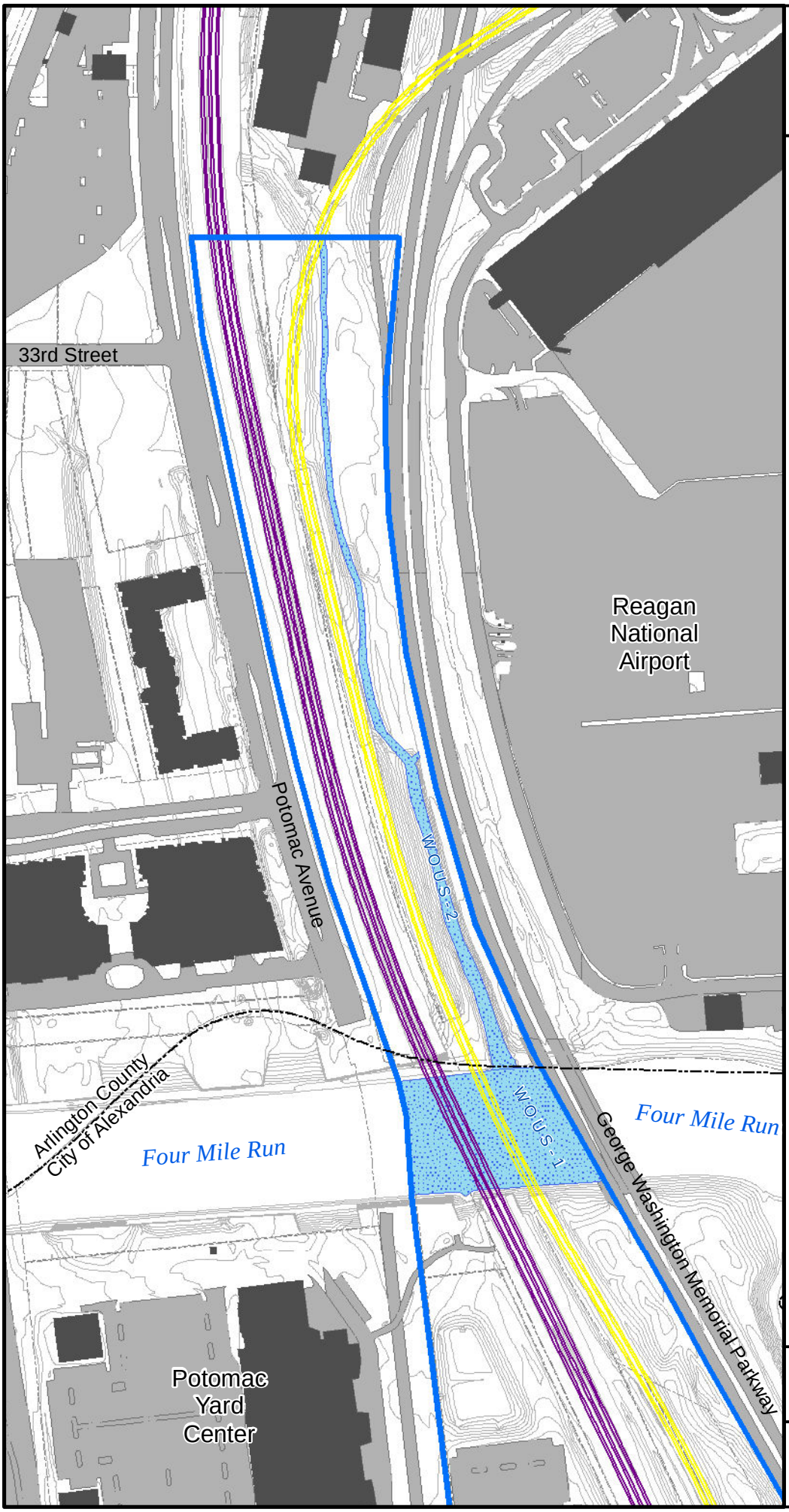


Figure 7A
Wetland Delineation with Topography - North

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Waters of the U.S.
- Building/Structures
- Paved Surfaces
- 2 ft Contour
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD METRORAIL STATION EIS

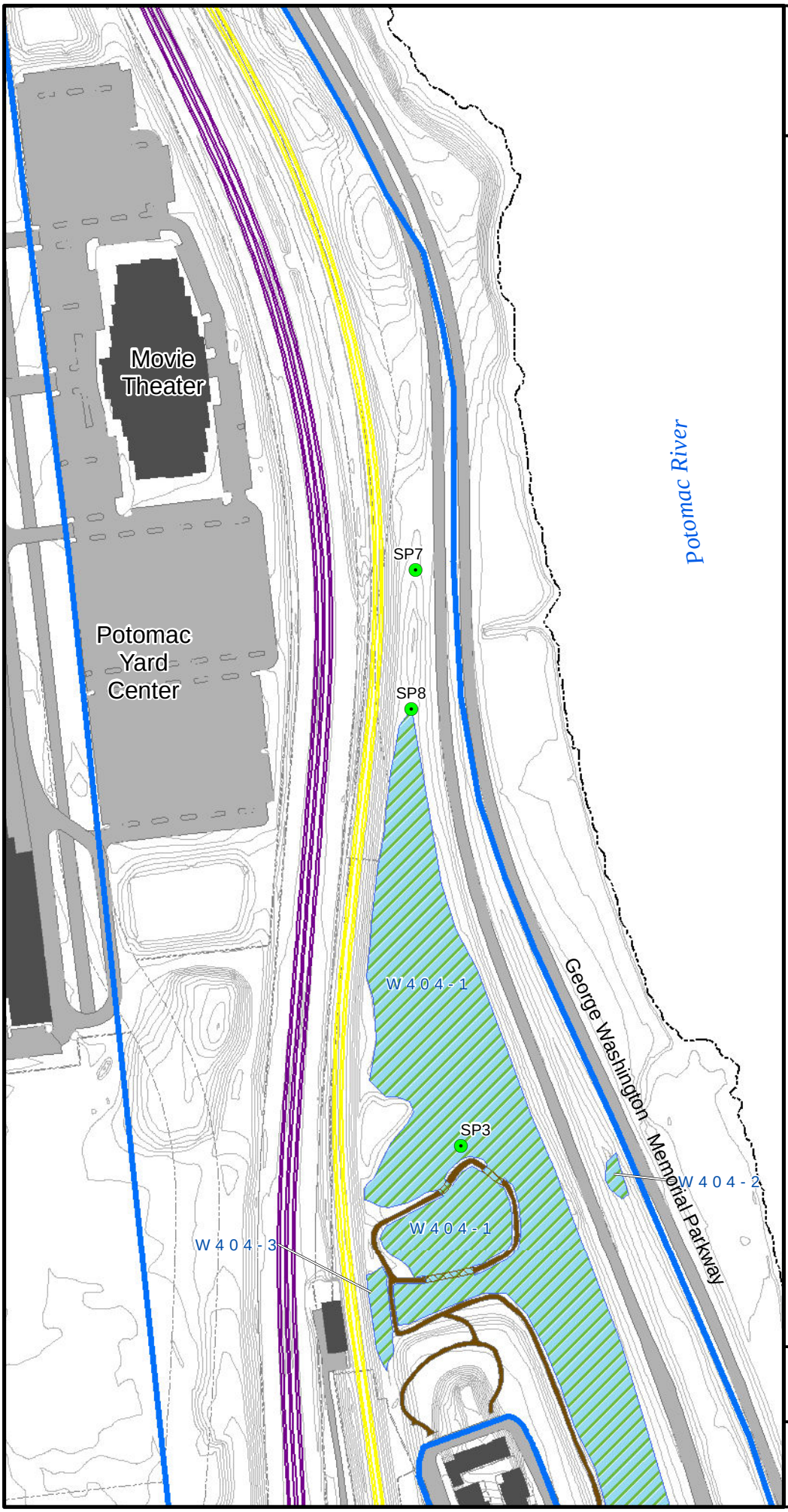


Figure 7B
Wetland Delineation with Topography - Central

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Wetland Sample Points
- Boardwalk
- Recreational Trail
- USACE/Section 404 Wetland
- Building/Structures
- Paved Surfaces
- 2 ft Contour
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

Figure 7C
Wetland Delineation with Topography - South

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Wetland Sample Points
- Recreational Trail
- USACE/Section 404 Wetland
- Building/Structures
- Paved Surfaces
- 2 ft Contour
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

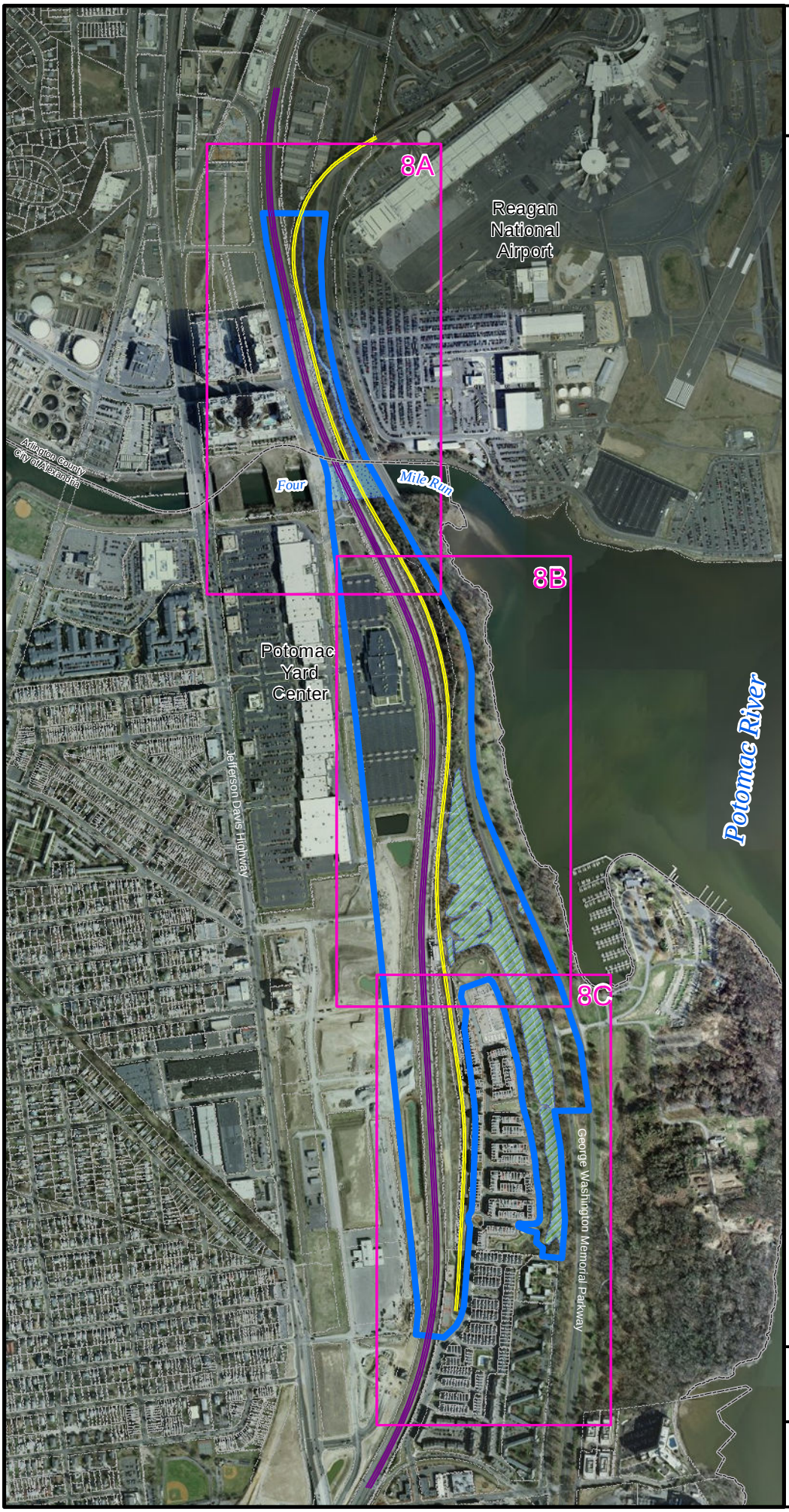


Figure 8
Wetland Delineation with Aerial Photography - Overall

LEGEND

- Study Area
- Tracks - WMATA
- Tracks - CSXT
- Waters of the U.S.
- USACE/Section 404 Wetland
- Parcels
- City Boundary
- Index Grid

Source: City of Alexandria 2010
Arlington County 2011
WMATA 2011
ESRI 2011

0 500 1,000 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

Figure 8A
Wetland Delineation with Aerial Photography - North

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Waters of the U.S.
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

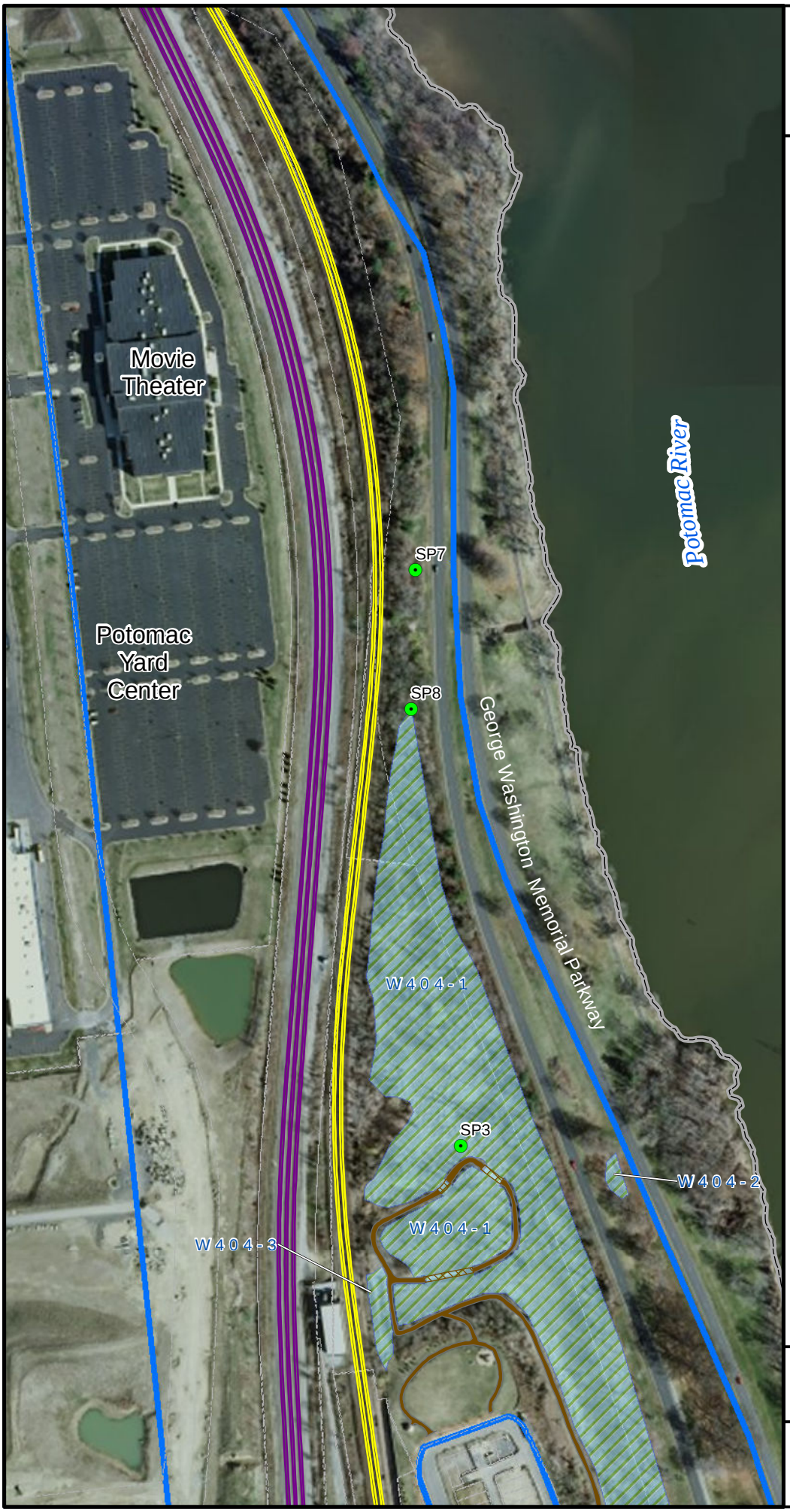


Figure 8B
Wetland Delineation with Aerial Photography - Central

LEGEND

- Study Area
- City Boundary
- Tracks - WMATA
- Tracks - CSXT
- Wetland Sample Points
- USACE/Section 404 Wetland
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entre study area.			

Source: City of Alexandria 2010, WMATA 2011, ESRI 2011

0 150 300 Feet

N

POTOMAC YARD METRORAIL STATION EIS

Figure 8C
Wetland Delineation with Aerial Photography - South

LEGEND

- Study Area
- City Boundary
- Tracks - WMATA
- Tracks - CSXT
- Wetland Sample Points
- USACE/Section 404 Wetland
- Parcels

	Square Feet	Acres	Linear Feet
Wetland ID			
W404-1	530,927	12.19	-
W404-2	2,530	0.06	-
W404-3	7,196	0.17	-
total	540,653	12.42	
Waters ID			
WOUS-1	84,106	1.93	396
WOUS-2	31,817	0.73	1795
total	115,923	2.66	2191
Study Area	5,129,028	117.75	-
Note:			
Measurements apply to entire study area.			

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

N

POTOMAC YARD
METRORAIL STATION EIS

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: ALEXANDRIA Sampling Date: 10/28/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP1

Investigator(s): DF/BK Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): CONCAVE Slope (%): 3%

Subregion (LRR or MLRA): LRRP Lat: 38.8270 4725 Long: -77.0439 9693 Datum: _____

Soil Map Unit Name: 40- GRIST MILL SANDY LOAM NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____
Hydric Soil Present?	Yes X	No _____
Wetland Hydrology Present?	Yes X	No _____

Is the Sampled Area within a Wetland? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): 10"
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: SP1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling Stratum (Plot size: .10 ac)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Shrub Stratum (Plot size: .10 ac)			
1. Cornus amomum	20%	Y	FACW
2. Mimosa spp.	5%	N	NO
3. Ailanthus altissima	20%	Y	NI
4.			
5.			
6.			
7.			
	45 = Total Cover		
Herb Stratum (Plot size: .10 ac)			
1. Solidago gracillima	30%	Y	NI
2. Phragmites australis	40%	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
Woody Vine Stratum (Plot size: .10 ac)			
1. Vitis riparia	30	Y	FACW
2. Ampelopsis brevipedunculata	30	Y	N/A
3. Hedera helix	10	N	N/A
4. Lonicera japonica	5	N	
5.			
	75 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.5 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 =
FACW species	3	x 2 = 6
FAC species	0	x 3 =
FACU species	0	x 4 =
UPL species	0	x 5 =
Column Totals:	3 (A)	6 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 4/1	80	10YR 3/4	20	C	M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

Low chroma

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: ALEXANDRIA Sampling Date: 10/28/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP2

Investigator(s): DF/BK Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): CONVEX Slope (%): –

Subregion (LRR or MLRA): LRR P Lat: 38.82704952 Long: -77.044106404 Datum: –

Soil Map Unit Name: 40 - GRIST MILL SANDY LOAM NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No _____	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP2

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus sylvestris	10	N	N/A
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling Stratum (Plot size: .10 ac)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Shrub Stratum (Plot size: .10 ac)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: .10 ac)			
1. Oxalis stricta	30	Y	UPL
2. Oenothera biennis	20	N	UPL
3. Poa pratensis	50	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size: .10 ac)			
1. Toxicodendron radicans	30	Y	FAC
2. Lonicera japonica	10	N	FAC-
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 =
FACW species	0	x 2 =
FAC species	2	x 3 = 6
FACU species	1	x 4 = 4
UPL species	2	x 5 = 10
Column Totals:	5 (A)	20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10"	10YR 4/3	90					Loamy Clay	
10" +	10YR 6/6	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: ALEXANDRIA Sampling Date: SP3

Applicant/Owner: WMATA State: VA Sampling Point: _____

Investigator(s): BK / DF Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): –

Subregion (LRR or MLRA): LRP Lat: 38.83293656 Long: -77.04581236 Datum: _____

Soil Map Unit Name: 40- GRIST MILL SANDY LOAM NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation N, Soil Y, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ?

Are Vegetation N, Soil Y, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:
INVASIVE SPECIES ARE EXTREMELY ABUNDANT = NORMAL?
SITE WAS FORMERLY LISTED BY EPA AS A SUPERFUND SITE - VOCs

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 1-8"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: SP3

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (Plot size: .10 ac)			
1. Paulownia tomentosa	10	N	N/A
2.			
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		
Herb Stratum (Plot size: .10 ac)			
1. Phragmites australis	75	Y	FACW
2. Impatiens capensis	25	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: .10 ac)			
1. Ampelopsis brevipedunculata	100	Y	N/A
2.			
3.			
4.			
5.			
	100 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	2	x 2 = 4
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	2 (A)	4 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16+	GY 5/10Y	100	10YR 3/4	10	C	M	Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

- Soil is heavily impacted from former Railyard
- EPA Listed several metals present in soils
- Heavy diesel smell in soils.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: ALEXANDRIA Sampling Date: 12/6/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP4

Investigator(s): DF/BK Section, Township, Range: —

Landform (hillslope, terrace, etc.): — Local relief (concave, convex, none): — Slope (%): 3

Subregion (LRR or MLRA): LRRP Lat: 38.83053728 Long: -77.0442068 Datum: .

Soil Map Unit Name: 40-Grist mill Sandy loam NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 12"
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 10"

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP4

Tree Stratum (Plot size: .10 ac)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus pennsylvanica	10	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		

Sapling Stratum (Plot size: .10 ac)			
1. Fraxinus pennsylvanica	15	Y	FACW
2. Acer rubrum	10	N	FAC
3.			
4.			
5.			
6.			
7.			
	25 = Total Cover		

Shrub Stratum (Plot size: .10 ac)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	25 = Total Cover		

Herb Stratum (Plot size: .10 ac)			
1. Poa pratensis	30	Y	FACU
2. Lespedeza cuneata	30	Y	NI
3. Andropogon virginicus	10	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70 = Total Cover		

Woody Vine Stratum (Plot size: .10 ac)			
1. Hedra helix	10	N	N/A
2. Lonicera japonica	10	N	N/A
3. Ampelopsis brevipedunculata	10	N	N/A
4. Vitis riparia	30	Y	FACW
5.			
	60 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.6 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	3	x 2 =	6
FAC species		x 3 =	
FACU species	2	x 4 =	8
UPL species		x 5 =	
Column Totals:	5 (A)		14 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

Sampling Point: SP4

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-4"	10YR 2/2	100					Loam	
4-10"	7.5YR 4/6	70	Gley 1 2.5/10GY	40	C	M	Loam Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: Alexandria Sampling Date: 12/6/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP5

Investigator(s): DF/BK Section, Township, Range: -

Landform (hillslope, terrace, etc.): - Local relief (concave, convex, none): - Slope (%): <1

Subregion (LRR or MLRA): LRRP Lat: 38.830551934 90 Long: -77.044191867 9 Datum: _____

Soil Map Unit Name: 40 - Grist mill Sandy Loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: _____)			
1. Poa pratensis	100	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size: _____)			
1. Lonicera japonica	20	N	N/A
2. Allium schoenoprasum	20	N	FACU
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species	1	x 4 =	4
UPL species		x 5 =	
Column Totals:	1 (A)		4 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: (If observed, list morphological adaptations below).

Area reg. mowed.

SOIL

Sampling Point: SP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-12"	10YR 4/2						Sand Loam	Black line ca. 10"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

Around 10" depth. A black line appears in soil profile. Smells like "diesel"? Possible VOC contamination from previous YARD USAGE.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: Alexandria Sampling Date: 12/6/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP6

Investigator(s): BK/DF Section, Township, Range: –

Landform (hillslope, terrace, etc.): – Local relief (concave, convex, none): – Slope (%): 3

Subregion (LRR or MLRA): LRR P Lat: 38.83055585 Long: -77.0441789 Datum: _____

Soil Map Unit Name: 40-Crest Mill Sandy Loam NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): 18"
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 10"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

High water Table & Saturation could be due to recent rain event – approx. 2-3" of rain fell during last 24-48 hrs.

VEGETATION – Use scientific names of plants.

Sampling Point: SP6

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: _____)			
1. Poa pratensis	100	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. Lonicera japonica	20	N	N/A
2. Allium schoenoprasum	30	Y	FACU
3.			
4.			
5.			
	50 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species	2	x 4 = 8
UPL species		x 5 =
Column Totals:	2 (A)	8 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: (If observed, list morphological adaptations below).

Area is Regularly mowed

SOIL

Sampling Point: SP6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-4"	10YR 4/3						Sandy Loam	
4"-12"	10YR 4/2						Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: Alexandria Sampling Date: 12/6/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP7

Investigator(s): DF/BK Section, Township, Range: –

Landform (hillslope, terrace, etc.): – Local relief (concave, convex, none): – Slope (%): –

Subregion (LRR or MLRA): LRR P Lat: 38.836224283 8 Long: -77.0460728221 Datum: –

Soil Map Unit Name: 40-Grist Mill Sandy Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: SP7

Tree Stratum (Plot size: .10 ac)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	30	Y	FACW
2. Acer rubrum	30	Y	FAC
3.			
4.			
5.			
6.			
7.			
	60 = Total Cover		

Sapling Stratum (Plot size: .10 ac)			
1. Salix nigra	20	Y	FACW+
2.			
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Shrub Stratum (Plot size: .10 ac)			
1. Lonicera japoica	30	Y	FAC-
2.			
3.			
4.			
5.			
6.			
7.			
	30 = Total Cover		

Herb Stratum (Plot size: .10 ac)			
1. Alliaria petiolata	30	Y	FACU-
2. Ilex decidua	30	Y	FACW
3. Andropogon virginicus	10	N	FACU
4. Solidago altissima	10	N	FACU-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80 = Total Cover		

Woody Vine Stratum (Plot size: .10 ac)			
1. Hedera helix	10	N	N/A
2. Smilax rotundifolia	90	Y	FAC
3.			
4.			
5.			
	50 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.85 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	3	x 2 = 6
FAC species	3	x 3 = 9
FACU species	3	x 4 = 12
UPL species		x 5 =
Column Totals:	9 (A)	27 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SP7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-4"	10YR 4/2						Sandy Loam Clay	
4-12"	10YR 4/3						Sand Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: WMATA PYMS City/County: Alexandria Sampling Date: 12/6/2011

Applicant/Owner: WMATA State: VA Sampling Point: SP8

Investigator(s): DF/BK Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): 2

Subregion (LRR or MLRA): LRR P Lat: 38.835420256 30 Long: -77.016122707 Datum: -

Soil Map Unit Name: 40-Grist Sandy Loam mill NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____
Hydric Soil Present?	Yes X	No _____
Wetland Hydrology Present?	Yes X	No _____

Is the Sampled Area within a Wetland? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 10"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: .10 ac)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus pennsylvanica	15	N	FACW
2. Ulmus americana	10	N	FACW-
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling Stratum (Plot size: .10 ac)			
1. Salix nigra	10	N	FACW
2. Betula nigra	10	N	FACW
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Shrub Stratum (Plot size: .10 ac)			
1. Cornus amomum	20	Y	FACW
2. Morus rubra	10	N	FACU
3. Lonicera japonica	20	Y	FAC-
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: .10 ac)			
1. Solidago altissima	20	Y	FACU-
2. Solidago gracillima	10	N	NI
3. Phragmites australis	20	Y	FACW
4. Ilex deciduа	20	Y	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size: .10 ac)			
1. Toxicodendron radicans	25	Y	FAC
2. Smilax rotundifolia	25	Y	FAC
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.85 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	7	x 2 =	14
FAC species	3	x 3 =	9
FACU species	2	x 4 =	8
UPL species		x 5 =	
Column Totals:	12 (A)		31 (B)

Prevalence Index = B/A = 2.58

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SP8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-10"	2.5Y 2/1	100	10YR 5/4	20	C	M		Muck Brown Clay Loam
10+"	Gley 4/10Y	100				Clay		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- X Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- X Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Alexandria City, Virginia, and Arlington County, Virginia

December 20, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:12,800 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1,800 2,700

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:12,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alexandria City, Virginia
Survey Area Data: Version 5, Dec 14, 2009

Soil Survey Area: Arlington County, Virginia
Survey Area Data: Version 12, Aug 9, 2010

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/25/2003; 6/21/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Alexandria City, Virginia (VA510)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
40	Grist Mill sandy loam, 0 to 25 percent slopes	41.5	35.3%
95	Urban land	60.9	51.7%
W	Water	3.1	2.6%
Subtotals for Soil Survey Area		**105.5**	**89.6%**
Totals for Area of Interest		**117.7**	**100.0%**

Arlington County, Virginia (VA013)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
12	Urban land-Udorthents complex, 2 to 15 percent slopes	12.3	10.4%
Subtotals for Soil Survey Area		**12.3**	**10.4%**
Totals for Area of Interest		**117.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been

observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Alexandria City, Virginia

40—Grist Mill sandy loam, 0 to 25 percent slopes

Map Unit Setting

Mean annual precipitation: 37 to 49 inches
Mean annual air temperature: 45 to 67 degrees F
Frost-free period: 185 to 212 days

Map Unit Composition

Grist mill and similar soils: 100 percent

Description of Grist Mill

Setting

Landform: Marine terraces
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Earthy fill of fluviomarine deposits

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 79 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 6 inches: Sandy loam
6 to 60 inches: Sandy clay loam

95—Urban land

Map Unit Setting

Mean annual precipitation: 28 to 58 inches
Mean annual air temperature: 87 to 89 degrees F
Frost-free period: 175 to 200 days

Map Unit Composition

Urban land: 95 percent

Description of Urban Land

Interpretive groups

Land capability (nonirrigated): 8s

W—Water

Map Unit Composition

Water: 100 percent

Arlington County, Virginia

12—Urban land-Udorthents complex, 2 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 140 to 200 days

Map Unit Composition

Urban land: 85 percent
Udorthents and similar soils: 15 percent

Description of Urban Land

Interpretive groups

Land capability (nonirrigated): 8s

Description of Udorthents

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 6s

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

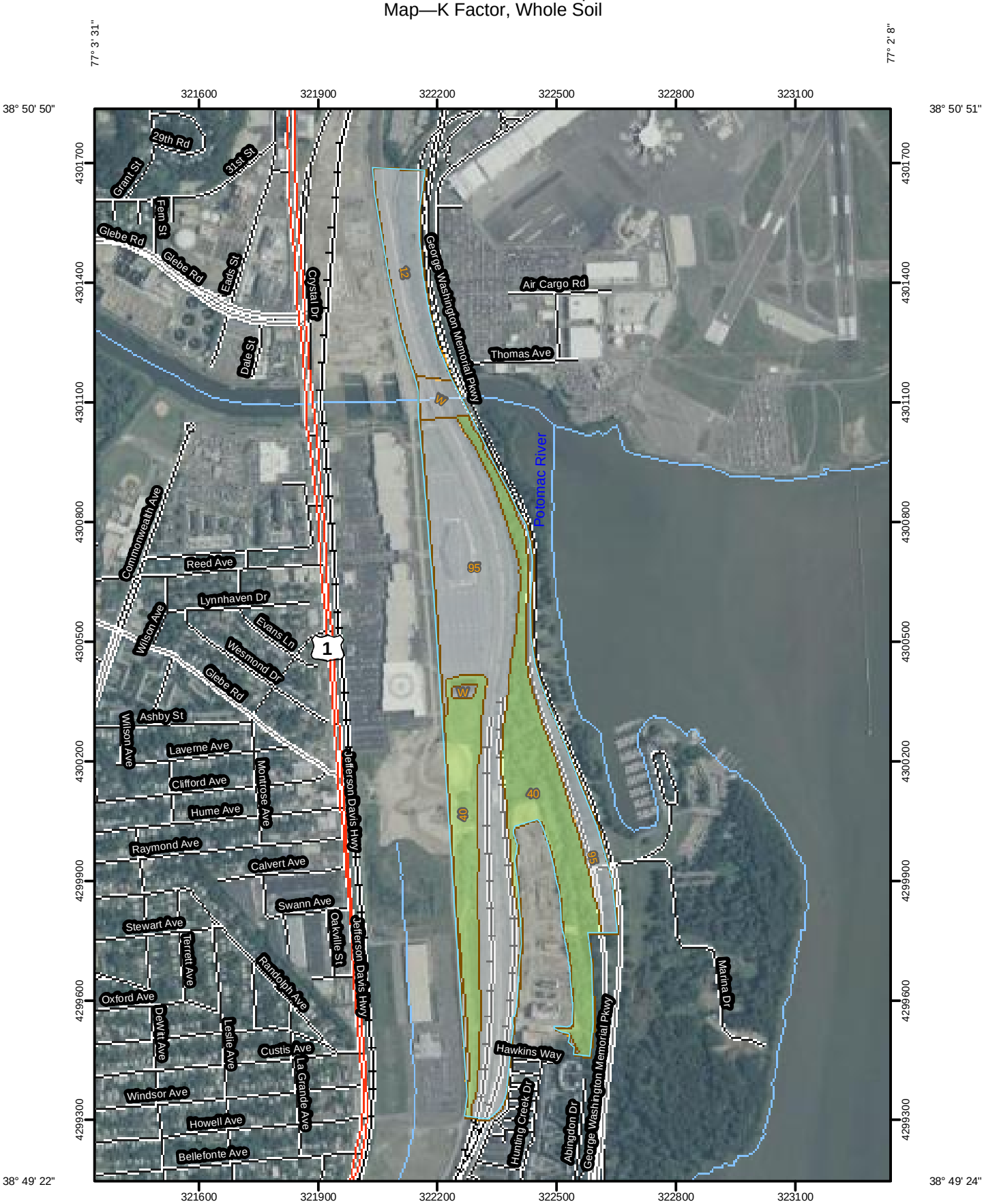
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Custom Soil Resource Report
Map—K Factor, Whole Soil



Map Scale: 1:12,800 if printed on A size (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 450 900 1,800 2,700

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

.02

.05

.10

.15

.17

.20

.24

.28

.32

.37

.43

.49

.55

.64

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:12,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alexandria City, Virginia
Survey Area Data: Version 5, Dec 14, 2009

Soil Survey Area: Arlington County, Virginia
Survey Area Data: Version 12, Aug 9, 2010

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/25/2003; 6/21/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Alexandria City, Virginia (VA510)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
40	Grist Mill sandy loam, 0 to 25 percent slopes	.24	41.5	35.3%
95	Urban land		60.9	51.7%
W	Water		3.1	2.6%
Subtotals for Soil Survey Area			**105.5**	**89.6%**
Totals for Area of Interest			**117.7**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Arlington County, Virginia (VA013)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
12	Urban land-Udorthents complex, 2 to 15 percent slopes		12.3	10.4%
Subtotals for Soil Survey Area			**12.3**	**10.4%**
Totals for Area of Interest			**117.7**	**100.0%**

Rating Options—K Factor, Whole Soil

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options: Surface Layer

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

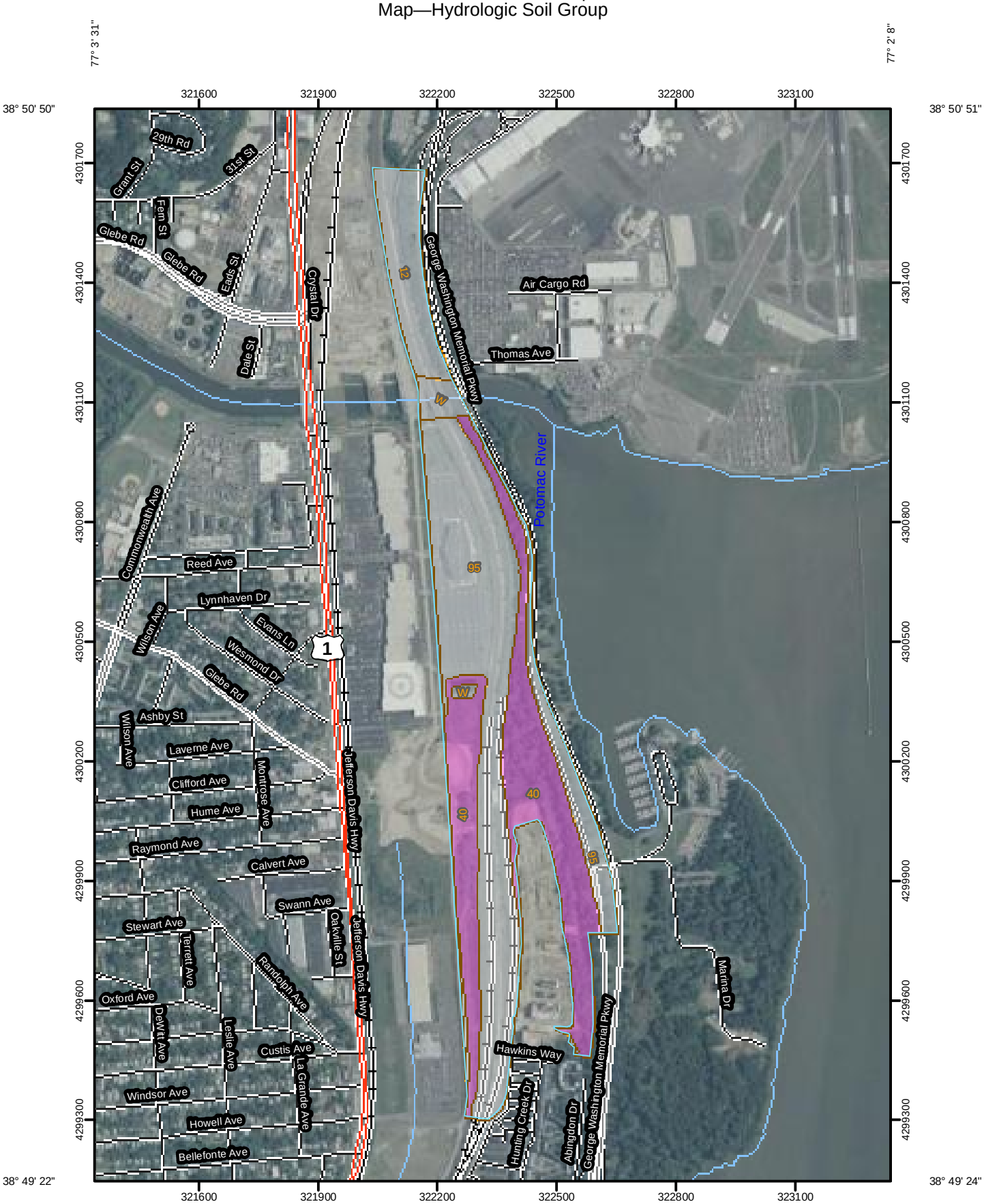
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:12,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alexandria City, Virginia
Survey Area Data: Version 5, Dec 14, 2009

Soil Survey Area: Arlington County, Virginia
Survey Area Data: Version 12, Aug 9, 2010

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/25/2003; 6/21/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Alexandria City, Virginia (VA510)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
40	Grist Mill sandy loam, 0 to 25 percent slopes	D	41.5	35.3%
95	Urban land		60.9	51.7%
W	Water		3.1	2.6%
Subtotals for Soil Survey Area			**105.5**	**89.6%**
Totals for Area of Interest			**117.7**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — Arlington County, Virginia (VA013)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
12	Urban land-Udorthents complex, 2 to 15 percent slopes		12.3	10.4%
Subtotals for Soil Survey Area			**12.3**	**10.4%**
Totals for Area of Interest			**117.7**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Erosion

This folder contains a collection of tabular reports that present soil erosion factors and groupings. The reports (tables) include all selected map units and components for each map unit. Soil erosion factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the surface horizon.

Report—RUSLE2 Related Attributes

RUSLE2 Related Attributes– Alexandria City, Virginia								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
40—Grist Mill sandy loam, 0 to 25 percent slopes								
Grist mill	100	—	D	.24	5	55.6	28.5	15.9
95—Urban land								
Urban land	95	—	—	—	—	—	—	—
W—Water								
Water	100	—	—	—	—	—	—	—

RUSLE2 Related Attributes– Arlington County, Virginia								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
12—Urban land-Udorthents complex, 2 to 15 percent slopes								
Urban land	85	—	—	—	—	—	—	—
Udorthents	15	—	—	—	—	—	—	—

References

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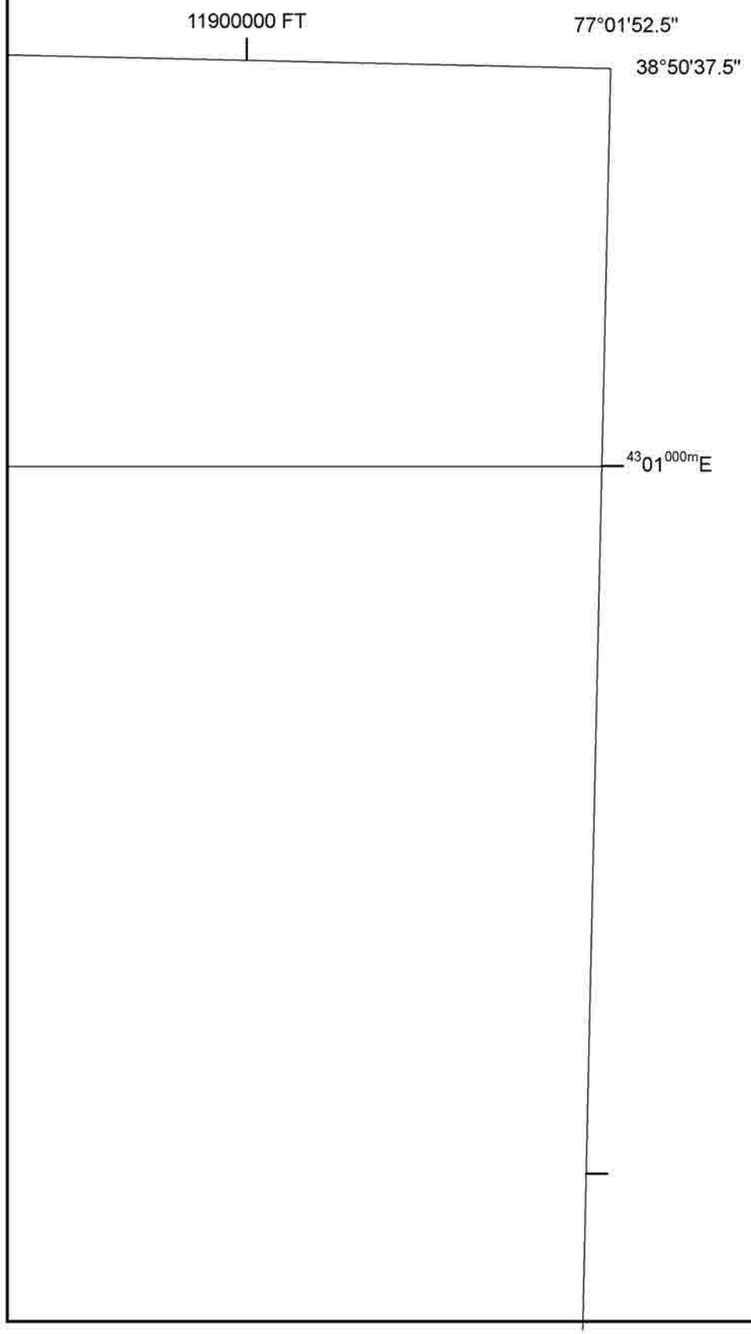


LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0033E

FIRM
FLOOD INSURANCE RATE MAP

CITY OF ALEXANDRIA, VIRGINIA
INDEPENDENT CITY

PANEL 33 OF 45
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF (INDEPENDENT CITY)	515519	0033	E

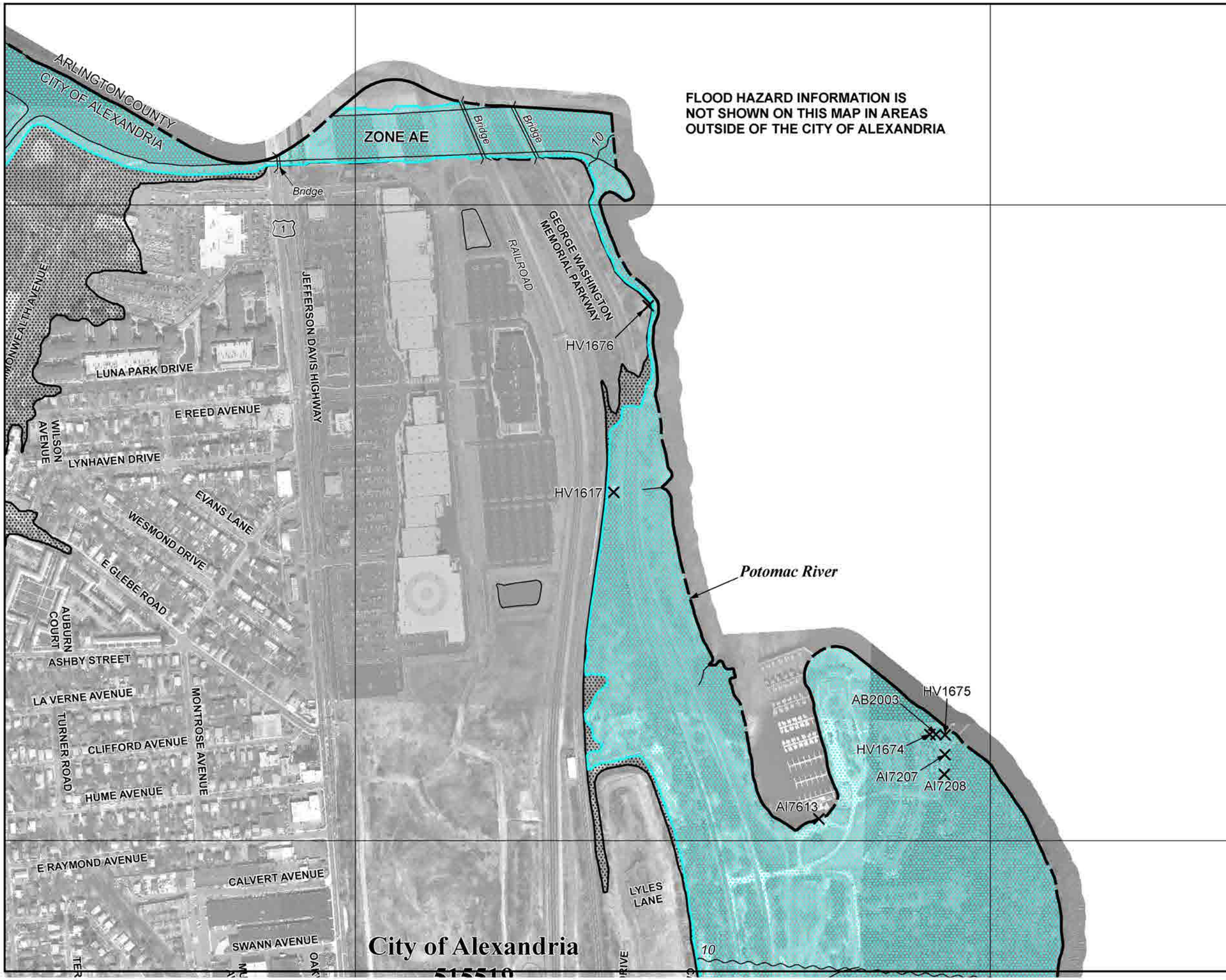
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
5155190033E

MAP REVISED
JUNE 16, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



FLOOD HAZARD INFORMATION IS NOT SHOWN ON THIS MAP IN AREAS OUTSIDE OF THE CITY OF ALEXANDRIA

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0033E

FIRM

FLOOD INSURANCE RATE MAP

CITY OF ALEXANDRIA, VIRGINIA

INDEPENDENT CITY

PANEL 33 OF 45

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF (INDEPENDENT CITY)	515519	0033	E

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MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0033E

FIRM

FLOOD INSURANCE RATE MAP

CITY OF ALEXANDRIA, VIRGINIA

INDEPENDENT CITY

PANEL 33 OF 45

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF (INDEPENDENT CITY)	515519	0033	E

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 18. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12, National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the Arlington County's GIS Mapping Center. This information was photogrammetrically compiled at a scale of 1"=50' from aerial photography dated September 2003. Digital orthophotographs, published in 2003, were also provided by the Arlington County's GIS Mapping Center. Adjustments were made to specific base map features to align them to 1":120' digital orthophotographs.

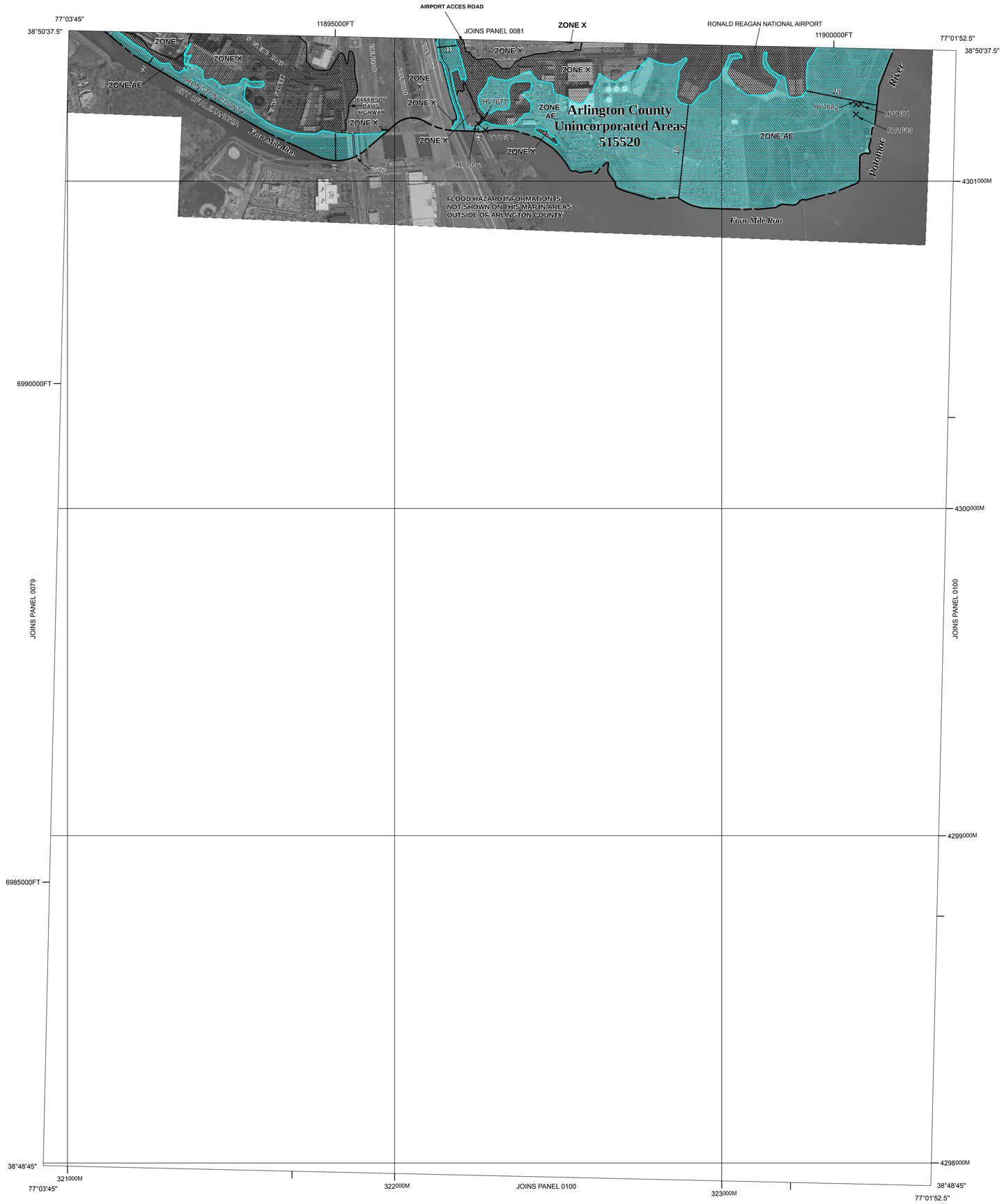
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and /or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000 M	1000-meter Universal Transverse Mercator grid values, zone 18
600000 FT	5000-foot grid ticks: Virginia State Plane coordinate system (FIPSZONE 4501), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0083C

FIRM
FLOOD INSURANCE RATE MAP

ARLINGTON COUNTY, VIRGINIA
AND INCORPORATED AREAS

PANEL 83 OF 100
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ARLINGTON COUNTY	515520	0083	C

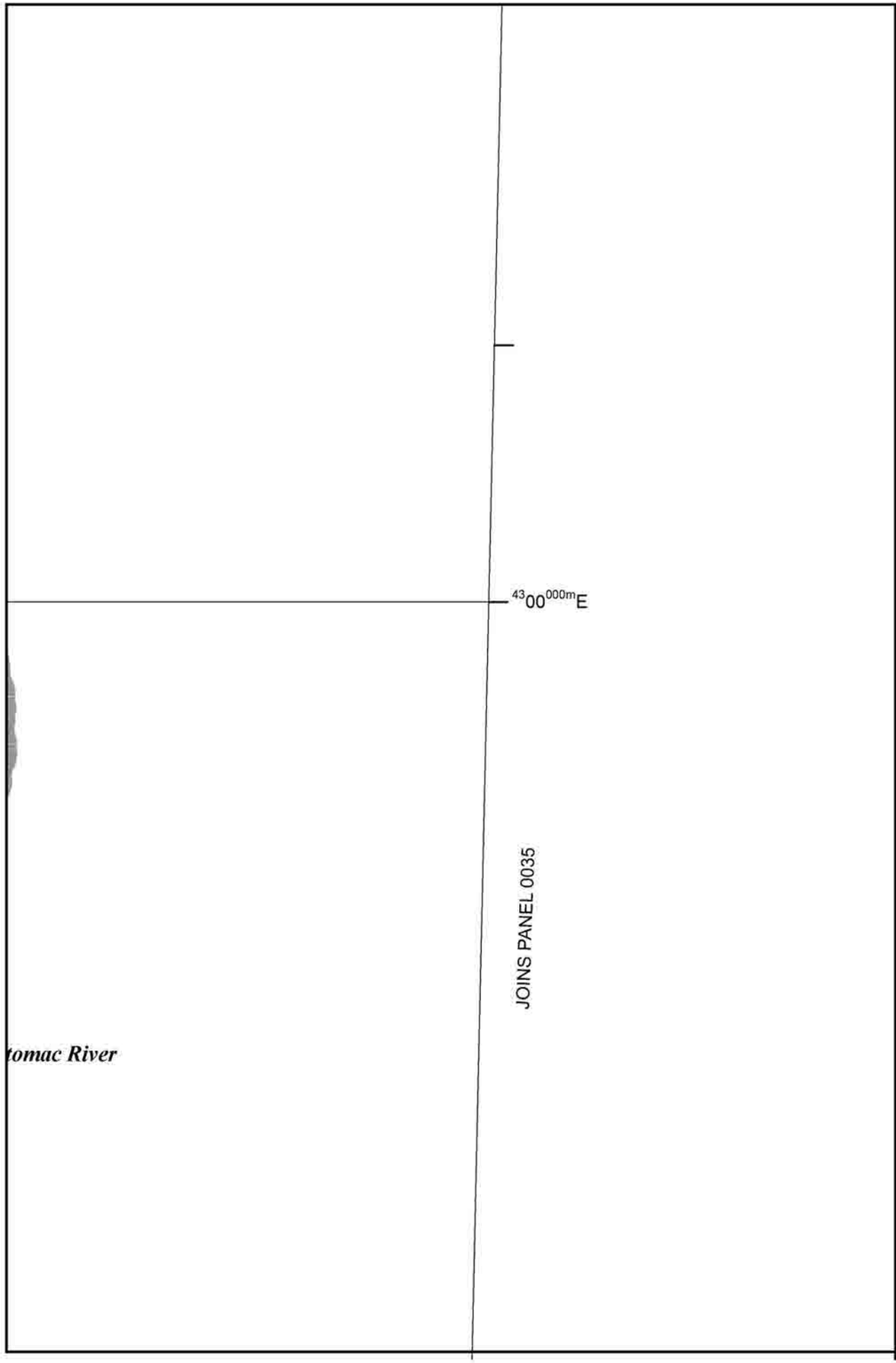
PRELIMINARY 9/23/2009

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
51013C0083C

EFFECTIVE DATE

Federal Emergency Management Agency



OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
42 76 000m E	1000-meter Universal Transverse Mercator grid values, zone 18
600000 FT	5000-foot grid ticks: Virginia State Plane coordinate system (FIPSZONE 4501), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY

City Hall. 301 King Street. Alexandria, VA 22314 (Maps available for reference only, not for distribution).

INITIAL IDENTIFICATION
AUGUST 22, 1969

FLOOD HAZARD BOUNDARY MAP REVISIONS
NONE

FLOOD INSURANCE RATE MAP EFFECTIVE
AUGUST 22, 1969

FLOOD INSURANCE RATE MAP REVISIONS

May 2, 1970 - to add special flood hazard area.
May 28, 1971 - to add special flood hazard area.
July 1, 1974 - to change zone designations.
October 22, 1976 - to reflect curvilinear flood boundary and to add special flood hazard area.
April 30, 1982 - to change special flood hazard area, to change base flood elevations, to change zone designations, to add streets, to re-align streams, to convert to Z-fold format, and to change to FEMA title block.
October 18, 1988 - to change base flood elevations, and to change special flood hazard areas.
May 15, 1991 - to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to update map format, and to add roads and road names.
June 16, 2011 - To change base flood elevations, to add base flood elevations, to add special flood hazard areas, and to reflect updated topographic information.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0033E

FIRM
FLOOD INSURANCE RATE MAP

CITY OF ALEXANDRIA, VIRGINIA
INDEPENDENT CITY

PANEL 33 OF 45
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF (INDEPENDENT CITY)	515519	0033	E

Notice to User. The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
5155190033E

MAP REVISED
JUNE 16, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 18. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12, National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the Arlington County's GIS Mapping Center. This information was photogrammetrically compiled at a scale of 1"=50' from aerial photography dated September 2003. Digital orthophotographs, published in 2003, were also provided by the Arlington County's GIS Mapping Center. Adjustments were made to specific base map features to align them to 1"=120' digital orthophotographs.

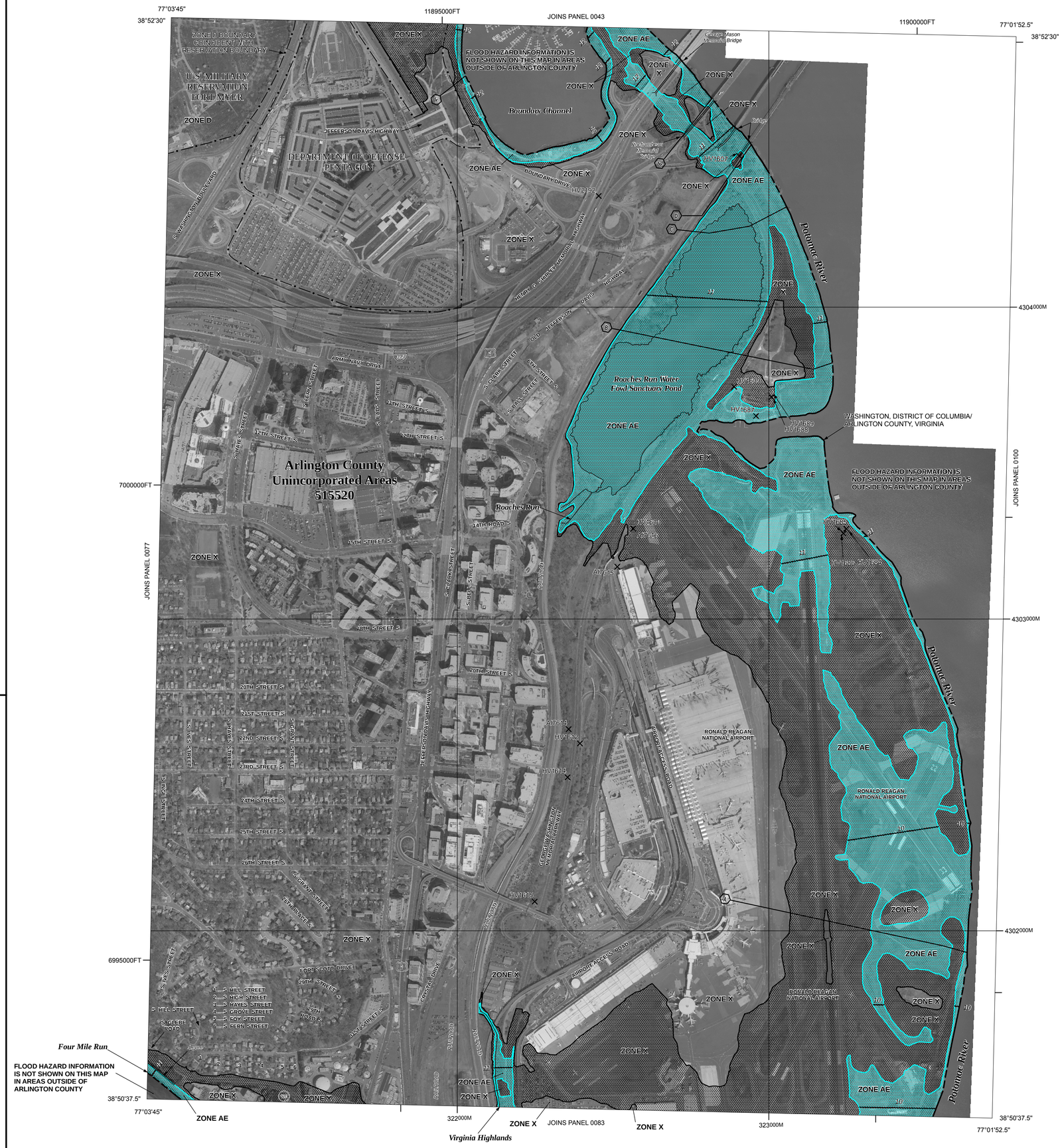
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and /or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000 M	1000-meter Universal Transverse Mercator grid values, zone 18
600000 FT	5000-foot grid ticks: Virginia State Plane coordinate system (FIPSZONE 4501), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0081C

FIRM
FLOOD INSURANCE RATE MAP

ARLINGTON COUNTY, VIRGINIA
AND INCORPORATED AREAS

PANEL 81 OF 100
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ARLINGTON COUNTY	515520	0081	C

PRELIMINARY 9/23/2009

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
51013C0081C

EFFECTIVE DATE

Federal Emergency Management Agency

1.0 NATIONAL PARK SERVICE – FINDINGS

The following figures illustrate the boundary limits of the Waters of the US (WOUS), including wetlands, that were identified during the field investigation using the methods described in the *National Park Service Procedural Manual #77-1: Wetland Protection*, which is in the next section of this appendix (April 2001 edition). The boundaries depicted in the figures are based on a fall field investigation. The project team anticipates a spring field investigation to update these findings.

The NPS property line was estimated using GIS-based tax maps from the City of Alexandria and Arlington County. Parcels administered by NPS are not listed in the jurisdictions' tax databases. Therefore, the boundaries of parcels abutting the George Washington Memorial Parkway were assumed to be the NPS property line.

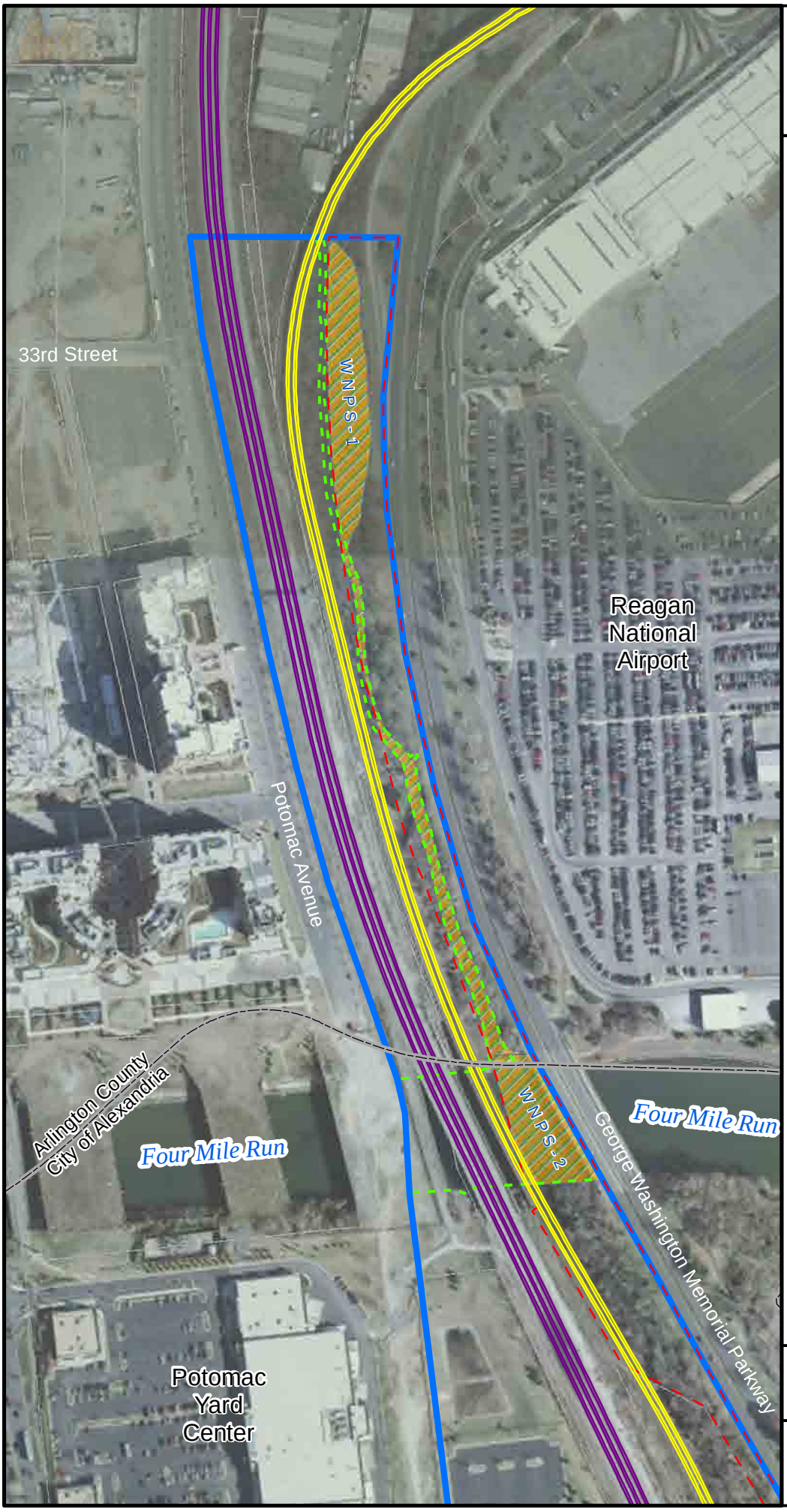


Figure D1
Wetland Delineation to NPS/Cowardin Standards - North

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Estimated NPS Property
- USACE Regulated Line
- NPS/Cowardin Wetland
- Parcels

	Square Feet	Acres
Wetland ID		
WNPS-1	68,825	1.58
WNPS-2	33,903	0.78
WNPS-3	132,986	3.05
WNPS-4	955	0.02
WNPS-5	10,135	0.23
WNPS-6	2,362	0.05
WNPS-7	9,149	0.21
total	258,315	5.92
NPS Property	968,964	22.24
Study Area	5,129,028	117.75
Note:		
Measurements apply to entire study area.		

Source: City of Alexandria 2010, WMATA 2011, ESRI 2011

0 150 300 Feet

POTOMAC YARD METRORAIL STATION EIS

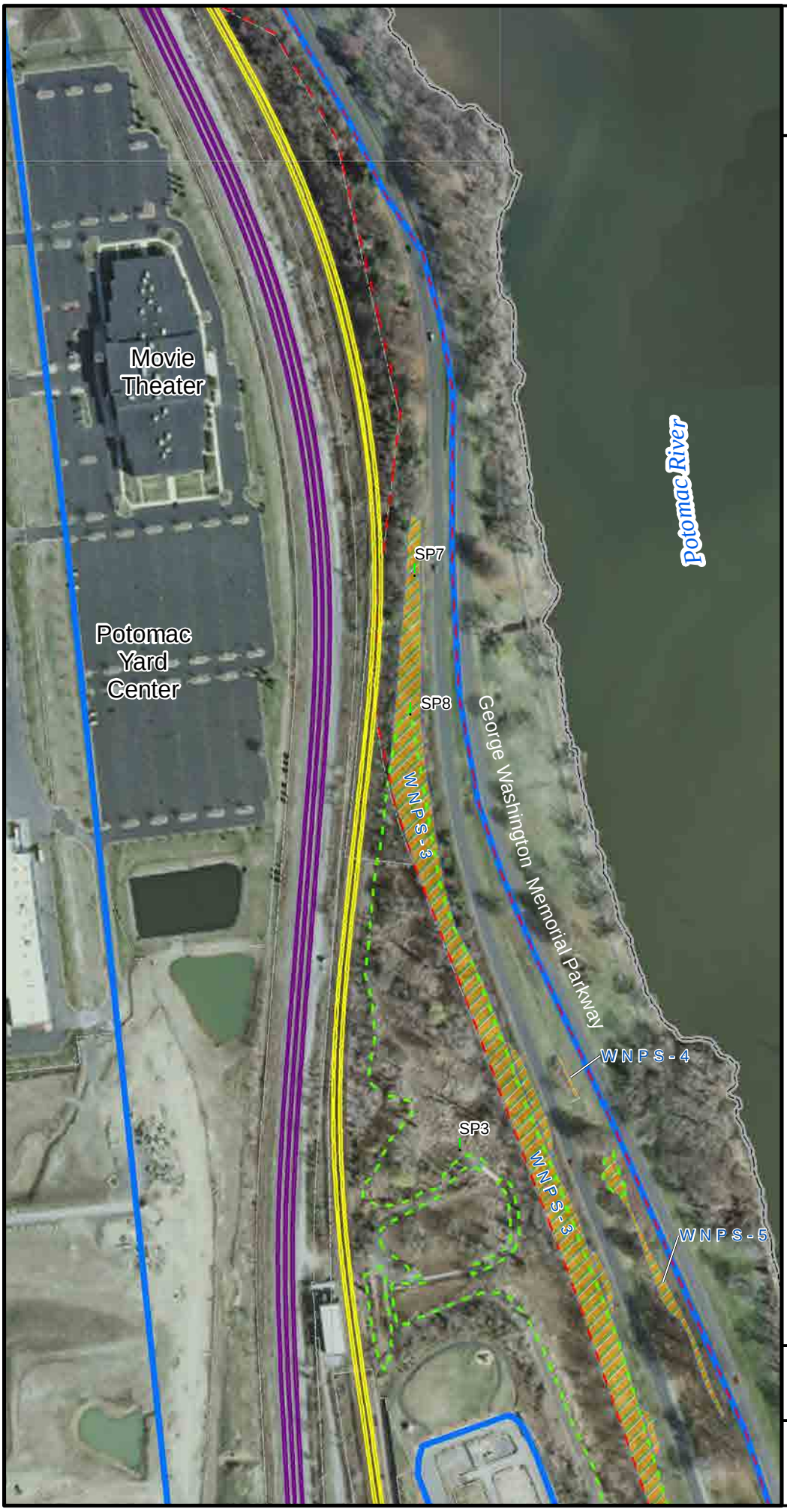


Figure D2
Wetland Delineation to NPS/Cowardin Standards - Central

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Wetland Sample Points
- Estimated NPS Property
- USACE Regulated Line
- NPS/Cowardin Wetland
- Parcels

	Square Feet	Acres
Wetland ID		
WNPS-1	68,825	1.58
WNPS-2	33,903	0.78
WNPS-3	132,986	3.05
WNPS-4	955	0.02
WNPS-5	10,135	0.23
WNPS-6	2,362	0.05
WNPS-7	9,149	0.21
total	258,315	5.92
NPS Property	968,964	22.24
Study Area	5,129,028	117.75
Note:		
Measurements apply to entire study area.		

Source: City of Alexandria 2010, WMATA 2011, ESRI 2011

0 150 300 Feet

POTOMAC YARD METRORAIL STATION EIS

Figure D3
Wetland Delineation to NPS/Cowardin Standards - South

LEGEND

- Study Area
- City Boundary
- Tracks - CSXT
- Tracks - WMATA
- Wetland Sample Points
- Estimated NPS Property
- USACE Regulated Line
- NPS/Cowardin Wetland
- Parcels

	Square Feet	Acres
Wetland ID		
WNPS-1	68,825	1.58
WNPS-2	33,903	0.78
WNPS-3	132,986	3.05
WNPS-4	955	0.02
WNPS-5	10,135	0.23
WNPS-6	2,362	0.05
WNPS-7	9,149	0.21
total	258,315	5.92
NPS Property	968,964	22.24
Study Area	5,129,028	117.75
Note:		
Measurements apply to entire study area.		

Source: City of Alexandria 2010, WMATA 2011

0 150 300 Feet

POTOMAC YARD
METRORAIL STATION EIS

National Park Service
U.S. Department of the Interior

National Park Service
Procedural Manual #77-1: Wetland Protection

Reissued April 2011
(Replaces all previous versions)

ON THE COVER: Camas in bloom at Weippe Prairie, Nez Perce National Historical Park (photo by Jannis Jocius, Nez Perce National Historical Park, 2008)

National Park Service
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Reissued April 2011
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Fort Collins, Colorado

This manual may be downloaded at http://www.nature.nps.gov/water/wetlands.cfm, or a hard copy may be obtained by sending a request to the address on the back cover.

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PROCEDURAL MANUAL #77-1: WETLAND PROTECTION

1.0 Introduction

This Procedural Manual was developed for use by the National Park Service (NPS) in carrying out its responsibilities under Executive Order (E.O.) 11990 to protect wetlands. It contains two main elements: 1) the text of Director's Order (D.O.) #77-1:Wetland Protection (last issued in 2002) in Section 2.0 below; and 2) detailed procedures (in Sections 3–5) by which the NPS will implement D.O. #77-1. Figure 1 provides a brief summary of NPS wetland compliance procedures. *The previous version of NPS Procedural Manual #77-1 (issued in 2008) is obsolete and is replaced by this revised manual.*

2.0 Director's Order #77-1: Wetland Protection

D.O. #77-1 (2002) is incorporated in its entirety into this section of the Procedural Manual. This Director's Order establishes the policies, requirements, and standards through which the NPS will meet its responsibilities to protect and preserve wetlands. D.O. #77-1 also requires the Associate Director, Natural Resource Stewardship and Science, to develop and issue this Procedural Manual.

DIRECTOR'S ORDER #77-1: WETLAND PROTECTION

Approved: /s/ Fran P. Mainella
Director, National Park Service

Effective Date: October 30, 2002

1.0 Background and Purpose of this Director's Order

The purpose of this Director's Order is to establish National Park Service (NPS) policies, requirements, and standards for implementing Executive Order (E.O.) 11990: "Protection of Wetlands" (42 Fed. Reg. 26961). E.O. 11990 was issued by President Carter in 1977 in order "…to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative...."

Section 6 of E.O. 11990 directed federal agencies to issue procedures to implement the Executive Order. NPS wetland protection procedures were originally adopted together with E.O. 11988 (Floodplain Management) procedures in the 1980 "NPS Floodplain Management and Wetland Protection Guidelines" (45 Fed. Reg. 35916, minor revisions in 47 Fed. Reg. 36718). Experience with implementing the wetland procedures, and changes in wetland management concepts since they were first published, necessitated updating, streamlining, and clarifying NPS wetland policies and procedures in Director's Order #77-1: Wetland Protection (issued October 22, 1998). The 1998 Director's Order and the accompanying Procedural Manual #77-1 superseded and replaced the 1980 NPS wetland guidance. Included in Director's Order #77-1 were: 1) adoption of a "no net loss of wetlands" goal, which was first proclaimed in 1989 by President George Bush and has been sustained by subsequent Administrations; and 2) adoption of the Cowardin et al. (1979) wetland classification system as the NPS standard for defining, classifying, and inventorying wetlands.

The four-year sunset provision for NPS Director's Orders now requires that Director's Order #77-1 be re-issued. The NPS has operated under the 1998 version of Director's Order #77-1 for the last four years with excellent success. Therefore, the following sections of that document are re-issued without substantive change.

In addition to the requirements of this Director's Order, NPS activities that involve the discharge of dredged or fill material into wetlands or other "waters of the United States" must also comply with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act (regulations and permit process are described in 33 CFR 320-331).

2.0 Policies, Requirements, and Standards

Executive Order 11990 directs the NPS: 1) to provide leadership and to take action to minimize the destruction, loss, or degradation of wetlands; 2) to preserve and enhance the natural and beneficial values of wetlands; and 3) to avoid direct or indirect support of new construction in wetlands unless there are no practicable alternatives to such construction and the proposed action includes all practicable measures to minimize harm to wetlands.

In carrying out the NPS's responsibilities related to:

- acquiring, managing, and disposing of NPS lands and facilities;
- construction and related development activities;
- permitting activities as provided for under NPS regulatory authorities; and
- conducting activities, programs, or planning efforts affecting use of NPS lands,

in a manner consistent with E.O. 11990 and with the "no net loss of wetlands" goal, the NPS will take the following actions:

2.1 The NPS adopts a goal of "no net loss of wetlands." In addition, the NPS will strive to achieve a longer-term goal of net gain of wetlands Servicewide.

2.2 NPS units will conduct parkwide wetland inventories (or will obtain such inventories from appropriate sources such as the National Wetlands Inventory) to help assure proper planning with respect to management and protection of wetland resources. Additional large-scale (more detailed) wetland inventories will be conducted in areas that are proposed for development or are otherwise susceptible to degradation or loss due to human activities.

2.3 For purposes of compliance with Executive Order 11990, the NPS will use "Classification of Wetlands and Deepwater Habitats of the United States" (FWS/OBS-79/31; Cowardin et al. 1979) as the standard for defining, classifying, and inventorying wetlands.

2.4 For proposed new development or other new activities, plans, or programs that are either located in or otherwise have the potential for direct or indirect adverse impacts on wetlands, the NPS will employ a sequence of:

a) avoiding adverse wetland impacts to the extent practicable,
b) minimizing impacts that could not be avoided, and
c) compensating for remaining unavoidable adverse wetland impacts via restoration of degraded wetlands.

Consistent with 2.1 above, compensation for wetland degradation or loss will be at a minimum 1:1 ratio. Actions that may be excepted from the compensation requirement are identified in Procedural Manual #77-1, which was developed by the Associate Director, Natural Resource Stewardship and Science to implement this Director's Order.

2.5 Actions proposed by the NPS that have the potential to have adverse impacts on wetlands will be addressed in an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). If the preferred alternative in an EA or EIS will result in adverse impacts on wetlands, a "Statement of Findings" documenting compliance with this Director's Order and Procedural Manual #77-1 will be completed. Actions that may be excepted from the Statement of Findings requirement are identified in the Procedural Manual.

2.6 Superintendents will oversee preparation of Statements of Findings and will recommend their approval to Regional Directors. The Chief of the NPS Water Resources Division or, alternatively, a certified Professional Wetland Scientist (Society of Wetland Scientists Certification Program, Inc.) from within the NPS with working knowledge of this Director's Order and Procedural Manual #77-1, will certify: 1) the adequacy of wetland-related technical analyses; and 2) consistency with Servicewide implementation of this Director's Order and Procedural Manual #77-1. Regional Directors have final approval authority for Statements of Findings.

2.7 Where natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human activities, the NPS will, to the extent appropriate and practicable, restore them to pre-disturbance conditions.

2.8 Where appropriate and practicable, the NPS will not simply protect, but will seek to enhance natural wetland values by using them for educational, recreational, scientific, and similar purposes that do not disrupt natural wetland functions.

3.0 Responsibilities

The Director is responsible for ensuring NPS compliance with E.O. 11990 in accordance with provisions of 520 DM 1. In performing this duty, the Director approves NPS policies and directives for complying with the Executive Order.

The Deputy Directors and Associate Directors are responsible for general supervision of the Divisions and Offices under their jurisdictions to ensure compliance with E.O. 11990 as outlined in this Director's Order and Procedural Manual #77-1.

The Associate Director, Natural Resource Stewardship and Science is responsible for: 1) issuing and updating NPS procedures for implementing this Director's Order; and 2) revising relevant portions of the NPS *Management Policies* and NPS natural resources management and NEPA procedures to ensure compliance with E.O. 11990 as outlined in this Director's Order and Procedural Manual #77-1.

The Associate Director, Professional Services is responsible for revising NPS planning procedures as necessary to satisfy the requirements of E.O. 11990 as outlined in this Director's Order and Procedural Manual #77-1.

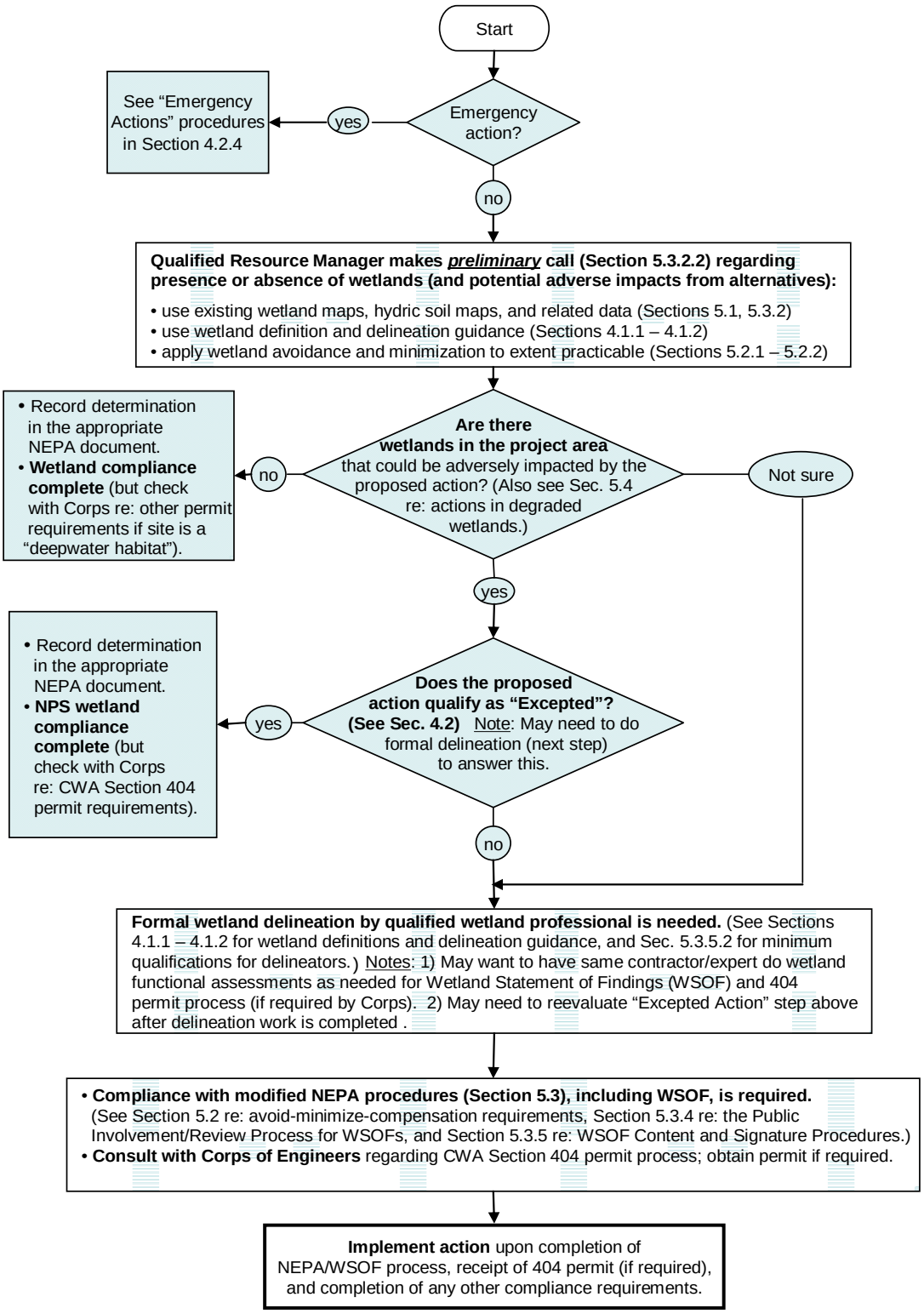
The Superintendents oversee the planning/NEPA process, identify preferred alternatives, assure that appropriate wetland permits have been obtained (e.g., Section 404 of the Clean Water Act), and oversee preparation of Statements of Findings as outlined in this Director’s Order and Procedural Manual #77-1, utilizing the wetland technical information developed during the planning process. Superintendents sign the "Recommended" line on Statement of Findings cover sheets.

The Chief, Water Resources Division (or a certified Professional Wetland Scientist from within the NPS as described in this Director’s Order and Procedural Manual #77-1) signs the "Certification of Technical Adequacy and Servicewide Consistency" line on Statement of Findings cover sheets, assuring both technical adequacy of wetland analyses and Servicewide consistency in implementation of this Director's Order and Procedural Manual #77-1.

The Regional Directors are responsible for ensuring compliance with E.O. 11990 within their respective Regions as outlined in this Director's Order and Procedural Manual #77-1. They are responsible for final approval of Statements of Findings after recommendation by Superintendents and certification of technical adequacy and Servicewide consistency as described in Section 2.6.

------End of Director’s Order------

Figure 1: Summary of the NPS wetlands compliance process for activities subject to D.O. #77-1 and these procedures (see Section 4.1.3 regarding applicability)



3.0 Relationships to Other Requirements

3.1 Relationships to DOI and CEQ Policies and Procedures for Implementing E.O. 11990 and the National Environmental Policy Act

E.O. 11990 was issued "in furtherance of the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 *et seq.*), in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands." The policies, requirements, and standards in D.O. #77-1, as implemented under these procedures, supplement and must be used in conjunction with the Department of the Interior procedures and policies for implementing E.O. 11990 (520 DM 1); the Council on Environmental Quality (CEQ) Implementing Regulations for NEPA (40 CFR Part 1500); the Department of the Interior policies and procedures for complying with NEPA (516 DM 1-7, 12); and NPS NEPA procedures (D.O. #12 and the D.O. #12 Handbook).

According to Sections 3.5.B and 3.5.I (Exceptions to Categorical Exclusions) of the D.O. #12 Handbook, actions proposed by the NPS that may cause adverse effects on wetlands cannot be categorically excluded from NEPA. (Sections 4.1, 5.3.2, and 5.3.3 of these procedures provide guidance for determining if a proposed action has the potential to have adverse impacts on wetlands.) If such potential is found to exist, then an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) must be prepared, and the supplemental NEPA requirements described in Section 5.3 of these procedures apply. However, some requirements (Statement of Findings, wetland compensation) may be waived for certain “excepted actions” as described in Section 4.2 of these procedures.

3.2 Relationship to Compliance with Section 404 of the Clean Water Act

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers issues permits for activities that result in the discharge of dredged or fill material into waters of the United States, including wetlands. Regulated activities range from depositing fill for building pads or roads to discharges associated with mechanized landclearing.

Although portions of the Corps of Engineers 404 permit procedures (33 CFR 320-330) are similar to some of the requirements found in D.O. #77-1 and these implementing procedures, there are significant differences in scope that warrant a separate NPS wetland protection process. First, the 404 permit program regulates only the discharge of dredged or fill material, while Executive Order 11990 covers a much broader range of actions that can have adverse impacts on wetlands, including ground water withdrawals, water diversions, nutrient enrichment, and other examples listed in Section 4.1.2 of these procedures. Second, the wetland definition used for the 404 permit program (33 CFR 328.3) is narrower than the Cowardin et al. (1979) wetland definition used for NPS compliance with E.O. 11990 (see Section 4.1.1 of these procedures). Therefore, a broader range of aquatic habitat types fall under these procedures than under the wetland procedures of the 404 permit program. Third, the Corps of Engineers has "general permit" provisions that allow many projects affecting wetlands to proceed with minimal review.

Thus, in many cases, the 404 permit program does not meet the wetland protection directives of E.O. 11990 for resources managed by the NPS.

For these reasons, all NPS actions with the potential to have adverse impacts on wetlands (as defined in Section 4.1.1) must comply with D.O. #77-1 and these procedures, and those actions that involve placing dredged or fill material in wetlands or other "waters of the U.S." (as defined in 33 CFR 320-330) must comply with Section 404 of the Clean Water Act as well. In cases where both NPS and Corps of Engineers procedures apply, it is important to avoid duplication of effort by coordinating with the appropriate Corps of Engineers office early in the process of developing alternatives to assure that they are workable under both these procedures and Section 404 regulations. Also, if wetland compensation is necessary (Section 5.2.3 of these procedures), *every effort should be made to assure that the same wetland restoration proposal meets the compensation requirements of both processes.*

3.3 Relationship to Executive Order 11988 (Floodplain Management)

Executive Order 11988 (Floodplain Management) directs federal agencies to avoid adverse impacts upon floodplains and their occupants if there is a practicable alternative. The NPS is further directed to take action to reduce the risk of flood loss, to minimize impacts of flooding on human safety, health, and welfare, and to restore and preserve the natural and beneficial values of floodplains.

NPS D.O. #77-2: Floodplain Management and Procedural Manual #77-2: Floodplain Management established NPS procedures for implementing E.O. 11988. The floodplain procedures require that a floodplain Statement of Findings documenting consistency with E.O. 11988 be prepared for proposed activities that would result in occupation or modification of floodplains or that would result in impacts to floodplain values. Since wetlands are often located within floodplains, such proposed activities may require compliance with both E.O. 11988 and E.O. 11990. In such cases, *the floodplain Statement of Findings discussed in Section VII of Procedural Manual #77-2 and the wetland Statement of Findings discussed in Sections 5.3.4 and 5.3.5 of these procedures may be combined into one Statement of Findings* as long as the requirements for both documents, including all specified signatures, are met.

3.4 Compliance with Other Federal Laws and Regulations

In addition to the above, the NPS must also assure compliance with: 1) the Coastal Zone Management Act, which requires that NPS actions be consistent, to the maximum extent practicable, with approved state coastal zone management programs; 2) Section 10 of the Rivers and Harbors Act, which requires Department of the Army permits for work in navigable waters; 3) the Fish and Wildlife Coordination Act; 4) the Wild and Scenic Rivers Act; 5) the Endangered Species Act; 6) the National Historic Preservation Act; and other relevant laws and regulations governing actions in wetlands and other aquatic environments.

4.0 Scope

4.1 Applicability

4.1.1 Wetlands Subject to Executive Order 11990 and These Procedures

For the purpose of implementing E.O. 11990, any area that is classified as a *wetland* according to the U.S. Fish and Wildlife Service's "Classification of Wetlands and Deepwater Habitats of the United States" (Report FWS/OBS-79/31); Cowardin et al. 1979) is subject to D.O. #77-1 and these implementation procedures. This publication can be downloaded at http://www.fws.gov/wetlands. (Note: The Cowardin classification system forms the basis for the U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) mapping program. Section 5.1 of these procedures discusses the applicability of NWI maps to compliance with E.O. 11990.)

Under the Cowardin definition, a wetland must have one[1] or more of the following three attributes:

1. at least periodically, the land supports predominantly hydrophytes (wetland vegetation);
2. the substrate is predominantly undrained hydric soil; or
3. the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

These three attributes encompass wetland areas that fall into five categories:

1. areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs;
2. areas without hydrophytes but with hydric soils - for example, flats where drastic fluctuations in water level, wave action, turbidity, or high concentration of salts may prevent the growth of hydrophytes;
3. areas with hydrophytes but non-hydric soils, such as margins of impoundments or excavations where hydrophytes have become established but hydric soils have not yet developed;
4. areas without soils but with hydrophytes such as the seaweed-covered portion of rocky shores; and
5. wetlands without soil and without hydrophytes, such as gravel beaches or rocky shores without vegetation.

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[1] This should not be interpreted as advocating a simple “one-parameter approach” to delineating all wetlands. Please see the rest of this section and the following Section 4.1.2 for further guidance on delineating wetlands under the Cowardin definition.

The Cowardin wetland definition encompasses more aquatic habitat types than the definition (33 CFR 328.3) and delineation manual used by the Corps of Engineers for identifying wetlands subject to Section 404 of the Clean Water Act. The 1987 "Corps of Engineers Wetlands Delineation Manual" requires that *all three* of the parameters listed above (hydrophytic vegetation, hydric soil, wetland hydrology) be present in order for an area to be considered a wetland (with some exceptions for "atypical situations" and "problem areas"). The Cowardin wetland definition includes such wetlands, but also adds some areas that, though lacking vegetation and/or soils *due to natural physical or chemical factors* such as wave action or high salinity, are still saturated or shallow inundated environments that support aquatic life (e.g., unvegetated stream shallows, mudflats, rocky shores). Most of these additional shallow aquatic environments, as well as most deepwater habitats, are still regulated as "waters of the U.S." under the 404 permit program. The following section provides guidance for delineating and mapping wetlands on NPS-managed lands so that both Clean Water Act and NPS-regulated wetlands are included.

4.1.2 Guidance for Delineating and Mapping Wetlands to Meet Corps of Engineers and NPS Requirements

U.S. Supreme Court decisions periodically change the types of wetlands that fall under Clean Water Act jurisdiction. The Corps of Engineers responds to these decisions by updating the Section 404 permit regulations and guidance accordingly. The NPS also makes periodic minor changes to its wetland procedures. Therefore, if a proposed NPS action has the potential to have adverse impacts on wetlands, the first step for the NPS or its contractors is to delineate *all natural and artificial wetlands* in the project area according to the following guidance without regard to regulatory jurisdiction. Once this is done, determinations must be made (in consultation with the Corps and the NPS Water Resources Division) regarding how each wetland affected by the proposed actions is treated under *current* Section 404 regulations and NPS wetland protection procedures.

Most wetlands on NPS lands will have all three parameters required by the 1987 Corps Manual. However, NPS adoption of the Cowardin wetland definition requires modified procedures to assure that all wetlands subject to D.O. #77-1 are identified. The following procedures should be used so that wetland delineation and mapping projects on NPS lands will satisfy both the Clean Water Act wetland definition (1987 Corps Manual) and the NPS standard for identifying wetlands (Cowardin et al. 1979):

- For sites with vegetation and soils, use the most recent version (and any approved regional supplements) of the 1987 Corps Manual, including "problem area" and "atypical situation" procedures.

- For naturally unvegetated or non-soil sites, such as many stream channels, tidal mudflats, playas, wave-active shorelines, and so on, use the "limits" of these systems as described in Cowardin et al. (1979) and briefly summarized below. In some cases, modification of the 1987 Corps Manual procedures may be necessary to delineate boundaries for these wetland types. In such cases, *clear evidence of wetland hydrology is always required*. However, the absence of vegetation or hydric soil characteristics due to

natural physical or chemical conditions such as fluvial processes, wave action, or high salinity may make it appropriate to waive the hydrophytic vegetation and/or hydric soil requirements. Such modifications must be explained on data sheets and in wetland delineation/mapping reports.

- Wetland delineation reports should identify which sites qualify as wetlands according to the 1987 Corps Manual and which additional waters qualify as wetlands under the Cowardin system and these procedures. Other "waters of the U.S." that are subject to Corps regulation, such as deepwater habitats, should also be identified.

- At drained sites that no longer meet wetland hydrology criteria, relic hydric soils or relic hydrophytic vegetation are not indicative of current wetlands. However, if such sites are encountered and the hydrologic alterations are likely human-induced, then they should be identified as potential wetland restoration opportunities.

Following is a summary of the limits (boundaries) of Cowardin wetland types:

Riverine wetlands: The landward limits of riverine wetlands are defined on page 7, 2nd column of Cowardin et al. (1979). The wetland/deepwater habitat boundary is described on page 4 (1st paragraph) as a depth of 2 meters at low water, or at the limits of emergent or woody vegetation extending beyond this depth. Dry washes are considered to be wetlands if the substrate is saturated or flooded at some time during the growing season of each year (see part 3 of the wetland definition on p. 3 of Cowardin et al. 1979).

Marine/Estuarine wetlands: The upper limits of these systems are described on pp. 4-5 of Cowardin et al. (1979). The lower limits (boundaries between wetland and deepwater habitats in these systems) are described as the elevation of extreme low water of spring tides (p. 4, 1st paragraph in Cowardin et al. 1979). In other words, if a marine or estuarine area remains flooded during the extreme low spring tide, it is considered subtidal and is therefore a deepwater habitat, not a wetland. Intertidal areas that are exposed by the extreme low spring tide are considered wetlands. (Note: These systems include the splash zones from breaking waves, and may also include areas where wind-enhanced tides periodically trap enough water above the intertidal zone to maintain saline wetland conditions.)

Palustrine wetlands: These wetlands are bounded by upland or by any of the other four systems (p. 10, Cowardin et al. 1979). The transitions between palustrine wetlands and uplands are usually vegetated, so the 1987 Corps Manual can be used to delineate those boundaries. In some cases, such as where high salinity prohibits vegetation establishment, the 1987 Corps Manual may have to be adapted such that only the wetland hydrology and hydric soil parameters are used to determine the upland/wetland boundaries.

Lacustrine wetlands: The limits of lacustrine wetlands are described on p. 9 of Cowardin et al. (1979). The upper limits are either uplands or vegetated wetlands that can be delineated using the 1987 Corps Manual. The lower limits, or boundaries between the lacustrine littoral (wetland) and lacustrine limnetic (deepwater habitat) zones, are where the water depth reaches

2 meters at low water. For reservoirs, it may be necessary to use design or mean high pool elevation data for the upper limit, as appropriate.

4.1.3 Activities Subject to Executive Order 11990 and These Procedures

NPS activities that have the potential to have adverse impacts on wetlands are subject to the provisions of E.O. 11990 as implemented through D.O. #77-1 and these procedures. Such activities may include: 1) acquiring, managing, and disposing of NPS lands and facilities; 2) construction and related development activities; 3) permitting activities as provided for under NPS regulatory authorities; and 4) activities, programs, or planning efforts affecting use of NPS lands.

NPS activities with the potential to have adverse impacts on wetlands must follow the procedures in Sections 5.2, 5.3, and 5.4 of this document (unless such procedures may be waived under Section 4.2 "Excepted Actions"). The basic test for determining if a proposed action will have adverse impacts on wetlands is if the activity has the potential to degrade any of the natural and beneficial ecological, social/cultural, or other functions and values of wetlands (see Sections 5.3.2 and 5.3.3 of these procedures regarding evaluating adverse impacts). Such activities may require compliance due to direct impacts (e.g., placement of fill in a wetland) or due to indirect impacts (e.g., secondary or offsite impacts that reach into wetlands). Examples of activities with the potential to have adverse impacts on wetlands include drainage, water diversion, pumping, flooding, dredging, channelizing, filling, nutrient enrichment, diking, impounding, placing of structures or other facilities, livestock grazing, and other activities that degrade natural wetland processes, functions, or values.

Examples of wetland degradation include modifying flow, circulation, hydroperiod, or other aspects of the hydrologic regime; degrading natural biotic communities and processes including native plant and animal communities, habitat quality, floral and faunal productivity, and natural biodiversity; and degrading social/cultural values such as aesthetics, education, historical values, archeological resources, recreation, and scientific research (see Section 5.3.3).

Section 5.1 (Wetland Inventories), Section 5.5 (Restoring Wetlands Degraded by Human Activities), Section 5.6 (Retaining or Removing Structures and Facilities in Existence Prior to May 28, 1980), and Section 5.10 (Proposals to Lease, Create Easements or Rights-of-Way on, Exchange or Dispose of NPS Lands Containing Wetlands) address procedures applicable to wetland inventories and land use decisions that are not necessarily associated with new adverse impacts on wetlands.

4.1.4 Land Acquisition for Administrative Purposes

Land acquisition primarily for administrative purposes (e.g., future development of housing, administrative facilities, transportation systems, etc.) is subject to the policies and requirements of D.O. #77-1 and these procedures if there is a potential for adverse impacts on wetlands. Requirements to avoid or minimize wetland impacts described in Section 5.2 must be addressed in the land acquisition (for administrative purposes) planning process. The Statement of Findings (Sections 5.3.4 and 5.3.5) for the acquisition process should focus on justifying why no sites with

fewer potential wetland impacts were practicable; however, the wetland compensation requirement (Section 5.2.3) may be delayed until the NEPA compliance documents for the actual facility plans are prepared. If compensation is delayed in this manner, an amended Statement of Findings must be prepared and issued for the specific development plan according to the procedures in Sections 5.3.4 and 5.3.5. This amendment can tier off the acquisition Statement of Findings as much as possible, but must address the specifics of minimizing wetland impacts and required wetland compensation (Section 5.2.3).

4.2 Excepted Actions

This subsection identifies certain types of activities that require modified approaches to achieve the objectives of E.O. 11990 while reducing delay and paperwork. "Excepted actions" described in this subsection are those actions that may be excepted from the Statement of Findings requirements described in Sections 5.3.4 and 5.3.5 and the compensation requirements discussed in Section 5.2.3 of these procedures. *If actions are "excepted" from these two requirements under this subsection, requirements to avoid wetlands and minimize unavoidable wetland impacts, to the extent practicable (Sections 5.2.1 and 5.2.2), still apply and should be discussed in the appropriate NEPA document.*

Exceptions described in the following subsections do not imply exemption from the Clean Water Act (including Section 404 permits for discharge of dredged or fill material in waters of the U.S.), Section 7(a) of the Wild and Scenic Rivers Act, Section 10 of the Rivers and Harbors Act (Corps of Engineers permits for projects in navigable waters), the Endangered Species Act, or other laws, regulations or procedures governing NPS activities.

4.2.1 Potential Exceptions for Certain "Water Dependent" and Maintenance Activities

Certain types of activities cannot accomplish their intended purposes unless they are located in or are carried out in close proximity to aquatic environments (i.e., they are "water dependent"). Following is a list of such actions that *may be excepted* from the Statement of Findings procedures outlined in Sections 5.3.4 and 5.3.5 and the compensation requirement discussed in Section 5.2.3 of these procedures. This list also includes a limited exception (g., below) for maintenance, repair, or renovation (but not reconstruction or expansion) of currently serviceable facilities or structures.

For an action to be excepted from the Statement of Findings and compensation requirements, the conditions and best management practices referred to in Section 4.2.2 below and listed in Appendix 2 must be satisfied. If one or more of these conditions/BMPs are not met, the action reverts to full compliance with D.O. #77-1 and these procedures. The NPS Water Resources Division is available for consultation to help determine if an action should be excepted.

Acreage limits in the excepted actions below apply to “single and complete projects.” Single and complete projects are located on discrete sites and have “independent utility” (are fully functional units by themselves). For example, a park proposes to construct two small canoe ramps on a lake at separate locations 1.5 miles apart, and each ramp is fully functional by itself (not dependent on the other ramp or on later project phases to perform its intended function). In this case, the 0.1

acre threshold in exception "b." below may be applied separately at each canoe ramp because each is a single and complete project.

In a contrasting example, a park proposes to construct a new sewer line that would be buried under three stream channels. In this case, the single and complete project is the entire sewer line, so the threshold in exception "e." below is the cumulative limit of wetland disturbance for the three stream crossings, and not applicable to each individual crossing. This is because each crossing doesn't have independent utility (i.e., isn't functional by itself without being part of the entire sewer line).

Actions that may be excepted from the Statement of Findings (Sections 5.3.4 and 5.3.5) and compensation (Section 5.2.3) requirements:

a. **Scenic overlooks and foot/bike trails or boardwalks**, including signs, where primary purposes include public education, interpretation, or enjoyment of wetland resources and where total wetland impacts from fill placement are 0.1 acre or less (Parking lots, access roads, borrow sites, and other associated facilities can not be excepted.)

b. **Small boat ramps/launches, piers, or docks** with total long-term wetland impact for the entire project (both onsite and offsite) of 0.1 acre or less.

c. **Use and maintenance of unimproved backcountry vehicle stream crossings** (use of stream channels as road *corridors* can not be excepted).

d. ***Minor* stream crossings** using bridges or other structures that completely span the channel and associated wetland habitat (i.e., no pilings, fill, or other support structures in the wetland/stream habitat).

e. **Minor stream crossings for underground utility lines**, including electrical lines, telecommunications cables, or water, sewer, gas or other pipelines, if the cumulative wetland disturbance (stream channel plus non-riverine wetlands immediately adjacent to the channel) totals 0.1 acre (4,356 ft^2) or less. This exception requires that: 1) directional drilling under the stream channel and adjacent wetlands has been evaluated during the NEPA process and determined not to be practicable; 2) restoration of pre-construction contours and elevations, soil/substrate characteristics, and wetland/riparian vegetation is accomplished as part of the project; 3) the project will not result in adverse impacts on surface or ground water hydrology (e.g., no wetland drainage); and 4) best management practices for protection of aquatic life (e.g., siltation controls, measures to protect fish migration and spawning) are implemented throughout the construction and restoration processes.

f. **Installation of scientific measuring devices** such as water level recorders, water quality monitoring stations, small weirs or flumes, or similar devices necessary for monitoring of or research on wetland resources.

g. **Maintenance, repair, or renovation** (but not full reconstruction[1] or expansion) of currently serviceable[2] facilities or structures:

- that were under construction or were completed *prior to* May 28, 1980 (date when original "NPS Floodplain Management and Wetland Protection Guidelines" were published) but whose retention has been reviewed and justified according to Section 5.6 of these procedures, or
- that were completed *after* publication of the May 28, 1980 guidelines (or subsequent revisions, including this Procedural Manual) and for which compliance with them is on record.

This exception allows for *minor* (0.1 acre or less) deviations in the structure's configuration or fill footprint in wetlands due to changes in construction codes, methods, or safety standards (e.g., handicap accessibility), but does <u>not</u> apply to other types of reconstruction/expansion (e.g., road widening to increase capacity, road re-routing) or conversion to other uses that cause new adverse impacts on wetlands.

h. **Actions designed to restore degraded (or completely lost) wetland, stream, riparian, or other aquatic habitats or ecological processes.** For this exception, "restoration" refers to reestablishing environments in which natural ecological processes can, to the extent practicable, function as they did prior to disturbance.

- Short-term wetland disturbances that are directly associated with and necessary for implementing the restoration may be allowed under this exception.
- Conditions 1 and 2 in Appendix 2 may be waived for this excepted action if adverse impacts on hydrology and fauna exceed “minor” but are necessary to achieve restoration objectives. Justification for this waiver must be included in the NEPA document.
- Actions causing a cumulative total of up to 0.25 acres of new, long-term adverse impacts on natural wetlands may be allowed under this exception if they are directly associated with and necessary for the restoration (e.g., small structures).
- Some "artificial wetlands" (see definitions in Section 4.2.3 below) may have been constructed on sites which were originally 100% upland habitat (e.g., wetlands sustained by water pumps or other means). Restoration of such sites to upland habitat may also be considered under this exception.

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[1] Full reconstruction of instream diversions, water intake or outfall structures, or similar, legal and permitted instream structures that are damaged or destroyed by storms, floods or similar events may be allowed under this exception.

[2] “Currently serviceable” means usable as is or with maintenance or renovation, but not so degraded as to essentially require full reconstruction.

4.2.2 Conditions and Best Management Practices for Actions Listed in 4.2.1 to Qualify as Excepted

Appendix 2 presents a set of conditions that must be satisfied and best management practices (BMPs) that must be implemented for a proposed action to qualify for the exceptions in this subsection. *If one or more of the conditions or BMPs cannot be met, then the action reverts to full compliance with these procedures.*

4.2.3 Activities with Adverse Impacts on "Artificial" Wetlands

"Artificial" wetlands are those that have been created on previously dry land (upland) as a result of human activities. Such wetlands may be *incidental* (e.g., formed due to leakage from irrigation systems or in artificial impoundments created by inadequate road drainage) or may be *intentional* (e.g., associated with constructed ponds or reservoirs). *For this subsection, constructed "ponds" and other small intentional artificial wetlands are defined as less than five acres in size, while larger intentional artificial wetlands or "reservoirs" are five acres or larger.*

Proposed actions in *incidental* wetlands or small *intentional* wetlands can have significant adverse impacts on NPS resources and purposes even though the habitats are artificial. Decisions on these actions must include consideration of the potential loss of aquatic resource functions and values, including those described in Section 5.3.3 of these procedures. These decisions must also take into account NPS management policies allowing preservation of such resources under a number of special circumstances, including:

1. when needed to "maintain the closest approximation of the natural condition when a truly natural system is no longer attainable" (*NPS Management Policies 2006*, Chapter 4.1),

2. for the benefit of threatened or endangered species (*NPS Management Policies 2006*, Chapter 4.4.2.3),

3. for cultural resources management purposes (*NPS Management Policies 2006*, Chapter 5), or

4. when directed by Congress (*NPS Management Policies 2006, Chapter 4.1*).

Proposed actions in incidental artificial wetlands or small intentional artificial wetlands are subject to NPS NEPA compliance procedures. However, actions impacting these types of artificial wetlands *may be excepted* from the Statement of Findings requirements of Sections 5.3.4 and 5.3.5 and the compensation requirements of Section 5.2.3 of these procedures if, after evaluation of impacts on wetland functions and values, the anticipated wetland loss or degradation is determined to be minor (including no adverse impacts on state or federally listed or candidate species or their critical habitats). The NPS Water Resources Division is available for consultation to help determine if an action should be excepted. *Note: This NPS exception does not imply exception from compliance with Section 404 of the Clean Water Act (which does regulate many artificial wetlands) or any other relevant laws, regulations, or procedures.*

Construction, deposition of fill material, and other activities with adverse impacts on larger intentional wetlands/reservoirs are also subject to NPS NEPA compliance procedures and must comply fully with D.O. #77-1 and these procedures (though other exceptions in Section 4.2 may apply).

Artificial ponds, channels, or similar features that are used for the sole purpose of active stormwater, wastewater, or drinking water treatment are not considered wetlands for purposes of these procedures. However, if such systems retain wetland characteristics as defined in Section 4.1.1 of these procedures after they have been abandoned, they revert to the procedures for artificial wetlands discussed previously in this Section.

4.2.4 Emergency Actions

When the NPS performs emergency actions essential to protect property and public health and safety from an immediate threat, modified procedures for compliance with D.O. #77-1 and this manual are necessary. Taking into consideration the need for rapid action in emergency situations, practicable steps to avoid and minimize potential adverse impacts on wetlands must be taken. However, the other procedures described in this document for compliance with D.O. # 77-1 (e.g., Statement of Findings) are not required prior to implementing emergency actions.

After such emergency actions have been completed, restoration actions for wetlands damaged by the emergency action should be implemented as soon as possible. During the next revision of the park General Management Plan or other relevant park planning document, actions that would lessen the frequency of such emergencies or eliminate them entirely should be evaluated and implemented, where practicable.

Note: This exception does not imply exception from the requirements of Section 404 of the Clean Water Act. In order to allow emergency work without delays, each NPS unit should contact the local Corps of Engineers District Office regarding emergency authorization procedures.

5.0 Procedures

D.O. #77-1 (reproduced in Section 2 of these procedures) states the NPS goal to achieve "no net loss of wetlands" in the course of managing NPS resources and developing park management and visitor use facilities and programs. In addition, the Director's Order establishes a longer-term goal to achieve "net gain" of wetland habitat through efforts to restore natural wetlands that have been degraded or lost due to past human activities. These and related policies established in D.O. #77-1 will be met through the following procedures.

5.1 Wetland Inventories

For general park planning and resource management purposes, NPS units should obtain parkwide wetland inventories based on "Classification of Wetlands and Deepwater Habitats of the United States" (FWS/OBS-79/31; Cowardin et al. 1979). In many cases, National Wetlands Inventory (NWI) maps and digital data meeting current standards (based on 1:58,000 scale color infrared aerial photography for most of the country, somewhat smaller scale in Alaska) can serve this

purpose and should be obtained, if available. (NWI maps based on black-and-white, smaller scale photography can be used temporarily in the absence of better products, but should be considered substandard.) Because the NWI uses relatively small scale aerial photography and is based on limited ground truthing, these maps may have significant omissions or misclassifications and should be considered initial tools for avoiding wetland impacts in park planning. Field verifications of NWI maps, enhanced wetland inventories, or site-specific wetland delineation studies will be necessary for more detailed planning and compliance, as explained below.

If it is determined that NWI maps are not adequate for general park planning or wetland management purposes, more detailed "enhanced inventories" employing larger scale imagery and more extensive ground truthing may be necessary. As part of the enhanced wetland inventory process, observable degradation of wetlands and the likely causes (e.g., drainage, filling, mining, nutrient enrichment) should be recorded for use in resource protection and wetland restoration planning. *Enhanced inventories should either use the Cowardin et al. (1979) classification system or be cross-referenced to that system.*

Regardless of the type of wetland inventory data used in general park planning or resource management, site-specific wetland evaluations must be conducted as part of the more detailed project planning process to accurately delineate wetland boundaries, locate any unmapped wetlands, and otherwise assure that projects will not impact wetlands (see Section 5.3.2). *It is critical for this onsite investigation to be conducted in advance of project design to assure that the avoidance and minimization requirements outlined in Section 5.2 of these procedures can be met.*

5.2 Sequence of Avoiding, Minimizing, and Compensating for Wetland Impacts

For proposed development or other activities either located in or otherwise with the potential to have adverse impacts on wetlands (as defined in Sections 4.1.2, 5.3.2, and 5.3.3 of these procedures), the NPS is required to use the following sequence of avoiding, minimizing, and compensating for wetland impacts.

5.2.1 Avoiding Adverse Impacts on Wetlands

In the course of developing project alternatives and implementing actions, the NPS must seek to *avoid* direct or indirect adverse impacts on wetlands and avoid support of activities that would result in such impacts, wherever practicable. (See Section 5.3.1.2 of these procedures for examples of factors to be considered in determining if an alternative is "practicable.")

5.2.2 Minimizing Unavoidable Wetland Impacts

If a proposed action will still have adverse impacts on wetlands even after avoidance measures have been incorporated, the NPS must *minimize* such impacts by designing or modifying the action to reduce wetland degradation or loss and by using the BMPs listed in Appendix 2. Every practicable effort must be made during this process to maintain the integrity of the affected wetlands and their attendant organisms and physical/biological processes.

5.2.3 Compensating for Wetland Impacts

After *avoidance* and *minimization* have been applied to the maximum practicable extent, remaining new wetland degradation or loss must be offset through wetland *compensation*. For the NPS, compensation refers primarily to restoring natural wetland functions in degraded or former natural wetland habitats on NPS lands. It does not refer to creating wetlands where they did not exist previously, except as may be allowed under Chapter 4 of *NPS Management Policies 2006*.

NPS wetland compensation is required as follows:

1. If the adverse impact on wetlands (direct plus indirect impacts as described in Section 5.3.2 of these procedures) from the entire project totals less than 0.1 acres, then wetland compensation is strongly encouraged, but may be waived if the loss of wetland functions is considered by the park/Region and the NPS Water Resources Division to be minor. *A Wetland Statement of Findings is still required for all new adverse impacts on wetlands, regardless of size, unless the action qualifies as "excepted" as defined in Section 4.2 of this manual.* The Wetland Statement of Findings must provide a justification for the proposed compensation waiver, and the waiver must be approved by the NPS Water Resources Division as part of the certification process described in Section 5.3.5.

2. If the adverse impacts on wetlands from the entire project total 0.1 acres or more, then wetland compensation in the form of restoration of degraded or former wetland habitats is required.

For the purpose of wetland compensation, wetland restoration proposals must, *at a minimum*, provide one-for-one (1:1) *wetland function replacement* (i.e., focus on no net loss of wetland functions, not just wetland acreage). Section 5.3.3 of these procedures discusses evaluation of wetland functions for this purpose. In the absence of definitive information needed to specifically address 1:1 wetland *function* replacement, a minimum of 1:1 wetland *acreage* replacement may be used as a surrogate. In the latter case, the focus should be on replacing wetlands of equivalent type and function, to the extent practicable.

Final compensation ratios may need to be greater than 1:1 in cases where: (1) the functional values of the site being impacted are determined to be high and the restored wetlands will be of lower functional value; (2) it will take a number of years for the restored site to become fully functional (e.g., reestablishment of forested wetlands); or (3) the likelihood of full restoration success is unclear. Conversely, the replacement ratio may simply be 1:1 for areas where the functional values associated with the area being impacted are determined to be low relative to the restoration site and the likelihood of fully successful, timely replacement of functions at the restoration site is high. Consultation with Regional Aquatic Professionals and the NPS Water Resources Division regarding compensation proposals and methods for assessing wetland functions is strongly encouraged prior to preparing Statements of Findings, as discussed in Sections 5.3.4 and 5.3.5 of these procedures.

Wetland compensation sites must be on lands managed by the NPS, with the following recommended priority order: 1) within the same wetland system as the impacted wetland; 2)

within the same watershed; or 3) in another watershed within the same NPS unit. If no practicable restoration sites can be found within this location sequence, then sites in other NPS units within the Region may be considered. Practicability factors such as those discussed in Section 5.3.1.2 should be considered in determining appropriate compensation sites. For example, lack of opportunities may make local restoration impossible in some cases, and the decision to expand the area of consideration for compensation sites is clear. However, there may be other cases where local restoration sites exist, but factors such as the opportunity to restore a rare or critical wetland type in another watershed may outweigh the value of restoring a more local wetland.

To help achieve the long-term "net-gain" of wetlands goal within the NPS, the costs of wetland compensation are considered project costs. That is, *compensation costs should be factored into project budgets rather than being accomplished using NPS natural resources funding sources.* For example, funding sources for compensatory wetland projects may include Federal Lands Highway Program (FLHP) funds, other construction funds, ONPS funds, Federal Lands Recreation Enhancement Act funds (fee money), or Regional funding sources that are not designated for natural resources management. *Funding sources that are considered unacceptable for compensatory wetland work include Servicewide or Regional natural resource programs such as NRPP, WRD-Competitive, Exotic Plant Management Team projects, and Biological Resource Management Division-Competitive funds.*

In keeping with the NPS no-net-loss of wetlands policy, the NPS Water Resources Division may conduct periodic surveys to verify that compensation projects have been successfully completed.

5.3 The NEPA Process as Modified by Director's Order #77-1 and These Procedures

All NPS proposed actions that have the potential to have adverse impacts on wetlands must be treated in the appropriate NEPA document (EA or EIS) according to NPS NEPA procedures (D.O. #12 and the D.O. #12 Handbook), *as supplemented by these procedures.*

5.3.1. Identifying and Evaluating Alternatives for Proposed Actions

1. Alternatives presented in EAs and EISs must include:

    a. A "no action" alternative; and

    b. Any *practicable alternatives* for carrying out desired actions such that adverse impacts on wetlands are avoided or minimized in accordance with these NPS wetland protection procedures (Section 5.2).

2. In determining an alternative's "practicability" with respect to E.O. 11990, the NPS must analyze and take into account the following and any other relevant factors:

    a. Effects on natural wetland functions (e.g., fish and wildlife productivity and habitat, threatened and endangered species, vegetation impacts, water purification, streamflow maintenance, and other functions listed in Section 5.3.3 of these procedures) Note: Significance or abundance of the wetland functions in that park unit should be considered, e.g., importance of desert springs and seeps for sustaining wildlife compared to such features in parks with more abundant water resources.

    b. Effects on wetland social values (e.g., aesthetics, historic and cultural values, land use patterns, and other social/cultural values listed in Section 5.3.3)

    c. Economic factors (e.g., costs of space, construction, services, relocation, transportation, and other factors listed in Section 5.3.3)

    d. Existing technology (e.g., available construction methods, equipment, and materials)

    e. Legal/regulatory constraints

3. The “Affected Environment” section of the EA or draft EIS identifies wetlands that would be impacted by the various alternatives and describes their sizes, locations, types, characteristics, functions, and values. The “Environmental Consequences” section documents the consequences of implementing these alternatives, analyzing the full range of the direct or indirect adverse impacts of the various alternatives on wetlands. The impact analyses must include both impacts associated with *direct occupation of wetlands* (e.g., habitat displacement due to placement of fill) *and offsite impacts* (e.g., wetland water tables lowered by ground water pumps or drainage systems, even if those facilities are constructed on uplands). The level of detail needed in these analyses may vary according to the planning stage for the project or action being proposed. For example, standard National Wetlands Inventory maps could provide much of the information needed for park General Management Plans (GMPs) that are programmatic or strategic in nature, whereas enhanced mapping and/or onsite wetland investigations would be needed for GMPs or subsequent plans that identify specific project locations or detailed plans for facilities.

    In cases where the alternatives are associated with existing facilities or activities, the cumulative impact analyses in the EA or EIS must address the impacts that the alternatives would have in concert with these existing developments or activities. For example, the decision to expand an existing facility in a wetland rather than building the facility elsewhere could preclude opportunities to restore wetland functions at the existing site. The analysis should also include the potential for support of future development in wetlands that could result from the alternatives.

5.3.2 Determining if Alternatives are Located in or Could Otherwise Have Adverse Impacts on Wetlands

1. Existing Data Sources for Preliminary Wetland Determinations

   Several sources of data and information (a. - e. below) are available to help determine, at an early planning stage, if a proposed activity might be located in or near wetlands. (Note: onsite investigations, as explained in 2. below, are necessary for detailed planning and compliance.)

   a. NWI Data: Project planners should consult park databases and files to determine if NWI data or enhanced wetland inventory data (see b. below) are available for a site. The NWI website (www.fws.gov/nwi) has information on the status of NWI mapping for the nation, and can be accessed to download available digital data. USFWS or NPS Water Resources Division Wetlands Program staff can also help determine the status and availability of NWI data.

      As discussed in Section 5.1 of this manual, the NWI uses relatively small scale aerial photography and is based on limited ground truthing. These maps may have significant omissions or misclassifications and should be considered as initial tools for avoiding wetland impacts in park planning. Field verifications of NWI maps, enhanced wetland inventories, or site-specific wetland delineation studies will be necessary for more detailed planning and compliance.

   b. Enhanced Inventories: Many parks have conducted enhanced wetland inventories utilizing relatively large-scale imagery and/or intensive ground truthing. The resulting maps or digital data layers may be enhancements of existing NWI maps or they may be entirely independent products. Project planners should consult park and I&M network databases and files to see if enhanced inventories are available for project areas.

   c. NPS I&M Vegetation Maps: The I&M Vegetation Mapping Program is a potential source of wetland spatial data for park planning. I&M Program staff may be able to create a crosswalk between the vegetation classification system and the Cowardin classification system for use in determining wetland locations.

   d. Natural Resources Conservation Service (NRCS): NRCS soil surveys can be good sources of general information for determining the presence of wetlands. NRCS state or local offices can provide available soil maps and lists of soils that they have determined to be hydric (wetland) soils. This information may also available at http://soils.usda.gov/. If an area is mapped as hydric or as having hydric "inclusions," the area most likely contains wetlands. However, because of scale limitations, limited ground truthing, and the fact that these maps were not developed for purposes of wetland identification, there may be significant omissions. They should, therefore, be used primarily as supplemental information.

e. Other Mapping Programs: Project planners can consult agencies such as the U.S. Army Corps of Engineers (e.g., regarding areas delineated for past 404 permits), the Environmental Protection Agency (e.g., 404 "Advanced Identification" mapping), the National Oceanic and Atmospheric Administration (e.g., National Institute of Marine Fisheries coastal wetland maps), the Natural Resources Conservation Service (e.g., wetland maps for agricultural lands), the state, the county, or comparable sources regarding availability of wetland maps.

2. Determining Wetland Locations and Boundaries for Detailed Planning and Compliance

Regardless of the quality of the above data and mapping sources, when a project enters more detailed planning and compliance stages it is always necessary to conduct onsite investigations to confirm wetland boundaries, correct any misclassifications, and locate any unmapped wetlands. Most NPS natural resource professionals should be able to make the *preliminary* onsite determination that: 1) there clearly are no wetlands in the project area (no potential for direct or indirect adverse impacts on wetlands); 2) wetlands clearly exist in the project area that could be adversely impacted by the proposed activity; or 3) it is unclear if wetlands are present. If 1) is the case, and there is no potential for adverse impacts on wetlands, including secondary or offsite impacts as described in Section 5.3.2.3 below, then this should be documented in the NEPA process, but no further compliance with D.O. #77-1 and these procedures is necessary.

If the preliminary onsite investigation indicates that any part of a proposed activity might cause adverse impacts on wetlands, or the presence of wetlands is not clear, then trained, qualified wetland professionals must delineate wetlands (and other waters that may be regulated by the Corps of Engineers) based on the definitions, classification system, and methods discussed in Section 4.1.1 and 4.1.2 of these procedures. These investigations should be conducted in advance of the project design phase to assure that requirements to avoid and minimize wetland impacts can be met. (Please see recommended minimum qualifications for wetland delineators in Section 5.3.5.2 of this manual.)

It is also important to consult with the Corps of Engineers early on regarding the potential need for a Clean Water Act Section 404 permit for the project. Project planners should contact both the NPS Water Resources Division Wetlands Program staff and the Corps of Engineers for guidance on appropriate wetland delineation methods so that a single delineation study provides the data and information needed to satisfy both procedures. Corps of Engineers regulatory offices can be located via the internet at http://www.usace.army.mil.

3. Determining if an Alternative Could *Otherwise* Have Adverse Impacts on Wetlands

   Even if the information gathered as described under Sections 5.3.2.1 and 5.3.2.2 shows that an alternative is not located in a wetland, it must also be determined if the alternative holds the potential for indirect adverse impacts on wetlands. An alternative has such impacts on offsite wetlands if it:

   a. Supports, encourages, or otherwise facilitates additional development in wetlands; or

   b. Has secondary or offsite effects (e.g., drainage, flooding, pollutant discharge, wildlife disturbance, etc.) that extend into wetlands and have adverse impacts on them.

5.3.3 Evaluating Adverse Impacts on Wetland Functions and Values

1. Examples of wetland functions and values to be considered in this analysis include:

   a. Biotic Functions (e.g., fish and wildlife habitat, floral and faunal productivity, native species and habitat diversity, threatened and endangered species)

   b. Hydrologic Functions (e.g., flood attenuation, streamflow maintenance, ground water recharge and discharge, water supply, erosion and sediment control, water purification, detrital export to downstream systems)

   c. Cultural Values (e.g., aesthetics, education, historical values, archeological values, recreation, interpretation)

   d. Research/Scientific Values (e.g., "reference sites" for research on unimpacted ecosystems)

   e. Economic Values (e.g., flood protection, fisheries, tourism)

   If an alternative is determined to have no direct or indirect adverse impacts on wetlands, this should be documented in the impact analysis for the alternative.

2. Methods for Evaluating Wetland Functions and Values

   Several methods are available (or are being developed) to assess wetland functions and values for a site and to predict which will be degraded or lost (and, therefore, need to be compensated for) if a project is implemented. The NPS Water Resources Division can provide information on current methods.

5.3.4 Public Involvement/Review and Wetland Statements of Findings

1. Distribution of Public Notice Information for EAs or EISs

   Notice regarding public meetings/hearings and EA/EIS review opportunities for projects with the potential to have adverse impacts on wetlands must be targeted to reach individuals and groups affected by or with an interest in the proposal. Public involvement should provide an opportunity to assist in developing and evaluating alternatives, to review and indicate a preference among alternatives, to provide ideas on avoiding, minimizing, and compensating for wetland impacts, and to comment on proposed actions prior to implementation.

   EAs or EISs disclosing adverse impacts on wetlands must be circulated to the appropriate reviewing agencies as outlined in 520 DM 1.8C(4), including but not limited to:

   - U.S. Environmental Protection Agency
   - U.S. Army Corps of Engineers
   - U.S. Fish and Wildlife Service
   - U.S. Natural Resources Conservation Service
   - U.S. Geological Survey
   - Federal Emergency Management Agency
   - Bureau of Reclamation
   - Appropriate state review agencies as determined by E.O. 12372, OMB Circular A-95 (Revised), and other requirements, including coastal or river basin commissions, state coastal zone management administrators, and state agencies with responsibility for maintaining water quality in accordance with the Clean Water Act.

2. Environmental Assessments for Proposed Actions with Adverse Impacts on Wetlands

   EAs that reveal adverse impacts on wetlands from proposed actions or their alternatives must be made available for broad public and agency review, consistent with the requirements of D.O. #12 and the D.O. #12 Handbook. An EA that identifies a preferred alternative that will have adverse impacts on wetlands must be accompanied by a separately identifiable draft “Wetland Statement of Findings" (WSOF) that explains why an alternative with such impacts was chosen and that meets the other requirements identified in Section 5.3.5 of these procedures. EA/draft WSOF distribution must include all affected parties, other interested parties or organizations, and the agencies listed in Section 5.3.4.1 of these procedures. The review period is the same as that established in D.O. #12 and the D.O. #12 Handbook for EAs.

   Following this review, the NPS must reevaluate the preferred alternative and its impacts, revise the WSOF as necessary, and issue either a FONSI or a Notice of Intent to prepare an EIS consistent with NPS NEPA procedures. If the final preferred alternative still results in adverse impacts on wetlands and a FONSI is to be issued, a final WSOF meeting the requirements identified in Section 5.3.5 must be attached to the FONSI as a

separately identifiable document. Public notice requirements for the FONSI/WSOF are the same as those established by D.O. #12 and the D.O. #12 Handbook. This notice should indicate that a WSOF documenting compliance with E.O. 11990, D.O. #77-1, and these procedures is included with the FONSI.

If an EA is released without a preferred alternative, then preparation of a WSOF may be delayed until a preferred alternative is identified.

3. Environmental Impact Statements for Proposed Actions with Adverse Impacts on Wetlands

   Draft EISs revealing that proposed actions or their alternatives will have adverse impacts on wetlands must be made available for broad public and agency review under procedures established in NPS NEPA guidance. A draft EIS that identifies a preferred alternative that will have adverse impacts on wetlands must be accompanied by a separately identifiable draft WSOF that explains why an alternative with such impacts was chosen and that meets the other requirements identified in Section 5.3.5 of these procedures. Draft EIS/draft WSOF distribution must include all affected parties, other interested parties and organizations, and the agencies listed in Section 5.3.4.1 of this document.

   Following public and agency review of the draft EIS/draft WSOF and any public meetings/hearings as provided for in D.O. #12, the NPS must reevaluate the alternatives and impacts and revise the documents as necessary. If the preferred alternative in the final EIS still results in adverse impacts on wetlands, a final WSOF must be completed according to the requirements in Section 5.3.5 of these procedures. The final signed WSOF must be attached to the Record of Decision (ROD) as a separately identifiable document.

5.3.5 Content and Signature Procedures for Wetland Statements of Findings

When an alternative is to be selected for implementation that will result in adverse impacts on wetlands, the FONSI or ROD must be coupled with a *separately identifiable* WSOF as described in Section 5.3.4. (WSOFs may be combined with floodplain SOFs as explained in Section 3.3 of these procedures.) The WSOF, which in most cases can be less than 10 pages, documents the rationale for identifying a preferred alternative that has adverse impacts on wetlands, explains why no alternatives with less wetland impacts were practicable, and otherwise documents compliance with the policies and requirements of D.O. #77-1 and these procedures. The relatively short length of the text implies that the bulk of the wetland descriptions and impact analyses for more complicated situations can occur in the body of the EA or EIS. The WSOF can then summarize these analyses (referring back to specific portions of the EA or EIS, as needed) and focus more on explaining the rationale for choosing an alternative that has adverse impacts on wetlands, explaining how that choice is consistent with D.O. #77-1 and these procedures, and explaining plans for wetland compensation as described in Section 5.2.3 and in 8. below.

The Statement of Findings for wetlands must contain:

1. A map at sufficiently large scale to show the locations, boundaries, and types of wetlands at the project site and the aspects of the preferred alternative that would have adverse impacts on them. Wetland mapping must be consistent with wetland definitions and delineation instructions in Sections 4.1.1 and 4.1.2 of this manual.

2. Verification that wetland delineation/mapping work has been performed by a qualified wetland professional. This must include the qualifications of the wetland delineators, their affiliations, and a citation for the wetland delineation product or report. The NPS Water Resources Division strongly recommends the following minimum delineator qualifications: 1) has current "Professional Wetland Scientist" certification through the Society of Wetland Scientists Certification Program, Inc.; or 2) has a certificate of training from a recognized wetland delineation training provider and at least 5 years of experience in wetland delineation. Upon request, Water Resources Division staff can review scopes of work for wetland delineation contracts, help evaluate proposals, and review draft products/reports to confirm technical adequacy.

3. Detailed descriptions of the affected wetlands (i.e., plant species and communities, hydrologic characteristics, wetland classifications, and so on). *Abundance of these wetland types in the NPS unit/area/region must be included in this analysis.*

4. Detailed functional assessments of the affected wetlands, including evaluation of the biological, chemical, hydrologic, geomorphological, recreational, cultural, aesthetic, and other functions and values listed in Section 5.3.3 of these procedures.

5. Full disclosure of the adverse impacts on the wetland habitats, processes, functions, and values at the site (see examples to be considered in Section 5.3.3), and acreages affected, by wetland type.

6. A description of alternatives considered in addition to the preferred alternative.

7. The reasons why the preferred alternative must be located and designed such that it has adverse impacts on wetlands, *and why no non-wetland alternatives or those with fewer wetland impacts were chosen.* A discussion of the various factors and trade-offs considered in arriving at this decision *must* be included.

8. A description of how the preferred alternative was designed to minimize wetland impacts to the greatest extent practicable.

9. A description of the proposed wetland compensation. What wetland area(s) will be restored to compensate for this loss or degradation and maintain consistency with the NPS "no net loss of wetlands" goal found in D.O. #77-1? The first paragraph of this section should state the total acreage of wetland impact, by type, and the total acreage of restored

wetlands, by type, proposed as compensation.

This portion of the WSOF must include:

a. a large scale map that clearly identifies the location and boundaries of the compensation site
b. a description of wetland types and wetland functions to be restored at the compensation site, and the degree to which they replace the types and functions lost at the project site
c. a description of the restoration process (e.g., hydrologic restoration, excavation, grading, structure removal, plantings, etc.)
d. the anticipated schedule for project completion
e. the anticipated time-frame for full functioning of the compensation wetlands
f. monitoring and maintenance requirements and schedule
g. the funding source for the project consistent with the funding source restrictions listed in Section 5.2.3 of these procedures.

As described in the D.O. #77-1 "Responsibilities" section, the Superintendent chooses the preferred alternative, oversees preparation of the WSOF utilizing the wetland technical information developed during the planning process, and signs the "Recommended" line on the final WSOF cover sheet[1]. The Chief of the NPS Water Resources Division then certifies: 1) the adequacy of wetland technical analyses; and 2) consistency with Servicewide implementation of E.O. 11990 and these procedures. This certification is accomplished by signing a "Certification of Technical Adequacy and Servicewide Consistency" line on the WSOF cover sheet. Signature by the Regional Director indicates final approval of the WSOF.

Example WSOFs can be obtained by contacting NPS Water Resources Division Wetlands Program staff or at http://www1.nrintra.nps.gov/wrd/wetlands/wetlanddocuments.cfm.

5.4 Development in Degraded Wetland Sites

Development activities proposed for wetland sites that have been modified or degraded as a result of human activities (but still meet the wetland definition) are considered "new actions" subject to the sequence identified in Section 5.2 of this document and the other policies and requirements of D.O. #77-1 and these procedures. In other words, degraded wetlands should not be treated as preferred development sites simply because they are already in an impacted condition. In cases where there are no practicable alternatives to using such sites for development, actions must be included in the proposals to restore natural wetland processes and functions at the site, to the extent practicable.

[1] Some Regions may establish additional procedures for Regional Aquatic Professionals or Compliance Specialists to provide guidance and review on draft WSOFs prior to signature by the Superintendent and submission to the NPS Water Resources Division. Please check with the Regional Office regarding any such procedures.

5.5 Restoring Wetlands Degraded by Human Activities

Where natural wetland functions have been degraded or lost due to previous or ongoing human activities (e.g., drainage facilities, structures, agriculture), NPS General Management Plans, Resource Stewardship Plans, or other planning documents should outline actions to reestablish environments in which wetland ecological processes can function as they did prior to disturbance, to the extent practicable. Highest priority should be placed on removing such damaging facilities, structures, or activities and restoring pre-existing wetland habitats and processes. Where removing such facilities or activities is not practicable, the NPS should seek ways to minimize and, to the extent possible, reverse the adverse impacts. (See Sections 5.6 and 5.9 regarding procedures for implementing this directive.)

5.6 Retaining or Removing Structures and Facilities in Existence Prior to May 28, 1980

General Management Plans (GMPs) or subsequent planning documents for NPS units should include inventories of structures or facilities in existence prior to May 28, 1980 (original publication date of the NPS Floodplain Management and Wetland Protection Guidelines) that are located in or otherwise have the potential to have adverse impacts on wetlands. These documents should justify and record decisions on the retention or removal of these facilities (see Section 5.9 of these procedures regarding cultural resources). Decisions to retain such facilities should be supported by a discussion of why relocation to a site less damaging to wetlands is not practicable, but do not require WSOFs. Expansion or full reconstruction of such facilities require full compliance with D.O. #77-1 and these procedures, although reconstruction involving no new wetland impacts does not require the wetland compensation described in Section 5.2.3 of these procedures.

5.7 Compliance With the Executive Order 11990 Directive to "Enhance the Natural and Beneficial Values of Wetlands"

Under most circumstances, *NPS Management Policies 2006* do not support "enhancement" of wetland resources beyond natural levels. Therefore, for purposes of implementing E.O. 11990, the term "enhancement" refers to enhancing wetland *values*, where appropriate and practicable, by using wetlands for educational, recreational, scientific, and similar purposes *that do not disrupt natural ecological functions*. The NPS should seek to further enhance wetlands by improving, supporting, and coordinating wetland planning, research, inventory and monitoring efforts, resource management activities, and interpretation in such a manner that the widest range of natural wetland functions and values may be attained.

5.8 Wetland Mitigation Banks

In some cases, such as when authorized inholder access routes or long-term road renovation programs in parks are expected to generate a series of relatively small wetland impacts over time, it may be appropriate to establish wetland "mitigation banks" *on NPS lands* for compliance with these procedures. Mitigation banks are accounting systems in which "credits" for wetland restoration at a site or sites are "banked" and used at a later date as compensation for actions that adversely impact wetlands. Establishing mitigation banks can have significant advantages,

including: 1) compensation sites can be identified and restoration can be accomplished in advance, thereby preventing temporal loss of wetland functions and smoothing project planning and compliance; 2) compensation for a series of small wetland losses can be achieved more efficiently at larger restoration sites where planning, design, implementation, and monitoring can be consolidated; and 3) such larger restoration projects often tend to have increased biodiversity and habitat value compared to smaller, fragmented compensation projects. *The Chief of the NPS Water Resources Division must certify all NPS wetland mitigation banks for use in compliance with these procedures.*

NPS mitigation banks will not satisfy wetland compensation requirements under Section 404 of the Clean Water Act unless they are also certified by the Corps of Engineers. Complications in obtaining such certification often arise because multiple agencies must agree on acceptable mitigation ratios and other administrative details. The NPS Water Resources Division can advise and assist in creating NPS mitigation banks and in obtaining Corps certification, as appropriate.

Consistent with Servicewide policy regarding no-net-loss of wetlands, and with prohibitions against expending NPS funds on non-NPS lands, *only mitigation banks on NPS lands can be used to satisfy the wetland compensation requirements of these procedures.*

5.9 Cultural Resources and Wetland Protection

The NPS preserves, manages, and interprets cultural resources including objects possessing historical, archeological, and architectural significance, some of which may occur in or adjacent to wetlands. Many of these cultural resources are included in, or eligible for inclusion in, the National Register of Historic Places. *NPS Management Policies 2006*, NPS cultural resources Director's Orders and procedures, and specific park management plans give direction for the management of these resources. In addition, NPS actions affecting cultural resources included in, or eligible for inclusion in, the National Register are subject to the provisions of Section 106 of the National Historic Preservation Act of 1966 and the implementing regulations found in 36 CFR Part 800, "Protection of Historic Properties."

In some cases, wetland and cultural resource management objectives may conflict. For example, a park may wish to reconstruct a historic facility or restore a cultural landscape in a wetland area, or may wish to remove historic structures that interfere with wetland management objectives. Rather than dictating a result for wetland/cultural resource management conflicts, this document outlines procedures for documenting the decisionmaking process in accordance with other NPS management policies. For example, these procedures and policies do not say that the NPS must preserve each and every wetland or that the NPS must restore every wetland that has been impacted in the past at the expense of cultural resources. Rather, procedures are established whereby alternatives are developed in accordance with Section 5.2, practicability factors such as those listed in Section 5.3.1.2 are weighed, and decisions that have unavoidable, adverse impacts on wetlands are justified.

5.10 Proposals to Lease, Create Easements or Rights-of-Way on, Exchange or Dispose of NPS Lands Containing Wetlands

When the NPS proposes, at its own discretion, to lease, create easements or rights-of-way on, exchange, or dispose of NPS-managed wetlands to non-federal public or private parties, the NPS must determine if the proposal constitutes a net loss of wetland acreage or functions on NPS lands. If so, then the proposed action is subject to the wetland protection procedures and requirements described in this Procedural Manual, including the Wetland Statement of Findings and wetland compensation requirements.

There are occasional circumstances when actions like these are not proposed by the NPS but instead are non-discretionary, such as when Congress directs the NPS to carry out certain actions through enactment of a specific law. When the NPS complies with that specific law, the applicability of E.O. 11990 and this Procedural Manual to these Congressionally-directed actions depends on the terms of that law. This is generally determined by considering the level of discretion granted to the NPS in the law to carry out the action, and whether its terms are broad enough to provide for a practicable alternative, which is the premise of E.O. 11990. This determination is made on a case by case basis in consultation with the NPS Water Resources Division and the Solicitor's Office.

For either type of transaction (discretionary or directed by Congress), the NPS must: 1) reference in the conveyance those uses that are restricted under identified federal, state, or local wetland regulations; b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law.

Appendix 1: Executive Order 11990 - Protection of Wetlands (42 Fed. Reg. 26961)

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative, it is hereby ordered as follows:

Section 1. (a) Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

(b) This Order does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.

Sec. 2. (a) In furtherance of Section 101(b)(3) of the National Environmental Policy Act of 1969 (42 U.S.C. 4331(b)(3)) to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors.

(b) Each agency shall also provide opportunity for early public review of any plans or proposals for new construction in wetlands, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended [42 U.S.C. 4332(2)(C)].

Sec. 3. Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in wetlands, whether the proposed action is in accord with this Order.

Sec. 4. When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of

properties by the grantee or purchaser and any successor, except where prohibited by law; or (c) withhold such properties from disposal.

Sec. 5. In carrying out the activities described in Section 1 of this Order, each agency shall consider factors relevant to a proposal's effect on the survival and quality of the wetlands. Among these factors are:

(a) public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion;

(b) maintenance of natural systems, including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and

(c) other uses of wetlands in the public interest, including recreational, scientific, and cultural uses.

Sec. 6. As allowed by law, agencies shall issue or amend their existing procedures in order to comply with this Order. To the extent possible, existing processes, such as those of the Council on Environmental Quality, shall be utilized to fulfill the requirements of this Order. [Sec. 6 amended by EO 12608 of Sept. 9, 1987, 52 F.R. 34617, 3 CFR, 1987 Comp., p. 245]

Sec. 7. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting wetlands.

(b) The term "new construction" shall include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order.

(c) The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Sec. 8. This Order does not apply to projects presently under construction or to projects for which all of the funds have been appropriated through Fiscal Year 1977, or to projects and programs for which a draft or final environmental impact statement will be filed prior to October 1, 1977. The provisions of Section 2 of this Order shall be implemented by each agency not later than October 1, 1977.

Sec. 9. Nothing in this Order shall apply to assistance provided for emergency work, essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

Sec. 10. To the extent the provisions of Sections 2 and 5 of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended [42 U.S.C. 4321 *et seq.*].

Jimmy Carter

Appendix 2: Best Management Practices and Conditions for Proposed Actions with the Potential to Have Adverse Impacts on Wetlands

The following serve as Best Management Practices (BMPs) for NPS actions that may have adverse impacts on wetlands. Additional BMPs may be appropriate depending on local conditions or special circumstances. These also serve as "conditions" that must be met for the actions listed in Section 4.2.1 of these procedures to qualify as "excepted."

1. **Effects on hydrology and fluvial processes:** Action must have only negligible to minor, new adverse effects on site hydrology and fluvial processes, including flow, circulation, velocities, hydroperiods, water level fluctuations, sediment transport, channel morphology, and so on. Care must be taken to avoid any rutting caused by vehicles or equipment.

2. **Effects on fauna:** Action must have only negligible to minor, new adverse effects on normal movement, migration, reproduction, or health of aquatic or terrestrial fauna, including at low flow conditions.

3. **Water quality protection and certification:** Action is conducted so as to avoid degrading water quality to the maximum extent practicable. Measures must be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering the waterway or wetland. Action is consistent with state water quality standards and Clean Water Act Section 401 certification requirements (check with appropriate state agency).

4. **Erosion and siltation controls:** Appropriate erosion and siltation controls must be maintained during construction, and all exposed soil or fill material must be permanently stabilized at the earliest practicable date.

5. **Proper maintenance:** Structure or fill must be properly maintained so as to avoid adverse impacts on aquatic environments or public safety.

6. **Heavy equipment use:** Heavy equipment use in wetlands must be avoided if at all possible. Heavy equipment used in wetlands must be placed on mats, or other measures must be taken to minimize soil and plant root disturbance and to preserve preconstruction elevations.

7. **Stockpiling material:** Whenever possible, excavated material must be placed on an upland site. However, when this is not feasible, temporary stockpiling of excavated material in wetlands must be placed on filter cloth, mats, or some other semipermeable surface, or comparable measures must be taken to ensure that underlying wetland habitat is protected. The material must be stabilized with straw bales, filter cloth, or other appropriate means to prevent reentry into the waterway or wetland.

8. **Removal of stockpiles and other temporary disturbances during construction:** Temporary stockpiles in wetlands must be removed in their entirety as soon as practicable. Wetland areas temporarily disturbed by stockpiling or other activities during construction must be returned to their pre-existing elevations, and soil, hydrology, and native vegetation communities must be restored as soon as practicable.

9. **Topsoil storage and reuse:** Revegetation of disturbed soil areas should be facilitated by salvaging and storing existing topsoil and reusing it in restoration efforts in accordance with NPS policies and guidance. Topsoil storage must be for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and degradation of the soil microbial community.

10. **Native plants:** Where plantings or seeding are required, native plant material must be obtained and used in accordance with NPS policies and guidance. Management techniques must be implemented to foster rapid development of target native plant communities and to eliminate invasion by exotic or other undesirable species.

11. **Boardwalk elevations:** Minimizing shade impacts, to the extent practicable, should be a consideration in designing boardwalks and similar structures. (Placing a boardwalk at an elevation above the vegetation surface at least equal to the width of the boardwalk is one way to minimize shading.)

12. **Wild and Scenic Rivers:** If the action qualifies as a water resources project pursuant to Section 7(a) of the Wild and Scenic Rivers Act, then appropriate project review and documentation requirements under Section 7(a) are required.

13. **Coastal zone management:** Action must be consistent, to the maximum extent practicable, with state coastal zone management programs.

14. **Endangered species:** Action must not jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, including degradation of critical habitat (see *NPS Management Policies 2006* and guidance on threatened and endangered species).

15. **Historic properties:** Action must not have adverse effects on historic properties listed or eligible for listing in the National Register of Historic Places.

National Park Service
U.S. Department of the Interior

Natural Resources Stewardship and Science
Water Resources Division
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov

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APPENDIX C:

COASTAL ZONE CONSISTENCY DETERMINATION

July X, 2012

Ms. Ellie Irons
Programs Manager
Office of Environmental Impact Review
Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 23219

Re: Coastal Zone Consistency Determination Request
Potomac Yard Metrorail Station Environmental Impact Statement

Dear Ms. Irons:

The Federal Transit Administration (FTA) is requesting VDEQ provide Coastal Zone Consistency Determination for the proposed Potomac Yard Metrorail Station project in accordance with the Coastal Zone Management Act. The proposed federal action is located in the City of Alexandria and Arlington County, both jurisdictions in Virginia's designated Coastal Zone.

The project proposes the construction of a new Metrorail station located at Potomac Yard within the City of Alexandria, along the existing Metrorail Blue and Yellow line. The station would be located between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail Stations.

The Federal Transit Administration (FTA), as the federal lead agency and City of Alexandria (project sponsor) are preparing an Environmental Impact Statement (EIS) for the project in accordance National Environmental Policy Act. The EIS is being prepared in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) and National Park Service (NPS). The Draft EIS is analyzing three alternative station locations which are described in further detail in the project overview.

Attached following background materials to assist in your review of the project:

- Attachment 1: Project Overview
- Attachment 2: Coastal Zone Consistency Determination
- Attachment 3: Resource Protection Area Encroachment

Should you have any questions or comments, please contact me at (703) 340-3065 or by email at bill.pugh@aecom.com for more information.

Sincerely,

Bill Pugh
Environmental and Transportation Planner

Attachments

cc: Dan Koenig, FTA
Ben Helwig, NPS/GWMP
Susan Gygi, City of Alexandria
Jim Ashe, WMATA

Coastal Zone Management Act (CZMA) Consistency Determination
Potomac Yard Metrorail Station Environmental Impact Statement

This document provides the Commonwealth of Virginia with the Federal Transit Administration's Consistency Determination under CZMA section 307(c)(1) and 15 CFR Part 930, subpart C for the proposed Potomac Yard Metrorail Station Project. The study area is located in the City of Alexandria and Arlington County. Both jurisdictions are located in Virginia's designated coastal zone. The information in this Consistency Determination is provided pursuant to 15 CFR 930.39.

Project Description

The project proposes the construction of a new Metrorail station located at Potomac Yard within the City of Alexandria, along the existing Metrorail Blue and Yellow line. The study area is located at the border of the City of Alexandria and Arlington County, and includes portions of the George Washington Memorial Parkway which is managed by the National Park Service. The station would be located between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail Stations. A project overview is provided in **Attachment 1.**

Virginia Coastal Zone Management Program Policies

The Virginia Coastal Zone Management Program (VCP) encompasses nine enforceable policies for the coastal area pertaining to:

- Fisheries management.
- Subaqueous lands management.
- Wetlands management.
- Dunes management.
- Non-point source pollution control.
- Point source pollution control.
- Shoreline sanitation.
- Air pollution control.
- Coastal lands management.

The project is not anticipated to impact the following certain coastal resources, and therefor is in compliance with the following enforceable policies:

- Fisheries management.
- Dunes management.
- Point source pollution control.
- Shoreline sanitation.

The Federal Transit Administration has determined that the Potomac Yard Metrorail Station affects the land or water uses or natural resources of Commonwealth of Virginia's coastal zone in the following manner:

a. **Subaqueous Lands Management:** No activity associated with the proposed project will occur within subaqueous lands if Alternatives A or B are constructed.

   Alternative D would require bridge above a waterway (Four Mile Run), and it is anticipated that piers for the bridge's substructure would be constructed within the waterway. The new bridge for

Alternative D would replace the existing Metrorail bridge over Four Mile Run approximately 75-feet east of its existing location. The existing bridge would be removed from the waterway.

b. **Wetlands Management:** A delineation for wetlands and Waters of the U.S. (WOUS) in the project study area was completed in the fall of 2011. Wetlands and Waters of the U.S. are shown in Figure 2 of Attachment 1. Coordination with the U.S. Army Corps of Engineers-Norfolk District (USACE) is on-going to receive a Jurisdictional Determination (JD) for USACE delineated wetlands and WOUS. In addition to using the USACE methodology, WOUS and wetland boundaries on NPS property were delineated using NPS procedures. The NPS method requires one wetland characteristic to be identified for a wetland boundary to be determined rather than two or three parameters as required by the USACE method. **Table 1** provides an estimate of temporary and permanent impacts to WOUS for the three Build Alternatives being analyzed in the Draft EIS. **Tables 2 and 3** provide an estimate of permanent and temporary impacts to both USACE and NPS delineated wetlands for the three Build Alternatives being analyzed in the Draft EIS.

Table 1: Permanent Impacts to Waters of the U.S.

Alternative	Waters of the U.S. (acres)	
	Temporary	Permanent
A	0.00	0.00
B	0.00	0.00
D	0.75	0.14

Table 2: Permanent Impacts to USACE and NPS Regulated Wetlands

Alternative	USACE Wetlands (acres)	NPS Wetlands (acres)	Wetlands Delineated by both USACE and NPS (acres)	Total (acres)
A	0.01	0.00	0.00	0.01
B	1.13	0.01	0.00	1.14
D	0.03	0.02	0.11	0.16

Table 3: Temporary Construction Impacts to USACE and NPS Regulated Wetlands

Alternative	USACE Wetlands (acres)	NPS Wetlands (acres)	Wetlands Delineated by both USACE and NPS (acres)	Total (acres)
A	0.01	0.00	0.00	0.01
B	3.14	0.04	0.55	3.73
D	0.08	0.07	0.60	0.75

Estimates of wetland and stream impact are preliminary and subject to revision through the Joint Permit Application (JPA) process in accordance with Section 401 Water Quality and Section 404 of the Clean Water Act. The project sponsors will obtain a permit prior to starting any work that would impact wetlands or WOUS. To compensate for unavoidable wetland and stream impacts, the project sponsors will develop a mitigation plan in consultation with the USACE and the Virginia Department of Environmental Quality (VDEQ).

c. **Non-point Source Pollution Control:** The proposed action will increase the amount of impervious surface and resulting stormwater runoff at the site beyond the existing conditions depending on which Build Alternative is selected as the Preferred Alternative. The net increase of impervious surface for each Build Alternative is provided in **Table 4**. As the project progresses into final design, impervious surface calculations are expected to decrease from the initial estimates.

Table 4: Net Impervious Surface Increase

Alternative	Impervious Area (acres)
A	1.82
B	1.66
D	9.24

Construction methods will be selected to minimize the potential for non-point source pollution impacts (primarily erosion and sedimentation). During construction, site stability will be maintained and runoff from the work area will be controlled to avoid the migration of pollutants from the various construction areas to nearby surface water resources. If the selected alternative is expected to disturb over 2,500 square feet of land (0.57 acres), the project will develop a Stormwater Pollution Prevention Plan (SPPP) and obtain a General Permit for Discharges from Construction Activities from Virginia Department of Conservation and Recreation (DCR). The SPPP will describe the practices that will be used to manage on-site waste, such as building materials, garbage and debris, and to implement controls to minimize the exposure of these materials to stormwater.

The project will be designed to ensure that stormwater impacts during construction are avoided or minimized to the maximum extent practicable. Erosion and Sediment Control Plans for construction activities would be developed for the project in accordance with Sec. 5-4 of the City of Alexandria Code and Chapter 57 of the Arlington County Code.

e. **Air Pollution Control:** The proposed project site is located within the National Capital Interstate Air Quality Control Region (AQCR 47). The region is designated as a non-attainment area for ground-level ozone (O_3) and particulate matter ($PM_{2.5}$). The project has demonstrated air quality conformity and is included in the region's approved *National Capital Region's Financially Constrained Long-Range Transportation Plan (CLRP)* and *2013-2018 Transportation Improvement Program (TIP)*. The project is anticipated to generate 288 automobile trips in the AM peak hour, and 99 automobile trips in the PM peak hour that would be directly attributable to the station. The Metrorail station is being designed as an urban station with no park and ride facilities. The project is not anticipated to affect the region's air quality conformity goals or attainment status.

f. **Coastal Lands Management:** Both the City of Alexandria and Arlington County are located in Virginia's designated coastal zone and have established Chesapeake Bay Preservation Ordinances (CBPO). CBPOs are defined in Article XIII of the City of Alexandria Zoning Ordinance and Chapter 61 of the Arlington County Code. The City of Alexandria and Arlington County have defined Resource Protection Areas (RPA) to include tidal and non-tidal wetlands, shores, and 100-foot buffers around those water bodies.

RPAs within the study are shown in Figure 3 of Attachment 1. Wetlands identified in the USACE Jurisdictional Determination (JD) review process are assumed to have 100-foot RPAs consistent with Sec. 13-105 of the City Alexandria's Zoning Ordinance and Subsection 61-5.B.1.d of the Arlington County Code. These areas are referred to as "preliminary" RPAs and are illustrated in Figure 3 as well. The wetland delineation, however, has yet to be confirmed and adopted by the City of Alexandria and Arlington County.

Based on these defined areas, the three Alternatives will all encroach upon RPAs. Alternatives A and B would affect preliminary RPAs around the proposed platform areas, while Alternative D affects existing RPAs buffering Four Mile Run with a new bridge crossing the waterway. **Table 5** provides a summary of impacts to existing and preliminary RPAs. To comply with each jurisdiction's CBPO, the project will disturb no more land than is necessary, preserve indigenous vegetation as much as possible, and minimize impervious cover. To minimize the impacts to RPAs, the project will be designed and constructed with stormwater management facilities to meet the performance criteria of Alexandria, Arlington, and the CBPA.

Any development within an RPA, or development exceeding 2,500 square feet of land disturbance (0.57 acres) within a Resource Management Area is subject to the development review processes of the City of Alexandria and Arlington County. Development review approvals must be obtained prior to any site clearing or issuance of any development permit for the project.

City and County development reviews a project specific site plan; environmental site assessment; water quality impact assessment, landscape plan; stormwater management plan and an erosion and sediment control plan. As a transportation facility, the project may be exempted from the development review process for impacts to RPA based on Section 13-119 (A-1) of the City of Alexandria Zoning Ordinance and Section 61-15 (A) of the Arlington County Code.

Table 5: Resource Protection Area Encroachment

Alternative	Existing RPA (acres)		Preliminary RPA (acres)	
	Temporary	Permanent	Temporary	Permanent
A	0.00	0.00	0.53	0.37
B	0.00	0.00	5.91	3.41
D	1.40	1.14	1.69	0.21

Based upon the following information, data, and analysis, the Federal Transit Administration finds that the Potomac Yard Metrorail Station is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program.

Pursuant to 15 CFR Section 930.41, the Virginia Department of Environmental Quality has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR section 930.41(b). Virginia's concurrence will be presumed if its response is not received by the Federal Transit Administration on the 60th day from receipt of this determination. The State's response should be sent to:

Daniel Koenig
Environmental Protection Specialist
Federal Transit Administration
1990 K Street NW, Suite 510
Washington, DC 20006-1178

and

James A. Ashe, PE, CPG
Manager, Environmental Planning and Compliance
Office of Chief Engineer, Infrastructure
Transit Infrastructure and Engineering Services
Washington Metropolitan Area Transit Authority
600 5th Street, NW
Washington, DC 20001

Attachments

1. Project Overview

Project Overview

1.0 INTRODUCTION

The Federal Transit Administration (FTA), as the lead federal agency, and the City of Alexandria, as the project sponsor and joint lead agency, in cooperation with the Washington Metropolitan Area Transit Authority (WMATA), and the National Park Service (NPS), are preparing a Draft Environmental Impact Statement (Draft EIS), under the National Environmental Policy Act (NEPA), for the proposed Potomac Yard Metrorail Station (or "the project").

The project consists of construction of a new Metrorail station located at Potomac Yard within the City of Alexandria, along the existing Metrorail Blue and Yellow Lines between the Ronald Reagan Washington National Airport station and the Braddock Road station. The project would serve existing neighborhoods and retail centers as well as high-density, transit-oriented development planned by the City of Alexandria. The project would provide access to the regional Metrorail system for the U.S. Route 1 corridor of north Alexandria. The Potomac Yard area is currently without direct access to the Metrorail system.

The Draft EIS will analyze a No Build and three Build Alternatives.

2.0 PROJECT AREA

The project area for the proposed Potomac Yard Metrorail Station is in the City of Alexandria and Arlington County, Virginia, located in the Northern Virginia portion of the Washington metropolitan region. The project area, as shown in the Location Map (**Figure 1**), is generally bounded by U.S. Route 1 on the west, George Washington Memorial Parkway and Potomac Greens Drive on the east, Slater's Lane on the south, and the Ronald Reagan Washington National Airport Access Road on the north. Wetlands and Waters of the U.S. within the study area are shown in Figure 2. Resource Protection Areas (RPAs) are shown in Figure 3.

3.0 ALTERNATIVES

3.1 No Build Alternative

The No Build Alternative includes the existing transportation network, plus all of the committed projects within the study area. The No Build Alternative includes the build-out of an internal street network within Potomac Yard, generally from Four Mile Run to Braddock Road, in addition to investments in transit and bicycle/pedestrian facilities. Transit investments include the Crystal City/Potomac Yard (CCPY) Transitway, as well as expansion of local transit service. The No Build Alternative also includes an off-street trail through the planned linear park between Potomac Avenue and the CSXT right-of-way, enhancing access to the major regional trail network, which serves recreational users and commuters.

Figure 1: USGS Quadrangle Map (Location Map)

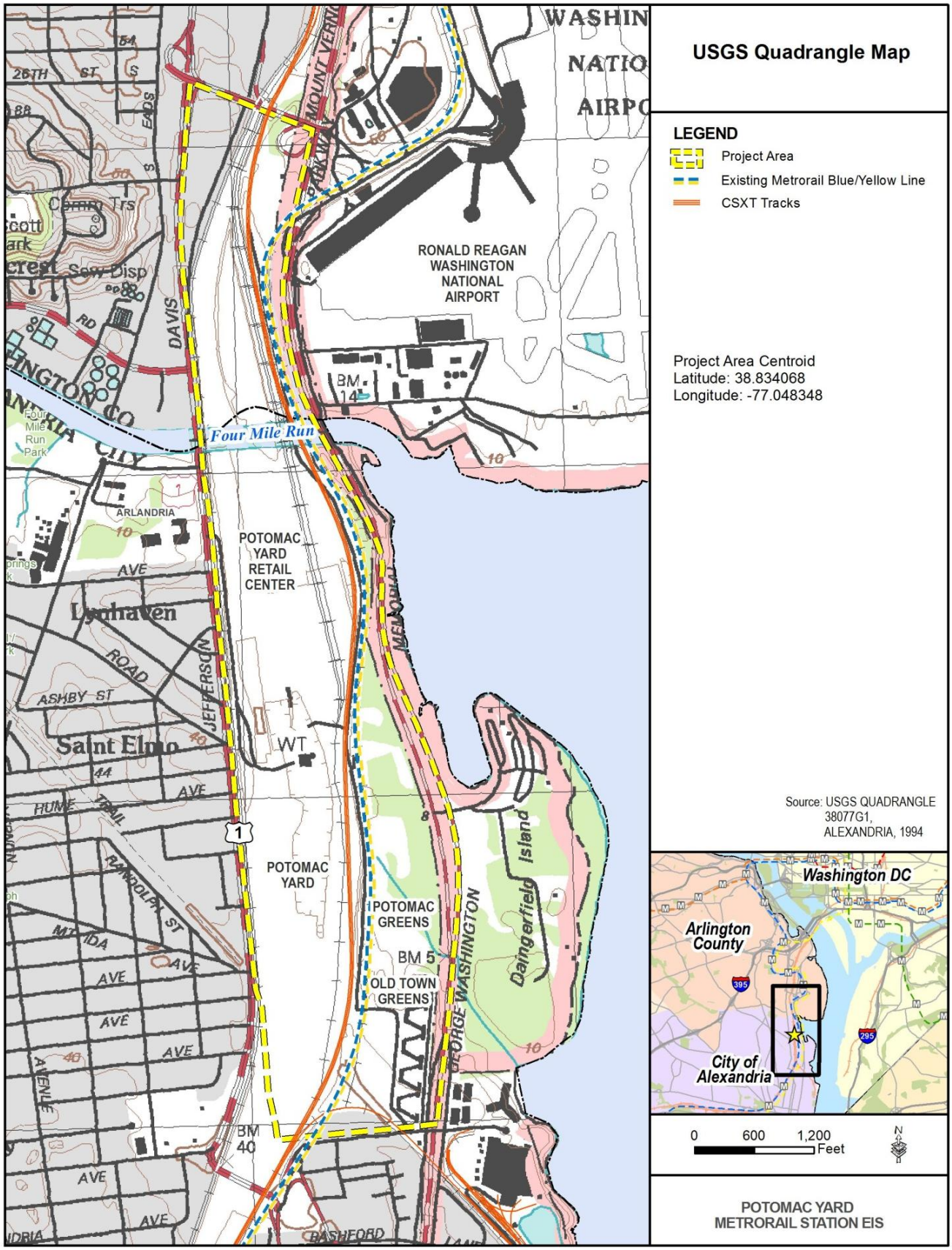


Figure 2: Waters of the United States Including Wetlands

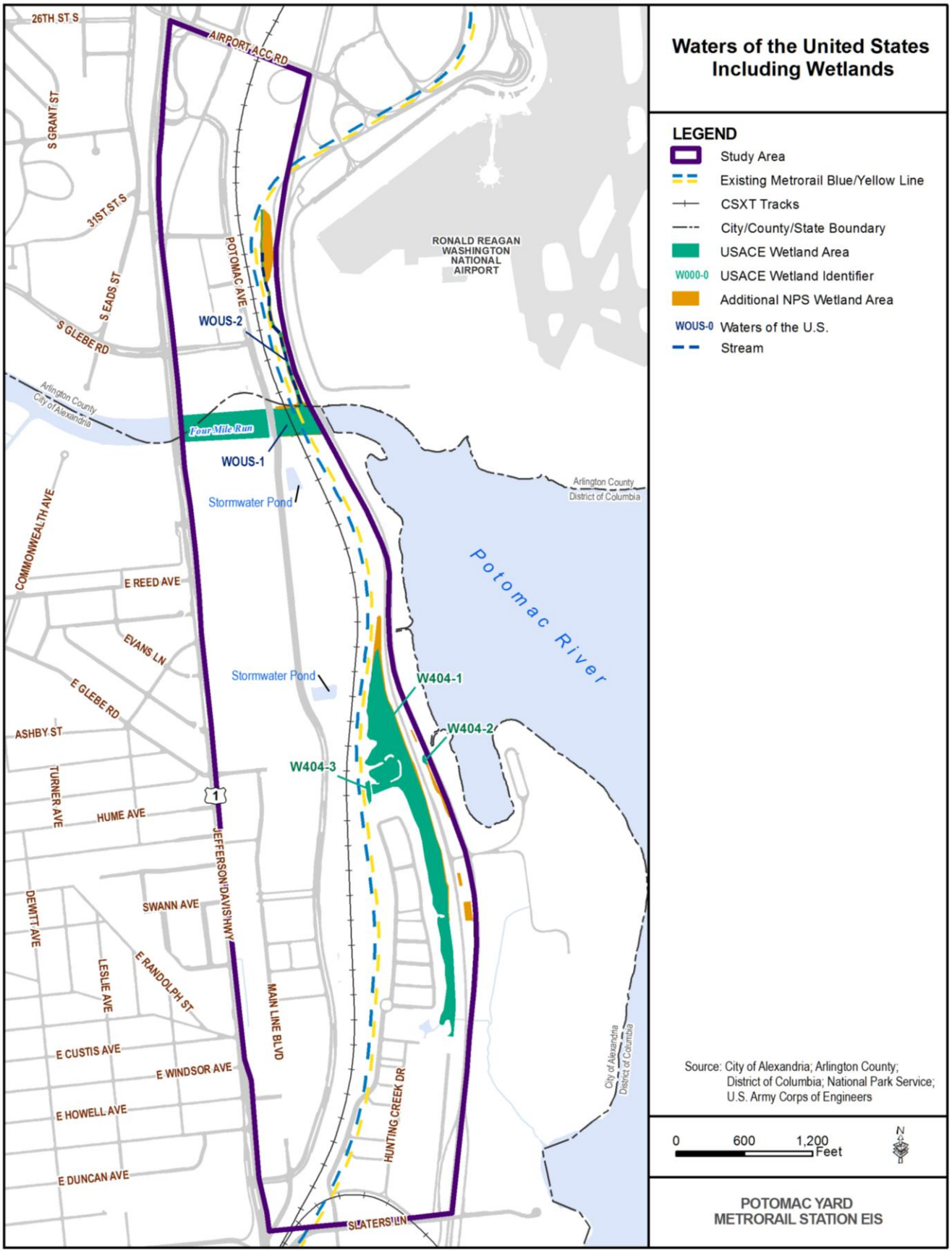
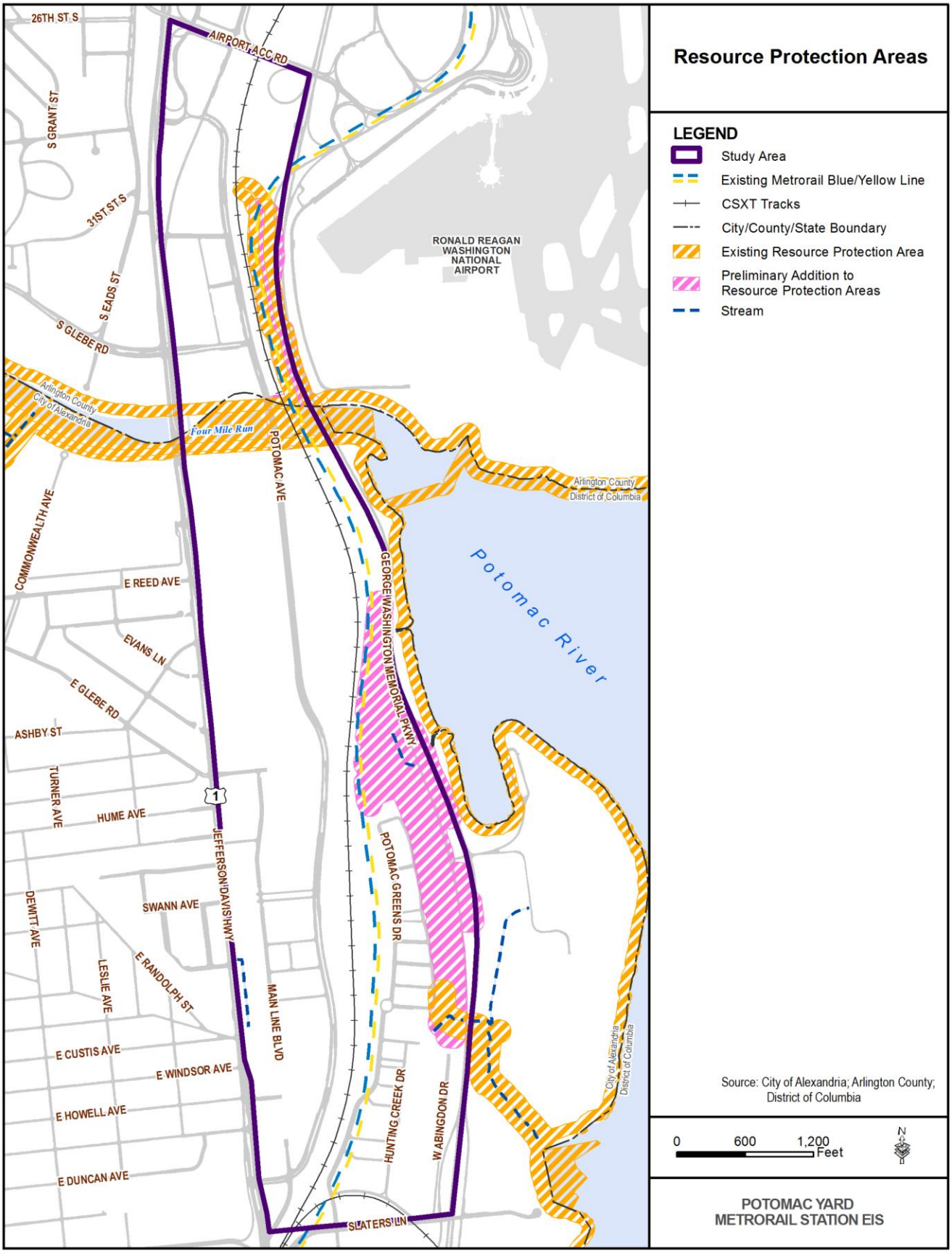


Figure 3: Resource Protection Areas



3.2 Build Alternatives

Each Build alternative consists of the construction and operation of a Metrorail station. The Build alternatives are described below and illustrated in **Figure 4**.

3.2.1 Alternative A

Alternative A would be located between the CSXT Railroad tracks and the north end of the Potomac Greens neighborhood, in the "Metrorail Reservation" identified during earlier planning efforts for Potomac Yard. The station would be at-grade, with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard, and pedestrian access to the Potomac Greens and Old Town Greens neighborhoods.

Alternative A would include minimal track realignment within the station area and in special track work areas, including construction of a double crossover, located approximately 900 feet south of the station.

3.2.2 Alternative B

Alternative B would be located between the George Washington Memorial Parkway and the CSXT Railroad, north of the Potomac Greens neighborhood, and east of the existing Potomac Yard Retail Center and the CSXT right-of-way. The station would be at-grade, with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard, and a pedestrian bridge over the proposed Metrorail alignment to provide access to the Potomac Greens and Old Town Greens neighborhoods.

Alternative B would include the realignment of approximately 500 to 1,000 feet of existing track (double track), as well as the installation of approximately 1,300 feet of new track (double track). Special track work (to include construction of a double crossover) would be required approximately 100 feet north of the station.

The new track and station would be built on retained fill, and a new retaining wall would be constructed on the east side of the track and station to support the structures.

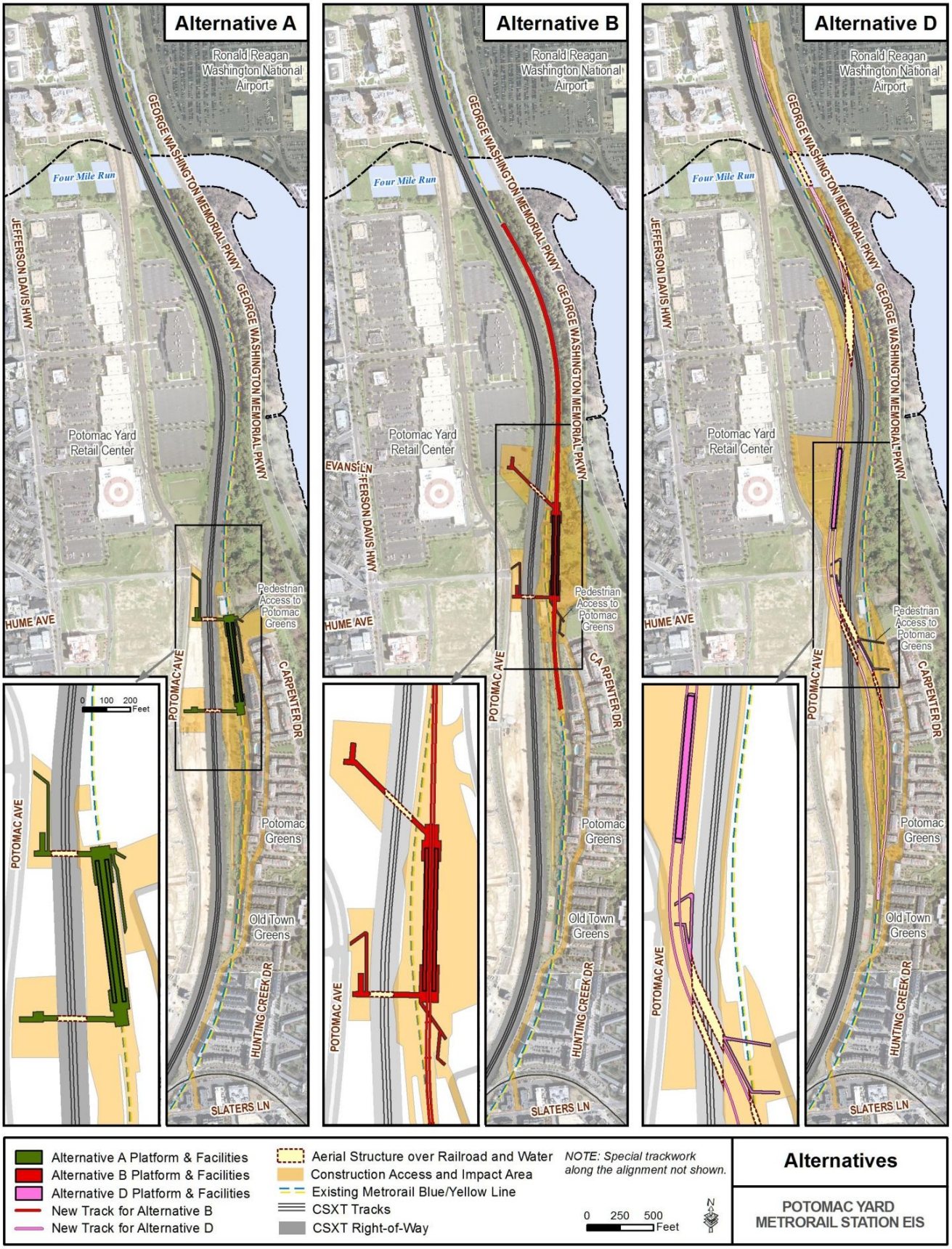
3.2.3 Alternative D

Alternative D would be located just west of the CSXT right-of-way, in the vicinity of the existing Potomac Yard Retail Center. The station would be aerial, with a center platform layout. One pedestrian bridge over the CSXT right-of-way, to be constructed separately from the station, would connect the neighborhoods of Potomac Greens and Old Town Greens to Potomac Avenue at East Glebe Road. The pedestrian bridge would parallel the adjacent, yet separate, Metrorail aerial structure.

Alternative D would include the realignment of approximately 1,000 feet of existing track (double track), as well as the installation of approximately 5,600 feet of new track (double track). Most of the new track would be elevated. Alternative D would also include construction of two Metrorail aerial bridges crossing the CSXT right-of-way to the north and south of the station, and a new, single span, aerial structure over Four Mile Run. Special track work (to include construction of a double crossover) would be required approximately 100 feet north of the station.

Additional structural improvements would include the removal and replacement of the existing retaining wall at Potomac Greens and the removal of an additional retaining wall on the west side of the existing Metrorail tracks, north of the portal at the southern end of the neighborhood.

Figure 4: Alternatives



APPENDIX D:

COASTAL ZONE CONSISTENCY DETERMINATION

AECOM

AECOM
2101 Wilson Boulevard 8th Floor
Arlington, VA 22201
www.aecom.com

703 340 3100 tel
703 340 3101 fax

December 4, 2012

Ms. Ellie Irons, Program Manager
Office of Environmental Impact Review
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Re: Coastal Zone Consistency Determination Request
Potomac Yard Metrorail Station Environmental Impact Statement

Ms. Irons:

The Federal Transit Administration (FTA), as the federal lead agency, and City of Alexandria, as project sponsor, are preparing an Environmental Impact Statement (EIS) for the proposed Potomac Yard Metrorail Station project in accordance National Environmental Policy Act (NEPA). The EIS is being prepared in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) and National Park Service (NPS). The Draft EIS is analyzing three alternative station locations which are described in further detail in the project overview, which is provided as an attachment to the enclosed Coastal Zone Consistency Determination. Additional information on the project is also available on the project web site at http://potomacyardmetro.com/.

The project proposes the construction of a new Metrorail station located at Potomac Yard within the City of Alexandria, along the existing Metrorail Blue and Yellow line. The station would be located between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail Stations.

In accordance with the Coastal Zone Management Act (15 CFR Part 930, Subpart C), the project team is requesting VDEQ review and provide comment for the Coastal Zone Consistency Determination of the project (submitted Dec. 4, 2012 via PDF file email attachment and enclosed 3 hard copies via U.S. mail). As described, the proposed federal action is located in the City of Alexandria and Arlington County, both jurisdictions in Virginia's designated Coastal Zone.

Should you have any questions or comments, please contact me at (703) 340-3065 or by email at bill.pugh@aecom.com for more information.

Sincerely,

Bill Pugh

Bill Pugh
AECOM

Enclosure: Coastal Zone Consistency Determination (3 copies)

cc: Dan Koenig, FTA
Ben Helwig, NPS/GWMP
Susan Gygi, City of Alexandria
Jim Ashe, WMATA

Coastal Zone Management Act (CZMA) Consistency Determination
Potomac Yard Metrorail Station Environmental Impact Statement

This document provides the Commonwealth of Virginia with the Federal Transit Administration's Consistency Determination under CZMA section 307(c)(1) and 15 CFR Part 930, subpart C for the proposed Potomac Yard Metrorail Station project. The study area is located in the City of Alexandria and Arlington County. Both jurisdictions are located in Virginia's designated coastal zone. The information in this Consistency Determination is provided pursuant to 15 CFR 930.39.

Project Description

A project overview is provided in **Attachment 1.** As described, the project proposes the construction of a new Metrorail station located at Potomac Yard within the City of Alexandria, along the existing Metrorail Blue and Yellow line. The study area is located at the border of the City of Alexandria and Arlington County, and includes portions of the George Washington Memorial Parkway which is managed by the National Park Service. The station would be located between the Ronald Reagan Washington National Airport and the Braddock Road Metrorail Stations.

Virginia Coastal Zone Management Program Policies

The Virginia Coastal Zone Management Program (VCP) encompasses nine enforceable policies for the coastal area pertaining to:

- Fisheries management
- Subaqueous lands management
- Wetlands management
- Dunes management
- Non-point source pollution control
- Point source pollution control.
- Shoreline sanitation
- Air pollution control
- Coastal lands management

The project is not anticipated to impact the following certain coastal resources, and therefore assumed to be in compliance with the following enforceable policies:

- Fisheries management
- Dunes management
- Point source pollution control
- Shoreline sanitation

The Federal Transit Administration has determined that the proposed Potomac Yard Metrorail Station would affect the land or water uses or natural resources of the Commonwealth of Virginia's coastal zone in the following manner:

a. Subaqueous Lands Management: No activity associated with the proposed project would occur within subaqueous lands if Alternatives A or B are constructed.

Alternative D would require a new bridge above a waterway (Four Mile Run), and it is anticipated that piers for the bridge's substructure would be constructed within the waterway. The new bridge for Alternative D would be located approximately 75-feet east of the existing Metrorail

bridge over Four Mile Run. The existing bridge would be abandoned. A Joint Permit Application (JPA) would be prepared for the construction of the new bridge in accordance with Section 401 and 404 of the Clean Water Act.

b. **Wetlands Management:** A delineation of wetlands and Waters of the U.S. (WOUS) in the project study area was completed between October and December 2011. The results of the wetlands and WOUS delineation are shown in **Figure 2** of **Attachment 1**. The U.S. Army Corps of Engineers-Norfolk District (USACE) verified the Jurisdictional Determination (JD) for USACE delineated wetlands and WOUS in September 2012. USACE correspondence verifying the Jurisdictional Determination for the project is provided as **Attachment 2** to this review package.

In addition to using the USACE methodology, WOUS and wetland boundaries on National Park Service (NPS) property were delineated using NPS procedures. The NPS method requires one wetland characteristic to be identified for a wetland boundary to be determined rather than two or three parameters as required by the USACE method.

Table 1 provides an estimate of permanent impacts to wetlands and WOUS for the three Build Alternatives being analyzed in the Draft EIS. **Table 2** provides an estimate of the temporary construction impacts to both USACE and NPS delineated wetlands for the three Build Alternatives.

Table 1: Permanent Impacts to NPS and USACE Regulated Wetlands

Alternative	USACE-only Wetlands (acres)	NPS-only Wetlands (acres)	Wetlands Delineated by both USACE and NPS (acres)	Total (acres)
A	0.01	0.00	0.00	**0.01**
B	1.13	0.00	0.01	**1.14**
D	0.01	0.04	0.34	**0.39**

Table 2: Temporary Construction Impacts to USACE and NPS Regulated Wetlands

Alternative	USACE-only Wetlands (acres)	NPS-only Wetlands (acres)	Wetlands Delineated by both USACE and NPS (acres)	Total (acres)
A	0.01	0.00	0.00	**0.01**
B	3.12	0.04	0.57	**3.73**
D	0.07	0.07	0.39	**0.52**

Estimates of wetland and stream impact are preliminary and subject to revision through the Joint Permit Application (JPA) process in accordance with Section 401 and 404 of the Clean Water Act. The project sponsors will obtain a permit prior to starting any work that would impact wetlands or WOUS. To compensate for unavoidable wetland and stream impacts, the project sponsors will develop a mitigation plan in consultation with the USACE, the Virginia Department of Environmental Quality (VDEQ), and NPS as appropriate.

c. **Non-point Source Pollution Control:** The proposed action would increase the amount of impervious surface and resulting stormwater runoff at the site beyond the existing conditions. The net increase of impervious surface for each Build Alternative is provided in **Table 3**. As the

project progresses into final design, impervious surface calculations are expected to decrease from the initial estimates as the project design is refined.

Table 3: Net Impervious Surface Increase

Alternative	Impervious Area (acres)
A	1.82
B	1.66
D	9.24

Construction methods will be selected to minimize the potential for non-point source pollution impacts (primarily erosion and sedimentation). During construction, site stability will be maintained and runoff from the work area will be controlled to avoid the migration of pollutants from the various construction areas to nearby surface water resources. If the selected alternative is expected to disturb over 2,500 square feet of land (0.057 acres), the project will develop a Stormwater Pollution Prevention Plan (SPPP) and obtain a General Permit for Discharges from Construction Activities from the Virginia Department of Conservation and Recreation (VDCR). The SPPP will describe the practices that will be used to manage on-site waste, such as building materials, garbage and debris, and to implement controls to minimize the exposure of these materials to stormwater. VDCR approvals will be prepared separately from local construction approvals required by the City of Alexandria or Arlington County described in the next paragraph.

The project will be designed to ensure that stormwater impacts during construction are avoided or minimized to the maximum extent practicable. Erosion and Sediment Control Plans for construction activities would be developed for the project in accordance with Sec. 5-4 of the City of Alexandria Code and Chapter 57 of the Arlington County Code.

e. Air Pollution Control: The proposed project site is located within the National Capital Interstate Air Quality Control Region (AQCR 47). The region is designated as a non-attainment area for ground-level ozone (O_3) and particulate matter ($PM_{2.5}$). The project has demonstrated air quality conformity and is included in the region's approved *National Capital Region's Financially Constrained Long-Range Transportation Plan (CLRP)*. The project will not be a point source of air pollution, therefore no air quality permits are anticipated. In addition, the project is not anticipated to generate a net increase in automobile trips or vehicle miles traveled. The Metrorail station is being designed as an urban station with no park and ride facilities. The project is not anticipated to affect the region's air quality conformity goals or attainment status.

f. Coastal Lands Management: Both the City of Alexandria and Arlington County are located in Virginia's designated coastal zone and have established Chesapeake Bay Preservation Ordinances (CBPO). CBPOs are defined in Article XIII of the City of Alexandria Zoning Ordinance and Chapter 61 of the Arlington County Code. The City of Alexandria and Arlington County have defined Resource Protection Areas (RPAs) to include USACE-regulated tidal and non-tidal wetlands, shores, and 100-foot buffers around those water bodies.

RPAs in the study area include areas identified on the adopted RPA maps of the City of Alexandria and Arlington County, USACE-regulated wetlands delineated for the project, and 100-foot buffers around the delineated wetlands consistent with Sec. 13-105(B) of the City zoning ordinance and Subsection 61-5.B.1.d of the Arlington County Code.

Based on these defined areas, the three Build Alternatives would all encroach upon RPAs. Build Alternatives A and B would affect RPAs around the proposed platform areas, while Build Alternative D would affect RPAs buffering Four Mile Run due to the new bridge crossing the waterway. **Table 4** provides a summary of potential impacts to identified RPAs. To comply with each jurisdiction's CBPO, the project will disturb no more land than is necessary, preserve indigenous vegetation as much as possible, and minimize impervious cover. To minimize the impacts to RPAs, the project will be designed and constructed with stormwater management facilities to meet the performance criteria of Alexandria and Arlington CBPOs.

Any development within an RPA or development exceeding 2,500 square feet of land disturbance (0.057 acres) within a Resource Management Area is subject to the development review processes of the City of Alexandria and Arlington County. Development review approvals must be obtained prior to any site clearing or issuance of any development permit for the project.

City and County development require a project-specific site plan, environmental site assessment, water quality impact assessment, landscape plan, stormwater management plan, and an erosion and sediment control plan. As a transportation facility, the project may be exempt from the development review process for impacts to RPAs based on Section 13-119 (A-1) of the City of Alexandria Zoning Ordinance and Section 61-15 (A) of the Arlington County Code.

Table 4: Resource Protection Area Encroachment

Alternative	Impact (acres)	
	Temporary	Permanent
A	0.52	0.38
B	5.74	3.07
D	1.80	1.48

Mitigation will be developed in accordance with the VDCR Chesapeake Bay Local Assistance Department (CBLAD) *Riparian Buffers Modification & Mitigation Manual* and with planting recommendations or other mitigation deemed appropriate to the satisfaction of the City of Alexandria's Director of Transportation and Environmental Services. In lieu of mitigation, contribution to the City of Alexandria Water Quality Improvement Fund may be acceptable, or a combination of strategies involving mitigation and contribution to the Water Quality Improvement Fund (for RPA impact within the City of Alexandria).

Based upon the following information, data, and analysis, the Federal Transit Administration finds that the Potomac Yard Metrorail Station is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program.

Pursuant to 15 CFR Section 930.41, the Virginia Department of Environmental Quality has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR section 930.41(b). Virginia's concurrence will be presumed if its response is not received by the Federal Transit Administration on the 60th day from receipt of this determination. The State's response should be sent to:

Daniel Koenig
Environmental Protection Specialist
Federal Transit Administration
1990 K Street NW, Suite 510
Washington, DC 20006-1178

and

James A. Ashe, PE, CPG
Manager, Environmental Planning and Compliance
Office of Chief Engineer, Infrastructure
Transit Infrastructure and Engineering Services
Washington Metropolitan Area Transit Authority
600 5th Street, NW
Washington, DC 20001

ATTACHMENT 1

PROJECT OVERVIEW

Project Overview

1.0 INTRODUCTION

The Federal Transit Administration (FTA), as the lead federal agency, and the City of Alexandria, as the project sponsor and joint lead agency, in cooperation with the Washington Metropolitan Area Transit Authority (WMATA), and the National Park Service (NPS), are preparing an Environmental Impact Statement (Draft EIS), under the National Environmental Policy Act (NEPA), for the proposed Potomac Yard Metrorail Station (or "the project").

The project consists of construction of a new Metrorail station located at Potomac Yard within the City of Alexandria, along the existing Metrorail Blue and Yellow Lines between the Ronald Reagan Washington National Airport station and the Braddock Road station. The project would serve existing neighborhoods and retail centers as well as the high-density, transit-oriented development planned by the City of Alexandria. The project would provide access to the regional Metrorail system for the U.S. Route 1 corridor of north Alexandria. The Potomac Yard area is currently without direct access to the Metrorail system.

The Draft EIS is analyzing a No Build and three Build Alternatives.

2.0 PROJECT AREA

The project area for the proposed Potomac Yard Metrorail Station is in the City of Alexandria and Arlington County, Virginia, located in the Northern Virginia portion of the Washington metropolitan region. The project area, as shown in the Location Map (**Figure 1**), is generally bounded by U.S. Route 1 on the west, George Washington Memorial Parkway and Potomac Greens Drive on the east, Slaters Lane on the south, and the Ronald Reagan Washington National Airport Access Road on the north. Wetlands and Waters of the U.S. within the study area are shown in **Figure 2**. Resource Protection Areas (RPAs) are shown in **Figure 3**.

3.0 ALTERNATIVES

3.1 No Build Alternative

The No Build Alternative is defined as the existing highway and transit network and committed transportation improvements from the National Capital Region Transportation Planning Board's Financially Constrained Long Range Plan (CLRP). The Draft EIS will assume that any improvements that are anticipated to be implemented by the project horizon year of 2040, whether physical or operational, are part of the No Build Alternative, with the exception of the new Metrorail Station at Potomac Yard.

The No Build Alternative includes the build-out of an internal street network within Potomac Yard (roughly from Four Mile Run to Braddock Road) and additional investments in transit and bicycle/pedestrian facilities. Anticipated transit investments include the Crystal City/Potomac Yard (CCPY) Transitway and an expansion of local transit service.

Figure 1: USGS Quadrangle Map (Location Map)

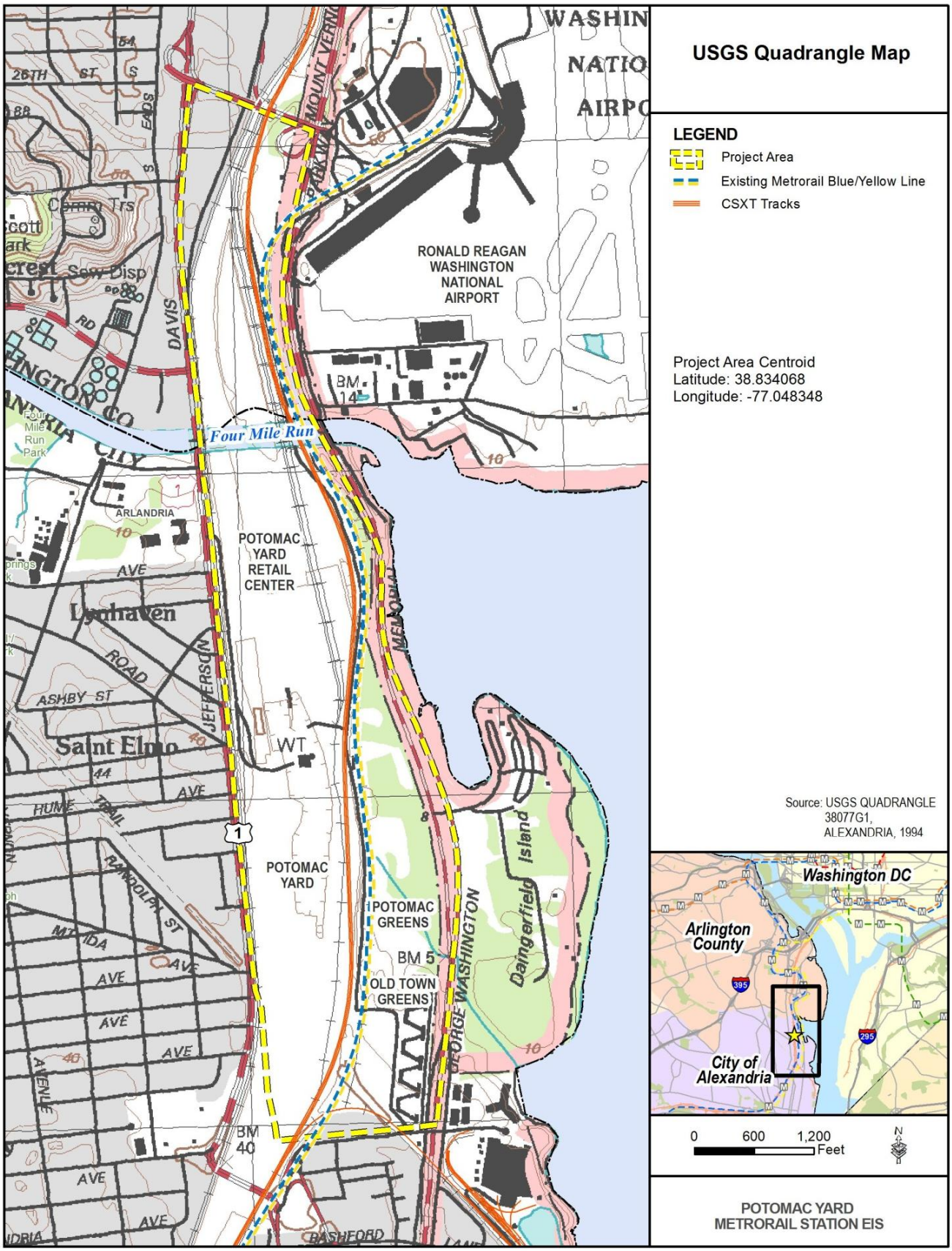


Figure 2: Waters of the United States Including Wetlands

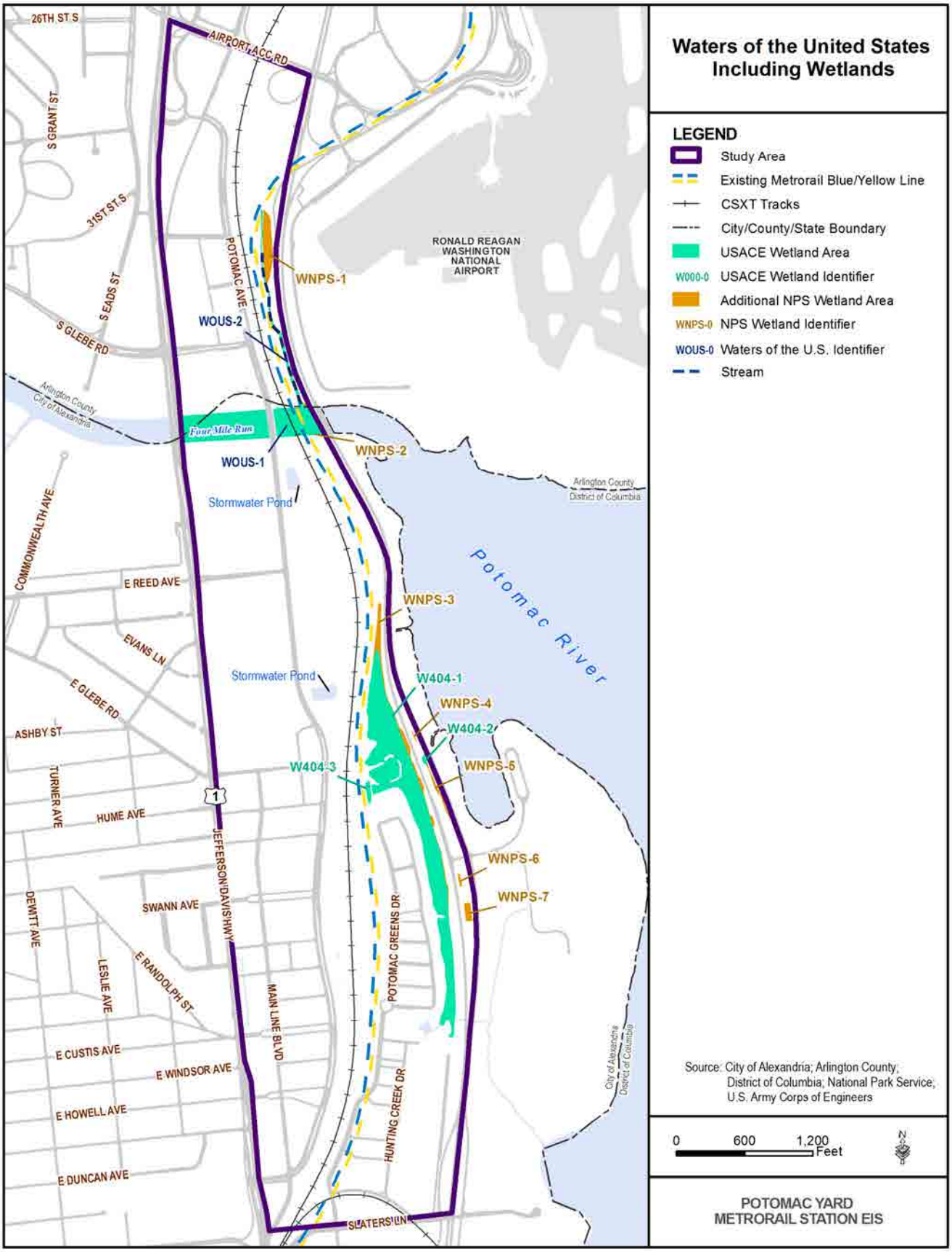
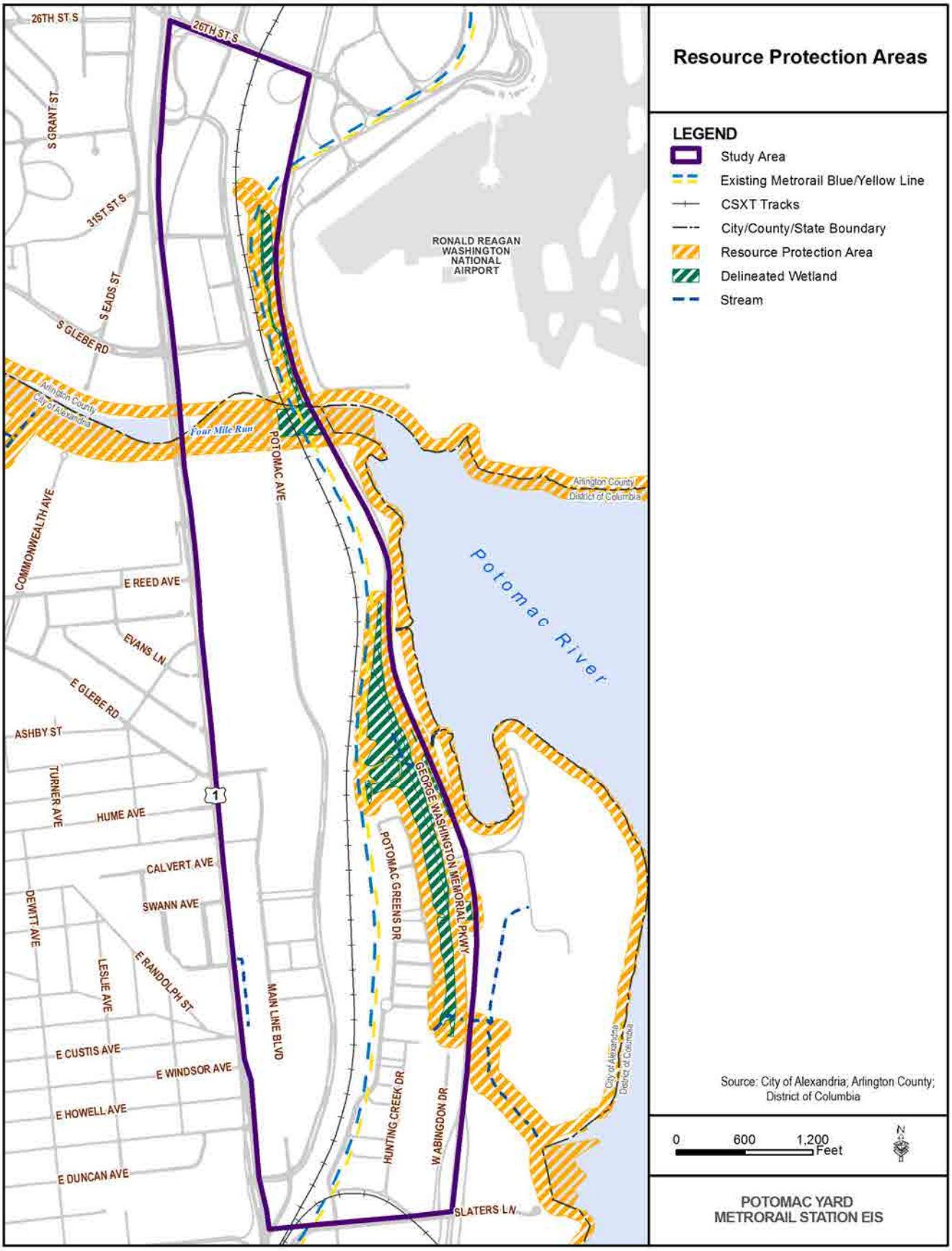


Figure 3: Resource Protection Areas



3.2 Build Alternatives

Each Build alternative consists of the construction and operation of a Metrorail station. The Build alternatives are described below and illustrated in **Figure 4**.

3.2.1 Build Alternative A

Build Alternative A would be located on the existing Metrorail tracks between the CSX Transportation Railroad (CSXT) tracks and the north end of the Potomac Greens neighborhood, generally within the existing Metrorail Reservation easement designated during earlier planning efforts for the Potomac Yard area. The station would be at-grade with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard, as well as pedestrian access to the Potomac Greens and Old Town Greens neighborhoods.

Build Alternative A would include construction of a double crossover located approximately 900 feet south of the station.

3.2.2 Build Alternative B

Build Alternative B would be located between the George Washington Memorial Parkway and the CSXT Railroad, north of the Potomac Greens neighborhood and east of the south end of the existing Potomac Yard Shopping Center in North Potomac Yard. The station would be located within the Greens Scenic Area easement managed by NPS. The station would be at-grade. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard and a pedestrian bridge over the proposed Metrorail alignment to provide access to the Potomac Greens and Old Town Greens neighborhoods.

Build Alternative B would require the realignment of approximately 650 feet of existing track, as well as the installation of approximately 1,450 feet of new track. Special track work – a double crossover – would be required approximately 100 feet north of the station.

The new track and station would be built on retained fill, and a new retaining wall would be constructed on the east side of the track and station to support the structures.

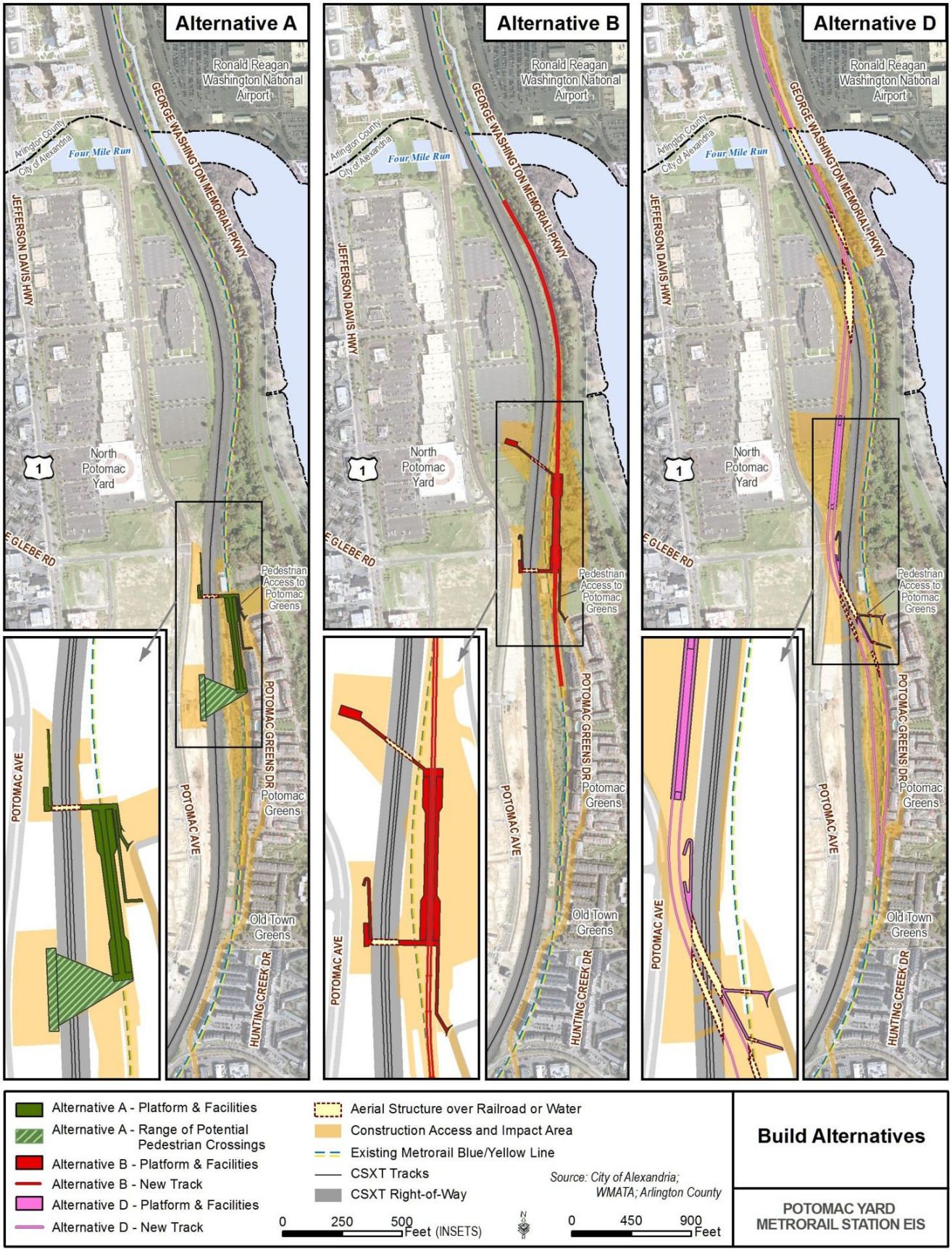
3.2.3 Build Alternative D

Build Alternative D would be located west of the CSXT right-of-way near the existing Potomac Yard Retail Center in North Potomac Yard. The station would be aerial with a center platform layout. One pedestrian bridge over the CSXT right-of-way would be constructed, connecting the neighborhoods of Potomac Greens and Old Town Greens to Potomac Avenue at East Glebe Road. The pedestrian bridge would be parallel to the new Metrorail bridge over the CSXT right-of-way.

Build Alternative D would require the realignment of approximately 550 feet of existing track, as well as the installation of approximately 5,800 feet of new track. The majority of new track would be elevated. Build Alternative D would also include construction of two Metrorail aerial bridges crossing the CSXT right-of-way to the north and south of the station and a new Metrorail bridge over Four Mile Run. Construction of a double crossover would be required in a location approximately 100 feet north of the station. Following completion of construction, the old Metrorail tracks would be removed from service.

Additional structural improvements would include the removal and replacement of the existing retaining wall near the Potomac Greens neighborhood and the removal of an additional retaining wall west of the existing Metrorail tracks, north of the portal at the southern end of the neighborhood.

Figure 4: Build Alternatives



ATTACHMENT 2

U.S. ARMY CORPS OF ENGINEERS

JURISDICTIONAL DETERMINATION VERIFICATION LETTER

SEPTEMBER 28, 2012

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

REPLY TO
ATTENTION OF:

September 28, 2012

Northern Virginia Regulatory Section
NAO-2012-02012 (Potomac Yard Metrorail)

James A. Ashe, PE, CPG
Manager, Environmental Planning and Compliance
Office of Chief Engineer, Infrastructure
Transit Infrastructure and Engineering Services
Washington Metropolitan Area Transit Authority
600 5th Street, NW
Washington, DC 20001

Dear Mr. Ashe:

This letter is in regard to your request for verification of an approved jurisdictional determination for waters of the U.S. (including wetlands) on property known as the Potomac Yard Metrorail Station, located on an approximately 117.0 acre parcel in Alexandria and Arlington County, Virginia.

An on-site jurisdictional determination has found waters and/or wetlands regulated under Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) and/or Section 404 of the Clean Water Act (33 U.S.C. 1344) on property listed above. Nontidal wetlands and/or waters have been identified on the site. This letter shall serve to confirm the wetlands delineation by AECOM, Inc. as surveyed and shown on the maps titled, "Potomac Yard Metrorail Station" dated April 2012 (on file at the Corps).

Our basis for this determination is the application of the Corps' 1987 Wetland Delineation Manual and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation. The wetland is a water of the United States and is part of a tributary system to interstate waters (33 CFR 328.3(a)). These waters meet the Corps' definition of waters of the United States, are part of a tributary system to interstate waters (33 CFR 328.3 (a)) and have an ordinary high water mark.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into jurisdictional waters and/or wetlands on this site will require a Department of the Army permit and may require authorization by state and local authorities, including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these jurisdictional areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This letter contains an approved jurisdictional determination for your subject site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the North Atlantic Division Office at the following address:

Mr. Michael Vissichelli
Regulatory Appeals Review Officer
U.S. Army Corps of Engineers
Fort Hamilton Military Community
301 General Lee Avenue
Brooklyn, NY 11252-6700

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 C.F.R. part 33 1.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by ****November 28, 2012.**** It is not necessary to submit an RFA form to the Division office if you do not object to the determination in this letter.

This jurisdictional determination is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date. If you have any questions, please contact Ms. Theresita Crockett-Augustine in the Northern Virginia Field Office at 18139 Triangle Plaza, Suite 213, Dumfries, Virginia 22026, (703) 221-9736 or **theresita.m.crockett-augustine@usace.army.mil**.

Sincerely,

for Nicholas L. Konchuba
Chief, Northern Virginia
Regulatory Section

Copy Furnished: DEQ, Woodbridge.

POTOMAC YARD METRORAIL STATION
ENVIRONMENTAL IMPACT STATEMENT

Ecosystems and Endangered Species Technical Memorandum

February 2013

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1.0 Introduction

The Federal Transit Administration (FTA), as the lead federal agency, and the City of Alexandria, as the project sponsor and joint lead agency, have prepared a Draft Environmental Impact Statement (Draft EIS) in accordance with the National Environmental Policy Act (NEPA) for the proposed Potomac Yard Metrorail Station ("the project"). The Draft EIS has been prepared in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) and the National Park Service (NPS).

This technical memorandum identifies the potential permanent effects to ecosystems (terrestrial and aquatic biological resources and habitats) and federally listed or state listed rare, threatened and endangered species that exist within the project study area as a result of the No Build and three Build Alternatives. The memorandum describes the following:

- Project alternatives
- Applicable regulations and guidance
- Methodology
- Opening year conditions
- Potential effects of each alternative (note that construction effects are described separately in the Construction Impacts Technical Memorandum)
- Mitigation Measures

Temporary construction effects are described separately in the *Construction Impacts Technical Memorandum*. The findings of this analysis are incorporated in the Draft EIS.

1.1 Project Alternatives

The Draft EIS evaluates a No Build Alternative and three Build Alternatives. Each Build Alternative includes the same area improvements as the No Build Alternative in addition to construction and operation of a Metrorail station.

1.1.1 No Build Alternative

The No Build Alternative is defined as the existing highway and transit network and committed transportation improvements from the National Capital Region Transportation Planning Board's Financially Constrained Long Range Plan (CLRP). The Draft EIS assumes that any improvements that are anticipated to be implemented by the project horizon year of 2040, whether physical or operational, are part of the No Build Alternative, with the exception of the new Metrorail Station at Potomac Yard.

The No Build Alternative includes the build-out of an internal street network within Potomac Yard (roughly from Four Mile Run to Braddock Road) and additional investments in transit and bicycle/pedestrian facilities, including a pedestrian bridge over the Metrorail and CSX Transportation (CSXT) rights-of-way between Potomac Greens and Potomac Yard. Anticipated transit investments include the Crystal City/Potomac Yard (CCPY) Transitway and an expansion of local transit service.

1.1.2 Build Alternatives

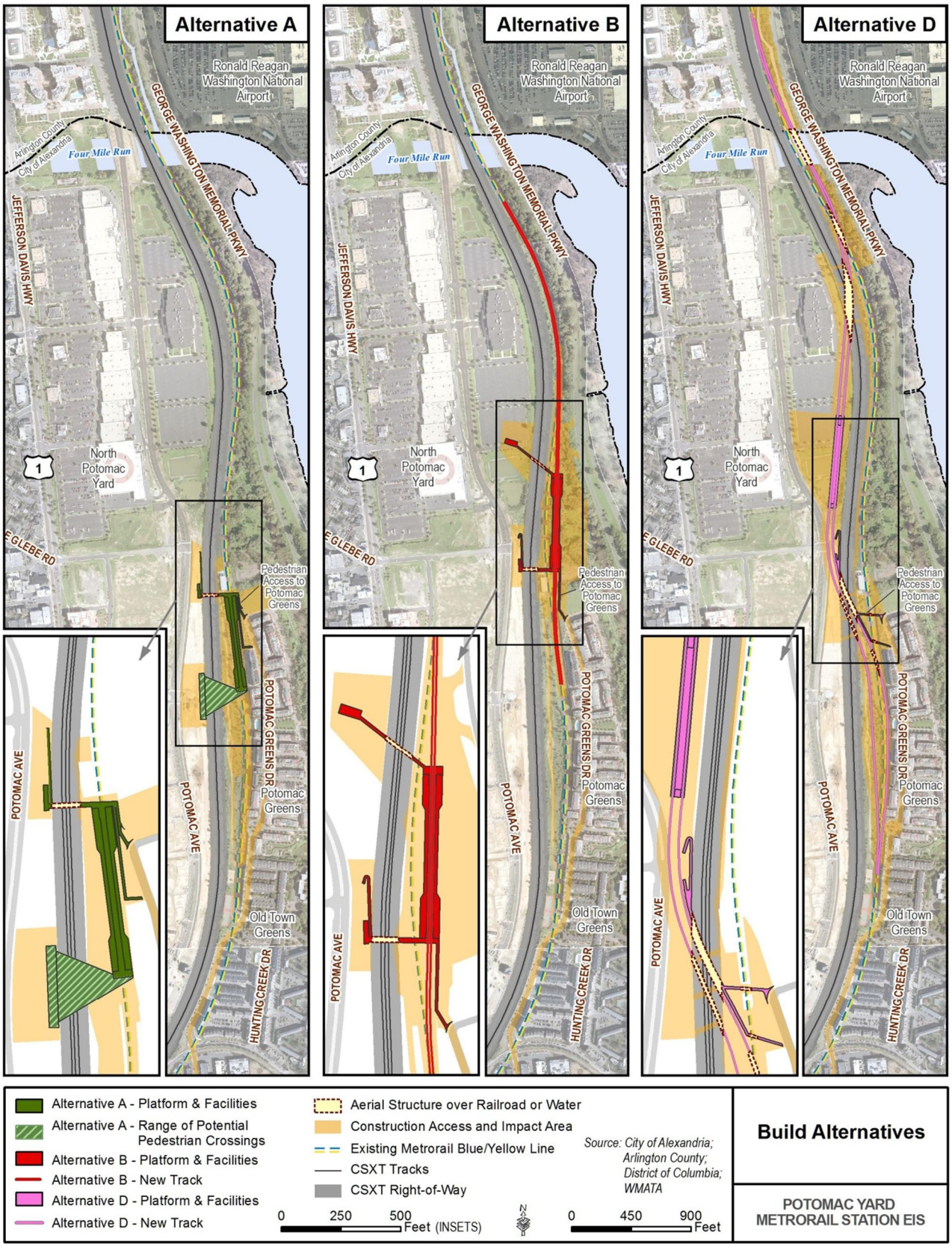
The Build Alternatives are described below and shown in **Table 1-1** and **Figure 1-1**.

Build Alternative A

Build Alternative A would be located on the existing Metrorail tracks between the CSXT right-of-way and the north end of the Potomac Greens neighborhood, generally within the existing Metrorail Reservation easement designated during earlier planning efforts for the Potomac Yard area. The station would be at-grade with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard. The bridge at the northern end of the station would provide 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood.

Build Alternative A would include construction of a double crossover located approximately 900 feet south of the station.

Figure 1-1: Build Alternatives



Build Alternative B

Build Alternative B would be located between the George Washington Memorial Parkway and the CSXT right-of-way, north of the Potomac Greens neighborhood and east of the south end of the existing Potomac Yard Shopping Center in North Potomac Yard. The station would be located within the Greens Scenic Area easement administered by NPS. The station would be at-grade. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard. The bridge at the southern end of the station would provide 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood.

Build Alternative B would require the realignment of approximately 650 feet of existing track, as well as the installation of approximately 1,450 feet of new track. Special track work – a double crossover – would be required approximately 100 feet north of the station.

The new track and station would be built on retained fill, and a new retaining wall would be constructed on the east side of the track and station to support the structures.

Build Alternative D

Build Alternative D would be located west of the CSXT right-of-way near the existing Potomac Yard Shopping Center in North Potomac Yard. The station would be aerial with a center platform layout. One pedestrian/bicycle bridge over the CSXT right-of-way would be constructed, providing 24-hour pedestrian/bicycle access between Potomac Yard and the Potomac Greens neighborhood. The pedestrian/bicycle bridge would be parallel to the new Metrorail bridge over the CSXT right-of-way.

Build Alternative D would require the realignment of approximately 550 feet of existing track, as well as the installation of approximately 5,800 feet of new track. The majority of new track would be elevated. Build Alternative D would also include construction of two Metrorail aerial bridges crossing the CSXT right-of-way to the north and south of the station, and a new Metrorail bridge over Four Mile Run. Construction of a double crossover would be required in a location approximately 100 feet north of the station. Following completion of construction, the old Metrorail tracks would be removed from service.

Additional structural improvements would include the removal and replacement of the existing retaining wall near the Potomac Greens neighborhood and the removal of an additional retaining wall west of the existing Metrorail tracks, north of the portal at the southern end of the neighborhood.

Table 1-1: Build Alternatives

Alternative	Type and Layout	Track Work	Facilities for Station Access	Additional Structures Required
Build Alternative A	At-grade, side platform	Minimal track work	Two pedestrian bridges over CSXT right-of-way; access to Potomac Greens via walkway	None
Build Alternative B	At-grade, side platform	Moderate track work	Two pedestrian bridges over CSXT right-of-way; access to Potomac Greens via walkway	Structures (retaining wall) to support new track and station
Build Alternative D	Aerial, center platform	Major track work	One pedestrian bridge over CSXT right-of-way to provide access between Potomac Yard and Potomac Greens	Two aerial structures over CSXT right-of-way, one Metrorail bridge over Four Mile Run, aerial track and supports, and retaining wall replacement on the east and west sides of the tracks north of the existing Metrorail portal. New structures would pass over the existing Metrorail tracks, which would be removed following construction.

Note: Track work for Build Alternatives B and D assumes existing Blue and Yellow Line Metrorail track would be removed where track is realigned

1.2 Applicable Regulations and Guidance

Biological resources within the study area are protected by federal and state law, as well as local regulation. The analysis was developed in accordance with the federal, state and local laws, regulation and guidance described in the following sub-sections.

1.2.1 Federal Law and Guidance

Endangered Species Act of 1973 (16 U.S.C. 1531-1544)

The act and subsequent amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Section 7 of the Endangered Species Act (ESA) requires that federal agencies aid the conservation of listed species and ensure that their activities do not jeopardize the continued existence of listed species or adversely modify designated critical habitat. At the federal level, the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) are responsible for the administration of the ESA.

Interagency Cooperation – Endangered Species Act of 1973, As Amended (50 CFR Part 402)

50 CFR 402 provides interpretation and implementation rules for federal agency compliance with the ESA.

Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d)

The act provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds, including their parts, nests, or eggs.

Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661-667e)

The act requires consultation with USFWS and the state agency responsible for wildlife resources whenever a stream or other body of water is proposed to be modified for any purpose. Compliance with this law can be accomplished through the NEPA process, which normally includes direct coordination with USFWS, VDCR, and VDGIF to review and provide comments on a project during scoping and subsequent NEPA phases.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712)

The act decrees that all migratory birds and their parts (including eggs, nests and feathers) are fully protected. Under this act, taking, killing or possessing migratory birds is unlawful. Projects that are likely to result in the taking of birds protected under the Migratory Bird Treaty Act require permits from USFWS. Activities that require such a permit include, but are not limited to, the destruction of migratory bird nesting habitat during the nesting season when eggs or young are likely to be present.

Clean Water Act of 1972 (33 U.S.C. 1251-1387)

Aquatic habitats are protected under a variety of regulations that limit the use or destruction of designated Waters of the U.S., including jurisdictional wetlands, in accordance with Section 401 and 404 of the Act.

U.S. Fish & Wildlife Service – Virginia Field Office, Information, Planning and Consultation System (IPaC)

The Information, Planning and Consultation System (IPaC) is a spatial database maintained by USFWS that identifies listed, proposed or candidate species which may be present in a user defined study area.

National Park Service, Natural Resource Management Reference Manual #77

NPS describes this reference manual as: "comprehensive guidance to National Park Service employees responsible for managing, conserving, and protecting the natural resources found in NPS units"[1] The

[1] National Park Service, *Natural Resource Management Reference Manual #77,* Accessed at: http://www.nature.nps.gov/rm77/

manual provides guidance on management of freshwater, terrestrial and marine habitat, as well as management of threatened and endangered species.

U.S. Department of Agriculture, National Invasive Species Information Center

The U.S. Department of Agriculture (USDA) maintains a comprehensive database of aquatic and terrestrial plant, animal, and microbial species which are designated by the federal government as invasive, consistent with Presidential Executive Order 13112 Invasive Species.

1.2.2 State Law

Two state agencies, VDGIF and the Virginia Department of Agriculture and Consumer Services (VDACS) have legal authority for endangered and threatened species and are responsible for their conservation in Virginia. A third state agency, the Division of Natural Heritage (DNH) of VDCR, produces an inventory of the Commonwealth's natural resources and maintains a data bank of ecologically significant sights.

Endangered Plant and Insect Species Act

The act mandates that VDACS conserve, protect, and manage endangered and threatened species of plants and insects. The Virginia Endangered Plant and Insect Species Program of VDACS cooperates with USFWS, VDCR-DNH, and other agencies and organizations regarding the recovery, protection or conservation of listed threatened or endangered species and designated plant and insect species that are rare throughout their worldwide ranges.

Virginia Natural Areas Preserve Act

The act established the Natural Heritage Program (NHP), which is administered through the VDCR -DNH. Under a memorandum of agreement, VDCR represents VDACS by providing comments regarding potential impacts of projects on state listed threatened and endangered plant and insect species, and other state designated natural communities. Through the program, VDCR identifies and designates sensitive natural heritage areas within the Commonwealth for conservation.

1.2.3 Local Regulation

Both the City of Alexandria and Arlington County consider habitat impact in their development review processes, specifically for potential impacts to wetlands and Chesapeake Bay Preservation Areas.

1.3 Methodology

1.3.1 Ecosystems

Study area ecosystems were assessed using findings from this project's water resources and wetlands analyses, including the *Waters of the U.S. (Including Wetlands) Delineation Report* (February 2012). Other relevant studies of natural resources in the study area included the City of Alexandria, *Water Quality Management Supplement* (2001), and National Park Service, *Final Environmental Impact Statement, George Washington Memorial Parkway, Potomac Greens* (1991). Study area ecosystems were identified through aerial imagery and field observations. Potential effects on existing habitat were assessed using GIS mapping overlays of the project limits of disturbance for each Build Alternative. Ecologically sensitive areas (apart from documented habitat of federally or state-listed rare, threatened or endangered species described below) were identified using the USFWS list of National Wildlife Refuges and the VDCR Natural Heritage database.

1.3.2 Threatened and Endangered Species

The USFWS Threatened and Endangered Species Database System was used to identify federal and state species listed within the study area for the City of Alexandria and Arlington County. The USFWS

database search is provided in **Appendix C**. In addition, the VDCR Natural Heritage database[2] was reviewed for wildlife resources within the study area.

Coordination with USFWS, VDGIF, and VDCR was undertaken during the scoping process and again at the initiation of the resource analyses for the Draft EIS. VDCR and VDGIF were contacted in May 2012 requesting a review of the project and were asked to provide written determinations regarding whether the project would impact any federally listed or state listed species. USFWS ESA coordination was completed on October 4, 2012. See **Appendix C** for a copy of the USFWS Project Review Certification Package.

2.0 Opening Year Conditions

2.1 Ecosystems

2.1.1 Study Area Natural Habitat Types

Habitat is utilized by plant and animal species for food, shelter, and water. Within the study area, existing habitat is divided into the following four general categories:

- Emergent wetlands
- Riverine habitat
- Forested wetlands
- Treed uplands

Figure 2-1 shows the locations of existing natural habitat types within the study area. Emergent and forested wetlands occur in the east/southeast portions of the study area between the Metrorail tracks and the George Washington Memorial Parkway. Treed uplands occur in the same vicinity of the delineated wetlands in the study area. Wetlands also occur in the area of Four Mile Run, in the northern portion of the study area at the border of Arlington and Alexandria. Wetlands in the study area are tidally influenced by the Potomac River and Four Mile Run.

Each habitat is characterized by a particular dominant association of vegetation, although there is substantial overlap between the types of plant and animal species which use both the wetland and upland habitat. The other portions of the study area not included in the natural habitat categories consist of urban development and associated vegetated areas of generally low habitat value.

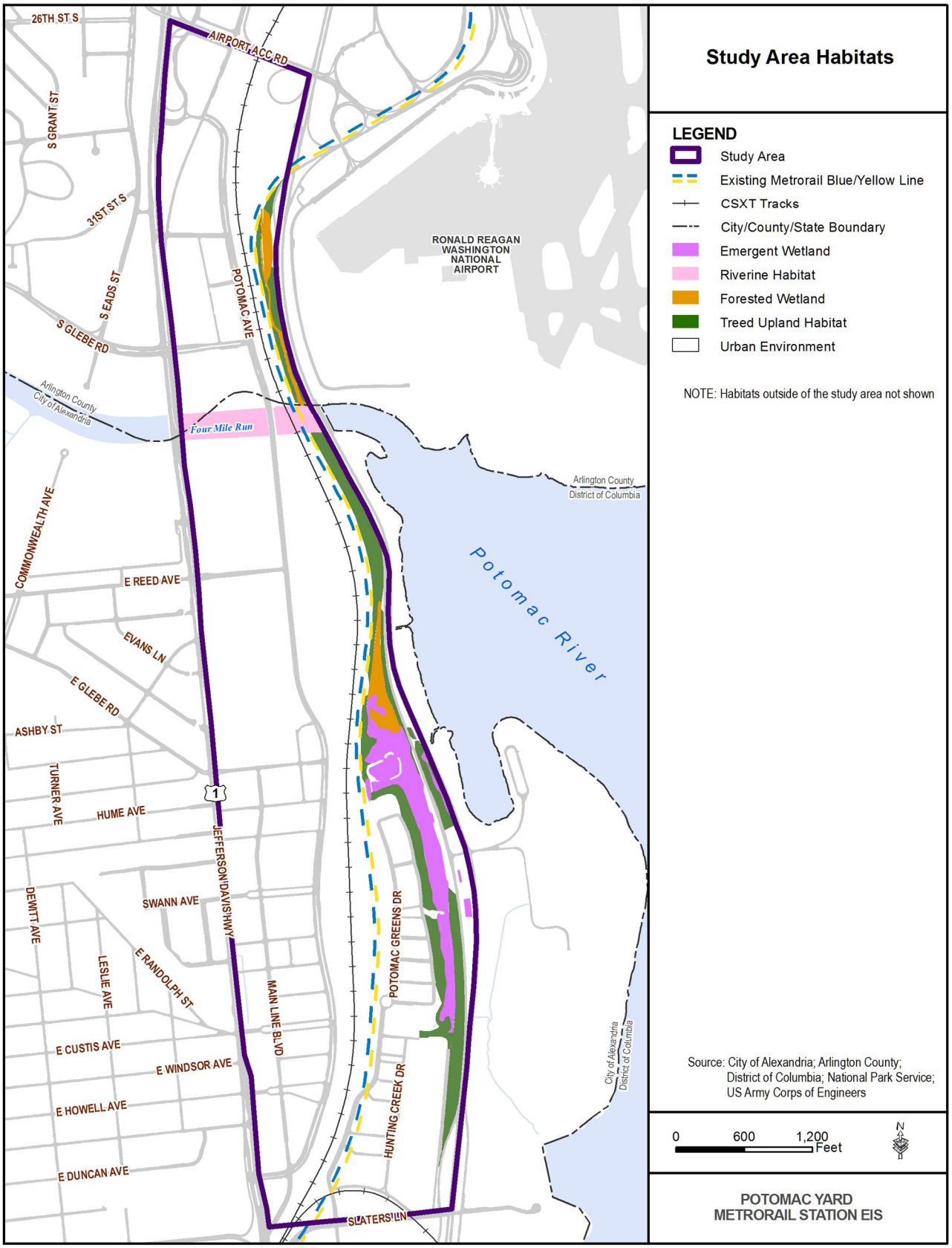
Emergent Wetlands

Emergent wetlands are generally characterized by erect, rooted herbaceous hydrophytic vegetation. The ecosystem functions of emergent wetlands include floodflow protection, sediment trapping, nutrient retention and removal, and valuable habitat for many animal and plant species.

A variety of plant and wildlife species live in emergent wetlands. Migratory bird species use this habitat to satisfy nesting and brooding needs. Animal species which use this habitat include smaller mammals such as rabbits, beavers, reptiles (e.g., snakes and turtles), amphibians (e.g., frogs and toads), juvenile fish, and valuable pollinating insects. Other wildlife that utilizes this type of habitat includes macroinvertebrates, such as amphipods, snails, spiders, and several species of worms. The populations of reptiles and amphibians fluctuate seasonally as water levels and temperature change.

[2] Virginia Department of Conservation and Recreation, Natural Heritage Database, Accessed at http://www.dcr.virginia.gov/natural_heritage/dbsearchtool.shtml.

Figure 2-1: Study Area Habitats



The 1991 *Potomac Greens Final Environmental Impact Statement* conducted by NPS and the wetland investigation conducted for this project between October and November 2011 verified the dominant vegetation in the emergent and forested wetland areas to be a giant cane or reed (*Phragmites australis*). Other species identified in wetlands of the study area include buttonbush (*Cephalanthus occidentalis),* arrow arum (*Peltandra virginica*), swamp rose (*Rosa palustris*), skunk cabbage (*Symplocarpus foetidus*), soft rush (*Juncus effuses*), and poison ivy (*Toxicodendron radicans*).

An additional set of predominant plant species is found at the edge of the wetland/upland boundary, including: black willow (*Salix nigra*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), and green ash (*Fraxinus pennsylvanica*) within the canopy layer; and sweet bay (*Magnolia virginiana*) and arrow-wood (*Viburnum dentatum*) within the understory layer. The understory consists of climbing species, such as poison ivy, trumpet creeper (*Campsis radicans*), and wild grape (*Vitis* spp.).

Animal species that are likely to be present within the wetlands of the study area include: Virginia opossum (*Didelphis virginiana*), north American beaver (*Castor canadensis*) and Norway rat (*Rattus norvegicus*).

Common amphibian species that exist in this habitat include: the eastern red-backed salamander (*Plethodon cinereus*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), snapping turtle (*Chelydra serpentine*), and painted turtle (*Chrysemys picta*).

Many species of birds can occur within this habitat. The most abundant are those that have adapted to the urban habitats, such as the European starling (*Sturnus vulgaris*), pigeon (*Columba livia*), and house sparrow (*Passer domesticus*). Additional species of birds that are commonly found in this habitat and throughout the project study area include the northern cardinal (*Cardinalis cardinalis*), the blue jay (*Cyanocitta cristata*), tufted titmouse (*Parus bicolor*), black-capped chickadee (*Parus atricapillus*), white-breasted nuthatch (*Sitta carolinensis)*, northern mockingbird (*Mimus polyglottos*), downy woodpecker (*Picoides pubescens*), house finch (*Carpodacus mexicanus*), American robin (*Turdus migratorius*), and mourning dove (*Zenaida macroura*). These species are known to breed in the project study area.[3]

Several other species of birds breed in the project study area but migrate to warmer temperatures in the winter. These include the northern oriole (*Icterus galbula*), house wren (*Troglodytes aedon*), gray catbird (*Dumetella carolinensis*), great-crested flycatcher (*Myiarchus crinitus*), chimney swift (*Chaetura pelagica*), eastern kingbird (*Tyrannus tyrannus*), and northern flicker (*Colaptes auratus*).

Insects that use this habitat include dragonflies, damselflies, mosquitoes, and other flies. Bird species present consume large quantities of insects and worms over the growing season when they are the most abundant.

Any areas that flood intermittently or permanently (e.g., ponds) attract and support large numbers of birds, especially during migration. Emergent wetland habitat can sometimes be flooded and commonly supports the mallard duck (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), mute swan (*Cygnus olor*), wood duck (*Aix sponsa*), common merganser (*Mergus merganser*), ruddy duck (*Oxyura jamaicensis*), ring-necked duck (*Aythya collaris*), and hooded merganser (*Lophodytes cucullatus*). On occasion, sandpipers and plovers can be found, but are generally passing through and would not find this habitat suitable for nesting. Other similar bird species that take advantage of flooded emergent wetland habitat include the great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), and black-crowned heron (*Nycticorax nycticorax*)[4].

Spiders would be very abundant in this type of habitat, for example, the common yellow garden spider (*Argiope aurantia*) and the common wolf spider (*Rhabidosa rabida*) as well as several other species.

Riverine Habitat

Riverine habitat includes floating and sub-emergent herbaceous vegetation, insect, fish, amphibian and reptile species. A riverine aquatic habit exists within Four Mile Run in the northern portion of the study

[3] Arlington County, Virginia, *Wildlife of Arlington: A Natural Heritage Resource Inventory Technical Report*, July 2011, Accessed at: http://www.arlingtonva.us/departments/parksrecreation/documents/file82321.pdf
[4] Ibid.

area. Four Mile Run is a tidally influenced water body within the study area. Plant and animal species that live in this habitat must be able to tolerate degraded water quality and the brackish water conditions of the Middle Potomac River.

The study area riverine habitat is surrounded by urban development, and the natural course of Four Mile Run was substantially altered in the 1970s and 1980s by the U.S. Army Corps of Engineers (USACE) to control flooding and stormwater runoff. Four Mile Run is on Virginia's list of 303(d) impaired waters for exceeding fecal coliform bacteria standards, as well as fish tissue concentrations for the chemicals chlordane (a pesticide) and polychlorinated biphenyls (PCBs).[5]

Subaquatic vegetation which may occur in the study area riverine habitat includes wild celery (*Vallisneria Americana*) and hydrilla (*Hydrilla verticillata*)[6]. Hydrilla is designated as an invasive species by the USDA.

(VDEQ identifies[7] fish species which may occur in tributaries of the Middle Potomac River, such as Four Mile Run, including: American eel (*Anguilla rostrata*), bullhead catfish (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*), anadromous (coastal) striped bass (*Morone saxatilis*), sunfish species (genus *Lepomis*) smallmouth bass (*Micropterus dolomieu*), white catfish (*Ameiurus catus*), white perch (*Morone Americana*), gizzard shad (*Dorosoma cepedianum*), and yellow perch (*Perca flavescens*). The snakehead (*Channa argus*), an invasive fish species, has also been reported in Four Mile Run.

Several common species of birds use Four Mile Run as habitat, such as the barn swallow (*Hirundo rustica*), European starling (*Sturnus vulgaris*), pigeon (*Columba livia*), and house sparrow (*Passer domesticus*). Specific aquatic birds that utilize this habitat include the mallard duck (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), mute swan (*Cygnus olor*), wood duck (*Aix sponsa*), common merganser (*Mergus merganser*), ruddy duck (*Oxyura jamaicensis*), ring-necked duck (*Aythya collaris*), hooded merganser (*Lophodytes cucullatus*), great blue heron (*Ardea herodias)*, green heron (*Butorides virescens*), and black-crowned heron (*Nycticorax nycticorax)*[8].

Common amphibian species that exist in this habitat include: the eastern red-backed salamander (*Plethodon cinereus*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), snapping turtle *(Chelydra serpentine*), and painted turtle (*Chrysemys picta*).

Forested Wetlands

Forested wetland is a habitat dominated by woody species that are adapted to tolerate saturation of their roots for long periods during the growing season. Forested wetlands, like most wetland habitats, are defined by their hydrology, soils and vegetation. Boundaries of forested wetlands are usually difficult to delineate, because wetlands that form within these areas are generally very similar to the upland forest habitat. Forested wetlands provide beneficial ecosystem functions such as flood flow alteration, sediment trapping, nutrient retention and removal, and wildlife habitat. Forested wetlands, within the Mid-Atlantic region, usually include a diverse gradient of forest types.

Bird, mammal, amphibian, insect, reptile, and plant species occurring in forested and emergent wetlands in the study area are similar and described in the previous section. Bird populations, including migratory and native song birds, utilize habitat for nesting and brooding purposes. Other wildlife likely to use this habitat includes small mammals, reptiles (e.g., turtles and snakes), amphibians (e.g., frogs, toads, and salamanders), insects, and macroinvertebrates (e.g., snails, amphipods, and worms). These organisms contribute to the overall function and value of this habitat and provide food for other species. Vegetative cover of any sort in an urbanized environment is considered valuable habitat for all wildlife as it provides a protected respite.

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[5] Virginia Department of Environmental Quality, *2012 Impaired Waters Fact Sheet, Arlington County,* Accessed at: http://www.deq.virginia.gov/fs2012/Choose.aspx

[6] City of Alexandria, Virginia, *City of Alexandria Master Plan, Water Quality Management Supplement*, 2001, Accessed at: http://alexandriava.gov/uploadedFiles/tes/info/alexandria_water_quality_master_plan.pdf

[7] Virginia Department of Environmental Quality, *2012 Impaired Waters Fact Sheet, Arlington County,* Accessed at: http://www.deq.virginia.gov/fs2012/Choose.aspx

[8] Arlington County, Virginia, *Wildlife of Arlington: A Natural Heritage Resource Inventory Technical Report*, July 2011, Accessed at: http://www.arlingtonva.us/departments/parksrecreation/documents/file82321.pdf

Treed Uplands

Treed upland habitat is generally dominated by hardwood tree species. Trees also use a considerable amount of water and therefore help to retain water within an ecosystem. This type of habitat typically has a continuous, dense canopy of deciduous trees, commonly dominated by sugar maples (*Acer saccharam*), basswood (*Tilia americana*), and red oak (*Quercus rubra*) in the Mid-Atlantic region. Other canopy trees include American elm (*Ulmus Americana*), red elm (*Ulmus rubra*), black ash (*Fraxinus nigra*), green ash (*Fraxinus pennsylvanica*), bitternut hickory (*Carya cordiformis*), and hackberry (*Celtis occidentalis*). In more established settings, the canopy contains well-defined sub-canopy and shrub layers.

Ecosystem functions of treed uplands include moisture retention, flood flow protection, soil stabilization, and habitat for many small mammals, local nesting birds, and migratory birds. These species utilize this habitat for nesting, brooding, feeding, and protection from predators. Upland treed habitat is considered valuable in urbanized environments where expanses of vegetation are usually rare and may be heavily utilized by existing animal populations.

Common plant species in the upland areas include wormwood (*Artemisia sp.*), goldenrod (*Solidago sp*.), American basswood (*Tilia Americana*) and black locust trees (*Robinia pseudoacacia*), sumac (*Rhus sp*.), American holly (*Ilex opaca*), poison ivy (*Toxicodendron radicans*) and Virginia creeper (*Parthenocissus quinquefolia*)

Animal species that are likely to inhabit the upland areas include Virginia opossum (*Didelphis virginiana*), short-tailed shrew (*Blarina brevicauda*), cottontail rabbit (*Sylvilagus*), Norway rat (*Rattus norvegicus*) and black rat (*Rattus rattus*). Birds that use tree uplands in the study area are likely to include: grackle (*Quiscalus quiscula*), crow (*Corvus brachyrhyncos*), starling (Sturnus vulgaris), mourning dove (*Zenaida macroura*), robin (*Turdus migratorius*), vireo (*Vireo* sp.), thrush (*Catharus* sp.), and sparrow (*Spizella* sp.).

Other Portions of the Study Area

In addition to the natural habitat areas described above, the remainder of the study area consists of urban development with vegetated areas within it. The vegetated areas generally have low habitat value, consisting of upland areas of maintained turf grass that may incorporate other formal plantings, such as ornamental shrubbery, or naturally wooded borders. The urban vegetated areas provide soil stabilization and may provide limited quality wildlife habitat. Various animal species adapted to urban and suburban areas may use vegetated areas for feeding purposes, resting places, or traffic corridors when traveling between habitats.

2.1.2 Invasive Species

Executive Order 13112 defines invasive species as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.”[9] Nearly all invasive species are capable of displacing native species, having long-lasting and possibly permanent impacts to habitats and the organisms that depend on them. Habitat changes due to invasive species colonization can cause the entire food web to change and energy paradigms to shift. Invasive species can impact biodiversity, alter landscapes, and change fundamental ecosystem processes. In an urbanized or fragmented environment, such as the study area, the remaining habitat is undergoing changes due to intense invasive species colonization.

Invasive plant species found in the study area include phragmites *(Phragmites australis)*, porcelain-berry (*Ampelopsis brevipedunculata*), tree-of-heaven (*Ailanthus altissima*), English ivy (*Hedera helix*), garlic mustard (*Alliaria petiolata*), mile-a-minute (*Persicaria perfoliata*), Japanese honeysuckle *(Lonicera japonica)*, lesser celandine (*Ranunculus ficaria*), white mulberry (*Morus alba*), and mimosa (*Albizia julibrissin*). Invasive animal species found in the study area include the Norway rat and European

[9] Executive Order 13112, Invasive Species, Accessed at: http://www.gpo.gov/fdsys/pkg/FR-1999-02-08/pdf/99-3184.pdf

starling.[10] The house sparrow (*Passer domesticus*) is a designated as a nuisance bird species by VDGIF[11].

2.1.3 Ecologically Sensitive Areas

Ecologically sensitive areas are defined as natural areas that state or federal government has designated for conservation.

At the federal level, ecologically sensitive areas include designated National Wildlife Refuges and "critical habitat" areas. National Wildlife Refuges are designated public lands and waters that are managed by USFWS to conserve fish, wildlife, and plants. USFWS also formally designates certain areas as "critical habitat" for federally listed threatened or endangered species. USFWS defines critical habitat as "geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection."

At the state level, ecologically sensitive areas include state designated "natural communities", which are areas identified by VDCR and prioritized for conservation. VDCR selects these ecologically sensitive natural communities by unique qualities characterized by geographic location, the presence of certain types of plant and animal species, elevation, and hydrological conditions (tidal, non-tidal wetlands, etc.). There are six types of natural communities in the Coastal Plain areas of Virginia which VDCR prioritizes for conservation.

No National Wildlife Refuge exists in the study area, nor is there any federally designated critical habitat within the study area.[12] VDCR did not identify any state designated "natural communities" within the study area in the agency's project determination (see **Appendix C**).

2.2 Threatened and Endangered Species

One federally listed threatened or endangered species was initially identified by the USFWS for habitat potential the study area: the Sensitive joint-vetch (*Aeschynomene virginica*). Although the bald eagle is no longer considered an endangered species, it is protected separately through the Bald and Golden Eagle Protection Act of 1940. The College of William & Mary Center for Conservation Biology maintains a database of bald eagle nest locations within Virginia. No eagle's nest is known to exist in the study area. The Appalachian Springsnail *(Fontigens bottimeri*) is a state listed endangered species which may occur in Arlington County based on a review VDCR Natural Heritage database records. Although the federally listed Small Whorled Pogonia (*Isotria medeoloides*) plant species may exist within jurisdictions of Northern Virginia, the USFWS IPaC database search did not identify the Small Whorled Pogonia or its habitat in the study area (see **Appendix C**).

Table 2-1 summarizes the federally listed and state listed species which have the potential to occur within the study area.

Table 2-1: Federally listed and State listed Species.

Species	Status	Notes/Documentation
Federally Endangered, Threatened, Proposed, and Candidate, or Protected Species		
Sensitive Joint- Vetch (*Aeschynomene virginica*)	Threatened	This species occurs in fresh to slightly brackish tidal river systems, typically at the outer fringe of marshes or shores. The northern portion of the study area crosses Four Mile Run. Within the study area, Four Mile Run is tidally influenced; therefore, the appropriate habitat to support the Sensitive joint-vetch may occur within the study area.

[10] NPS, Plant Conservation Alliance, Alien Plant Working Group, *Least Wanted Fact Sheets*; and USDA National Invasive Species Information Center.
[11] Virginia Department of Game and Inland Fisheries, *Nuisance & Problematic Species, Accessed at:* http://www.dgif.virginia.gov/wildlife/nuisance/
[12] U.S. Fish & Wildlife Service, *Critical Habitat Portal*, June 2012, Accessed at: http://criticalhabitat.fws.gov/crithab/.

Species	Status	Notes/Documentation
Bald Eagle *(Haliaeetus leucocephalus)*	Bald and Golden Eagle Protection Act of 1940	The College of William & Mary Center for Conservation Biology does not report any bald eagle nests within the City of Alexandria or the study area specifically.
State listed Endangered, Threatened, Proposed, Candidate Species, and Species of Concern		
Appalachian Springsnail *(Fontigens bottimeri)*	State: Listed Endangered	This species may inhabit jurisdictions within the Potomac River basin, including the District of Columbia and Maryland. The VDCR-DNH Natural Heritage database reports potential species or habitat within Arlington County. USFWS lists the Appalachian springsnail as a Federal Species of Concern.
Wood Turtle *(Glyptemys insculpta)*	State: Listed Threatened	VDCR-DNH reports this species in the City of Alexandria. The City of Alexandria Master Plan's Water Quality Supplement (2001) states that "Wood Turtles can be found near clear brooks and streams in deciduous woodlands, although they have also been found in woodland bogs and marshy fields."

Sources:

1. U.S. Fish and Wildlife Service, Virginia Field Office. http://ecos.fws.gov/ipac/; Accessed April 3, 2012;
2. Virginia Department of Conservation and Recreation, Natural Heritage Resources by County. http://www.dcr.virginia.gov/natural_heritage/resources/display_counties.cfm; Accessed April 3, 2012.
   College of William & Mary, Center for Conservation Biology, *VaEagles Nest Locator*; Accessed at http://www.ccb-wm.org/virginiaeagles/locator.php; Accessed June 18, 2012.
3. City of Alexandria. City of Alexandria Master Plan: Water Quality Management Supplement, Adopted January 13, 2001. Accessed at, http://alexandriava.gov/uploadedFiles/tes/info/alexandria_water_quality_master_plan.pdf. Accessed on July 5, 2012.

2.2.1 Sensitive Joint-Vetch

Sensitive joint-vetch (*Aeschynomene virginica*) is a federally listed threatened plant species protected by the ESA. USFWS describes the plant as an "annual plant in the pea family (Fabaceae) that is native to the eastern United States." The plant is typically three feet in height but can reach heights of almost seven feet. **Figure 2-2** shows the plant in flower.

Figure 2-2: Sensitive Joint-Vetch

USFWS describes the habitat of the sensitive joint-vetch as:

"Occurring in slightly brackish tidal river systems, within the intertidal zone where populations are flooded twice daily. It typically occurs at the outer fringe of marshes or shores; its presence in marsh interiors may be a result of nutrient deficiencies, ice scouring, or muskrat herbivory. The sensitive joint-vetch is found in localities where plant diversity is high and annual species are prevalent. Bare to sparsely vegetated substrates appear to be a habitat feature of critical importance for establishment and growth of this species."

Although there are a number of isolated populations of the plant in Virginia, there have been no recorded instances of the plant in either the City of Alexandria or Arlington County.[13] There are a variety of stressors which have destroyed sensitive joint-vetch habitat within Virginia, including fuel leaks, boating activity, and shoreline stabilization programs.

In accordance with USFWS-Virginia policies and procedures, a field survey for the Sensitive joint-vetch was conducted by a USFWS-qualified surveyor on August 15th (within the USFWS-approved timeframe)

[13] *Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Sensitive Joint-Vetch (Aeschynomene virginica)*, 50 CFR 17.

when the plant is in flower or fruit. The surveyor did not find any species present within the study area (See **Appendix C** for complete results of the field survey). The surveyor did not recommend that any of the survey areas be designated as critical habitat.

2.2.2 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a bird species protected under federal law by the Bald and Golden Eagle Protection Act of 1940. Bald eagle habitat generally extends through the study area along the Potomac River. As described by USFWS, the Potomac River possesses the habitat qualities needed for the species, including its food sources: fish (the eagle's staple food) and other prey such as waterfowl, turtles, rabbits, snakes, other small animals and carrion. In addition to food supply, trees along the Potomac and tributaries provide shelter, good perching areas and nesting sites. No bald eagles are known to exist in the study area. The College of William & Mary Center for Conservation Biology maintains a database of bald eagle nests within the Commonwealth of Virginia and does not report any bald eagle nests within the City of Alexandria or the study area, specifically.(See **Appendix C** for VAEagles map.)

2.2.3 Appalachian Springsnail

The Appalachian springsnail *(Fontigens bottimeri)* is a freshwater and land snail (mollusk species) which is a state listed threatened species within Virginia. Habitat for the Appalachian springsnail is comprised of freshwater caves and small springs in isolated locations of the Potomac and Shenandoah River basin of Maryland, Virginia and the District of Columbia.[14]

USFWS has designated the springsnail as a "Federal Species of Concern" although it is not presently protected by the ESA. VDGIF regulates this species within the Commonwealth, and was contacted to provide a determination for potential project impacts to the species. VDGIF did not provide comment on the project in the agency's response letter. (See **Appendix C** for a copy of the VDGIF correspondence.)

2.2.4 Wood Turtle

The wood turtle (*Glyptemys insculpta*), is a turtle species that grows up to nine inches in length, with a keeled, sculptured (shell) carapace. The coloring of the wood turtle is dark brown to black, with areas orange or red pigment on the legs and neck. VDGIF describes wood turtle habitat as both terrestrial and aquatic; wood turtles require relatively moist terrestrial habitats throughout the year and aquatic areas during hibernation.[15]

Based on the VDGIF description, suitable habitat for the wood turtle may exist in the study area, although VDGIF indicates that the wood turtle prefers freshwater streams and wetlands. VDGIF reports one known occurrence of the species within the City of Alexandria but none in Arlington County (although suitable habitat may be present).

[14] NatureServe Explorer, *Appalachian Springsnail (Fontigens bottimeri),* Accessed at http://www.natureserve.org/explorer/.
[15] Virginia Department of Game and Inland Fisheries, *wood turtle (Glyptemys insculpta)*, Accessed at: http://www.dgif.virginia.gov/wildlife/information/?s=030062

3.0 Potential Effects

3.1 Permanent Effects

FTA completed a Project Review Certification Package which was submitted to the USFWS-Virginia Field Office on October 4, 2012. Based on the research efforts to complete the Project Review Certification Package, no permanent effects are anticipated to federally listed threatened or endangered species, and specifically the sensitive joint-vetch.

VDCR does not anticipate that the project would adversely impact natural heritage resources, threatened or endangered species under its regulatory authority. VDGIF did not comment on the project. As mentioned, VDCR and VDGIF correspondence is provided in **Appendix C**.

Impact analysis conclusions are presented in **Table 3-1**.

Table 3-1: Species Conclusion

Species / Resource Name	Analysis Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Sensitive Joint-Vetch (*Aeschynomene virginica*)	Species Not Present	No Effect	See **Appendix C** for U.S. Fish & Wildlife Service Project Review Certification Package for complete results of field survey.
Bald Eagle *(Haliaeetus leucocephalus)*	Unlikely to disturb nesting bald eagles.	No Eagle act permit required.	The study area is not located within 660 feet of a bald eagle nest. See **Appendix C** for VAEagles Map nest locations. The study area is located outside USFWS-designated *Eagle Concentrated Areas* in Virginia.
Appalachian Springsnail *(Fontigens bottimeri)*	No suitable habitat present.	Not a federally listed or candidate species	VDGIF did not provide any comment on the presence of this species or its habitat in the study area in the agency response letter.
Wood Turtle *(Glyptemys insculpta)*	Potential habitat present	Not a federally listed or candidate species	VDGIF did not provide any comment on the presence of this species nor its habitat in the study area in the agency response letter.

3.1.1 No Build Alternative

Under the No Build Alternative, there would be no impact to federally listed or state listed species, federally designated critical habitat for protected species, or study area ecosystems.

3.1.2 Build Alternatives

Table 3-2 provides estimates of permanent impacts for each type of habitat and Build Alternative.

Table 3-2: Permanent and Temporary Wetland and Upland Habitat Impacts (acres)

Habitat	Build Alternative		
	A (acres)	B (acres)	D (acres)
Emergent Wetland*	0.01	0.84	0.00
Forested Wetland*	0.00	0.30	0.18
Riverine Habitat	0.00	0.00	0.21
Wetland Total	**0.01**	**1.14**	**0.39**
Treed Upland	0.01	0.53	0.98

*Includes wetlands delineated with both USACE and NPS methodologies. For information on delineated wetland areas, including the separately delineated wetland areas using the USACE and NPS methodologies, see the Potomac Yard Metrorail Station EIS, *Waters of the U.S. (Including Wetlands) Delineation Report*, February 2012.

A permit for wetlands and stream impacts and mitigation would be sought in compliance with the Clean Water Act (CWA) Section 401 Water Quality Certification/Virginia Water Protection permit and Section 404 Wetlands permit process. The Section 401/404 permit would be obtained for the project prior to starting any work that would impact wetlands.

None of the Build Alternatives are anticipated to impact federally listed or state listed threatened or endangered species based on available data. A field survey for the presence of the sensitive joint-vetch was completed on August 15, 2012 and no species were found within the project study area. No federally designated National Wildlife Refuge or Critical Habitat exists in the study area; therefore, no impact is anticipated to these resources. Additionally, VDCR did not identify any state designated Natural Communities in the study area and no impact is anticipated to these resources.

Build Alternative A

Minimal impact to the study area habitat is anticipated for Build Alternative A. Build Alternative A maintains the same track alignment as the existing condition. The station platform locations and pedestrian bridges for Build Alternative A are proposed in locations that are already disturbed and fragmented by residential development and the Metrorail and CSXT corridors.

Build Alternative B

Build Alternative B would permanently impact wetland and upland habitat areas between the existing Metrorail alignment and the George Washington Memorial Parkway.

Build Alternative D

Build Alternative D would permanently impact wetland habitat areas in the location where a new bridge would be constructed over Four Mile Run. The bridge would be constructed approximately 75 feet east of the existing Metrorail Bridge. North of Four Mile Run, the tracks would be constructed on retained fill parallel to the unnamed tributary associated with Four Mile Run.

4.0 Mitigation Measures

4.1 No Build Alternative

As no project elements are proposed under the No Build Alternative, no mitigation is proposed.

4.2 Build Alternatives

As no National Wildlife Refuges, Critical Habitat or state-designated Natural Communities, or Threatened or Endangered species would be impacted, no mitigation is proposed.

The development and implementation of an Invasive Species Management Plan, which addresses the removal and management of invasive species, is proposed to mitigate overall habitat impacts by improving the quality of the natural habitat within the study area. The plan can serve as a reference for best practices and can support decisions and problem solving as progress is made in reaching vegetative condition goals. A management plan can help ensure consistency among several cooperating agencies, maintain continuity through project personnel changes, educate and engage stakeholders and citizens, and support efforts to obtain additional resources for invasive species management.

APPENDIX A:
References

Communications (personal, e-mails, memos)

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APPENDIX B:

List of Acronyms and Abbreviations

CCPY	Crystal City Potomac Yard Transitway
CFR	Code of Federal Regulations
CSXT	CSX Transportation
CWA	Clean Water Act
DNH	Division of Natural Heritage (Virginia Department of Conservation and Recreation)
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FTA	Federal Transit Administration
IPaC	Information, Planning and Consultation System (U.S. Fish & Wildlife Service)
NEPA	National Environmental Policy Act
NHP	Natural Heritage Program (Virginia Department of Conservation and Recreation)
NPS	National Park Service
PCB	Polychlorinated Biphenyls
Section 401	Section 401 of the Clean Water Act
Section 404	Section 404 of the Clean Water Act
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish & Wildlife Service
VAEagles	Virginia Bald Eagles Nest Locator (College of William & Mary, Center for Conservation Biology)
VDACS	Virginia Department of Agriculture and Consumer Services
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
WMATA	Washington Metropolitan Area Transit Authority
WOUS	Waters of the U.S.

APPENDIX C:

U.S. Fish & Wildlife Service

Project Review Certification Package

U.S. Department
of Transportation
**Federal Transit
Administration**

REGION III
Delaware, District of
Columbia, Maryland,
Pennsylvania, Virginia,
West Virginia

1760 Market Street
Suite 500
Philadelphia, PA 19103-4124
215-656-7100
215-656-7260 (fax)

OCT 2 2012

U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, Virginia 23061

Re: Online Project Review Certification Potomac Yard Metrorail Station Environmental Impact Statement City of Alexandria and Arlington County, Virginia

To Whom It May Concern:

The Federal Transit Administration (FTA) has reviewed the above-referenced project in accordance with the Virginia Field Office's online project review process and Section 7 of the Endangered Species Act (ESA). The FTA completed its review on September 12, 2012, and is submitting this project review package in accordance with the instructions. The Online Project Review Certification is provided as Attachment 1 and species conclusions table is provided in Table 1.

The proposed action consists of the construction of a new Metrorail Station located at Potomac Yard within the City of Alexandria. The Station would be along the existing Metrorail Blue and Yellow Lines between the Ronald Reagan Washington National Airport Station and the Braddock Road Station. The location of the project and the action area is provided in Attachment 2.

This project review is needed for the preparation of an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act and the ESA. The enclosed project review documentation was used to identify federally-listed species, critical habitat, and bald eagles. The project review documentation includes the search results of the IPaC query for the study area, bald eagles nest locator project query and a habitat photo log. Project review documentation is provided in Attachment 3.

The IPaC search indicated the potential for the presence of a federally-listed plant species within the study area, the Sensitive Joint Vetch (*Aeschynomene virginica*). To confirm the presence or absence of this plant species, consultants on behalf of FTA conducted a field survey for the Sensitive Joint Vetch within the approved survey timeframe. On August 15, 2012, the survey was completed by a USFWS qualified surveyor, John Brooks of Resource International, Ltd. No Sensitive Joint Vetch plant was identified by the surveyor, and the surveyor concluded there is marginal habitat potential for the Sensitive Joint Vetch within the study area. The survey report is provided in Attachment 4.

Both the Virginia Department of Conservation and Recreation (VDCR) and Department of Game and Inland Fisheries (VDGIF) were contacted to provide comment on the project. VDCR concluded that natural heritage resources would not be impacted by this project. VDCR and VDGIF correspondence and project determinations are provided in Attachment 5.

For additional information regarding this project or letter, please contact Daniel Koenig, Environmental Protection Specialist, of my staff at daniel.koenig@dot.gov or (202) 219-3528. Thank you for your cooperation.

Sincerely,

Brigid Hynes-Cherin,
Regional Administrator

Enclosures:

1) Table 1: Species Conclusion Table
2) Attachment 1: USFWS Online Project Review Certification Letter
3) Attachment 2: Project Description and Location Map
4) Attachment 3: Project Review Documentation
5) Attachment 4: Field Survey For Sensitive Joint Vetch Report
6) Attachment 5: VDCR and VDGIF Project Review and Correspondence

Attachment 1

On Line Project Review Certification Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

Date: Sep 12, 2012

Online Project Review Certification Letter

Project Name: Potomac Yard Metrorail Station Environmental Impact Statement

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Virginia Field Office online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the referenced project in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be mailed to the address on the letterhead for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. These conclusions resulted in "no effect" and/or "not likely to adversely affect" determinations for listed species and critical habitat and/or "no Eagle Act permit required" determinations for eagles regarding potential effects of your proposed project. We certify that the use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the "no effect" and "not likely to adversely affect" determinations for listed species and critical habitat and "no Eagle Act permit required" determinations for eagles. Additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of listed species, critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for one year.

Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html. If you have any questions, please contact Kimberly Smith of this office at (804) 693-6694, extension 124.

Sincerely,

/s/ Cynthia A. Schulz

Cindy Schulz
Supervisor
Virginia Field Office

Enclosures - project review package

Attachment 2

Project Description and Location Map

Project Description

1.0 INTRODUCTION

The Federal Transit Administration (FTA), as the lead federal agency, and the City of Alexandria, as the project sponsor and joint lead agency, prepared a Draft Environmental Impact Statement (Draft EIS) in accordance with the National Environmental Policy Act (NEPA) for the proposed Potomac Yard Metrorail Station ("the project"). The Draft EIS was prepared in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) and the National Park Service (NPS). **Figure 1** illustrates the study area location overlayed on a USGS Quandrangle Map.

1.1 Project Alternatives

The Draft EIS is evaluating a No Build Alternative and three Build Alternatives. Each Build Alternative includes the same area improvements as the No Build Alternative in addition to construction and operation of a Metrorail station.

1.1.1 No Build Alternative

The No Build Alternative is defined as the existing highway and transit network and committed transportation improvements from the National Capital Region Transportation Planning Board's Financially Constrained Long Range Plan (CLRP). The Draft EIS will assume that any improvements that are anticipated to be implemented by the project horizon year, whether physical or operational, are part of the No Build Alternative, with the exception of the new Metrorail Station at Potomac Yard.

The No Build Alternative includes the build-out of an internal street network within Potomac Yard (roughly from Four Mile Run to Braddock Road) and additional investments in transit and bicycle/pedestrian facilities. Anticipated transit investments include the Crystal City/Potomac Yard (CCPY) Transitway and an expansion of local transit service. The No Build Alternative also includes an off-street, multi-use trail through the planned linear park between Potomac Avenue and the CSXT right-of-way. This new off-street, multi-use trail will enhance access to the existing regional trail network, which serves both recreational users and commuters.

1.1.2 Build Alternatives

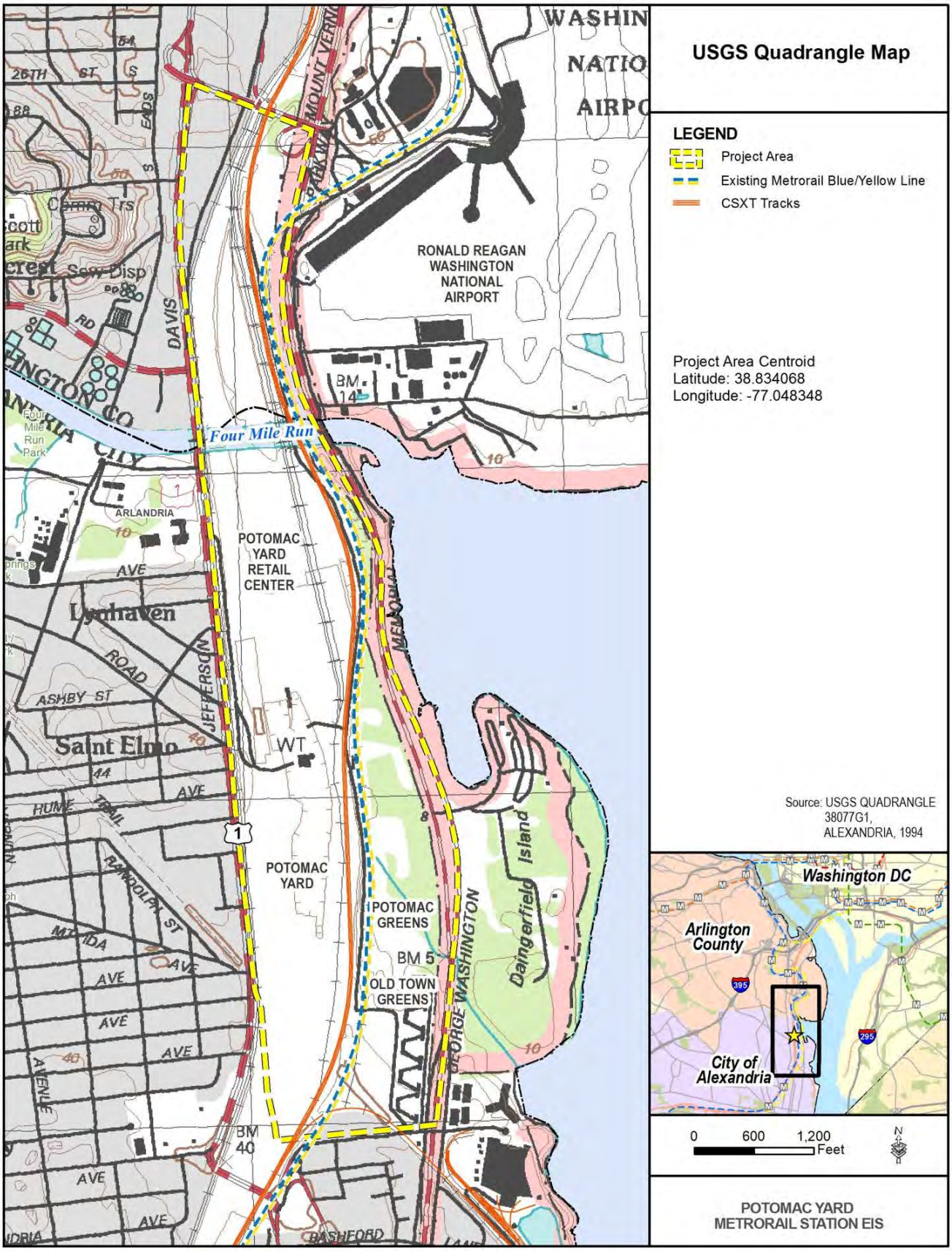
The Build Alternatives are described below and shown in **Table 1** and **Figure 2**.

Alternative A

Alternative A would be located between the CSXT Railroad tracks and the north end of the Potomac Greens neighborhood in the existing Metrorail Reservation easement designated during earlier planning efforts for the Potomac Yard area. The station would be at-grade with a side platform layout. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard, as well as pedestrian access to the Potomac Greens and Old Town Greens neighborhoods.

Alternative A would require minimal track realignment within the station area and would include construction of a double crossover located approximately 900 feet south of the station.

Figure 1: USGS Quadrangle Map



Alternative B

Alternative B would be located between the George Washington Memorial Parkway and the CSXT Railroad, north of the Potomac Greens neighborhood, and east of the existing Potomac Yard Retail Center and the CSXT right-of-way. The station would be at-grade. Additional station facilities would include two pedestrian bridges from the station over the CSXT right-of-way to the planned development in Potomac Yard and a pedestrian bridge over the proposed Metrorail alignment to provide access to the Potomac Greens and Old Town Greens neighborhoods.

Alternative B would require the realignment of approximately 650 feet of existing track, as well as the installation of approximately 1,450 feet of new track. Special track work – a double crossover – would be required approximately 100 feet north of the station.The new track and station would be built on retained fill, and a new retaining wall would be constructed on the east side of the track and station to support the structures.

Alternative D

Alternative D would be located west of the CSXT right-of-way near the existing Potomac Yard Retail Center. The station would be aerial with a center platform layout. One pedestrian bridge over the CSXT right-of-way would be constructed, connecting the neighborhoods of Potomac Greens and Old Town Greens to Potomac Avenue at East Glebe Road. The pedestrian bridge would be parallel to the adjacent new Metrorail bridge over the CSXT railroad, which is required to accommodate Alternative D and is described below.

Alternative D would require the realignment of approximately 550 feet of existing track, as well as the installation of approximately 5,800 feet of new track. The majority of new track would be elevated. Alternative D would also include construction of two Metrorail aerial bridges crossing the CSXT right-of-way to the north and south of the station, and a new, single span, aerial structure over Four Mile Run. Construction of a double crossover would be required in a location approximately 100 feet north of the station. During construction, two structures will be constructed over operating Metrorail tracks, north and south of the station. Following completion of construction, the old Metrorail tracks will be removed from service.

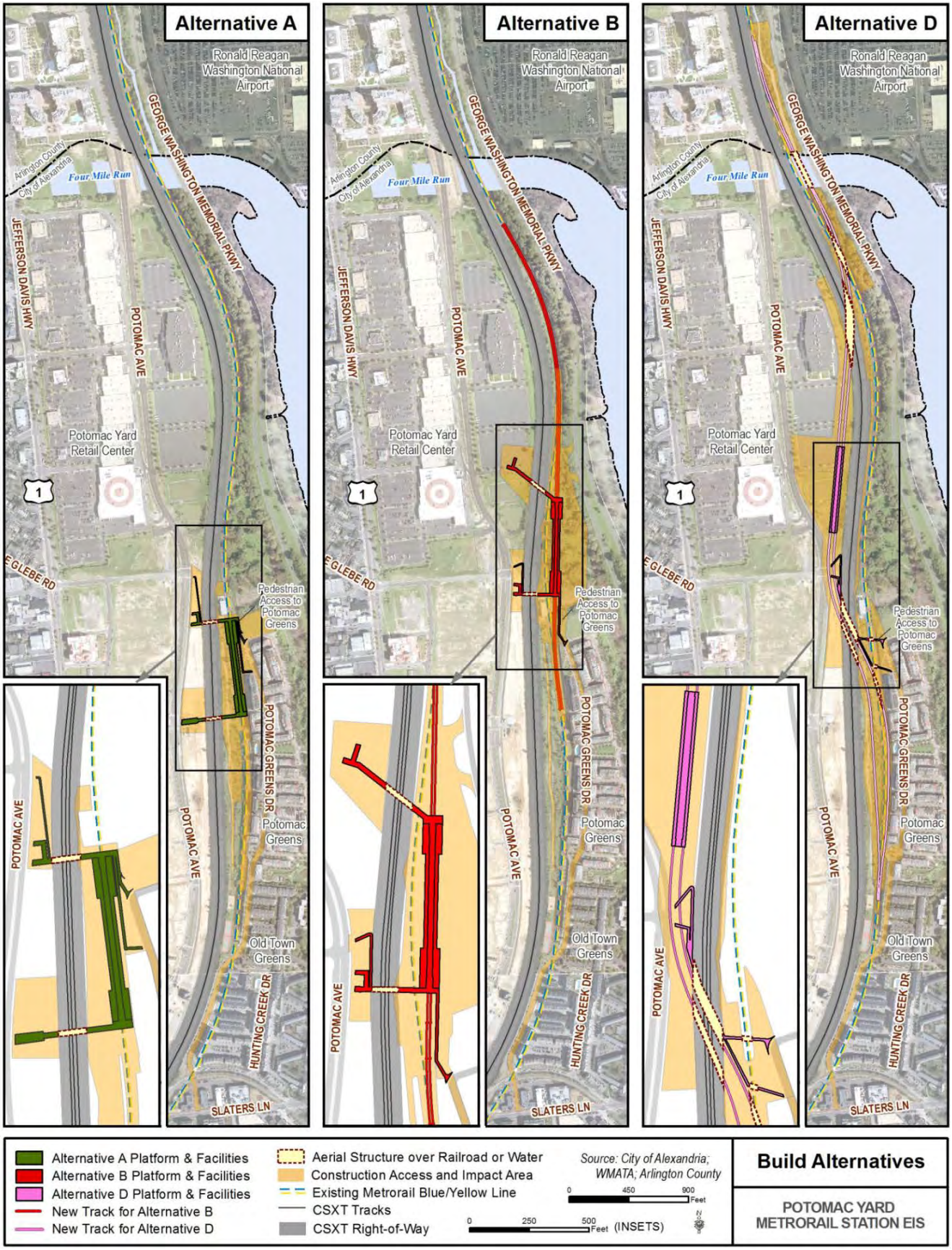
Additional structural improvements would include the removal and replacement of the existing retaining wall near the Potomac Greens neighborhood and the removal of an additional retaining wall west of the existing Metrorail tracks, north of the portal at the southern end of the neighborhood.

Table 1: Build Alternatives

Alternative	Type and Layout	Track Work	Facilities for Station Access	Additional Structures Required
A	At-grade, side platform	Use of existing alignment, minimal track work	Two pedestrian bridges over CSXT	None
B	At-grade, side platform	Realignment of 650 feet of existing track; installation of approx. 1,450 feet of new track	Two pedestrian bridges over CSXT, one pedestrian bridge over proposed Metrorail alignment	Retaining wall to support new track and station
D	Aerial, center platform	Realignment of approx. 550 feet of existing track; installation of approx. 5,800 feet of new track	One pedestrian bridge over CSXT	Two aerial structures over CSXT and existing Metrorail tracks, one Metrorail bridge over Four Mile Run, aerial track and supports, and retaining wall replacement on the east and west side of the tracks north of the Metrorail portal

Note: Structural items assume existing Blue and Yellow Line Metrorail track that is replaced would be removed.

Figure 2: Alternatives



Attachment 3

Project Review Documentation

IPaC Search Results

Center for Conservation Biology VaEagles Nest Locator Project Query

Habitat Photo Log

U.S. Fish and Wildlife Service

Natural Resources of Concern

This resource list is to be used for planning purposes only — it is not an official species-list.

Endangered Species Act species-list information for your project is available online and listed below for the following FWS Field Offices:

VIRGINIA ECOLOGICAL SERVICES FIELD OFFICE
6669 SHORT LANE
GLOUCESTER, VA 23061
(804) 693-6694
http://www.fws.gov/northeast/virginiafield/

CHESAPEAKE BAY ECOLOGICAL SERVICES FIELD OFFICE
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4500

Project Name:

Potomac Yard

U.S. Fish and Wildlife Service

Natural Resources of Concern

Project Location Map:

Project Counties:

District of Columbia, DC | Alexandria, VA | Arlington, VA

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-77.052335 38.8503469, -77.0470135 38.8495745, -77.0446961 38.8347279, -77.0424216 38.8287284, -77.0418637 38.8224542, -77.0510046 38.8210036, -77.052335 38.8503469)))

Project Type:

Transportation

U.S. Fish and Wildlife Service

Natural Resources of Concern

Endangered Species Act Species-list

There are a total of **1** species in your species-list

Species that may be affected by your project:

Flowering Plants				
Sensitive joint-vetch (*Aeschynomene virginica*)	Threatened	species info		Virginia Ecological Services Field Office

FWS National Wildlife Refuges

There are no refuges found within the vicinity of your project.

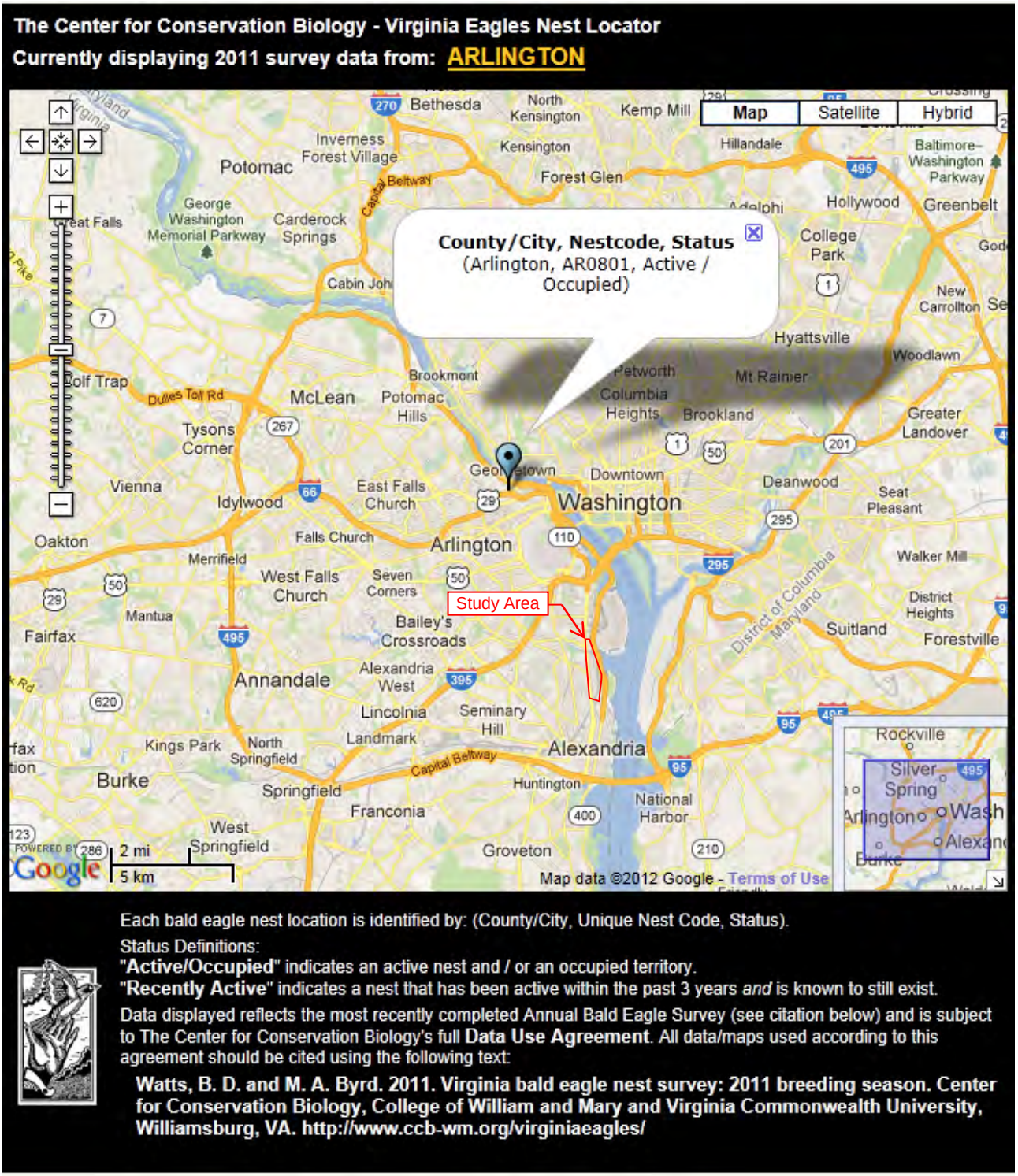
FWS Migratory Birds

Not yet available through IPaC.

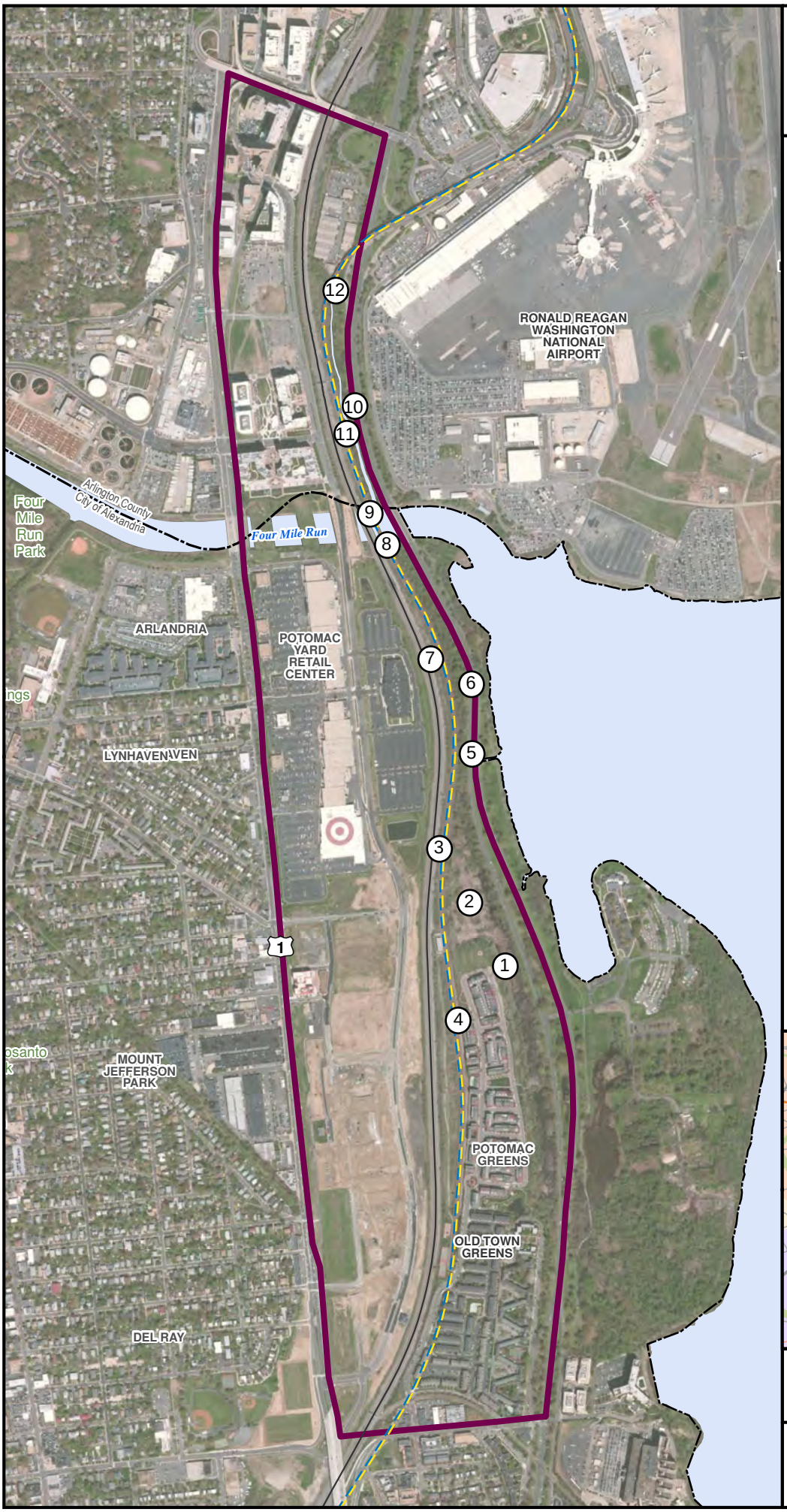
FWS Delineated Wetlands

Not yet available through IPaC.

VAEagles Nest Map



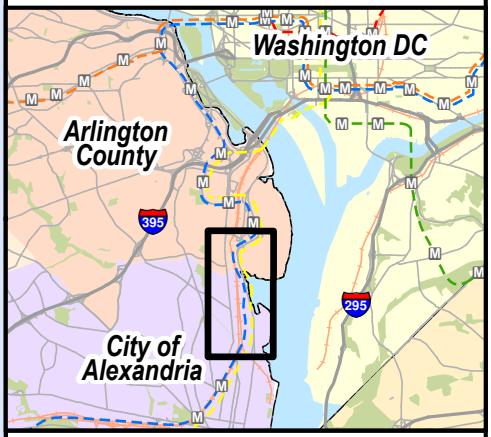
Source: College of William and Mary, Center for Conservation Biology, *VAEagles, Virginia's Bald Eagle Information Site*, Accessed at: http://www.ccb-wm.org/virginiaeagles/index.htm, Access Date: June 22, 2012.



HABITAT PHOTO LOG KEY MAP

LEGEND

- Project Area
- DEL RAY Neighborhood
- Existing Metrorail Blue/Yellow Line
- CSXT Tracks
- (1) Photo Location



0 600 1,200 Feet

N

POTOMAC YARD METRORAIL STATION EIS

Photo 1 – Northeast - Emergent Wetland w/ phragmites

Photo 2 – North - Board walk area showing mile-a-minute and porcelainberry

Photo 3 – East - Porcelainberry dominating site

Photo 4 – South – Drainage ditch along WMATA track

Photo 5 – West - Northern tip of forested wetland along GW Parkway

Photo 6 – West - Upland forested area along GW Parkway

Photo 7 – East – Forested area shot from WMATA R-O-W

Photo 8 – East – Upland slope down to Four Mile Run

Attachment 4

Field Survey For Sensitive Joint Vetch Report

Direct Dial (804) 550-9212
jbrooks@resourceintl.com
http://www.resourceintl.com

RESOURCE
INTERNATIONAL, LTD.
ENGINEERS • SCIENTISTS • SURVEYORS • PLANNERS

September 7, 2012

P.N. 212029.01

Mr. Mark Niles
AECOM
2101 Wilson Boulevard, 8th Floor
Arlington, VA 22201

RE: Field Survey For Sensitive Joint Vetch (*Aeschynomene Virginica*)
Potomac Yard Metrorail Station EIS
Alexandria, Virginia

Dear Mr. Niles:

Attached is a field survey report for sensitive joint vetch (*Aeschynomene virginica*) on the above referenced project. As indicated in the enclosed report, no sensitive joint-vetch plants were found and the habitat was marginal during the study.

We trust that the information provided meets your needs. If you have any questions, we may be reached at the above referenced sources.

Sincerely,

John H Brooks, PWD #3

John H. Brooks, III, PWD
Vice President - Environmental
Virginia Certified Professional Wetland Delineator, No. 3
Certified Surveyor for Small Whorled Pogonia, Swamp Pink and Sensitive Joint Vetch

/aw

Enclosure

FIELD SURVEY FOR SENSITIVE JOINT VETCH (*Aeschynomene virginica*) POTOMAC YARD METRORAIL STATION ENVIRONMENTAL IMPACT STATEMENT AT ALEXANDRIA, VIRGINIA

SEPTEMBER 2012

PREPARED FOR:

Mr. Mark Niles
AECOM
2101 Wilson Boulevard, 8th Floor
Arlington, VA 22201

P. N. 212029.01

RESOURCE INTERNATIONAL, LTD.

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(804) 550-9200 • FAX (804) 550-9259
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FIELD SURVEY FOR
SENSITIVE JOINT VETCH (*Aeschynomene virginica*)
POTOMAC YARD METRORAIL STATION ENVIRONMENTAL IMPACT STATEMENT
ALEXANDRIA, VIRGINIA

PREPARED FOR:

Mr. Mark Niles
AECOM
2101 Wilson Boulevard, 8th Floor
Arlington, VA 22201

September 2012
Resource International, Ltd. Job No. 212029.01

John H. Brooks, III
Vice President – Environmental Services
VA Certified Professional Wetland Delineator, No. 3
Certified Surveyor for Small Whorled Pogonia, Swamp Pink, and Sensitive Joint Vetch

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Figures 1 through 6: Site Location and Topography, National Wetland Inventory, Key Map, and Site Maps

PHOTOGRAPHS

Photographs 1 through 24: Representative Photographs of Study Area

APPENDICES

Appendix A: Representative Photographs Sensitive Joint Vetch (*Aeschynomene virginica*)

Appendix B: Representative Site Photographs

1.0 EXECUTIVE SUMMARY

This report presents the results of an investigation conducted to identify and record the presence or absence of the federally protected sensitive joint vetch (*Aeschynomene virginica*) or habitat. The investigation was conducted within the project limits of proposed alternative alignments of Metrorail Station located at the Potomac Yard, along the existing Metrorail Blue and Yellow Lines essentially between Ronald Regan Washington National Airport and Carpenter Road in within Arlington and Alexandria, Virginia (the project). The project area includes approximately 117.5 acres, including approximately 15.08 acres, which is considered waters of the United States (including wetlands and streams). This area has been collectively classified by the State and Federal Agencies as the Area of Potential Effect (APE), where the habitat for sensitive joint vetch is confined to the wetlands, and areas directly adjacent to the waters of the United States (U.S.).

This investigation was performed by Resource International, Ltd. (Resource) of Ashland, Virginia, under contract with AECOM of Arlington, Virginia. This report is provided for the sole use of AECOM, Federal Transit Administration, The City of Alexandria, Virginia, the U.S. Fish and Wildlife Service, and their designated representatives. Use of this report by any other parties will be at the risk of the party. Resource disclaims liability for any use or reliance by other parties.

The project is located in the City of Alexandria and Arlington County, Virginia. The potential for sensitive joint vetch habitat exists and would potentially support the threatened plant species. Section 7 Coordination was initiated as a part of a draft Environmental Impact Statement (EIS), where a project review was coordinated through the U.S. Fish and Wildlife Service's Information, Planning, and Conservation (IPAC) System (a.k.a. Virginia USFWS Field Office Project Review Process), an on-line project review application. Step 4 of the process determined that suitable habitat could exist with in the APE, and therefore in accordance with Step 7, a determination was required. Thus, an investigation for the presence of sensitive joint vetch and potential habitat is required. The findings in this report are meant to meet the Section 7 Coordination.

The U.S. Fish and Wildlife Service (USFWS) stipulate that surveys for sensitive joint vetch occur between August 15 and October 15, when the sensitive joint vetch is in flower or fruit and when the best conditions and most identifiable specimens persist. The USFWS also states that surveys conducted outside of this period may allow for identification of suitable habitat. Therefore, a habitat evaluation was conducted on August 13 and 14, 2012 to determine the areas where suitable habitat was present, and then the survey was conducted on August 15, 2012. All activities were site supervised and conducted by a surveyor certified by the U.S. Fish and Wildlife Service.

Three areas were surveyed and documented on site and included in this report. The areas within the APE consisted of tidal wetlands, tidal streams, non-tidal wetlands, non-tidal streams, those area topographically defined by elevation to be within the tidal influence of the Potomac River in

accordance with local tide stations, upland, and man-dominated habitats directly adjacent to the wetland areas. Man-dominated areas, upland areas, non-tidal forested wetlands, and non-tidal streams were eliminated first due to these areas not being suitable habitat for the sensitive joint vetch. On August 13 and 14, 2012 observations and pedestrian surveys were conducted in these areas in order to document that lack of habitat. Tidal wetlands, tidal streams, and those areas within the tidal elevations as documented by local tidal stations in the APE were surveyed on August 15, 2012. The survey for sensitive joint vetch was conducted by walking GPS controlled transects at 15-foot intervals through the areas documented as habitat. No sensitive joint vetch plants were identified during this survey.

2.0 SPECIES DESCRIPTION

2.1 Species Characteristics

Sensitive joint vetch (*Aeschynomene virginica*) is a robust, bushy-branched annual legume native to the eastern United States. Populations currently exist in Maryland, New Jersey, Virginia, and North Carolina. In Virginia, populations are most often found along the Potomac, Mattaponi, Chickahominy, and James Rivers and their tributaries. This herb usually grows to a height of three to six feet in a single growing season, and has been documented to grow as tall as eight feet. The "butterfly like" flowers are yellow, streaked with red and can be reddish purple. Sensitive joint vetch typically occurs at the outer fringe of marshes or shores; its presence in marsh interiors may be result of nutrient deficiencies, ice scouring, or muskrat herbivory. Threats to this species include sedimentation, competition from non-native plant species, dams, dredging, filling, recreational activities, shoreline stabilization, shoreline structures, road and bridge construction, etc.

Sensitive joint vetch is a robust, bushy-branched annual legume, usually between 20-39 inches (0.5-1 m) tall, but can grow to be taller. It is sensitive to light and usually to touch. Stems are single and branch near the top. Leaves are compound, divided pinately into 30-56 leaflets. The leaves are 0.8-5 inches (2-12 cm) long, the leaflets are usually no longer than 0.4 inches (1 cm) long, and 0.08-0.12 inch (2-3mm wide), with toothed edges. Flowers grow in a long cluster with each flower on its own short lateral stem and accompanied by reduced leaves. Petals are yellowish- to reddish-purple, about 0.4-0.6 inch (1-1.5 cm) long and irregular, legume-like. The dry fruit are legumes, 1.2-2.4 inches (3-6 cm) long; made up of about 6-10 segments that turn dark brown when ripe.

2.2 Species Habitat

Sensitive joint vetch grows in the intertidal zone where plants are flooded twice daily. The species seems to prefer the marsh edge at an elevation near the upper limit of tidal fluctuation. It is usually found in areas where plant diversity is high (50 species per acre) and annual species predominate. Bare to sparsely vegetated substrates appear to be a habitat feature of critical importance to this plant. As an annual, it requires such microhabitats for establishment and growth. Such areas may include accreting point bars that have not yet been colonized by

perennial species, low swales within extensive marshes, or areas where muskrats have eaten most of the vegetation. It is frequently found in the estuarine meander zone of tidal rivers where sediments transported from upriver settle out and extensive marshes are formed. The substrate may be sandy, muddy, gravelly, or peaty.

2.3 Life History

The sensitive joint vetch occurs in fresh to slightly brackish tidal river systems, within the intertidal zone where populations are flooded twice daily. It typically occurs at the outer fringe of marshes or shores; its presence in marsh interiors may be a result of nutrient deficiencies, ice scouring, or muskrat herbivory. The sensitive joint vetch is found in localities where plant diversity is high and annual species are prevalent. Bare to sparsely vegetated substrates appear to be a habitat feature of critical importance for establishment and growth of the species. Plants flower from July through September and into October in some years. Fruits are produced from July through late October, concurrent with flowering. Seedlings may germinate in "flotsam" of plant material that has been deposited on the riverbank.

Appendix A presents representative photographs of sensitive joint vetch.

2.4 Species Status

The extirpation of sensitive joint vetch from Delaware and Pennsylvania and its elimination from many sites in other States can be directly attributed to habitat destruction. Many of the marshes where it occurred historically have been dredged and/or filled and the riverbanks stabilized with bulkheads or riprap. Other threats include sedimentation, competition from exotic plant species, recreational activities, agricultural activities, mining, commercial and residential development with associated pollution and sedimentation, impoundments, water withdrawal projects and introduced insect pests.

Currently, only two sites (one in New Jersey and one in Virginia) across the entire range of the species are afforded land protection. These protected sites are still subject to off-site threats such as sedimentation and water withdrawal projects. The Virginia Department of Conservation and Recreation's Division of Natural Heritage is determining general threats on-site and off-site for the Virginia populations. They are also providing selective on-site conservation planning.

3.0 FIELD SURVEY

The U.S. Fish and Wildlife Service (USFWS) stipulates that surveys for the sensitive joint vetch occur between August 15 and October 15, when the plant is most likely in flower or bearing fruit, which is the most opportune time for identification. However, the USFWS also states that surveys conducted outside of these periods may allow for identification of suitable habitat. Therefore, a habitat evaluation was conducted on August 13 and 14, 2012, to determine the areas where suitable habitat was present, then the survey was conducted on August 15, 2012. All activities were site supervised and conducted by a surveyor certified by the USFWS.

3.1 Survey Method

The project limits of proposed alternative alignments of Metrorail Station located at the Potomac Yard, along the existing Metrorail Blue and Yellow Lines essentially between Ronald Regan Washington National Airport and Carpenter Road in within Arlington and Alexandria, Virginia (the survey area). The survey area is approximately 117.5 acres in size of which approximately 15.08 acres is waters of the United States (including wetlands and streams). This area has been collectively classified by the State and Federal Agencies as the Area of Potential Effect (APE), where the habitat for sensitive joint vetch is confined to the wetlands, and areas directly adjacent to the waters of the United States (U.S.).

The investigation for the presence or absence of sensitive joint vetch (*Aeschynomene virginica*) was conducted in the Area of Potential Effect (APE) as defined by the AECOM's Section 7 Coordination through the USFWS's Information, Planning, and Conservation (IPAC) System, an on-line project review application. Step 4 of the process determined that suitable habitat could exist with in the APE, and therefore in accordance with Step 7, a suitable habitat determination and species habitat survey was required. Thus, an investigation for the presence of sensitive joint vetch and potential habitat was required.

An off-site investigation was performed first, followed by an on-site investigation. The off-site investigation was conducted by a review of the following available data:

- U.S.G.S. Topographic Maps, 7.5 Minute Quadrangles, Alexandria, Virginia – District of Columbia - Maryland, 1965, Photo revised 1993, Bathymetry added 1982 (Figure 1).
- Google Earth images of the APE
- Proposed plans prepared and provided by AECOM dated May 30, 2012

Three areas were surveyed and documented on site and included in this report. Area 1 was an unnamed tributary of Four Mile Run, which was tidal along the lower section of the stream. Area 2 was the northern and southern banks of Four Mile Run, which is a tidal stream. Finally, Area 3, was a tidal and non-tidal wetland system south of Four Mile Run, which drains to the east through a tidal stream system, which has been culverted and directed under George Washington Memorial Parkway. Figures 1 and 2 depict the general mapping, topography, and a representation of wetlands and streams potentially in the APE. Figures 3 through 6 depict more site specific information from information provided by AECOM, as well as, the results of the site habitat evaluation conducted on August 13 and 14, 2012, and the site survey of habitat conducted on August 15, 2012.

Areas within the APE consisted of tidal wetlands, tidal streams, non-tidal wetlands, non-tidal streams, those area topographically defined by elevation to be within the tidal influence of the Potomac River in accordance with local tide stations, upland, and man-dominated habitats directly adjacent to the wetland areas. Man-dominated areas, upland areas, non-tidal forested wetlands, and non-tidal streams were eliminated first due to these areas not being suitable habitat for the sensitive joint vetch. On August 13 and 14, 2012 observations and pedestrian surveys

were conducted in these areas in order to document that lack of habitat with in the APE. Tidal wetlands, tidal streams, and those areas within the tidal elevations as documented by local tidal stations in the APE were surveyed on August 15, 2012. The survey for sensitive joint vetch was conducted by walking GPS controlled transects at approximate 15-foot intervals through the areas documented as habitat.

All areas were evaluated for the habitat requirements of the sensitive joint vetch, and those areas meeting the habitat requirement were surveyed. Each area evaluated and surveyed is described in the following section.

3.2 Results

3.2.1 Area 1: Unnamed Tributary of Four Mile Run

Area 1 is an unnamed tidal/non-tidal stream located to the north of Four Mile Run. The stream flows to the south, where its headwater originate from a piped system most likely associated with an upstream stormwater collection and control system. The unnamed tributary appears to have been straightened, and subsequently hardened with riprap for the length of the stream. The upstream portion of the stream is non-tidal that contains step pools allowing the stream to flow through a deeply entrenched stream system at a slope ranging from three to five percent. The stream had a hardwood-forested buffer on either side that had an average total width of approximately 40 to 60 feet. This section of highly degraded, laterally contained, non-tidal stream does not have the potential habitat to support sensitive joint vetch.

The tidal portion of the unnamed stream had a slope much less than one percent, but existed in much the same condition as the non-tidal portion upstream. The riprap lined edges, although buried by sediment over time offered very marginal habitat for sensitive joint vetch. A survey along the banks of the unnamed stream found no sensitive joint plants. The vegetation along most of the unnamed tributary consisted of white oak (*Quercus alba*), willow oak (*Quercus phellos*), box elder (*Acer negundo*), silver maple (*Acer saccharinum*), black locust (*Robinia pseudoacacia*), red mulberry (*Morus rubra*), Virginia creeper (*Parthenocissus quinquefolia*), empress tree (*Paulownia tomentosa*), and poison ivy (*Toxicodendron radicans*). Area 1 is depicted on Figure 4 and representative pictures of the reach are shown in photographs 1 through 4 and 17. This tidal section of the unnamed tributary had marginal habitat for sensitive joint vetch, due to the riprap lined banks, highly degraded and latterly contained stream that did not offer the high species diversity tidal flats due to the steep banks of the stream. A survey for sensitive joint vetch found no plants.

3.2.2 Area 2: Northern and Southern Banks of Four Mile Run

Area 2 is the northern and southern banks of Four Mile Run, where a series of bridges span Four Mile Run, providing significant shading. Four Mile Run is a tidal stream,

where both banks are lined from below mean low water (MLW) to above mean high water (MHW) with gabion baskets filled with medium to large size quarried stone. The sediment transported by Four Mile Run has filled the gaps between the rocks on some portions of this area, which has allowed pioneer species to establish. Typical vegetation observed on the banks consisted of Virginia creeper, dodder (*Cuscuta compacta*), porcelain berry (*Ampelopsis brevipedunculata*), red mulberry, silver maple, mimosa (*Albizia julibrissin*), dotted smartweed (Polygonum punctatum), morning glory (*Ipomea* sp.), poison ivy, blackberry (*Rubus allegheniensis*), and common dayflower (*Commelina communis*). Figure 4 and representative pictures of the reach are shown in photographs 5 through 6, 18, and 19. Four Mile Run had marginal habitat for sensitive joint vetch, due to the gabion baskets located from MLW to MHW which limited the area where seed would germinate and created more competition because of the reduced habitat. A survey for sensitive joint vetch found no plants.

3.2.3 Area 3: Tidal Wetland and Streams South of Four Mile Run

Area 3 is comprised of a non-tidal forested and emergent, tidal emergent wetland stream system located in the southern area of the APE. The system essentially collects water from multiple flow directions and then conveys the water through a culverted stream that flows under the George Washington Memorial Parkway to the Potomac River. Area 3 was subdivided into three areas (Areas 3a – 3c) that were distinguished as sub-watersheds, segments of the same watershed subdivided by roads, or areas with different habitats and cover types. Theses sub-areas are discussed as they occur in Area 3 progressing from the north to the south.

Area 3a

In the northern portion of Area 3, a non-tidal headwater wetland that coveys water to a concrete cistern, to the east through a culvert under the George Washington Parkway, and then outfalls to the Potomac River through an off site small tidal stream that has been straightened (Area 3a). The vegetation in the headwater non-tidal wetland consisted of river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), highbush blueberry (*Vaccinium corymbosum*), green briar (*Smilax rotundifolia*), and poison ivy. The elevations in this area were consistent with other areas within the APE that were under tidal influence; however the area was man-manipulated and the installation of the cistern may have severed the past tidal connectivity that this area may have seen in the past. Therefore, this non-tidal headwater wetland was not considered as habitat. Figure 5 and representative pictures of the reach are shown in photographs 7 through 9.

Area 3b

In the median of the George Washington Memorial Parkway, a tidal portion of a stream with adjacent tidal and non-tidal wetland is located between two culverts under the north and southbound lanes. The vegetation in the tidal and non-tidal wetlands consist of

sycamore (*Platanus occidentalis*), mokernut hickory (*Carya tomentosa*), staghorn sumac (*Rhus typhina*), red mulberry, flowering dogwood, multiflora rose (*Rosa multiflora*), porcelain berry, false nettle (*Boehmeria cylindrica*), common day flower, poison ivy, English ivy (*Hedera helix*), and broad leaf arrowhead (*Sagittaria latifolia*), as well as unvegetated tidal flats. This area possessed suitable habitat and was surveyed for sensitive joint vetch; however, no plants were found. As a precaution, the stream was surveyed downstream to its confluence with Potomac Bay, and again no plants were found. Figure 5 and representative pictures of the reach are shown in photographs 10, 11, 20, and 21.

Area 3c

Located to the west of the southbound lane of the George Washington Memorial Parkway is the upstream portion of the same tidal stream, which has both adjacent tidal and non-tidal wetland. The vegetation in the tidal and non-tidal wetlands consist of red maple (*Acer rubrum*), box elder, red mulberry, sycamore, black willow (*Salix nigra*), black locust, flowering dogwood (*Cornus florida*), elderberry (*Sambucus canadensis*), blackberry, poison ivy, honey suckle (*Lonicera japonica*), jewel weed (*Impatiens capensis*), muscadine grape (*Vitis rotundifolia*), and Pennsylvania smartweed (*Polygonum pensylvanicum*), as well as tidal flats overlain by the remnants of a former beaver dam that I was told had been removed by the National Park Service in February 2012. Even though the beaver dam created a natural barrier that could have severed the tidal connection for multiple years, this area was surveyed for sensitive joint vetch. Due to the beaver activity, low species diversity, and a number of invasive species, this area would be marginal habitat. The upstream application of Accord could have also reduced the habitat value downstream. No sensitive joint vetch was found in this area.

Located just upstream of the culvert two streams converge to form the stream that flows under George Washington Memorial Parkway. The vegetation in this area is comprised of some green ash, and red maple, but is dominated by Pennsylvania smartweed, tussock sedge (*Carex stricta*), phragmites (*Phragmites australis*), tear thumb (*Polygonum sagittatum*), arrow arum (*Peltandra virginica*), and rose mallow (*Hibiscus moscheutos*). This area was habitat, and due to the size of this area transects were employed at 15 foot intervals and the entire area was traversed. Although it was found out later, this habitat was more marginal than first thought due to the National Park Service's application of Accord, a glycophosphate containing herbicide. The application was recent as indicted by the signs (see photographs 14 and 15, specifically) located along the perimeter of this entire area. Figures 5 and 6, and representative pictures of the area are shown in photographs 13, 16, 22, 23, and 24. Non-tidal forested wetlands, non-tidal beaver ponds, and non-tidal herbaceous areas upgradient from the tidal areas were eliminated as possible habitat due to the lack of tidal influence, the disconnect provided by the active beaver dams, as well as, the prevalence of phragmites. Figures 5 and 6, and representative pictures of the area are shown in photographs 12, 14, and 15.

4.0 Summary

Potential habitats for sensitive joint vetch (*Aeschynomene virginica*) were found in the APE during this investigation. The habitat was mostly marginal. The potential habitat was searched via transects and pedestrian traverse methods - based on the most effective search method for the habitat. Additional areas were eliminated as habitat, and thus were not searched; however, due to the confined and small size of these areas, if one or more plants were present, they would have been identified, and documented.

No sensitive joint vetch plants were identified during this survey and given the lack of seed source from an identified population of sensitive joint vetch in the area; it would be unlikely that this species would be found in this area in future years.

5.0 REFERENCES

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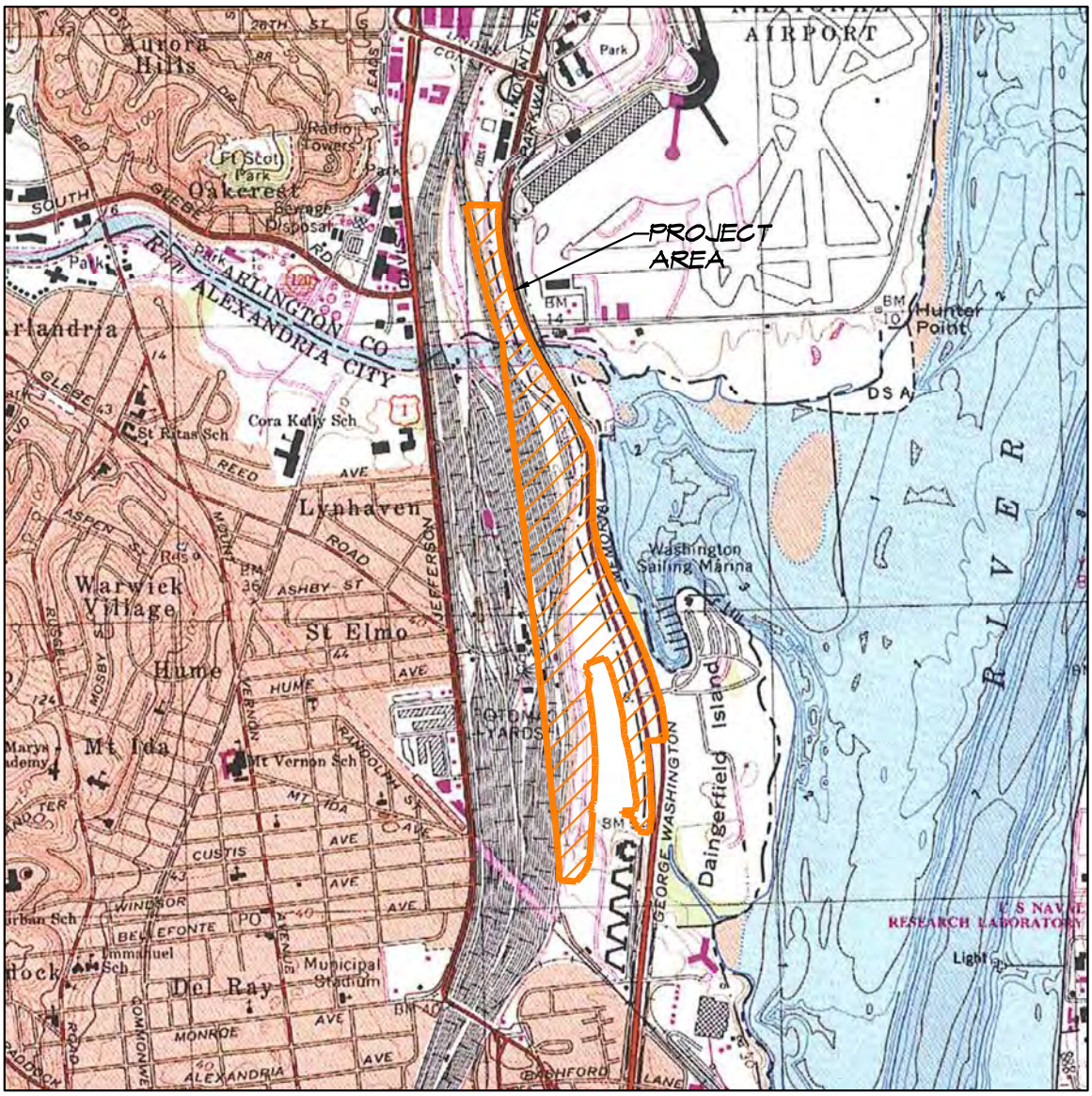
Radford, A. E., H. E. Ahles, C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press: Chapel Hill, North Carolina.



U.S.G.S. 7.5 SERIES QUADRANGLES
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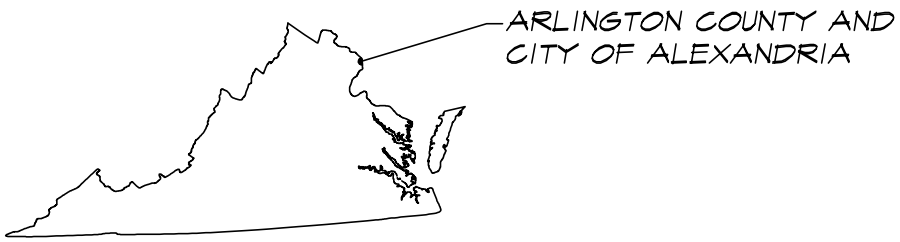
(BATHYMETRY ADDED 1982)
SCALE: 1" = 2,000'



NOTE: ALL LOCATIONS ARE APPROXIMATE.

FIGURE 1
SITE LOCATION AND
TOPOGRAPHY MAP
POTOMAC YARD METRORAIL STATION
SENSITIVE JOINT VETCH SURVEY
CITY OF ALEXANDRIA AND
ARLINGTON COUNTY, VIRGINIA
AUGUST 16, 2012

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United States Fish and Wildlife Service, National Wetlands Inventory (NWI) Map,
7.5 Minute Quadrangle, Alexandria, VA-D.C.-MD
Available URL: htt;://wetlandsfwser.usgs.gov/wtlndws/launch.html.
Accessed: [08142012], Scale: 1" = 1,500'

NWI LEGEND

PF01C	-	PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, SEASONAL.
PF01Eh	-	PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, SEASONAL SATURATED, DIKED/IMPOUNDED.
PF01S	-	PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, TEMPORARY TIDAL.
PF04Ch	-	PALUSTRINE, FORESTED, NEEDLE-LEAVED EVERGREEN, SEASONAL, DIKED/IMPOUNDED.
PEM1Eh	-	PALUSTRINE, EMERGENT, PERSISTENT, SEASONAL SATURATED, DIKED/IMPOUNDED.
PSS1Ch	-	PALUSTRINE, SCRUB/SHRUB, BROAD-LEAVED DECIDUOUS, SEASONAL, DIKED/IMPOUNDED.

NOTE: ALL LOCATIONS ARE APPROXIMATE.

FIGURE 2
SITE LOCATION AND
TOPOGRAPHY MAP
POTOMAC YARD METRORAIL STATION
SENSITIVE JOINT VETCH SURVEY
CITY OF ALEXANDRIA AND
ARLINGTON COUNTY, VIRGINIA
AUGUST 16, 2012

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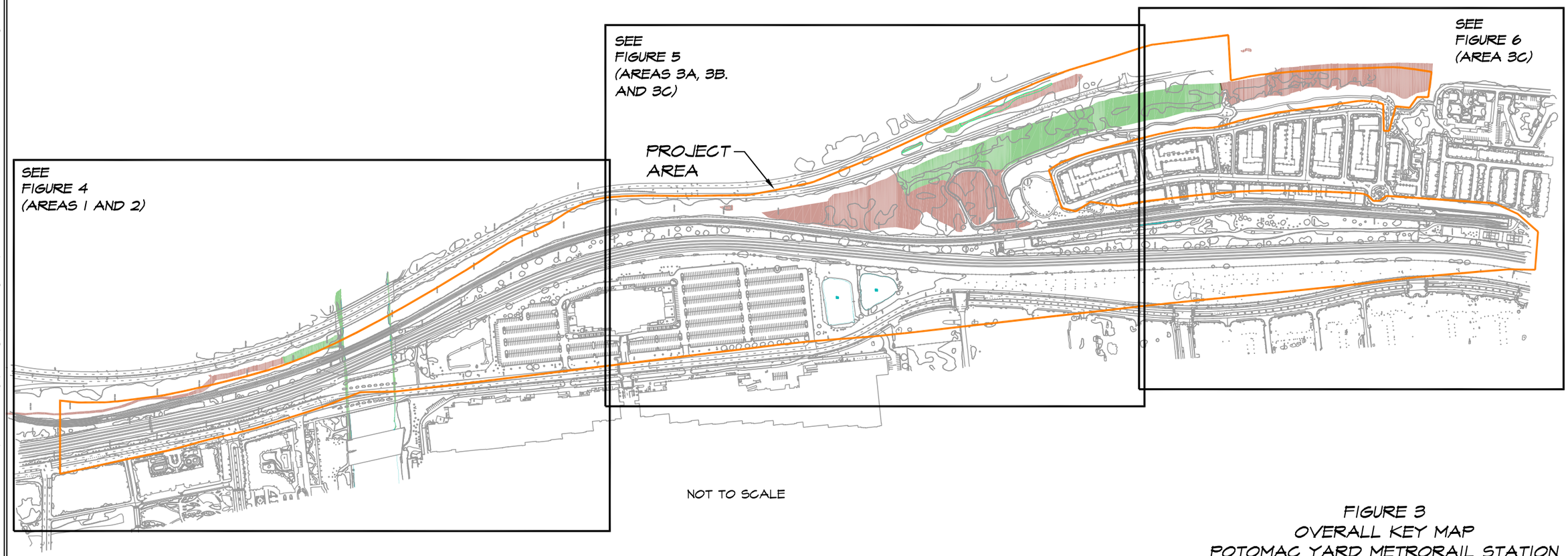

NOT TO SCALE

FIGURE 3
OVERALL KEY MAP
POTOMAC YARD METRORAIL STATION
SENSITIVE JOINT VETCH SURVEY
CITY OF ALEXANDRIA AND
ARLINGTON COUNTY, VIRGINIA
SEPTEMBER 7, 2012

NOTE: ALL LOCATIONS ARE APPROXIMATE.

NOTE:
THE BASE INFORMATION WAS TAKEN FROM
A DRAWING PROVIDED BY AECOM.

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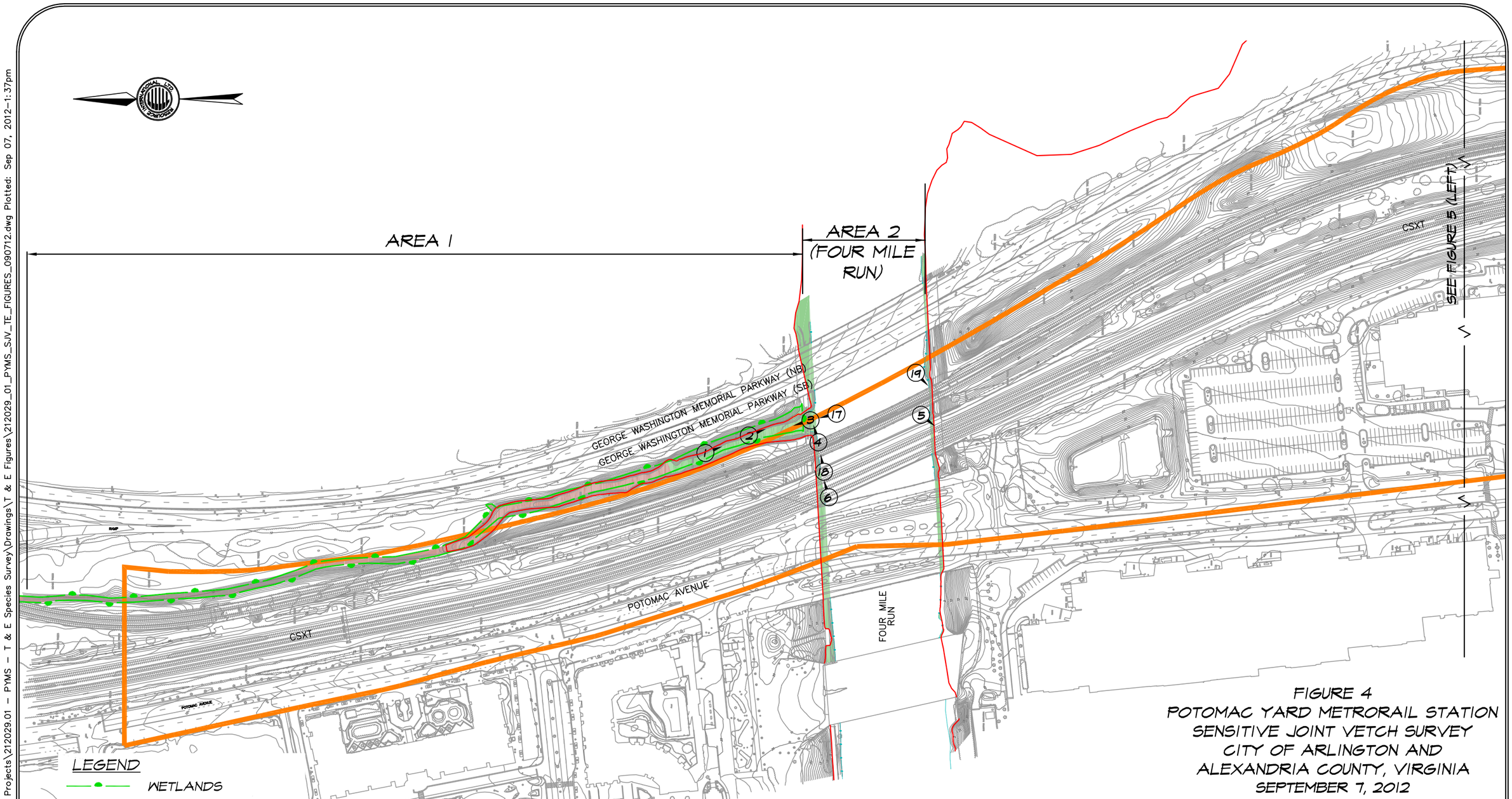

LEGEND

- WETLANDS
- PERENNIAL STREAM
- INTERMITTENT STREAM
- HABITAT (MARGINAL)
- NOT SUITABLE HABITAT
- ADDITIONAL STUDY AREA
- APPROXIMATE MEAN HIGHWATER ELEVATION (3FT MSL)
- (1) PHOTOGRAPH LOCATION AND ORIENTATION

200 0 100 200
(IN FEET)
1 inch = 200 ft.

FIGURE 4
POTOMAC YARD METRORAIL STATION
SENSITIVE JOINT VETCH SURVEY
CITY OF ARLINGTON AND
ALEXANDRIA COUNTY, VIRGINIA
SEPTEMBER 7, 2012

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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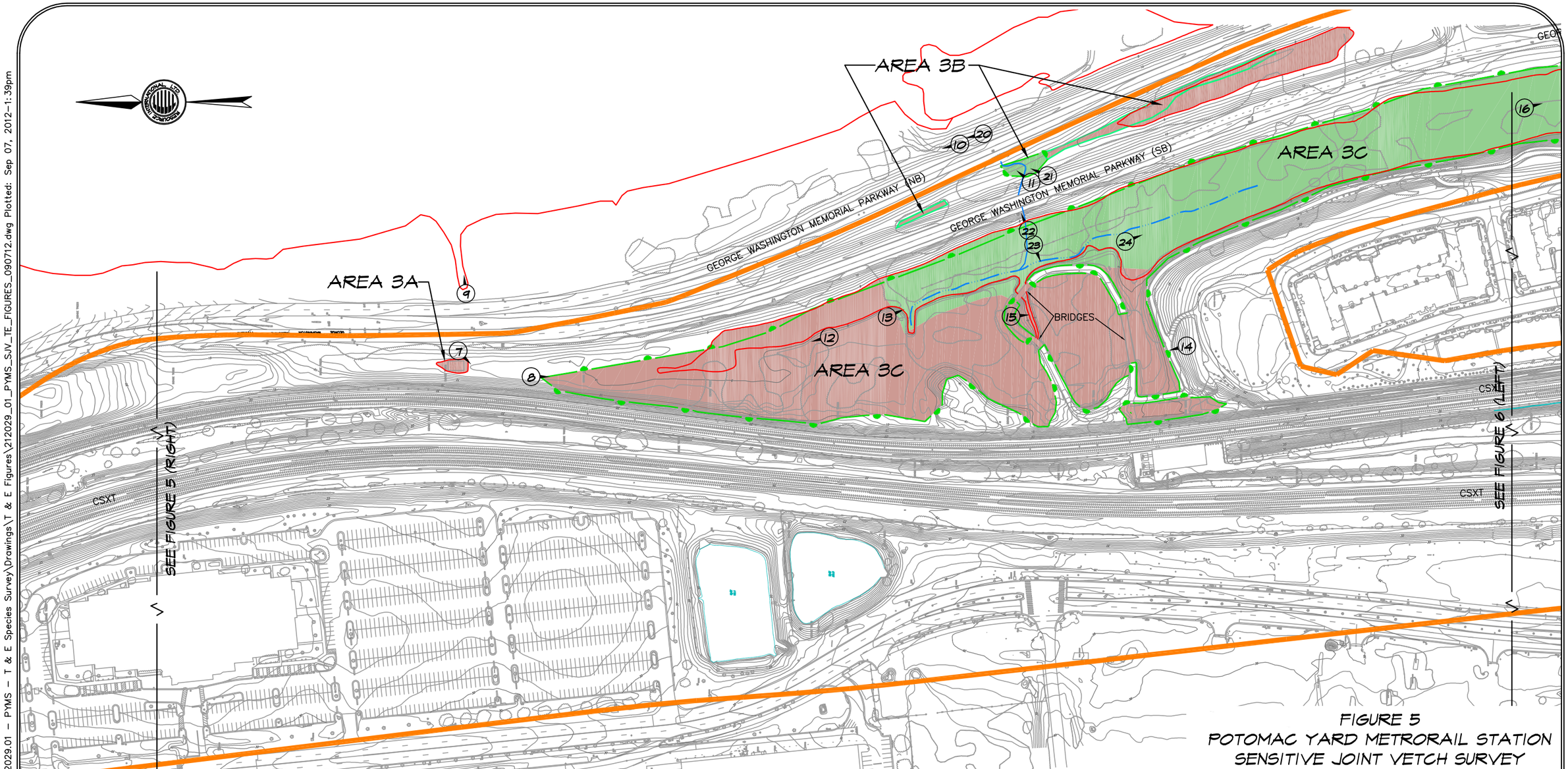

LEGEND

- WETLANDS
- PERENNIAL STREAM
- INTERMITTENT STREAM
- HABITAT (MARGINAL)
- NOT SUITABLE HABITAT
- ADDITIONAL STUDY AREA
- APPROXIMATE MEAN HIGHWATER ELEVATION (3FT MSL)
- (1) PHOTOGRAPH LOCATION AND ORIENTATION

200 0 100 200

(IN FEET)

1 inch = 200 ft.

FIGURE 5
POTOMAC YARD METRORAIL STATION
SENSITIVE JOINT VETCH SURVEY
CITY OF ARLINGTON AND
ALEXANDRIA COUNTY, VIRGINIA
SEPTEMBER 7, 2012

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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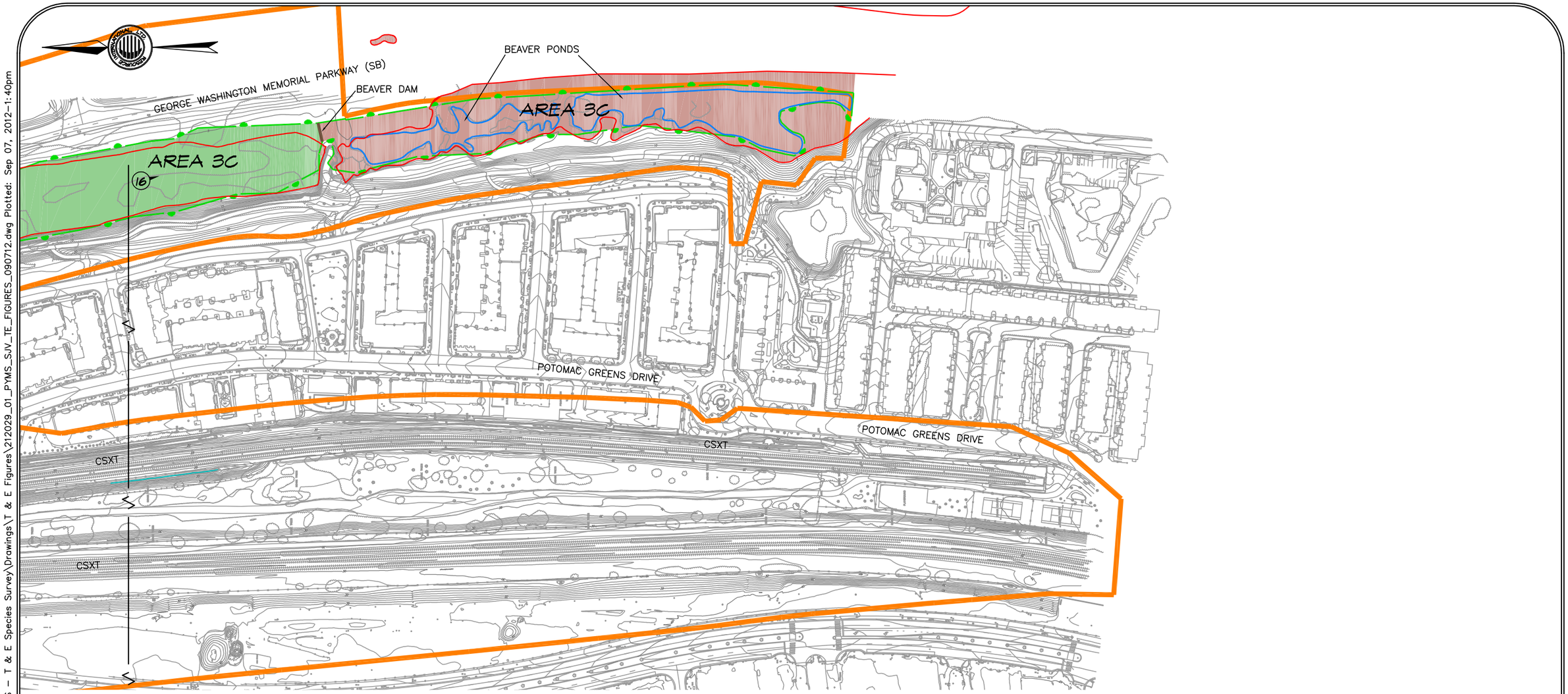

LEGEND

- WETLANDS
- PERENNIAL STREAM
- INTERMITTENT STREAM
- HABITAT (MARGINAL)
- NOT SUITABLE HABITAT
- ADDITIONAL STUDY AREA
- APPROXIMATE MEAN HIGHWATER ELEVATION (3FT MSL)
- 1 PHOTOGRAPH LOCATION AND ORIENTATION

200 0 100 200
(IN FEET)
1 inch = 200 ft.

FIGURE 6
POTOMAC YARD METRORAIL STATION
SENSITIVE JOINT VETCH SURVEY
CITY OF ARLINGTON AND
ALEXANDRIA COUNTY, VIRGINIA
SEPTEMBER 7, 2012

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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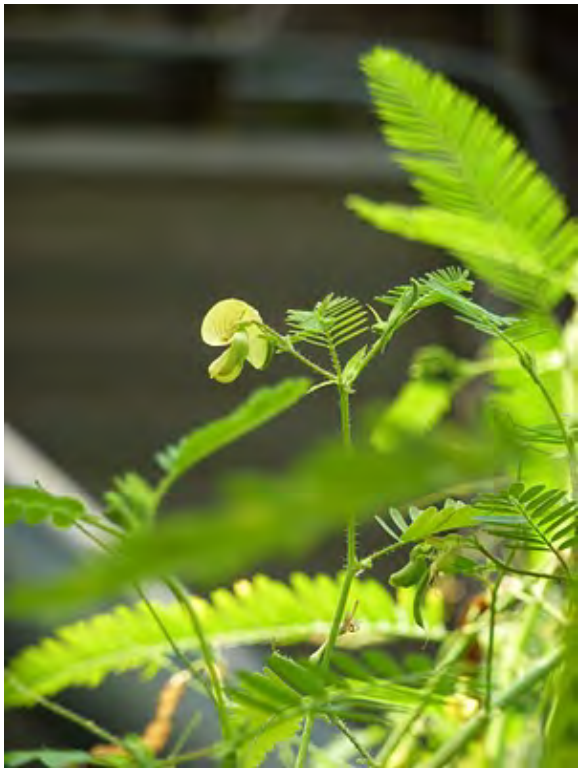
APPENDICES

APPENDIX A

Representative Photographs

Sensitive joint-vetch (*Aeschynomene virginica*)



PHOTOGRAPH 1: Sensitive joint-vetch (*Aeschynomene virginica*) side view.

PHOTOGRAPH 2: Sensitive joint-vetch (*Aeschynomene virginica*) side view.

APPENDIX B

Representative Site Photographs

Photograph 1. Area 1 - View of unnamed tributary of Four Mile Run during habitat survey on habitat survey on August 13, 2012.

Photograph 2. Area 1 - View of unnamed tributary of Four Mile Run during habitat survey on August 13, 2012, just upgradient of bike path. Note prevalence of riprap on banks to edge of water.

Photograph 3. Area 1 - View of confluence of unnamed tributary (Area 1) and (Area 2) Four Mile Run facing north from bike path.

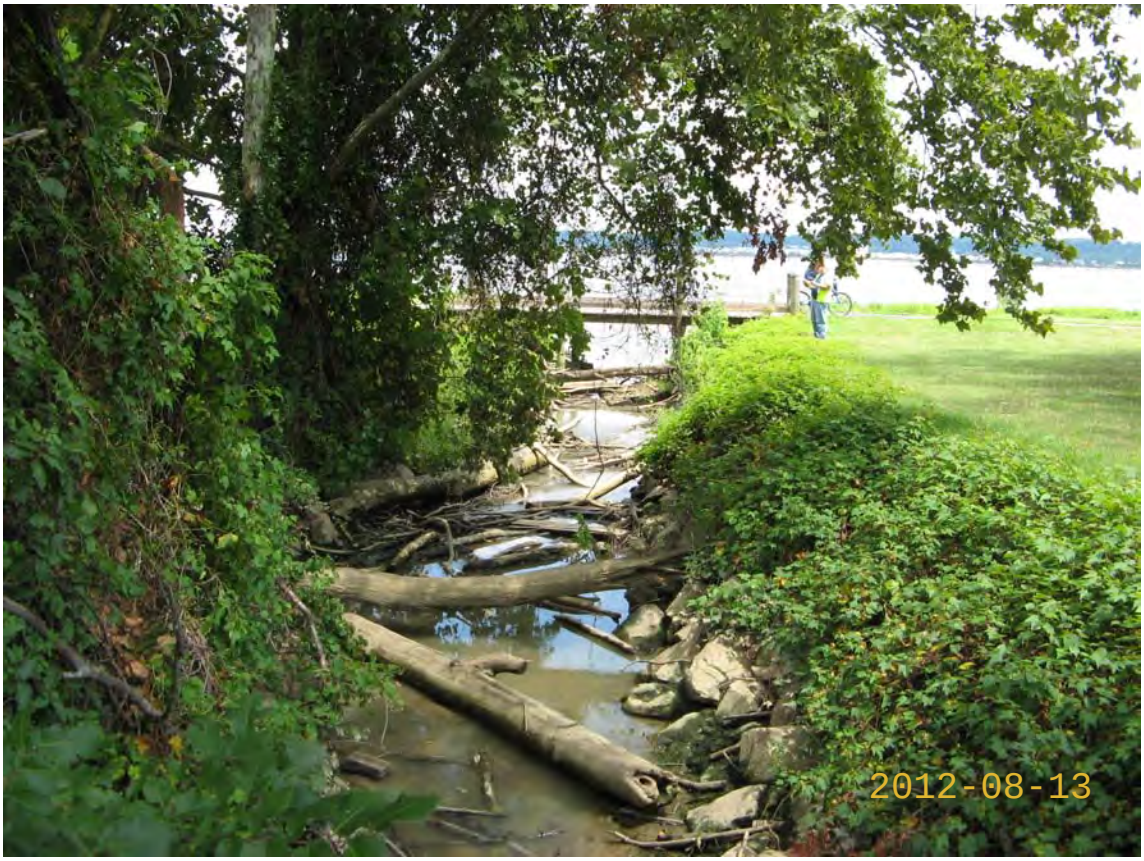
Photograph 4. Area 1 - View of Area 1 and Area 2 west side connection on August 13, 2012. Note gabion baskets at extending from below the water and extending above mean high tide.

Photograph 5. Area 2 - View of Area 2 southern bank of Four Mile Run on August 13, 2012, during habitat survey. Note gabion baskets that line stream banks from mean low water to above mean high tide.

Photograph 6. Area 2 - View of Area 2 northern bank of Four Mile Run on August 13, 2012, during habitat survey. Note gabion baskets that line stream banks from mean low water to above mean high tide..

Photograph 7. Area 3 - View of cistern on west side of George Washington Parkway and forest edge at north end of Area 3. Not suitable habitat due to concrete structure.

Photograph 8. Area 3 - View of nontidal wetland at north end of Area 3. Not suitable habitat for sensitive joint vetch due to lack of tidal influence.



Photoraph 9. View of northern unnamed tributary east of cistern in Photograph 7 and George Washington Parkway on August 13, 2012. This area is outside the Area of Potential Effect (APE); however previously provided a tidal connection between the Potomac River and the cistern located in a northern section of Area 3.

Photograph 10. View of unnamed tributary of Four Mile Run east of Area in median (Photograph 11) and George Washington Parkway, and north of the marina. This area is outside the APE but serves as a tidal connection between the Potomac River and Area 3, and the tidal stream in Photographs 11 and 22.

Photograph 11. Area 3 - View of tidal connection located in median of George Washington Parkway. Potential habitat for sensitive joint vetch.

Photograph 12. Area 3 - View in Area 3 facing north. Not suitable habitat due to presence of upland and nontidal areas from this point and dense overgrowth.

Photograph 13. Area 3 - View in Area 3 facing south on August 14, 2012.

Photograph 14. Area 3 - Close up of National Parks Service sign located in Area 3 indicating that the central and southern portions of Area 3 have been treated with the herbicide "Accord."

Photograph 15. Area 3 - View in central portion of Area 3 adjacent to walking paths. Note the stressed and dying vegetation treated with the herbicide "Accord."

Photograph 16. Area 3 - View of portions of Area 3 facing south. These areas have been treated by the National Parks Service with the herbicide "Accord."

Photograph 17. Area 1 - View of unnamed tribtary of Four Mile Run on August 15, 2012 during sensitive joint vetch survey. Marginal habitat, however, no sensitive joint vetch was found.

Photograph 18. Area 2 - View of northern bank of Four Mile Run on August 15, 2012. Marginal habitat, however, no sensitive joint vetch was found.

Photograph 19. Area 2 - View of southern bank of Four Mile Run. This bank is man dominated with gabion baskets filled with rocks. No sensitive joint vetch was found.

Photograph 20. View of unnamed tributary on August 15, 2012 east of Area 3, and not within APE. No sensitive joint vetch was found during the survey.

Photograph 21. Area 3 - View of median tidal connection between larger portion of Area 3 and east side tributary. Marginal habitat, but no sensitive joint vetch was found on August 15, 2012.

Photograph 22. Area 3 - View of culvert and connection of Area 3 tidal wetlands that connects to median of George Washington Parkway. No sensitive joint vetch was found.

Photograph 23. Area 3 - View of tidal tributaries in Area 3 immediately upgradient of culvert on west side of George Washington Parkway. No sensitive joint vetch was found.

Photograph 24. Area 3 - View of Area 3 facing south on August 15 2012. No sensitive joint vetch was found in this-tidal portion of Area 3. In addition, this area has been treated with the herbicide "Accord."

Attachment 5

VDCR and VDGIF Project Review and Correspondence

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

June 18, 2012

Bill Pugh
AECOM
2101 Wilson Boulevard, 8th Floor
Arlington, VA 22201

Re: Potomac Yard Metrorail Station Environmental Impact Statement

Dear Mr. Pugh:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Biotics historically documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, we do not anticipate that this project will adversely impact these natural heritage resources.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

A fee of $90.00 has been assessed for the service of providing this information. Please find enclosed an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, **DCR - Division of Natural Heritage, 217 Governor Street Richmond, VA 23219.** Payment is due within thirty days of the invoice date. Please note the change of address for remittance of payment as of July 1, 2008. Late payment may result in the suspension of project review service for future projects.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov). According to the information currently in our file, the Wood turtle (*Glyptemys insculpta*) has been historically documented in the project vicinity. Due to the legal status of the Wood turtle, DCR recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

Should you have any questions or concerns, feel free to contact me at (804) 692-0984. Thank you for the opportunity to comment on this project.

Sincerely,

Alli Baird

Alli Baird, LA, ASLA
Coastal Zone Locality Liaison

Cc: Amy Ewing, VDGIF

COMMONWEALTH of VIRGINIA

Douglas W. Domenech
Secretary of Natural Resources

Department of Game and Inland Fisheries

Robert W. Duncan
Executive Director

June 1, 2012

Bill Pugh - AECOM Transportation
Environmental and Transportation Planner
2101 Wilson Boulevard - 8th Floor
Arlington, VA 22201
Bill.pugh@aecom.com

Re: Project Review Request - Potomac Yard Metrorail Station

Dear Mr. Pugh:

We appreciate your interest in submitting your project(s) for review by VDGIF to ensure the protection of sensitive wildlife resources during project development. Unfortunately, due to staffing limitations, our Fish and Wildlife Information Services Section (FWIS) is unable to review or provide an assessment of any projects submitted to them for review.
No response from VDGIF does not constitute "no comment" nor does it imply support of the project or associated activities. It simply means VDGIF has not been able to respond.

If you should have further questions or need additional information, please visit:
http://www.dgif.virginia.gov/environmental-programs/

Please feel free to attach a copy of this letter/email with your project paper work.

Sincerely,

Mrs. Gladys D. Cason

Mrs. Gladys D. Cason
Virginia Department of Game & Inland Fisheries
Environmental Services Division
4010 West Broad Street // P.O. Box 11104
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